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shortwave magazine

BRITAIN'S BEST RADIO MAGAZINE

FEBRUARY 1998 £2.75

STACKED

REVIEW

Yupiteru MVT-3300EU Hand-held Scanner

- John Wilson On The Wadley Loop
- Build A Peak/Notch Filter - 2
- Joe Carr's Radioscience Observation - Magnetometer Sensors
- The Ionosphere Indoors - 2

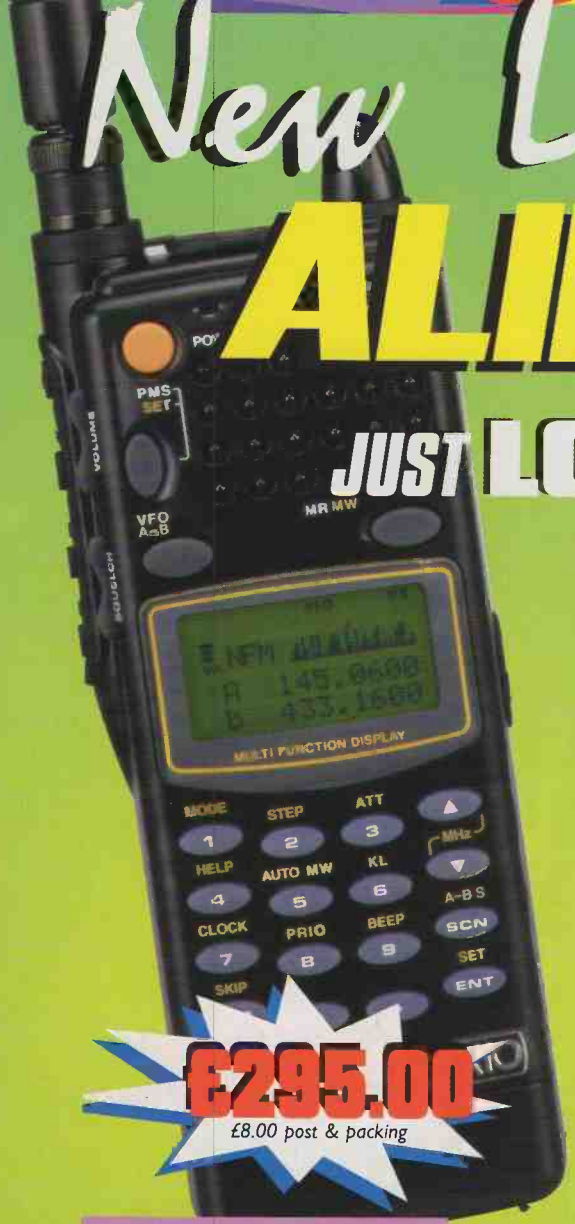
all the Regulars

pwp 9 770037 426050 02>

New Lower Price!

ALINCO DJ-X10E SCANNER

JUST LOOK AT THESE FEATURES!



£295.00
£8.00 post & packing

- **RECEIVES** 100kHz - 2000MHz
- **MULTI MODE RECEPTION**
  AM WFM - NFM - SSB - CW
- **1200 MEMORY CHANNELS**
- **CHANNEL SCOPE SPECTRUM ANALYSER**
  that allows monitoring of 40 channels at a glance
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  that allow selection of these types of scanning:

Programmed Scan	*VFO search*
(up to 10 groups)	*Dual VFO search*
Programmed Memory Scan	*Band encursion scan*
Any Memory Scan	*Priority scan*
Mode Scan	*Any channel ship scan*
(not found on many scanners!)	

- **USER FRIENDLY FEATURES**
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- **NICAD BATTERY PACK**
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- **CARRYING STRAP**
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OPTIONAL EXTRAS

EBP-33N	Small size 650mAH NiCad...£39.95
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ESC-29	Standard Soft Case.....£7.95
EBC-6	Mobile Mounting Bracket.....£12.95
EME-6	Earphone.....£10.95

SPECIFICATIONS

Frequency	100kHz - 2000MHz
Memories	1200
Scan Speed	25 ch/sec
Scan Steps	Selectable (50Hz - 500kHz) in 20 fixed steps
Receiver	Triple Superheterodyne
Dimensions	57(H) x 150(W) x 25.5(D)
Weight	320g (with EBP-37N Battery pack)

ICOM PCR 1000

ICOM'S NEW COMPUTER RADIO SYSTEM

- 100kHz - 1300MHz
- ALL MODE RECEPTION

plus LOTS MORE!

£349.00

now in stock!

YUPITERU MVT 3300

- **FREQUENCY:**
  66 - 88MHz 300 - 470MHz
  108 - 170MHz 806 - 1000MHz
- **MODES:** AM/NFM
- **STEPS:** 5, 6.25, 10, 12.5, 25kHz
- **MEMORIES:** 200
- **BAND MEMORIES:** 10
  (user re-programmable)
- **PRIORITY CHANNELS:** 10
- **SCAN/SEARCH SPEED:** 30 per sec
- **POWER:** Requires 4 x AA batteries
- **SUPPLIED WITH:** Antenna, Earpiece, Carrying Strap and built-in Desk Stand

JUST ARRIVED!

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

OUTSTANDING VALUE FOR MONEY!

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10 REASONS to buy your scanner with CONFIDENCE from NEVADA

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- We have been established 28 YEARS!
- All our SCANNERS are CE approved

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PRICE MATCH

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£269.00

PRICE MATCH

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NEW LOW PRICE!

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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
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- Wide dynamic range
- Sensitive receiver
- Noise blanker
- RS232 computer I/F
- 100 memories
- Clock/Timer functions
- Supplied c/w AC mains adaptor

£695.00

DRAKE SW2

A new low cost receiver from this famous American manufacturer with exceptional sensitivity, selectivity and dynamic range. A ruggedly built radio that is easily transported with optional carrying handle or vehicle mounted for mobile use.

- 100kHz - 30MHz
- AM/SSB
- 100 memories
- Easy tuning
- Selectable Sideband Synchronous detection
- Dual antenna inputs
- Long wire short wave antenna
- 12V DC operation

£499.00

DRAKE R8B

NEW MODEL -NOW IN STOCK!

- AM, FM, USB, LSB, RTTY, CW
- Freq range: 100kHz-30MHz
- Wide/narrow noise blanker
- RF pre-amplifier for enhancing weak signals
- 1000 memories
- RF attenuator
- Tone control
- Adjustable RF gain
- Notch filter
- AGC
- Two 24 hour clock timers
- RS 232 interface

£995.00

shipping world wide - fast - for 28 years!

NEVADA ®

iCan Reaction Tune Another Receiver!

Reaction Tune the NEW ICOM IC-R10

Use the OptoLinx for computer controlling the ICOM IC-R10

Computer Not Included

Another radio to tune, another reason to purchase the *Scout*.

Until now the AOR AR8000/2700 were the only hand held scanners to take advantage of the ***Scout's*** Patented Reaction Tune function. The Scout can now tune the new ICOM IC-R10 hand held scanner (shown below). Connection is easy: No modifications required - No custom cables to buy - Just plug and play.

Scanner hobbyists and communication professionals benefit from the ***Scout's*** unique functions. Whether you're searching for new frequencies in your neighborhood, or testing for interference, the ***Scout*** is the ultimate communications tool.

Armed with a 400 frequency memory register, the ***Scout*** does not record duplicate frequencies, instead it coordinates repeated frequencies into a hit register storing up to 255 hits per frequency. Attach it to your belt and begin your day, the ***Scout*** will alert you when a signal is received by its beeper or vibrator function.

You won't miss a thing with Reaction Tune. The ***Scout's*** CI-V compatible output allows it to interface to the AOR AR2700/AR8000, ICOM R7000, R7100, R8500, R9000 and now the new IC-R10 (shown oposite). The ***Scout*** captures the frequency, then sends the serial data to the receiver and tunes the scanner to the frequency for instant monitoring in less than one second. Recorded frequencies can be downloaded to a PC using the optional OptoLinx universal interface •

SPECIFICATIONS

- 10MHz - 1.4GHz frequency coverage
- Stores and records 400 frequencies in memory with 255 hits for each
- Interface to a PC for frequency download using optional OptoLinx PC interface
- Distinctive beeps indicate frequency hits, pager style vibrator for discreet recording
- Automatic EL backlight for night operation
- 16 segment RF signal strength bargraph
- Frequencies are automatically saved when unit is turned off
- Reaction Tune the ICOM R7000, R7100, R8500, R9000, IC-R10, and AOR AR2700, AR8000, and the Radio Shack Pro 2005/6 using the Optoelectronics OS456, Radio Shack Pro 2035/42 using the Optoelectronics OS535

Scout with ICOM IC-R10
Mono Cable required (shown)

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Vol. 56 Issue 2 February 1998
ISSN 0037-4261
ON SALE JANUARY 22
Next issue on sale February 26

EDITOR: Dick Ganderton, C. Eng., MIEE, G8VFH
ASSISTANT EDITOR: Kevin Nice, BRS95787, G7TZC
NEWS AND PRODUCTION: Zoë Crabb
ART EDITOR: Steve Hunt
PAGE LAYOUTS/SCANNING: Paul Blachford

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

If you wish to send E-mail to anyone at *SWM* then our Internet domain name is:
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ADVERTISEMENT DEPARTMENT
ADVERTISEMENT MANAGER: Roger Hall G4TNT
Telephone: 0171-731 6222
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Cover Subject

A gargantuan prominence errupts from the sun.
Photo courtesy of NASA/JPL.

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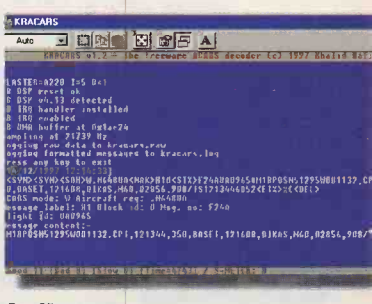

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Regular Columns

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Communiqué

Mr AMSAT UK!

Over the course of the last two years, the committee of AMSAT UK have been preparing for the retirement of **Ron Broadbent MBE G3AAJ** from his various key functions of Secretary, Treasurer and Editor that he has carried out so energetically for more than 20 years. During this time, Ron's hard work, knowledge and enthusiasm has built AMSAT UK into an organisation with an international reputation as a reliable and timely source of information, and that has raised very substantial contributions to fund the construction and launch of a series of amateur radio satellites has now retired from all posts held in AMSAT UK.

Prof. Martin Sweeting OBE G3YJO says that it is always difficult to replace someone who has played such a formative and central role in building up a Society and who has, indeed, become 'Mr AMSAT UK'. However, the Committee has a responsibility to the membership to ensure a smooth and efficient succession, and also owes it to Ron to ensure that he can retire from his executive roles assured that his hard work of so many years will not simply evaporate.

Ron G3AAJ 's hard work was rewarded at the beginning of 1995 when he was awarded an MBE.

However, Ron will remain active in the Committee of AMSAT UK, relieved of the burdens of day-to-day administration, he will have a responsibility for representing AMSAT UK on and to various bodies, such as the RSGB, IARU, etc., as well as having time to enjoy amateur radio! So AMSAT will continue to benefit from Ron's great experience and wide network of friends and contacts. All correspondence to AMSAT UK should now be addressed to:
AMSAT UK, 40 Downsview, Small Dole, West Sussex BN5 9YB UK,
Tel: (01273) 495733, FAX: (01273) 492927.

Tomorrow's World Live

The UK's best loved science, engineering and technology exhibition **BBC Tomorrow's World Live Event** is back at Birmingham's NEC between February 11-15th 1998 in Halls 6, 7 and 8. Opening times are from 9.30am to 5.30pm daily and will be bigger, better and bolder than before.

In association with The Year of Engineering Success (YES), BBC *Tomorrow's World* Live Event is the only show which brings together the most advanced inventions and innovations from around the world under one roof, offering visitors the opportunity to find out how their future will be shaped by the world of science, engineering and technology.

Major exhibitors for 1998 include the Royal Navy, Royal Air Force, Ministry of Defence, British Energy, Rolls-Royce, BBC Digital Audio Broadcasting, British Telecom, Nortel, JVC, Ford, Honda, National Grid, BG Transco, Institute of Electrical Engineers and ICL. A section will also be dedicated to individual inventors whose 'creations' will be previewed at the show.

Set to make its debut at the show is Home For Life, an innovative, functional, environmentally-conscious house which has been designed for family life in the third millennium. Other highlights include a new Shape Changing Robot with the potential to revolutionise medical science, and the Inguanadon Replica Four, a full size autonomously controlled dinosaur robot that moves freely on four legs and can interact with people using its senses.

A record-breaking attempt will also be made at the show to beat the Absolute Hour Record on a bicycle. Speeds of over 120mph will need to be reached on a rolling road if Bruce Bursford is to succeed in his feat, which is scheduled to take place on the opening day, Wednesday 11 February.

Fans of the popular *Tomorrow's World* programme will see it bought to life at the show in a specially-constructed 1000 seat theatre offering a rare opportunity to see the programme's presenters appearing live. The theatre will also host daily live presentations based on the highly successful summer series *TW Time Machine*, which gives a retrospective look at items from the programme's last 32 years.

Tickets booked in advance cost £8.50 for adults and £7 for children on weekdays (February 11-13)

Control Entertainment

Households with multiple TVs, SKY satellite, cable, video or hi-fi equipment can now operate the whole system from any room in the house, thanks to the Handylink remote control extender system, a revolutionary new product from TV equipment company **Labgear**. Although many of these households can already watch SKY programmes and video films on any TV in their home via a coaxial cable distribution system, until now they have been unable to change satellite channels or operate the video without returning to the main room where the equipment is located. The Handylink remote control extender system solves this problem by allowing the user to operate satellite, video and hi-fi equipment from an additional room in the house without having to point the remote control directly at the equipment.

How does it work? Well, it works by receiving the signal from the viewer's existing remote control handset in the additional room, sending it throught he coaxial cable to a base unit located in the main room and from there through to sender buttons attached to the video, satellite receiver, etc., in the main room. These buttons re-transmit the remote control signal and operate the equipment just as if the viewer's remote control handset had been pointed directly at it.

Handylink is compatible with the vast majority of TV and standard infra-red remote control systems, just requiring an existing coaxial connection between the satellite/cable receiver and the additional room, e.g. a bedroom. Because the system works through this existing cable, it is also quick and easy to install and risk of interference from neighbours' equipment, mobile 'phones, etc. is removed.

The equipment has also been developed to be compact and discreet and, once installed, is out of sight. The Handylink remote control extender system is available from Argos Superstores nationwide and selected Dixons stores. For further details call the Labgear helpline on **(0800) 616481**.

The Handylink remote control extender system, a revolutionary new product from TV equipment company Labgear.

and £9.50 and £8 respectively at the weekend (February 14-15). Tickets for the BBC *Tomorrow's World* Theatres cost £4. A special family ticket (2 adults, 2 children under 16) is also available for £22.50 on weekdays and £25 at the weekend.

For more information about the event, call the ticket hotline on **0121-767 4711.**

CQ, CQ!

367 Signal Association is calling all those who served at RAF, Little Sai Wan, Hong Kong, in whatever capacity. For details about the association contact the Secretary **Edward H. Ball, 8 Highgate Court, Highgate, Beverley, East Yorkshire HU17 0DW** or call on **(01482) 872755.**

Changes At The Shortwave Shop

The Shortwave Shop, Radio Communications Centre, Christchurch is now on the Internet and has E-mail facilities to speed up communications. Their internet address is **http://www.shortwave.co.uk** and their E-mail address is **sales@shortwave.co.uk**

For those who wish to call on the twisted pair, The Shortwave Shop Hotline Number is: 07000 CQDXCQ (07000 273927). The existing telephone/FAX number is still (01202) 490099.

The shop opening hours have also been changed. As from 2nd January 1998 they are:

Tuesday - Friday 10.30am - 6.00pm.
Saturday 10.00am - 5.30pm.
Closed Sunday and Monday.

The Shortwave Shop, Radio Communications Centre, 18 Fairmile Road, Christchurch, Dorset BH23 2LJ. Tel: (01202) 490099 Hotline: 07000 CQDXCQ.
E-mail: **sales@shortwave.co.uk,**
Web: **http://www.shortwave.co.uk**

Lake Electronics Catalogue

Lake Electronics have just produced their 1998 catalogue containing details of their DTR series of h.f. c.w. transceivers, including the new 10MHz version. Also included are their range of receiver ancilliaries such as filters, a.t.u.s and the ever-popular antenna coupling transformers.

For the first time in their catalogue Lake have included a section devoted to vintage radio - particularly out-of-print books and obsolete components.

You can get a free copy of the 1998 Lake Electronics catalogue by sending an A5 s.s.a.e. or two IRCs to **Lake Electronics, 7 Middleton Close, Nuthall, Nottingham NG16 1BX. Tel/FAX: 0115-938 2509. E-mail: 100775.730@compuserve.com**

New Low Frequency Band For Radio Amateurs

The Radiocommunications Agency has told the RSGB that it hopes to be able to release the 136kHz band to all UK Class A licence holders early this year.

(Continued on page 6)

Precision Timing

Motorola, the leading Global Positioning System receiver manufacturer has introduced new features on its high performance GPS receiver designed specifically for precision timing applications. This includes greater immunity from unintentional jamming from nearby transmitters and additional timing-specific software enhancers, which ensure greater control of the pulse signal and offer an improved level of timing and data availability.

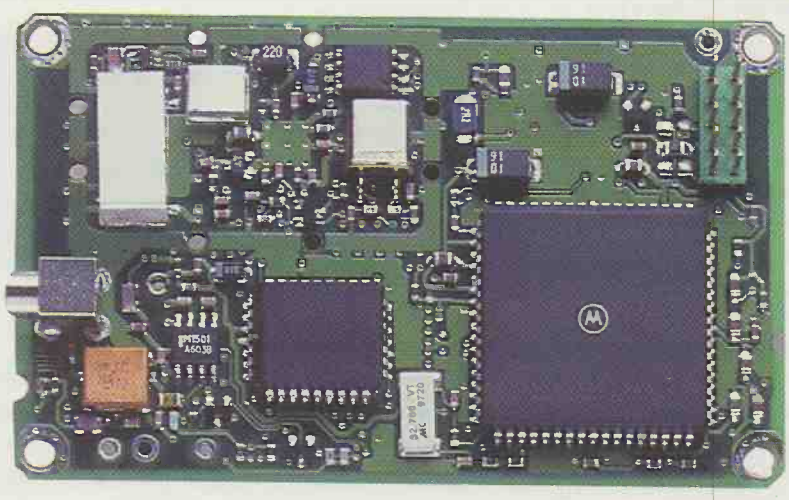
Using signals transmitted from the world-wide GPS satellites, the UT Plus Oncore provides a one pulse per second output accurate to 50ns. This is used by engineers to synchronise timings for cellular and paging networks and for radio frequency and two-way radio simulcast time synchronisation. Other applications include synchronising internal clocks on networked computers to ensure accurate timing of data transmission, as well as timed data updating and transactions.

Still at current UT Oncore price levels, the UT Plus Oncore now offers more features for current customers as well as improved performance, accuracy range and flexibility for new application designers. In a board measuring just 50 x 84 x 13mm, the UT Plus Oncore includes three radio frequency front-end filters, two amplifiers and enhanced intermediate frequency circuitry for greater immunity against jamming. To further protect against unintentional jamming from nearby transmitters, the UT Plus Oncore includes an innovative loop algorithm.

When used in cellular and paging base station applications, immunity from unintentional jamming allows for improved critical timing accuracy and continuous data availability which can mean the difference between application success or failure. The antenna power feed on the UT Plus Oncore now has a maximum current of 80mA as opposed to 45mA in the original UT Oncore. This, together with an increase in the dynamic range, allows greater flexibility by supporting a wider range of antenna installation configurations.

The UT Plus Oncore, which is built upon high speed Motorola custom Integrated Circuits, also used Motorola's proprietary T-RAIN (Time Receiver Autonomous Integrity Monitoring) algorithm. This ensures the validity and reliability of the GPS timing measurements by detecting and eliminating any errors from the satellites. It is capable of tracking eight satellites simultaneously, which is typically the maximum number of satellites in view at any given time.

All Motorola GPS receivers are available through Motorola's international network of distributors which provide sales support and application information. For further details contact **Michael Carter** from the Marco Group on **(0468) 367022** (mobile) or contact **Tina Connolly** at **Motorola's Automotive, Energy & Components Sector, 27 Market Street, Maidenhead, Berkshire UK, Tel: +44 (0) 1628 763260 or FAX: +44 (0) 1628 637059.**



New features on the UT Plus Oncore GPS from Motorola give the receiver greater immunity from unintentional jamming.

Send your news to Zoë Crabb at the Editorial Offices

Communiqué

The frequency limits of the new band are very likely to be as in a CEPT recommendation - 135.7 - 137.8kHz. Unlike the UK-only 73 kHz band, a Notice of Variation is not required, so the 136kHz band will just be added to the UK Table of Allocations.

Class A licence holders will be able to use the new band just as soon as an official *Gazette* noice can be published. Of course, Class B licence holders will not be able to to use the new frequencies.

The 73kHz band will continue in parallel with the new allocation and the RA have agreed to continue to issue Notices of Variation until 30 June 1998. The 73kHz band will be withdrawn from amateur use two years later, ie. on 30 June 2000.

It is interesting to note that UK amateurs have acheived ranges of up to 400km on the 73kHz band and it is thought likely that this distance will be greatly exceeded on 136kHz as the antennas will be more efficient.

RSGB Council Elections

Short Wave Magazine 'Amateur Bands Round-up' columnist **Paul Essery GW3KFE** has been re-elected, unopposed, to the RSGB Council to represent Zone E (Wales).
In the election for two Ordinary Members of Council there was only one candidate, **Ian Suart GM4AUP**, who was also declared elected unopposed.

Loral Skynet Introduces New Digital Video Delivery

Loral Skynet recently announced that it will offer a new digital programme transport service that will allow cable operators and other programming distributors to offer a broad range of new channels and services. Loral Skynet will provide Skynet Digital Video Service from uplinking facilities it agreed to acquire from Spectrum Satellite, Richmond, California, on 8 December 1997.

The digital service will allow multiple system operators, telephone companies, multiple dwelling units and wireless companies to complement their existing video and audio capabilities by offering new channel launches, international and ethnic programming and time shifted feeds. The service will also allow operators to offer speciality services including business television, distance learning, pay-per-view and live events and broadcast data services. Cable operators, specifically, will be able to customise their channel line-up, as well as to retransmit to digital or advanced analogue set top boxes.

Using the Richmond gateway, Loral Skynet will compress analogue and digital signals from various sources, including international and domestic satellites, and redistribute the signals digitally from its powerful Telstar satellites. This advanced service will help significantly reduce operators' costs for digital conversion and will provide cable operators with an incentive to upgrade channel capacity. By delivering the digital signals from the Telstar satellites, Loral Skynet will offer operators access to the continental United States, and Hawaii, Alaska, Canada, the Caribbean and Mexico. Terry Hart, president of Loral Skynet, said, "This advanced service is part of Loral Skynet's effort to offer new services and platforms for digital distribution. We see 1998 as a pivotal year in our industry's transition to new digital technologies, and by offering our customers new value-added services like this digital service, Loral Skynet is taking a lead role in the transition."

Loral Skynet will establish a North American digital video channel neighbourhood on Telstar 5 using Ku-band transponders, initially providing capacity for up to 20 channels of programming. The new service will be available by the third quarter of 1998, and will expand onto Skynet's Telstar 6 satellite, which is expected to be operational by the fourth quarter of 1998.

Based in Bedminster, New Jersey, Loral Skynet, a subsidiary of Loral Space & Communications is a leading US satellite communications service provider that owns and operates the Telstar satellites. Loral Skynet's customers lease transponder capacity to distribute network television programming, collect live video feeds for the reporting of news and special events, and to offer direct-to-home and pay-per-view programming, distance learning, educational, and other business television services. Loral Skynet also provides technical consulting, as well as tracking, telemetry, and control of satellite fleets for a

New Drake Receiver

Drake have announced a new communications receiver, the R8B. The new model has improved receiver performance, 1000 programmable memory channels and selectable sideband synchronous detection, yet still retains all the fetures of the earlier R8 models.

Imported into the UK by Nevada, the R8B has been priced at £995.

Frequency coverage is from 100kHz to 30MHz, with 35 - 55MHz and 108 - 174MHz available by using the optional v.h.f. converter.

Five built-in filter bandwidths are provided - 6.0, 4.0, 2.3, 1.8 and 0.5kHz.

Mode and bandwidth can be selected via the keypad and there is a selectable sideband synchronous detector for the improved reception of a.m. signals. The alphanumeric l.c.d. provides programmable display of station name and frequency, which can be displayed in either kHz or MHz as desired by the user. Dual operating v.f.o.s are provided and there is a choice of three tuning step sizes.

The pre-amp and attenuator is built-in , as is a noise blanker. Passband offset is provided for better rejection of nearby interfering signals and the a.g.c. is selectable.

Remote control of the receiver functions is possible through the built-in RS-232 serial interface.

Other built-in features include a multi-voltage power supply, dual time zone clock, two event timers, multiple antenna inputs, speaker and external speaker and tape recorder sockets.

Further information is available from:

Nevada, 189 London Road, North End, Portsmouth PO2 9AE. Tel: (01705) 662145. FAX: (01705) 690626.

wide variety of customers. Loral Skynet operates Telstar 4 and the recently launched Telstar 5, which provides C-band and Ku-band coverage over the continental United States, Hawaii, Alaska, Puerto Rico and the US Virgin Islands. Loral Skynet's vigorous growth plan includes future launches of Telstar 6 and 7, which are expected to be in service in 1998 and 1999, respectively, and Telstars 8 and 9, to be in service shortly thereafter. Through the recent privatisation of Mexico's satellite operations, a Loral-led joint venture has acquired 75% of Satellites Mexicanos, S.A. de C.V. (SatMex), Mexico's provider of satellite services. Loral Skynet will assist in integrating SatMex's capabilities into a combined product and service offering for customers throughout the Western Hemisphere. SatMex currently operates three satellites, Solidaridad 1, Solidaridad 2 and Morelos II. Morelos III, scheduled for launch in the fourth quarter of 1998, will replace the ageing Morelos II.

Loral Space & Communications Ltd. is a high technology company that concentrates on satellite manufacturing and satellite-based services. In addition to Loral Skynet, Loral's owns Space Systems/Loral, a premier manufacturer of commercial communications and weather satellites. Loral manages and holds a 39% equity interest in Globalstar, the global, mobile satellite-based telephony system scheduled for service initiation in the first quarter of 1999. Loral also is the developer and manager of CyberStar, a geostationary satellite-based, open protocol, digital telecommunications system that will support high bandwidth intranets, extranets and virtual private networks world-wide, adding capabilities and efficiency for businesses and consumers that are not available today. Most recently, Loral has entered into a definitive agreement to acquire Orion Network Systems Inc., an internationally focused corporate data networking and satellite services company, in a transaction expected to close in the first quarter of 1998.

Mid-season Changes

Radio New Zealand International have informed us of the following revisions to the schedule. Reception reports are most welcome and should be sent to:
Radio New Zealand International, PO Box 123, Wellington, New Zealand.
E-mail: **rnzi@actrix.gen.nz**
Web: **http://www.actrix.gen.nz/biz/rnzi**

RNZI Frequency Schedule from 1900UTC 3 January 1998

Time (UTC)	Frequency (MHz)	Day
1650-1850	9.810 (31m)	Monday - Friday
1851-1950	11.735 (25m)**	Sunday - Friday
1859-1958	11.735 **	Saturday
1951-2050	15.115 (19m)**	Sunday - Friday
1859-2155	15.115 **	Saturday
2156-0458	17.675 (16m)**	Sunday - Thursday
2205-0458	17.675 (16m)**	Friday - Saturday
0459-0815	11.905(25m)	Monday - Friday
0459-0758	11.905	Saturday & Sunday
0816-1206	9.700 (31m)	Monday - Friday
0758-1206	9.700	Saturday & Sunday
1206-1650	OFF AIR	Every Day
1206-1650	6.105 or 6.070	Occasional Use

Sport that begins before 1500 use 6.105 and sport scheduled after 1500 use 6.070MHz
** denotes change

Radio & TVDX News

With the American FCC already stating a close down date for analogue terrestrial TV (2006), the European Union is to set a timetabled close down for European analogue TV. This should ensure a smooth end to European terrestrial as news services opt into digital. It is felt that a phased shut down is preferred rather than individual countries own decisions. More details are expected to be announced in April 1998.

The Irish TV3 network will be the first private national network in Eire and should open in October 1998. The TV3 consortium is entirely privately owned with the Canadian CanWest Global group holding the majority shareholding at 45%.

Radio Television Malaysia has reduced programme spending budgets for 1998 by 20% following the request for savings from the government. This will lead to less locally produced and more repeat programming.

The two new Hungarian stations TV2 (owned by Scandinavian Broadcasting Systems) and RTL Klub (CLT-UFA, Pearsons and two local groups) both opened early October thought RTL offered a reduced service pending full installation of their presentation facilities. Both groups were given a maximum 90 days for service start-up following announcements of the successful applicants.

Information from Gibraltar suggests that new equipment for the Medium Wave transmitter at GBC has been received - likely to be running between 1-2kW output. The GBC are however awaiting the government finding a new location for the m.w. transmitter site. Interesting that Antigua has been in consultation with GBC over broadcasting legislation, a visiting delegation is expected to arrive at GBC soon whilst a GBC group have already paid a visit to Antigua.

Good news for RSL low power TVDXing! The ITC have given initial approval for 17 local RSL-TV areas and 22 applicants are invited to bid for them. Eight proposed RSL-TV areas are now withdrawn due to a lack of available channels - the non-runners are: Cambridge, Cardiff, Liverpool, Nottingham, Glasgow, Motherwell and Newcastle.

Uncontested RSL-TV bid areas are: Isle of Wight, Greater London, West London, Birmingham, Dundee, Derry, Edinburgh, Perth, Stirling, Perth, Bristol, Leeds, Coventry, Oxford.

Contested RSL-TV bid areas are: Manchester (three bidders), Inverness (two bidders), Leicester (two bidders). Subject to satisfactory final bids and licence awards, the RSL-TV stations should be on air this coming summer '98.

New Set for Badger Boards

New year, new location and new catalogue for Badger Boards. The supplier of p.c.b.s for *SWM* and *PW* projects, Badger Boards has relocated to: **12 Hazelhurst Road, Castlewich, Birmingham B36 0BH. Tel: 0121-681 4168.** Contact Roy or Sue Martin. Badger's new catalogue covering a range of components projects and p.c.b. is available free to anyone sending them an s.s.a.e.

FEBA Radio Benefits From Auction

Running a broadcasting station costs money and FEBA Radio's operation from the Seychelles is no expception. One way of raising money used by missionary organisations like FEBA is the Wallington Missionary Auctions. At a recent auction of china items donated by an anonymous FEBA supporter, the broadcaster benefitted by £8039.

The picture shows Vernon Hedderly of Missionary Auctions and Jim Girling of FEBA Radio examining two items of china for auction in aid of FEBA.

Send your news to Zoë Crabb at the Editorial Offices

Editorial

Another year gone by, another year starting! How time flies when you are enjoying yourself. All of us here at *Short Wave Magazine* hope that you had a very enjoyable Christmas - or perhaps that should be 'Mid-winter Solstice Holiday' - and that 1998 sees you achieve all that you have planned for your favourite hobby.

I am sure that all readers will join with me in wishing *Short Wave Magazine* 'Amateur Bands Round-up' columnist Paul Essery GW3KFE all the best as he continues to represent Welsh radio amateurs on the RSGB Council.

Dick Ganderton G8VFH

Letters

Is there something you want to get off your chest? Do you have a problem fellow readers can solve? If so then drop a line to the Editor.

IF YOUR LETTER IS PUBLISHED YOU WILL RECEIVE A £5 VOUCHER TO SPEND ON ANY SWM SERVICE.

Dear Sir

Over the past several weeks I have been regularly listening to Radio New Zealand, on 9.700MHz, from early morning to about mid-morning. I have no such luck for the rest of the day. My equipment being an 5.5m long wire connected to an HF-150 via a Maplin balun. However, for the past few months, the *SWM* propagation charts for the Australia region predict exactly otherwise.

Unless, of course, I turn them upside down, then the prediction is almost perfect!

Paul Jinks
Reading

I think that a look at a great circle map will answer your problem. New Zealand is on a totally different beam heading to Australia. Japan would be nearer the mark, except that the skip distances are wrong. However, a look at the chart for Japan in the January '98 issue shows that 9.7MHz should be open from around 4a.m. onwards. ***Ed.***

Dear Sir

I have been very interested by the FRG-100 review in the last issue. The reason I bought a subscription of British magazine is because product reviews do not exist in France. I just have a little comment. The authors says "I do wonder however just how many readers really understand or indeed care about the arcane world of third order intercept points..."

I am one of them! The only one? I don't think so! I choose my actual radio (TS-850) after reading the IP3 of this radio. Unfortunately, it does not give me the results as expected. I will choose my next radio according to the IP3 and any product review. I just want a radio to be able to receive a weak signal in a highly polluted band as 40m

Thank you for the quality and heartiness of the magazine.

Serge Vantalon F6BWF
St. Pierre de Bailleul, France

Dear Sir

With reference to the letter sent in by Mike Chamerlain from Redcar in the January 1998 edition, Mike was after some information regarding Radio Shack's DX-394 short wave receiver.

Well Mike, I own one of these sets and I can tell you that for its low price tag of around £150 it performs very well indeed. I have a long wire antenna about 18m in length connected to the radio via a DRAE balun and Global 1000 a.t.u. I listen to the amateur bands mainly and the DX-394 provides good reception on all of these, especially of DX broadcast stations and is also of good quality (especially nightime). Volmet s.s.b. stations are also clear.

On the whole, the receiver is very user friendly and gives you many functions that a more expensive Set will not. For example, it has two clocks, which can be programmed to switch on at a given time and also the sleep timer function is handy if, like me, you fall asleep and end up leaving the receiver on for too long a period. The l.c.d. display is large, clear and is easy to read.

Tuning is made easy with a choice of steps 0.1, 5 and 10kHz. This, together with memory channels makes it an ideal starting receiver. My only criticism is that the desired frequency whilst in u.s.b. or l.s.b. mode cannot be achieved and the clarifier has to be set roughly 0.6kHz below the desired frequency to receive an audible signal, however, this is not a great hardship and doesn't take long to get used to.

To sum up, go ahead and buy one. You won't be disappointed. I hope that this might help you decide!

Lee Shepherd
Portsmouth

Dear Dick,

In recent months my interest in 'things radio' has been re-kindled from my teens in the sixties - I have bits of wire stretched down the garden again! Various treasures (not my wife's definition!) have been acquired from boot sales, etc. including a pre-war two valver, an Eddystone 670, a Sony ICF-5900W, a Sony IC-2001D, several boxes of bits and a large number of copies of *Practical Wireless* from the sixties and seventies. But I suppose that it is only the last-mentioned items that are relevant to this electro-epistle.

Looking through the old magazines, I came across many interesting r.f. constructional projects, and even some that I had made many years ago. I thought that it would be fun to have a go at making some of these again, so the component lists were checked against my 'hoard'. So many of the projects were however based on Denco coils, alas no longer available. I remembered melting the first one I ever had with a 25W iron and having to order another - then I remembered *SWM*!

In the December 1996 issue you described a simple s.w. receiver and brought us the glad tidings that Denco was once more in production. This was wonderful news, perhaps some of these old projects could be turned into reality.

Today I 'phoned Denco, and had a very interesting conversation with Ronnie Allbright about winding coils, his father's business and Denco products in general. He has kindly agreed to supply me with some coils after Christmas. He also told me that, for sentimental reasons, he is trying to start up a private museum of Denco products. The company made, amongst other things, TV sets and several radios, one of which, the DR19 was exported to India in quantity (500) in the early 50s. He is particularly keen to hear from anyone who has any of these early radio or TV sets.

Call me sentimental if you like, but I felt that for all the pleasure Denco products have give to me, and so many other enthusiasts, a little help in return would not go amiss. I suggested that the Internet newsgroups might be of help, but he does not have access to the Internet, so I agreed to post a message on his behalf. This brings me round again to *SWM*.

I am sure that he would not ask you himself, but maybe a few lines in a forthcoming issue would also help him along with his museum.

Regards,

Chris Venables
Guildford

I am only too pleased to help to publicise Ronnie's Denco Museum. If any readers have anything made by Denco that they would be willing to donate to the Museum, Ronnie can be contacted at Denco (Clacton) Ltd., 259/265 Old Road, Clacton-on-Sea, Essex. Tel: (01255) 422213. ***Ed.***

Dear Sir,

Oh! Dear! Mr Tony Ward should perhaps go back to college and find out the difference between an operating system (DOS) and Interpreters like BASIC. To ask why anyone writes DOS programs shows a lack of knowledge of the principles of computing.

Tony, have a close look at Windows 95 and you will find that DOS 7 is there making it all work on your computer; without DOS one would not have anything. I think you will find that the best (and fastest) programs are written in assembler language and the less good (and slower) are written using interpreters like BASIC.

With regard to the speed of any given machine perhaps programmers should note that the majority of people having spent a large sum of money do **not** expect to have to spend yet more for just the latest whiz bang of a program. Programmers should write for the **average** machine, not the very latest. Anyone can get away with poor programming using a CRAY, but try it on a 286 and see if it works.

My experience of most of the current

programs is of poor quality programming, usually through badly thought out routines and lack of sufficient testing; and I speak as a programmer since 1967.

Come on chaps, let's have some simple programs that actually do what they promise and not some monster that can only run with 128Mb of memory and a Pentium MMX as a minimum system requirement.

C.F. Goodall,
Gloucestershire.

Hello,

I have just read on page 8 of December *SWM*, a comment you made about 6Gb hard drives?

You said..

"You know where to get 6Gb hard drives for £200 - WOW! Let us all into the secret please"

I feel this is a unfair jab at Tony Ward, who's letter you are commenting on. Why? Well, even going back on prices some weeks ago, Tony is more or less correct in his prices.

Recomended retail prices.

Maxtor (HD510DM)	5.1Gb	£215.00
Quantum *Fireball* ST	6.4Gb	£219.00
Quantum *Bigfoot* CY	6.4Gb	£215.00
Seagate (HD640)	6.4Gb	£239.00

These prices are, of course, **plus VAT**, so in fact the Quantum *Fireball* would be £257.33, but before you jump in and shout your doings, try ringing around some of the computer dealers, companies such as 'Choice' will do you the *Fireball* ST at around £240 (or less), including VAT, Delivery, etc.

If you 'club together' and order three or four at a time (between friends), or for the office, etc, you will maybe pay around £180.00 inclusive.

Or select a cheaper, not so well known, brand for much much less?

There are hundreds of dealers out there selling 6Gb drives at around £200, try ringing a few and see.

Perhaps Choice would be a good place to start on 0114-238 2000

I do feel that your comments were very unfair towards Tony Ward, although I do support your point of view that you were reviewing the radio, rather than an accessory for a computer.

Cheerio

Nidge

Hi Dick,

I must agree entirely with Tony Ward's letter in December's issue of *SWM* where he replied about William Tait's letter in a previous issue.

I almost replied as well but Tony has summed up my own feelings exactly. It's called progress. If we didn't have progress then we would all be using log tables, slide rules, watching black and white TV and driving around in Morris *Minors* (may be progress is bad idea!).

I'm not for progress for progress's sake but one has to keep up or get left behind.

Finally, 6Gb drives for £200. Well that is a bit expensive. You could do better, for example Dabs Direct do a Quantum 6.5Gb for £196. Treat yourself to a copy of *Computer Shopper* and see for yourself.

Excellent magazine. Keep up the good work.

Jon - G7RWH
Boscastle

I really will have to stop making comments about prices in areas where they are really tumbling - like hard drives. I checked in Computer Shopper as you suggested and a Quantum 6.5Gb from Dabs Direct is now down to £155 - £40 in only a matter of a couple of weeks! Shame that it's an EIDE drive and not SCSI. **Ed.**

Dear Sir,

With special interest I read articles and letters concerning loop antennas in *SWM*. I don't want to perpetuate the ongoing discussion on 'magnetic loops', but I would like to tell you a short story that you probably find interesting.

Through the Internet I came into contact with a DXer in Sweden who was looking for information on magnetic loops. Being by no means an expert I, nevertheless, have some practical experience in loops. I live in a very noisy environment here in Vienna where only loops make a modest kind of DXing possible.

I told my friend in Sweden all I knew about this topic. He seemed to be very content and informed me that he plans to place a two-part article in their club magazine. The first article about - as he puts it - 'normal loops' and a second article about 'magnetic loops'. Now I had my doubts: isn't every loop a magnetic loop, meaning that it has higher sensitivity to the magnetic field component in the near field? In my opinion the generic term is 'magnetic antenna' and loops and ferrite antennas belong to this species of antennas.

As I said, I'm no expert, so I contacted two people with more knowledge in this field. The first one, K5CNF, editor of *AntenneX* magazine, wrote:

"No, all loops are not all magnetic antennas. The difference in a 'regular' loop and the magnetic loop is that a regular loop may measure 1/4 to several wavelengths on a side and a magnetic loop should always measure less than 1/4 wave length in circumference. Also the 'regular' loop will have a much higher input impedance than a magnetic loop. The impedance of a magnetic loop will usually be under one ohm at its lowest operating frequency and sometimes near one ohm on the highest frequency it can operate. 73 *antenneX*, Richard, K5CNF."

Another enquiry I sent to the ARRL, asking what was so special about those 'magnetic loops' that everyone seems to talk about them in articles and adverts? Their specialist, W1VT, said:

"Magnetic loops are much smaller than traditional dipoles, but are much harder to make, so that purchasing them makes more sense. Thus, it is much more profitable to sell magnetic loops than dipoles. Also, it is more difficult to come up with something new to write about concerning dipole antennas—people are more interested in 'new stuff', so that's what the publishers choose to print. Zack Lau W1VT."

I found both answers very interesting, although the statement of the ARRL probably has transmitting loops in mind. After all I think the expression 'magnetic loop' was first applied to small transmitting loops where rather high currents produce a high magnetic field near the loop - or also an electric field ?

Once again I admire Maxwell, whose equations fascinated me ever since I tried to understand them some 30 years ago. Would he have the final answer on 'magnetic loops'?

Best wishes,

Hubert Gabler
Vienna, Austria

SWM Services

Subscriptions

Subscriptions are available at £30 per annum to UK addresses, £35 in Europe and £38 (Airsaver), £45 (Airmail) overseas. Subscription copies are despatched by accelerated Surface Post outside Europe. Airmail rates for overseas subscriptions can be quoted on request. Joint subscriptions to both *Short Wave Magazine* and *Practical Wireless* are available at £50 (UK) £59 (Europe) and £63 (rest of world), £74 (airmail).

Components for SWM Projects

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

The printed circuit boards for *SWM* projects are available from the *SWM* PCB Service, Badger Boards, 12 Hazelhurst Road, Castlewich, Birmingham B36 0BH. Tel: 0121-681 4168 (Mon.-Fri.9am-5.30pm).

PHOTOCOPIES AND BACK ISSUES

We have a selection of back issues, covering the past three years of *SWM*. If you are looking for an article or review, or whatever that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. Back issues are £2.85 each, photocopies are also £2.85 per article, plus £1.00 for subsequent parts of serial articles.

Binders, each taking one volume are available for £6.50 plus £1 P&P for one binder, £2 P&P for two or more, UK or overseas. Please state the year and volume number for which the binder is required. Prices include VAT where appropriate.

Orders for back numbers, binders and items from our Book Service should be sent to: PW Publishing Ltd., FREEPOST, Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling.

Credit card orders (Access, Mastercard, Eurocard or Visa) are also welcome by telephone to Broadstone (01202) 659930. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone (01202) 659950.

Technical Help

We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. If you require help with problems relating to topics covered by *SWM*, please write to the Editorial Offices, we will do our best to help and reply by mail.

America Bandscan

Gerry L. Dexter
c/o SWM Editorial Offices,
Broadstone, Dorset BH18 8PW
E-mail:
gdexter@pwpub.demon.co.uk

What began as the Christian Science Monitor/Herald Broadcasting's WCSN in Maine now has its third owner. Herald Broadcasting sold the station to Prophecy Countdown, which operated the station as WVHA - the World Voice of Historic Adventism. Prophecy Countdown, however, was unable to meet payments on the loan it took to buy the station and that, coupled with other money problems, forced them to sell the property after a couple of years of operation.

Owner number three is LeSea Broadcasting -

Radio Tahiti, a favourite of many DXers, is apparently on its last legs.

World Harvest Radio, which operates WHRI, Noblesville, Indiana and KWHR, Naalehu, Hawaii, as well as a string of domestic radio and TV stations. By the time you read this, the station should be all dressed up in its new call letters (WHRA) and back at the short wave party.

Frequencies used by WVHA were 5.850, 7.465, 9.930, 11.580, 13.825 and 15.745MHz so keep an ear on those. The station should be in operation for about 10 hours per day, at least initially, and will target its broadcasts to Africa and the Middle East.

New Station

A new station now operating from Argentina is Radio America International, using a transmitter running 30kW operating from the General Pacheco site (where the transmitters for Radio Nacional transmitters - LRA - and of the utility station General Pacheco Radio are based). The station hopes eventually to add English and perhaps other languages to its schedule. It is also using the slogan "la voz de la amistad".

Initially, at least, the station is using 15.280. It should be in more or less full operation by the time you read this and reception reports can be sent to: **Intendente Abel Costa 289, 1708 Moron, Argentina.**

Utility Transmitter

Domestic Argentine a.m. and f.m. stations continue to be aired via a 'utility' transmitter there on what seems a more or less sporadic basis. Most, if not all of the transmissions, are aimed at people serving and working in Argentine, Antarctica.

Aspen 102 FM, from Buenos Aires, is sometimes found on 8.098 - sometimes in lower sideband, sometimes in upper. Also noted on this frequency from time to time are Radio Continental FM and Radio Rivadavia.

CKWX relayed Vancouver's CKFX for many years until its transmitter expired a couple of years ago.

Other frequencies sometimes used for these relays include 13.3635 (upper sideband), which has also carried a station calling itself Radio Provincia de Buenos Aires, which mostly uses the slogan containing the numbers 1270, which may be a name change for an already existing station in Buenos Aires.

Another South American country which does this sort of thing is Paraguay, although probably not for the same reason. 8.921 or slightly below has had Radio Primero de Marzo and an f.m. station, Radio Cardinal, has used 9.034, both in upper sideband.

Incidentally, a new Paraguyan station is in the planning stages. La Voz del Chaco Paraguayo, in Filadelfia, may make its first appearance sometime this year. No target date or frequency is known yet.

Regular Performer

Radio Nacional continues to be a regular performer during the North American evenings, most of the time it is on 9.737, two kilohertz up from its nominal frequency. Deutsche Welle has at least one evening transmission which uses 9.735 so during that period reception of Radio Nacional becomes a real chore.

Radio Encarnacion, 11.939, has been slipping through in the late afternoon and early evening, i.e. 2200 and later. From next door, Uruguay Radio Oriental has been showing now and then around 0100 on 11.735, often with live sports events.

Also, the relatively new Emisora Ciudad de Montevideo on 9.650 has been able to sneak its weak signal through on occasion around 2300. Brazilian short wave stations noted in North America recently include:

3.205	Radio Ribeirao Preto
3.255	Radiodifusora 6 de Agosto
3.365	Radio Cultura, Araraquara
3.375	Radio Clube Dourados
4.755	Radio Educacao Rural
4.765	Radio Integracao
4.775	Radio Congohas
4.795	Radiodifusora Aquidauana
4.865	Radio Alvorada
4.865	Radio Sentinela da Amazonia
4.885	Radiodifusora Acreana
4.895	Radio Bare
4.985	Radio Brazil Central
4.915	Radio Anhanguera
5.015	Radio Copacabana
5.045	Radio Cultura do Para
5.955	Radio Gazeta
5.956	Radio Nova Visao
5.970	Radio Itataia
5.980	Radio Guaruja
6.000	RadioGuaiba
6.020	Radio Gaucha
6.040	Radio Clube Paranaense
6.050	Radio Guarani
6.060	Radio Universo
6.090	Radio Bandeirantes
6.120	Radio Globo
6.135	Radio Aparecida
6.150	Radio Record
6.170	Radio Cultura
6.183	Radio Nacional Amazonia (nominal 6180)
9.615	Radio Cultura
9.585	Radio Globo
11.795	Radio Guaiba
11.805	Radio Globo
15.415	Radio Clube de Ribeirao Preto (returned)
15.325	Radio Gazeta
17.815	Radio Cultura do Sao Paulo

Mexican Broadcaster

The first new Mexican short wave broadcaster in years (more like decades), is XERTA, Radio Transcontinental de America, operating on 4.800. They air a lot of ranchera music, along with US and Latin oldies, and toss in the occasional station identification in English (sometimes French, as well). They're scheduled for 24 hours per day, although this isn't always the case. Indeed, there are times when they don't show up at all! One often has to deal with interference from Radio Buenas Nuevas in Guatemala, which operates on the same frequency.

Peruvian short wave outlets which have come on the air recently include: Radio Comas Television on 3.251. Another one is Radio Master, from Moyobamba, operating on 5.767. Also Radio Cristal on 7.746 variable. Also Radio Paraton in Huamarca on 7.205 and Radio La Voz de Chiriaco on 5.265 and Radio Cristal on 7.746.

Rallies

January 25: The Lancastrian Rally is to take place at the Lancaster University. Please note that this Rally is now under new management and will be run under the auspices of the Central Lancashire Amateur Radio Club. There will be the usual traders, Bring & Buy and ample parking space is available on the campus. Admission is £1.50 and should you require further information, contact **Jim G0GVA** on **(01772) 621954.**

February 1: The 13th South Essex Amateur Radio Society Radio Rally will take place at the Paddocks, Long Road, Canvey Island, Essex. This is one of the biggest and best rallies in Essex, (the Paddocks is situated at the end of the A130). Doors open at 1030. Features include Amateur Radio, computer and electronic component exhibitors, a Bring & Buy, RSGB Morse testing on demand (two passport photos required), home-made refreshments, free car parking with space outside main doors for any disabled visitors. Admission is £1. **David G4UVJ** on **(01268) 697978.**

February 1: The Harwell Amateur Radio Society will be holding its second Indoor Radio & Computing Rally at the Harwell International Business Centre, 1 mile west of the A34, between Oxford and Newbury. Talk-in on S22. Doors open at 1030 (1015 for any disabled visitors). There will be trade stands, special interest groups, Bring & Buy, craft exhibitors, bar and refreshments and ample

Flow Of Changes

One could spend several hours a week trying to stay current with the never ending flow of changes on the Peruvian short wave scene. Of all the South American countries, only Bolivia and Brazil even come close to rivaling the level of short wave broadcast activity in Peru. The low powered Canadian private short wave broadcaster CKWX in Vancouver, BC is gone from short wave for good.

Over the several decades of its life the little 10W signal was a prized catch, even for most DXers in the USA. Unfortunately, the transmitter died of old age a couple of years ago and station management finally decided not to spend the money to buy a new transmitter and continue with a short wave relay of the medium wave CKFX.

Radio Miskut in Nicaragua is being fairly well heard of late (off and on!), due apparently to the installation of a new, somewhat higher power transmitter. They're still using 5.770 and running a little later than they used to - sometimes to 0100 or so.

Radio For Peace International in Costa Rica has been using the out-of-band frequency 6.970 upper sideband during North American evenings. It was also noted at least once on 6.980. Apparently the station has discontinued use of 7.585.

HCJB continues to operate a 500W transmitter on 21.455 upper sideband and reception of this is improving, contributing to the hope that higher band reception may be improving after the long period of low sunspots we've had to live with the past few years.

Unhappy News

A particularly unhappy piece of news is that Radio Tahiti's days are apparently very nearly done. The last of what were once three transmitters is barely managing to create a signal and just barely makes it to North America more and more infrequently. Word from the station is that, once this transmitter gives up the ghost (and that may have already happened), Radio Tahiti on short wave will be no more.

Back in the 'good old days' one could pass a few hours on a mean winter night listening to island music from Radio Tahiti and imagine being there. Warm!

That covers things for this time. More news and notes from and about The Americas short wave scene in three months. Until then, good listening!

Grassroots

AVON

Bristol International RC: Tuesdays, 2000. The Little Thatch Country Club, 684 Wells Road, Whitchurch, Bristol. All visitors are welcome. The club has been formed so that all radio enthusiasts, whether they be Licensed Amateurs, s.w.l.s or CBers can get together and have a good natter and do things that you do in radio clubs. PO Box 28, Bristol BS99 1GL.

RSGB City of Bristol Group: last Tuesdays, 7pm. Avon Combined Services Club, St Pauls Road, Clifton. Bristol. January 27 - Superb video of one of the coldest places on earth to visit, let alone take 34 tons of radio gear with you, February 24 - Cost effective h.f. equipment built, designed and published in *RadCom* by Steve Price. Robin Thompson G3TKF on (01225) 420442.

South Bristol ARC: Wednesdays, 1930. Whitchurch Folkhouse Assoc., Bridge Farm House, East Dundry Rd, Whitchurch. January 28 - Bring & Buy/Car Boot Sale, February 4 - 10m activity evening and committee meeting, 11th - Amateur radio software demonstration, 18th - Display of Morse keys, 25th - Simple home construction. For more information ring (01275) 834282 on a Wednesday evening.

DEVON

Appledore & DARC: 3rd Mondays, 1930. Appledore Football Clubroom. February 16 - Eyes In The Sky by Dennis G0FCL. Den Williams G0UMT on (01237) 471802 for more information.

Exmouth ARC: Alternate Wednesdays at the Scout Hut, Marlpool Hill, Exmouth. January 28 - Natter Night, February 11 - AGM, 25th - Junk Sale. D. Fox G0NRR on (01395) 271880.

Torbay ARS: Fridays, 1930. ECC Social Club, Highweek, Newton Abbot. January 23 - Constructors Cup, February 20 - AGM. Peter G4UTO. (01803) 864528.

EAST SUSSEX

Hastings Electronics & RC: 3rd Wednesdays, 1930. West Hill Community Centre, Croft Road, Hastings. The club runs courses for the RAE and Novices and is approved as an Examination Centre for City & Guilds exams. Doug Mepham G4ERA, 8 The Close, Fairlight, E. Sussex TN35 4AQ or 'phone on (01424) 812350.

EDINBURGH

Lothians RS: 2nd & 4th Wednesdays, 1930. Orwell Lodge Hotel, Polworth Terrace, Edinburgh. January 28 - Talk by C. Cowper GM4OYV, February 11 - Are Your Keys Really Necessary by Geoff Walsh GM4FH, 25th - Repeaters by Jack Hood GM4COX. Tommy Main GM4DCL, QTHR on 0131-663 8501 day and evening.

GREATER LONDON

Wimbledon & DARS: 2nd & last Fridays, 1930. St Andrews Church Hall, Herbert Road SW19. January 30 - On air practice, February 13 - Photo Copiers by G8ZOJ. J. Gale G4WYJ on (01737) 356745.

HAMPSHIRE

Horndean & DARC: 1st & 4th Tuesdays, 1930. Lovedean Village Hall, Lovedean Lane, Lovedean, Hants. January 27 - Club meeting, February 3 - Club social evening, February 24 - Annual Bring & Buy sale. S. Swain (01705) 472846.

Southampton ARC: Mondays, 1900. This club is now up-and-running after some years of inactivity. New members welcome. Harold McIntyre on (01703) 737715.

HEREFORD & WORCESTER

Bromsgrove ARS: 2nd & 4th Tuesdays. Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. January 27 - Surplus Sale, February 10 - Equipment on show, 24th - Speaker from the DTI. Barry Taylor. (01527) 542266.

Malvern Hills RAC: 2nd Tuesdays. Town Club, Worcester Road, Malvern. February 10 - February 10 - 'PCBs my way' by Steve G1KWF, Dave G4EYJ and Dave G4IDF. Dave Hobro G4IDF on (01905) 351568 evenings and weekends.

HERTFORDSHIRE

Hoddesdon RC: Alternate Thursdays, 2000. Conservative Club, Rye Road, Hoddesdon. January 22 - A visit from Waters & Stanton giving a talk and bringing their latest products - don't miss it! Visitors most welcome. Don G3JNJ on 0181-292 3678.

Verulam ARC: 2nd & 4th Tuesdays, 2000, RAFA Club, New Kent Road, St Albans. New members and visitors welcome. January 27 - SSB on 23cm up. Ian Forsyth G0PAU on (01923) 222284.

KENT

Dover RC: Wednesdays, 2000 to 2200 during term time. Duke of York's Royal Military School, Dover. Morse classes and Novice Training Courses are also conducted between 1900 and 2000 on the same evenings. January 28 - Talk by Ian Keyser G3ROO, February 4 - Committee meeting, 11th - Fire Brigade, Maidstone, visit, 25th - Natter night and club operating. Brian Hancock G4NPN on (01304) 821007.

LINCOLNSHIRE

Grimsby ARS: Thursday nights, fortnightly, at the Cromwell Social Club, Cromwell Road. Informal meetings are held on the Thursdays in-between. Non members are welcome at any meetings, but may not attend more than three meetings in any year. January 22 - Packet update, open forum for packet enthusiasts, all welcome, February 5 - Antenna trap construction, George G4EBK shows how to make traps, 9th - Computer night, Dave M1AKU shows you how with Windoze. G. J. Smith G4EBK, Hon. Sec. 6 Fenby Close, Great Grimsby, N. E. Lincs DN37 9QJ.

Spalding & DARS: Fridays, Club Room, Old Fire Station, Spalding. February 8 - Junk Sale at Spalding Common Hall, Spalding. Signposted from Spalding bypass. There will be refreshments, and free car parking, stalls and an auction, talk-in on S22, starts 10am, 20th - Talk on Offshore Radio by Mick G1APV. G4OO, QTHR. (01775) 750382.

NORFOLK

Norfolk ARC: Wednesdays, 1930. Formal and informal meetings at the Ugly Bug Public House, Colton. January 28 - Night on the air, construction QRP and Morse practice, February 4 - DXing for the absolute beginner by Victor G3JNB, 11th - Night on the air, construction QRP and Morse practice, 18th - Video 'Battle of the Beams' by Jack G3NJQ, 25th - Night on the air, construction QRP and Morse practice. Mike G4EOL. (01603) 789792.

West Norfolk Airband Monitoring Group: Regular informal meetings on Thursdays, 1930. Dave on (01485) 578183 for details.

NORTH YORKSHIRE

Hambleton ARS: All meetings held at Allertonshire School, Northallerton, 1930 to 2130. January 22 - AGM, February 5 - 6m - talk. More details from John G0VXH on (01845) 537547.

WARWICKSHIRE

Stratford-upon-Avon & DRS: 2nd & 4th Mondays, 1930pm. Home Guard Club, Main Street, Tiddington, Stratford-upon-Avon. January 26 - Talk on Direction Finding by Geof Foster G8UKT, February 9 - Test Equipment Evening, 23rd - Members projects and problems. The Society are again organising a course of instruction for the Radio Amateur Examination of the City & Guilds of London Institute and further details can be obtained by writing to the Chairman of the Society, Mr J. Harris G8HJS, enclosing a stamped addressed envelope. The address to write to is: 57 Evesham Road, Stratford-upon-Avon, Warks CV31 2PB.

WEST MIDLANDS

Coventry ARS: Fridays, 2000, Binley Church Hall, Brinklow Road, Coventry. January 23 - Quiz Night, 30th - Night ono the air, v.h.f., h.f. and Packet, February 6 - Junk Sale, 13th - Night on the air, v.h.f., h.f. and Packet, 20th - Annual Dinner. Robin Tew G4JDO on (01203) 673999.

WILTSHIRE

Trowbridge & DARC: 1st & 3rd Wednesdays, 2000. The Southwick Village Hall, Southwick, Trowbridge. February 4 - Amateur Radio facts and fallacies with Peter Chadwick G3RZP, 18th - Natter Night. Ian G0GRI on (01225) 864698.

Club Secretaries: Send all details of your club's up-and-coming events to: Lorna Mower, Short Wave Magazine, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.
Please tell us your County and keep the details as brief as possible.

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car parking with spaces for disabled visitors. Admission is £1, children free. **Arthur G0KOC** on **(01235) 815399**.

February 8: The Kidderminster Radio & Electronics Fair is taking place at the Kidderminster College, Hoo Road, Kidderminster, Worcs. Doors open 1000 to 1500 and admission is £1.50. There will be all the usual traders, plus a Bring & Buy, Flea Market, Food and Drinks and a talk-in on 145.550MHz. **John G8MGK** on **(01527) 545823** or mobile on **(0860) 147954** or **Tony G4ALT** on **(01562) 69652** or mobile on **(0860) 902165**.

February 15: Northern Cross Rally to be held at Thornes Park Athletics Stadium, Wakefield, South Yorkshire, just out of town on the Horbury Road. Easy access from M1 junctions 39 & 40. The event is well signposted and talk-in will be on 144 and 430MHz. Doors open at 1100 (1030 for disabled visitors and Bring & Buy). Details from **Peter G0BQB** on **(01924) 379680** or mobile on **(0976) 834938**, Internet on **rally@waveg.demon.co.uk** Web page at **http://www.waveg.demon.co.uk/rally/**

February 28: The 13th Rainham Radio Rally is to be held at the Rainham School For Girls, Derwent Way, Rainham, Kent ME8 0BX. It is very easy to find from junction 4 M2 motorway A278 to Gillingham or from the A2 at Rainham. Just follow the RRR Arrows. Talk-in on S22 GB4RRR. Doors open at 1000 (0930 for disabled visitors and items for the Bring & Buy). Admission is £2. There will be the usual excellent mix of trade stands, many special interest groups will also be represented: BARTG, Kent Repeater Group, Kent RAYNET, RNARS, KEPAC, TCP/IP, Kent ATV Group, G-QRP Club. BYLARA and local club stands. There is a large hardstanding carpark, a licensed bar, hot food and drinks and refreshments will be available plus somewhere to sit and eat. **Martin M0AAK** on Medway **(01634) 365980** at any reasonable time.

THE NON-PHASE LOCK

An appreciation of clever

This month John Wilson looks at what has proved to be a very simple but ingenious reciever design, responsible for putting Racal on the receiver map and more.

A couple of issues back I saw a reader's ad in the back of the magazine offering a Barlow-Wadley receiver for sale, and it reminded me that I had one of these in my small collection of what I call 'landmark' receivers. It occurred to me that not many people would know the significance of the Barlow-Wadley so I dug it out and re-acquainted myself with what is still a nice radio. I first met the Barlow-Wadley XCR-30 in a hotel lift during an early Leicester Show, when Harry James, G3MCN, was showing off by listening to 20 metre s.s.b. stations on what appeared to be a portable radio. It was of course an early sample of the Barlow-Wadley, and bearing in mind that I'm writing about the early 1970s, to have a portable radio performing like this was really something exciting, and I couldn't wait to find out more. Some of you will already have realised that the Wadley referred to in the name of the receiver was Trevor Wadley, the man who invented the triple mix drift cancelling loop, and others will know that the original application of this technique was in the mighty Racal RA-17. The drift cancelling properties of Wadley's design were so remarkable that the technique was copied by others, but before going into a ramble along memory lane I should perhaps present a small exposition on how the circuit worked.

There are two main tuning controls on a Wadley loop type of receiver; a continuously tuned 'MHz' control which is calibrated in 1MHz increments, and a 'kHz' control which is calibrated 0 to 1MHz in whatever steps are conveniently accommodated on the dial. In the case of the RA-17, you will probably know that the 'kHz' dial is a 35mm film strip which seems to go on forever and provides an easy to read well spread out tuning range. On a portable such as the XCR-30 the dial is much more restricted, but the principle is still the same and the tuning range is still 1MHz wide. The receiver configuration is the classic Collins layout with a tuneable i.f. preceded by a converter which changes the h.f. spectrum into 1MHz wide 'chunks' to be tuned by the tuneable i.f. The difference comes in that until the introduction of the Wadley loop the front end conversion was carried out by using a crystal controlled converter, which necessitated a crystal for each 1MHz 'chunk' - in fact the method used in the Collins 51S-1 and similar receivers of the period. The Wadley loop eliminated the costly multi-crystal arrangement and provided drift cancelling at the same time.

A Bit Of Maths

Let's take a look at **Figure 1** which shows the basics of the front end of a Wadley loop receiver such as the XCR-30. The 'MHz' dial which I previously mentioned actually tunes a high frequency oscillator from 45.5MHz (0 on the MHz dial) to 74.5MHz (29 on the MHz dial). The output from this oscillator is fed to two mixer stages designated Mixer 1 and Mixer 2 on the diagram, and into Mixer 1 is also fed the output from a harmonic generator which provides a 'comb' of signals from 1 to 30MHz derived from a stable 1MHz crystal oscillator. The i.f. output from Mixer 1 passes to an i.f. amplifier tuned to a centre frequency of 42.5MHz. The 30MHz low pass filter between the comb generator and Mixer 1 is there to limit the range of the comb generator output and prevent spurious mixer products.

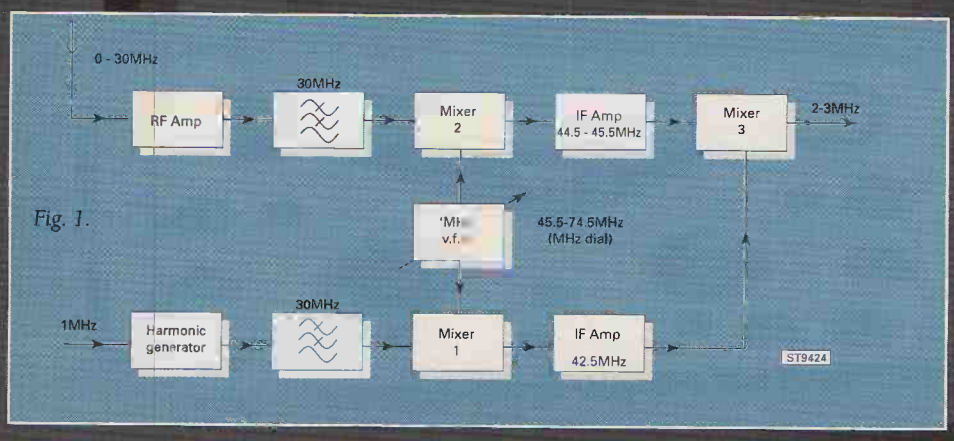

Fig. 1.

Now assume that the MHz dial on the receiver is set to '0MHz', which means that the high frequency oscillator is producing 45.5MHz. This mixes with all the outputs from the comb generator in Mixer 1, and the 3MHz harmonic from the comb will mix with the 45.5MHz to give an i.f. of 42.5MHz from Mixer 1. The presence of all the other 1MHz harmonics is immaterial; only the 3MHz input will produce the correct i.f. of 42.5MHz. The 45.5MHz

LOOP design

The ubiquitous RA-17, the receiver that turned Racal.

(Centre): Barlow-Wadley's XCR-30 high performance portable.

signal from the high frequency 'MHz' oscillator is also fed to a second mixer, the output of which is taken to a band pass filter and i.f. amplifier covering the range 44.5 to 45.5MHz. The other input to this second mixer comes from the antenna via a tuned r.f. amplifier, and a simple sum will reveal that from the antenna signals in the range 0 to 30MHz, only those from 0 to 1MHz will mix with 45.5MHz to give the second mixer i.f. of 45.5 to 44.5MHz. Now the next step - pay attention that boy at the back!

The now converted h.f. signals covering 44.5 to 45.5MHz are fed to the input of a third mixer (remember it's a Wadley **triple** mix loop) where they are combined with the 42.5MHz input from the output of Mixer 1. Another simple sum shows that the output of Mixer 3 will be in the range 2 to 3MHz, and these signals are fed to the tuneable i.f. which is in effect a receiver in its own right covering just the 2 to 3MHz tuning range. At this point, little Richard in the back row sticks up his grubby fist and asks a pertinent question. "What happens if I want to tune another section of the short wave spectrum?".

Right young Tricky Dickie, let's twiddle the MHz dial until the output of the MHz oscillator is at 55.5MHz. In order to produce the necessary 42.5MHz output from Mixer 1, the 55.5MHz mixes with the 13th harmonic from the comb generator (55.5 - 13 = 42.5MHz). The same 55.5MHz goes to Mixer 2, and the only (not quite the only - see my final paragraph) r.f. signals from the antenna which will produce the 44.5 to 45.5MHz i.f. output will be 10 to 11MHz (actually 11 to 10MHz - it all tunes backwards), and this combines in Mixer 3 with the 42.5MHz to produce again the 2 to 3MHz tuneable i.f. Up goes the hand in the back row again. "Sir, you said it was drift cancelling and you haven't told us how". I check the class register on the desk - Ah yes; it's R. McGeddon, know him well as the harbinger of disaster. What a Revelation. (That's my Christmas pun you are reading - got it from an old cracker but she didn't tell me her name). Thank you in advance to those few Biblical scholars who understood any of this.

Start with the situation just described, with the MHz oscillator at 55.5MHz. If this should drift, or the tuning control accidentally knocked so that the oscillator shifts to, say, 55.6MHz then the r.f. input signals of 10 to 11MHz will produce an output from Mixer 2 of 45.6 to 44.6MHz, so young Dickie thinks "That means the receiver has shifted 100kHz", but no - because the MHz oscillator at 55.6MHz still mixes with the 13MHz comb frequency in Mixer 1 and now produces an i.f. of 42.6MHz which is fed to Mixer 3 where it combines with the 45.6 to 44.6MHz signals from Mixer 2 to give the original tuneable i.f. of 2 to 3MHz (3 to 2MHz in fact). And that's how the drift cancelling system works. But of course it only cancels drift in the first conversion section of such a receiver, and the 2 to 3MHz tuneable i.f. still has to be stable in its own right. As you can well appreciate, it's a damned sight easier to get a stable 2 to 3MHz receiver than it is to get the same stability over the entire 0 to 30MHz range.

The only constraint on the amount of drift is that eventually the high frequency v.f.o. **mixes** with the next 1MHz harmonic from the comb generator and therefore selects the next 1MHz segment of the band 0 to 30MHz. In practice, this effect is limited by the bandwidth of the 42.5MHz i.f. amplifier which is of the order of 300kHz. The ideal bandpass characteristic for the 42.5MHz stages would be flat across the 300kHz passband and then very steep sides, but in a low cost receiver this is out of the question, unlike the situation in the RA-17 which lists no less than eleven separate adjustments for alignment of their filter in the corresponding i.f. section. In practical, use the MHz control is simply twiddled for maximum sensitivity of the receiver, and I have known some folk who think that it's actually an antenna trimmer. Oh no; up goes the hand again. "Sir, I'm confused about the backward tuning" - Tricky Dickie is almost terminally confused. I draw a table (**Table 1**) on the board and tell him to copy it out twenty times!

Table 1.

RF input	MHz v.f.o.	1st IF	Mixer 3	Tuneable IF
10MHz	55.5MHz	45.5MHz	42.5MHz	3MHz
11MHz	55.5MHz	44.5MHz	42.5MHz	2MHz

Simple But Ingenious

And there you have it; a quite remarkable example of electronic ingenuity which like the paper clip appears simple when you know about it, but which like the paper clip took a very clever person to invent it in the first place. Since any good idea will be copied as soon as it's legal to do so (perhaps even before it's legal), the Wadley triple loop started to appear not only in the

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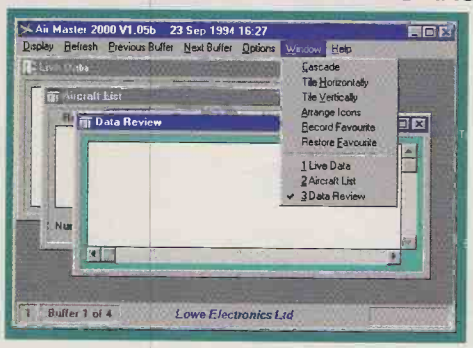

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RCON

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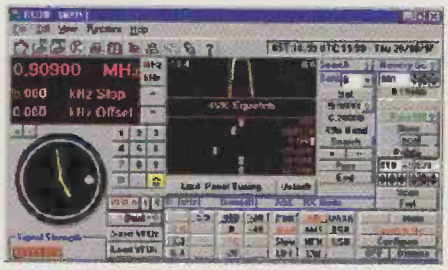

RCON is a Windows-based software program used to remotely control a suitably equipped communications receiver or scanner via an RS232 link. Integrated with the application are two relational databases of broadcaster/air band information that can be queried to tune the receiver quickly and accurately to active channels. Dozens of new ideas are implemented in this new release, thanks to many suggestions made by satisfied users of V1.0! You can select a Monitor Window, simulating a radio front panel with "virtual controls" or operate from a Database Window allowing rapid selection of frequencies and stations.

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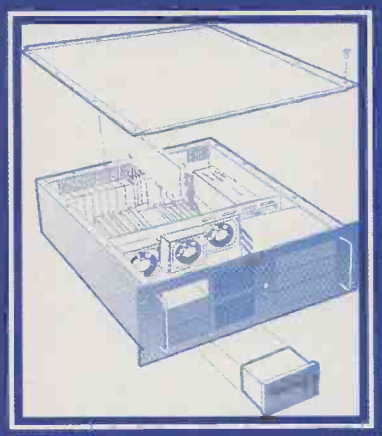

This month we would like to introduce a new service to customers from Lowe. Our Plymouth branch which has been run very ably for some years now by Robin G4XZS and Derek G7ESZ is actually part of a much larger computer business.

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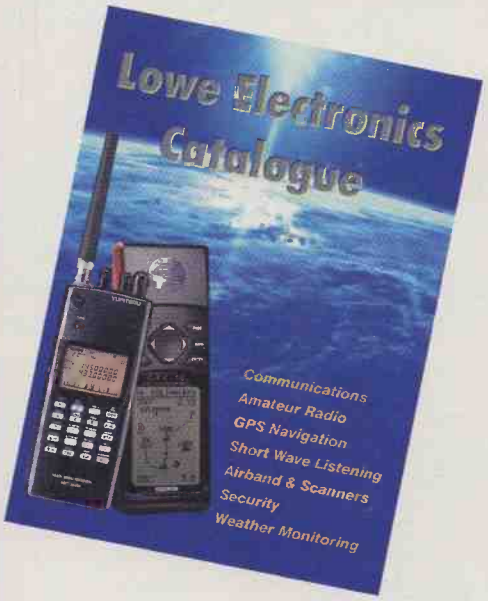
That's it for this month - our advert in the next issue will be "straight floggeroo" to quote the immortal words of our founder Bill Lowe many years ago.

Best regards
Richard G3OQT

OUT NOW...OUT NOW...

Lowe Electronics Catalogue



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Wadley Triple Loop the Yaesu way, the FROG 7.

South African produced Barlow-Wadley XCR-30, which was clearly legitimate because of the connection with Trevor Wadley, but also in receivers from Japan. As far as I know, the first external manifestation of the Wadley loop was in a receiver badged and sold by Drake as the SSR-1. Drake had at the time a very thriving business in the amateur radio field, and the first assumption was that they were making the SSR-1 in America. This was not the case however, and the SSR-1 was actually being made in Japan by a company called (I think) Seiki Denshi. Somewhat mysteriously, shortly after the Drake SSR-1 appeared on the UK market, we (at Lowe Electronics) were offered a new short wave receiver from Japan which could be made exclusively for us under the Lowe brand name. After taking a look at a sample unit and finding that it was based on the Wadley loop, we decided to have a crack at importing this and called it the Lowe SRX-30. It was very popular and we sold lots and lots of them because we pitched the price at an attractive level. It wasn't the world's greatest r.f. performer but for its day it was the nearest thing you could get to an RA-17 at a fraction of the cost.

It was not until we heard rumblings from America that we realised that the 'exclusive' SRX-30 was actually the Drake SSR-1 in a different, larger case, and with a new front panel. So much for manufacturer's integrity...! The next move has a certain inevitability about it, because we found that the same supplier had signed another 'exclusive' marketing agreement with someone in Europe and the SRX-30 appeared as the Century 21. The same thing still goes on today, so if someone comes along and offers you an 'exclusive' deal, just remember what I told you and treat such offers with extreme caution.

A little later in this saga, Yaesu Musen brought out their extremely successful FRG-7 which incorporated the Wadley loop principle but used much more advanced semiconductor devices throughout, including a balanced f.e.t. first mixer in the r.f. chain (Mixer 2 in my description) and the well known SN76514N for the corresponding Mixer 1. A particularly helpful feature of the FRG-7 (referred to throughout the known universe as the 'Frog') was a little l.e.d. driven from a detector at the end of the injection chain from Mixer 1 which made sure that you had the system tuned correctly. This l.e.d. was labelled, more in hope than truth, 'LOCK', but of course it was an amplitude detector and had nothing to do with locking anything - but it helped. Yes, it's 'lock' Jim, but not as we know it.

Catapulted Racal

The definitive receiver of the type has to be the Racal RA-17 and its derivatives. The Racal story has been told many times and is well known, but there is little doubt that the RA-17 catapulted Racal from being a small innovative company to a leading position in the electronics world, and all because of Trevor Wadley's idea. What was the saying about mighty oaks from little acorns? In the RA-17, the 'MHz' oscillator covers the frequency range from 40.5 to 69.5MHz and is combined in Mixer 1 with the output from a 1MHz comb generator to produce an i.f. of 37.5MHz (42.5MHz in the Barlow-Wadley). The bandpass filter corresponding to the 44.5 to 45.5MHz of the Barlow-Wadley is, in the RA-17, centred on 40MHz with a bandwidth of 1.3MHz, and again the performance of the

SSR-1 from the Drake stable.

filter can be estimated by the fact that it contains no less than eight over coupled tuned circuits, whereas the Barlow-Wadley tries to do it with four and the SRX-30 with three. Yaesu did rather well by matching Racal with eight filter elements. Despite the frequencies used in the architecture of the RA-17 being different to those in the XCR-30 and different again in the 'Frog 7', by just inserting the actual frequencies of the various oscillators into the basic diagram at the beginning of this article you can quickly and easily work out how the conversions take place and how the drift cancelling still works.

In all of the receivers I have mentioned so far, alignment of the various sections of the triple loop is critical, and never more so than in the RA-17. The manual stresses that alignment of the 37.5 and 40MHz filters should never be carried out without using a swept frequency technique, and my old mate Bob Ellis (his 'Listener's Guide' still sends me into fits of laughter) will recount stories of the RA-17 receivers he saw pass across his repair bench at Lowe which had been 'peaked up' by unwary owners who subsequently found that they could hear Radio 3 on 1215kHz (I know it's now Virgin Radio but I'm talking about the olden days) but any other frequency from 1 to 2MHz was dead, dead, and never called me Mother. However, at least the RA-17 and 'Frog' had 'proper' trimmers to align unlike the Barlow-Wadley: I quote from the XCR-30 service manual:- "...and peak up L4, L8, L9, L12 and L13 for maximum output. This tuning is accomplished by compressing or expanding the coils with a non-metallic alignment tool". Have you ever tried to "peak up" an open wound coil at 42.5MHz by poking at it with a non metallic alignment tool? What do you think caused Bob to have prematurely white hair and a nervous twitch?

The moral of this story is that you leave well alone unless you are **absolutely** confident you know what you are doing and have access to some decent alignment equipment or have a personal contact with Bob Ellis - but I promised not to divulge his telephone number until his Wadley twitch is completely cured.

Oh - That Ad.

As for the Barlow-Wadley receiver I saw advertised at £80, I think that it was a bargain and I wouldn't sell mine for that price because it represents a moment of history in the development of the short wave receiver and is definitely a 'landmark' in my eyes. Although its appearance may be a little *outré* and 1970's to the casual glance, it is in fact extremely well made and easy to work on. Drop down the front and back panels and you find a die cast frame worthy of the *Ark Royal*, and the service manual (if you can locate one) is a professional compilation bearing the distinct impression of Racal background. I haven't even mentioned the preselector tuning system, which is an engineer's ideal of how to cover 0 to 30MHz with a high Q tuned circuit. If you get a chance, just take a look inside an XCR-30 and twiddle the preselector control to see how it works. Such is the elegance of the design that we (John Thorpe and I) even considered copying the idea for a really high performance preselector that never saw the light of day.

The SRX-30/Century 21 was not so hot, but the FRG-7 was extremely well designed and executed, so it's no wonder that thousands are still in use today, and Yaesu Musen have continued to develop a range of well thought out competent general coverage receivers culminating in the FRG-100. The RA-17 and its later derivatives are large and heavy but again continue to be a favourite receiver for many people. The valves are becoming a bit scarce, particularly the E180 series with the gold plated pins, but no doubt prudent RA-17 owners will have these kept by as spares. I can well see the RA-17 still giving satisfaction to its owners well into the next century, and like the Land Rover it will reach a point below which it will never depreciate. I'll remember to raise a glass to Trevor Wadley this Christmas (I'm writing this in the dying days of 1997), and marvel at his ingenuity.

The Lowe Electronics incarnation of the SSR-1, the SRX-30.

Final Thought

In the dim and distant past when I first handled the SRX-30, I realised that if you take an oscillator at 55.5MHz with an i.f. of 44.5 to 45.5MHz, you don't only tune 10 to 11MHz, but also 100 to 101MHz, providing that you take out the short wave r.f. stage and the 30MHz low pass filter which follows it and replace them by a v.h.f. r.f. amplifier. So, if you want a receiver to tune the v.h.f. airband you could, with a little ingenuity, convert an old SRX-30 or 'Frog 7' to do just that. I did play around and get the idea working but didn't develop it further - but you could if you have the time and the interest. Please don't ask me for details: I've thrown the idea into the scrum - it's up to you to pick it up and run with it.

Happy listening.

YUPITERU

MVT-3300EU Hand-held Scanner

Yupiteru's latest hand-held scanner, the MVT-3300EU has been given the once-over by Chris Lorek.

Yupiteru have a well-deserved reputation with their high-performance and fully-featured portable communications receivers. As well as their all-mode wide-coverage hand-helds, which are the proud possession of many satisfied users, they've also released hand-held scanners for defined band ranges, e.g. for the civil airband and the marine v.h.f. f.m. ranges. Retailing at £180, the MVT-3300EU is a multi-band scanner rather than a continuous coverage all-mode receiver. The 'EU' suffix identifies the European version, which has satisfactorily passed the stringent European e.m.c. requirements

The MVT-3300EU provides coverage of 68-88, 108-170, 300-470 and 806-1000MHz, which includes all of the v.h.f. (civil) airband, plus a section of the military airband, as well as most v.h.f. and u.h.f. land mobile communication bands. It can tune, and store frequencies, across these ranges in steps of either 5kHz, 6.25kHz, 10kHz, 12.5kHz or 25kHz, with reception modes of a.m. and narrowband f.m. Unlike some commonly-found scanners you can select either a.m. or f.m. reception on any frequency within its coverage ranges, so you're not, for example, limited to 'a.m. only' on airband.

Channels

There are 200 memory channels provided for you to store your favourite frequencies into, these being arranged in ten banks of twenty channels each for easy scanning, a scan speed of 16 channels per second being specified. To help you find new active frequencies there are ten user-programmable search bands, as well as an 'auto-write' scan facility which can store active channels into a memory bank automatically. To save the receiver continually halting on given frequencies such as constant carriers, you can also program up to 100 'pass' channels into the set's memory, which it will subsequently ignore in search mode. A two-second delay after the squelch closes is provided before the set resumes scanning, to help in receiving replies on simplex channels in scan mode. There's also a switchable attenuator fitted to help in cases of signal overload, this can be switched in or out but not on a channel-by-channel basis into the memories.

Besides searching and scanning, the rotary click-step knob on the top panel lets you manually tune around in either your own selected tuning step and reception mode, or with the 'default' parameters for the frequency range you've chosen. For this, there are ten programmable 'band memories' in the set, into which you can store upper and lower frequency limits together with an accompanying step size and receive mode for each range. This means that you can store, say, f.m. with 12.5kHz steps for the 144MHz amateur band, a.m. with 25kHz steps on v.h.f. airband and so on, so that when you next select a frequency within that range the receiver will automatically switch in your preferred mode and step size.

Descrambler

Recently introduced into the UK, for on-site p.m.r. (Private Mobile Radio) users, has been the facility to use speech scrambling. This can range from simple 'inversion' scrambling (where the audio speech spectrum is inverted in frequency) to more secure types such as rolling code, and these are already being used by on-site security services as well as Formula One racing teams and the like. Amongst its front-panel controls the MVT-3300EU has an 'SCR' button, which switches in an internal descrambler for decoding simple inversion systems. But note that this will not cope with higher-security forms of scrambling such as rolling code or split-band types, nor will it descramble any digital forms of coding such as the 'MASC' systems used by UK government services (including the police), or GSM or PCN cellular 'phones systems and such - the suppliers of the review equipment tell me they're very keen to point this out!

Power

The MVT-3300EU uses four internally-fitted AA cells which you'll need to supply, a d.c. connector is also fitted so that you can plug in an external 12V d.c. supply for home or mobile use. The rear of the set's case has a pull-out wire stand, which you can use for desktop operation at home and which tilts the set at a comfortable angle for easier viewing of the display. The receiver comes supplied with a set-top helical antenna, a hand strap for portable use, a plug-in earphone, and an instruction manual. It measures 152 (H) x 59 (W) x 32mm (D) and weighs 310g with batteries fitted.

In Use

Most receiver manufacturers usually have their own defined idea on user operation methods and control, and the MVT-3300EU follows the normal Yupiteru type of operation as used in their many other hand-held scanners. So I found no surprises here, the supplied manual also giving clear instructions with plenty of worked step-by-step examples for the 'raw beginner'. Within minutes I was happily monitoring signals in my locality, the set-top antenna pulling in signals, particularly on v.h.f., surprisingly well. Entering frequencies into the memory channels was very easy, the receiver automatically selecting the 'next vacant' channel for me in each case, although I could easily change these as needed.

Over the dark winter evenings during my review period, I found the backlighting facility on the set to be superb. As well as this lighting up the l.c.d. panel, to let me see what was happening frequency-wise, it also illuminated the translucent keypad buttons so that I could also operate the scanner at night without too many incorrect button pushes! For weak signal-reception, a 'monitor' button next to the side-mounted backlight button acted as a momentary squelch defeat, which I found very handy with fading signals to prevent the scanner whizzing off to the next channel when I'd found something interesting to listen to.

Out And About

Although the supplied carry-strap was handy for portable use, I felt it was a pity that a belt clip wasn't also supplied, nor was there any facility for one to be fitted. I often use a car-mounted ventilator grille clip

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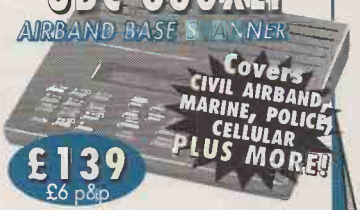

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- 10 memories

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Laboratory Test Results

All measurements taken at 145MHz, n.b.f.m., using set powered from internal fully-charged NiCad cells, attenuator off, unless otherwise stated

Sensitivity

Frequency (MHz)	Level (V p.d.)
68	0.19
78	0.19
88	0.16
108	0.22 (a.m.)
120	0.22 (a.m.)
130	0.24 (a.m.)
137	0.15
145	0.15
150	0.14
160	0.14
170	0.14
300	0.31 (a.m.)
350	0.33 (a.m.)
400	0.23
435	0.25
450	0.28
470	0.26
806	0.22
850	0.16
900	0.31
950	0.16
1000	0.21

Input signal level in V p.d. required to give 12dB SINAD.

Adjacent Channel Selectivity

(kHz)	(dB)
+12.5	50.0
-12.5	41.5
+25.0	60.5
-25.0	61.5

Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB SINAD ref. level to cause 6dB degradation in 12dB on-channel signal.

Blocking

+100kHz	55.3dB
+1MHz	87.4dB
+10MHz	89.5dB

Measured as increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal.

Squelch Sensitivity

Threshold	0.14V p.d. (10dB SINAD)
Maximum	0.46V p.d. (27dB SINAD)

Intermodulation Rejection

Spacing (kHz)	Rejection (dB)
25/50	44.1
50/100	44.1
100/200	45.3

Measured as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product.

Image Rejection

1st Image	>100.0dB
Half 1st Image	72.7dB
2nd Image	53.0dB
Half 2nd image	49.5dB

Difference in level between unwanted and wanted signal levels, each giving 12dB SINAD on-channel 145MHz f.m. signals.

Maximum Audio Output

135mW r.m.s.

Measured at speaker/earphone socket, with 1kHz audio at the onset 10% distortion level, 8Ω resistive load.

Attenuator Level

Frequency (MHz)	Attenuation (dB)
145	22.8
435	9.5

with my hand-held scanner for use on the move, but here I had to either just place it on the seat, or use one of the 'gripper' type of 'cellphone' holders instead.

I also took the scanner away with me on a few days holiday to a favourite 'haunt' of mine, a small fishing village in south-east Cornwall. But this was the first time I'd ever thought of taking a scanner along with me. Together with my growing family, we normally also take in a couple of sessions of sea-fishing here, and this time the MVT-3300EU provided me with yet another 'chatty' companion! Although I had to take care that it didn't drop into the 'briny', it certainly gave us all a surprising amount of extra entertainment, particularly from the comical banter between other fishermen out on the water. There was ample volume from the set's small speaker for use even in these windy outdoor conditions, and the fast search rate made sure that I didn't miss a thing when several channels were alternately busy with different radio users. The auto-write scan was also handy in finding active new frequencies here, and I quickly filled a number of memory channels using this mode.

I used both NiCads and nickel-hydride cells to power the set, finding each gave me at least a day's worth of listening, with the 1.3Ah nickel types naturally lasting rather longer - often for an entire weekend. However, I did need to take the batteries out of the set in order to charge them, which meant that I couldn't use the set on air in 'float charge' mode because the side-mounted d.c. connector couldn't also be used to charge the batteries. I eventually settled on using two sets of batteries, one in use in the scanner and with the other set on charge at any given time.

Strong Signals

The receiver usually worked fine when I was out and about, but in some locations I did get the occasional problem from strong signals such as paging transmitters. I found that, when tuning around even in 12.5kHz steps, that signals came and went cleanly, without the adjacent channel 'splitching' I've often found on less-selective scanners. However, using the set from home with my rooftop 144/430MHz vertical collinear antenna plugged in, gave me almost constant overload problems on the 144MHz amateur band from out-of band signals, and I had to keep the set's internal attenuator switched in at all times here. I also found an effect of weakly receiving otherwise strong signals which were exactly 225 and 900kHz above my tuned frequency, these being caused by second image and 'half 2nd i.f. effects within the scanner.

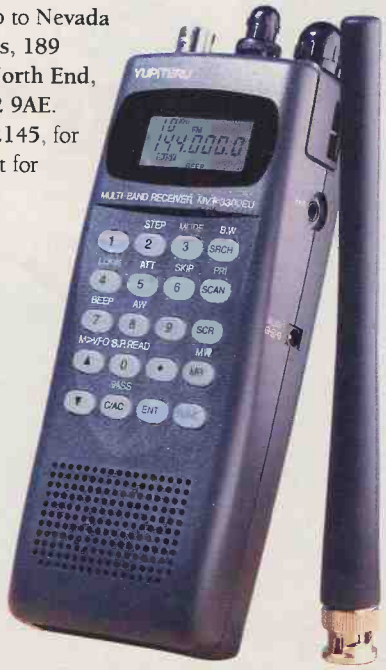
Lab Tests

A measurement period in my lab showed the set to be reasonably sensitive across its range, with excellent adjacent-channel selectivity, as I'd found on air. The 3rd order intermodulation results also replicated what I'd found on air, which wasn't all that good, but it would normally be adequate for the set's primary intended use as a hand-held, and not a base station, receiver.

Conclusions

Although the Yupiteru MVT-3300EU isn't a wideband, continuous-coverage receiver, it usefully gives coverage of many of the popular v.h.f. and u.h.f. communication bands used in and around Europe. I found it was easy to operate, with plenty of handy features such as the 'auto-write' scan and the extremely useful frequency 'pass' function for searching around. It gave a good level of performance when used out and about, pulling in signals well, although it did tend to suffer from signal overload when used in some r.f.-congested locations with an external and well-sited antenna connected.

Our thanks go to **Nevada Communications, 189 London Road, North End, Portsmouth PO2 9AE. Tel: (01705) 662145**, for the loan of the set for review.



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RAB THOMSON GIVES AN INSIGHT INTO THE BACKGROUND OF THE M

Rab, some 30 years ago operating a Marconi Marine Oceanspan Mk6 WT/RT h.f./m.f. transmitter. In the mid background the Reliance Emergency m.f. transmitter with its copper tubing open antenna feeder. Bottom right is is the Marconi Atlanta l.f./m.f./h.f. receiver. All these devices were very solid - only valves were used!

The Rise And Fall of Sparks

I spent almost 30 years as 'sparks' with the Royal Fleet Auxiliary Service after leaving Leith Nautical College in 1963 and taking early retirement in 1993. Although Fleet Auxiliaries are painted grey and sport a shipside pennant number, they are registered as Merchant vessels and staffed by MN Officers and Crews.

In The Begining

In 1895, Guglielmo Marconi, in conjunction with the British Army, made a remarkable, perhaps I should say, a far reaching, discovery. This was not the radio as commonly thought. What he had discovered was that the addition of an elevated wire on the primitive transmitting and receiving equipment of the day dramatically improved the range of communication - the antenna had been invented.

By 1901, Marconi had managed to span the Atlantic by radio, the first one-way contact was between Poldhu in Cornwall to Signal Hill in Newfoundland and later in the same year, the first British Merchantman, the *Lake Champlain*, was equipped with Wireless Telegraphy gear and a suitably qualified Morse operator who's main job description was to enhance Safety of Life at Sea.

The W/T equipment was quite primitive - the thermionic valve had yet to be invented. The radio wave was generated by discharging a large capacitor (then called a condenser) across a gap in a tuned circuit, the main part of that tuned circuit was the actual antenna. The whole device would ring like a massive electronic bell and radiate over a wide bandwidth which was just as well since frequency stability was poor - rolling of the ship causing antenna capacitance to change and with it the transmitter frequency. The spark itself was noisy and when Cape Cod station in Massachussetts came on the air the noise of the foot-long spark could be heard a couple of miles away on a still night - the operators were not long in acquiring a nickname.

The fitting of W/T to ships was invaluable, past now were the days when ships left port with no communications other than than visual signalling with flags or lamps. Safety of Life at Sea benefited greatly as did the ability of owners to maintain contact with their fleets. Well-shod passengers were able to keep in touch with their companies, bankers and the Stock Exchange, all this accomplished by Morse Code from ship to coastal W/T station.

Arresting Radio

A 'first' for ship/shore communications in 1910 was the arrest of wife murderer Dr. Crippen and his lover. A suspicious ship's Master alerted the British authorities who despatched detectives via another ocean liner and boarded Crippen's deliberately delayed ship prior to its berthing in New York.

In 1912, the foundering of the *Titanic* brought to light a problem. *Titanic* had sent the distress call of those days - the letters CQD (Seek You - Distress) and also the new SOS. Several ships that would have undoubtedly been in radio range and capable of rendering assistance did not hear the calls - their 'sparks' were off watch. This led to the introduction of the Automatic Alarm - a device which would alert the operator and bridge staff that a distress signal had been received. The device was designed to respond to a unique signal comprised of a series of four second duration dashes spaced with an interval of one second. On receipt of four correctly sent consecutive dashes, loud bells would ring in sparks' cabin and also on the ship's bridge and W/T room. Two minutes after sending the dashes, the casualty would send his full SOS, ship's name, position and nature of distress along with any other relevant information. Ships in receipt of the SOS were duty bound to acknowledge the distress signal.

These Auto Alarms were fixed tuned to the International Distress Frequency of 500kHz (600m wavelength). Daytime range of such signals is around 250-300nm but at night the ranges are dramatically increased and can travel tenfold distances. Many is the time when a distant SOS has awoken a slumbering 'sparks' who had to proceed to the 'Wireless Room' to silence the strident Auto Alarm bells which were shattering the peace on the Bridge, and listen for the distress traffic.

In December 1963, I was alerted by distress signals sent on 500kHz by the Greek cruise liner *Lakonia*, who I copied as being on fire off the Canaries. My ship, the Fleet tanker *Cherryleaf*/GQZQ, was in the Red Sea some 4800km distant. Little did I know that two of my townspeople were at that very moment, in dire danger and subsequently lost their lives.

The Alarm Device was also very prone to being set off by static, prevalent in the tropics - and the temptation after many false alarms was to switch it off - a totally illegal and very selfish temptation. Once again - in 1967 - in the Indian Ocean aboard RFA *Bacchus*/GHVE - I was awakened for the 4th or 5th time by the bells. Cursing, I made my way to the 'shack' as all radio rooms are called. Through the crashing of thunder static came the call - SOS - from the Swedish ship *Slidre Utara*. She had been broken down for almost a week after a fire and we took her in tow to Mombasa. The Admiralty eventually received about £2 million for the salvage claim that was submitted.

Shrinking Waves

In the very early days of marine radio much trans-Atlantic communicating was achieved on the long wave band (calling freq 143kHz). High transmitter power was required and large antenna currents of 500A and voltages into the thousands were commonplace at shore installations. In the 1920s much research was being undertaken in the so called short wave bands, mainly by radio amateurs, and gradually knowledge was acquired into the techniques of sending radiowaves via the ionosphere where they are refracted around the earth's curvature. Power requirements were much less than that needed for long wave working. Ships installations benefited from the lower

ERCHANT NAVY RADIO OFFICER, 'SPARKS', HIS FORMER OCCUPATION.

powered transmitters since arcing and breakdown of insulation was much less and therefore reliability was improved.

The short wave bands are subject to changes in propagation qualities on a 24 hours basis depending on the position of the sun and also seasonal changes and a long term fluctuation of approximately 11 years connected with sunspot activity.

Also, due to events on the sun, conditions can occur known as Sudden Ionospheric Disturbances (SIDs) and Dellenger fadeout, which will cause the entire short wave band to go dramatically quiet. This can happen so quickly that many a 'sparks' has assumed his receiver had gone defective. Eventually after a few hours the signals will start to come through again.

An experienced R/O would know how and when to contact a particular distant station and not spend hours fruitlessly bashing away at the Morse key. 'Sparks' was for many years, even into the mid sixties, the only person onboard who could 'talk' to the shore. Long distance voice comms were not compulsory and hence lots of companies did not have them fitted. In order to keep 'on-air' time to a minimum 'sparks' would employ the 'Q code', a system of three letter codes all commencing with 'Q'. These codes were internationally understood and covered a plethora of eventualities and situations.

One code which 'sparks' did not like to receive was QTB. This meant that the receiving station did not agree with your word count of chargeable words in a cable text. Considerable argument over the Morse key sometimes occurred but this could upset the shore operator which was never a good idea if you called later with lots of Christmas Greetings telegrams from a passenger liner and found you were not being answered. The 'In-Tray' still continued to pile-up!

The R/O was, by law, required to preserve the secrecy of the contents of all radio correspondence, indeed even of its very existence. The Post Office Protection Act of 1884 and the Wireless Telegraphy Act of 1949 were fairly draconian instruments, breaching of which could incur a penalty of two years hard labour. Perhaps Princess Diana should have made her calls through one of the ship stations.

Keeping Abreast

The invention of the multi-grid thermionic valve in 1907 was the springboard to progress in electronic technology. 'Sparks' was required to keep abreast of advancements and the examinations conducted by the Post Master General ensured that a high standard of theoretical and practical knowledge was taught in the various Marine Colleges throughout the country.

Two world wars focussed attention on many shipborne devices such as Depth Sounders, Direction Finders and Radars. All these became items for the R/O's attention when they became defective.

Prior to Radar becoming commonplace on Merchant Ships in the Sixties, the aforementioned Direction Finder was used to obtain bearings when the navigator had no visual information due to fog or cloud cover. The R/O frequently took the DF bearings and a very good ear was required to determine the null or quiet point in the radiobeacon signal that indicated the correct bearing on the graduated dial.

I recall testing some d.f. equipment supplied to one of my ships by the Navy Dept. It was called FU3 (Finder Unit Mark 3) - its predecessor was FU1 - apparently the Navy took exception to the title FU2!

The R/O enjoyed a fairly good life onboard ship, including Officer status, indeed the only person who signed as Officer on the Ship's Articles of Agreement, a legal document, was the Radio Officer. The Captain would sign as Master, 2nd Officer as 2nd Mate, Chief of the Engineering Branch as Chief Engineer and so forth.

All communications, private or ship's business, 'phone calls or cables, were connected by the R/O. The advent of automatic machines such as teleprinters and facsimile machines still required an expert knowledge of short wave propagation to operate them efficiently and although these devices did away to a fair extent with Morse, the professional communicator was still required. More time was, however, available to pursue faultfinding and maintenance techniques.

Via Space

In late 1978, two satellites were launched from Cape Kennedy and positioned in geo-stationary orbits 38400km above the Equator. One was located at 10°W over the Atlantic and the other at 60°E over the Indian Ocean. Their combined footprints covered a vast area taking in South America, Caribbean, Eastern Seaboard of USA, United Kingdom, the complete African continent and further East to encompass Malaysia and the Western half of Australia. A third 'Bird' was soon to follow covering the Pacific regions. These were the MARISATS. They were able to provide Telex, Data and Telephone contact between a shipboard satellite terminal and any terrestrial telephone system. Each of these satellites could handle 339 telex channels simultaneously and also several telephone calls. They utilised frequencies much higher than our land based TV and such frequencies (1.6GHz uplink) are relatively unaffected by ionospheric characteristics and disturbances. The ship terminal power output was not high, typically 30W e.r.p., and it used a small dish about 1m diameter enclosed in a weatherproof dome. The dish was gyro stabilised and would remain locked onto the satellite through course alterations and in heavy rolling or pitching of the vessel. Great care was taken in mounting of the dome onboard to ensure that the satellite would never be obscured or 'wooded' by parts of the ship's superstructure when steering certain courses, not quite so simple an exercise as it may sound!

All sorts of information, weather or safety, could be broadcast by these satellites to the entire SATCOM fitted fleet, a ship owner could telex the vessel, speak to the Master, and private 'phone calls could also be made. Telephone calls were approximately £6 per minute and I believe these charges have not been substantially reduced.

I was on RFA *Olmeda*/GPBE, the first Fleet Auxiliary which had SATCOM fitted in 1979. Our terminal was affectionately called 'ORAC'. Several of the radio staff believed it to be the beginning of the end of 'sparking' as we knew it . How right they were!

My head office instructed us to fire as much traffic as possible at the system, possibly to see if it could be overloaded. The ship's crew of around 100, were delighted when they were told they could cable home free of charge over a period of a month. Needless to say, we failed to jam the system.

Spark's Tide Turned

In 1982, when the Task Force sailed South to the Falkland Islands, almost every Merchant ship was equipped with a commercial SATCOM terminal. This proved invaluable, since the h.f. or short wave window from the Falklands to UK is only open for about an hour or so each day. Those ships with SATCOM were able to send and receive traffic with comparative ease. Without SATCOM there would have been considerable problems.

The system was easy to use, a simple dialling code e.g. 021, acquired the Atlantic satellite, followed by the country code and requisite phone or telex number. A ten second wait and "**It's For You**".

It was not long before Captains had their own cabin handset and cruise liner passengers were able to 'phone from their suites. The personal touch of 'sparks' was no longer required.

I also felt that the Ship Master, who used to stand at God's right hand, lost much of his authority when the shipowner was able to talk so easily with him. On many occasions I knew of Masters who would 'phone the office for advice on matters which, until PM (Pre-MARISAT) , would quite simply have been sorted 'In House'.

There are now many more MARISATS in orbit handling 'phones, telex, FAX, data, position reporting as well as Distress & Safety. They can also handle traffic from the small transportable terminals such as used by newsmen.

These satellites form part of the Global Maritime Distress & Safety System (GMDSS) which is in the course of implementation world-wide. This will mean that no longer will it be legally necessary to carry a Radio Officer purely to cater for Safety of Life at Sea.

The GMDSS terminal fitted to shipping nowadays is designed to be operated by any ship's personnel trained in its use. It is generally fitted on the ship's bridge and not in the Radio Shack.

The use of Morse code is in decline and every month or so sees another h.f. Coast Station dropping its c.w. facility, recent victims were Canada's Vancouver Radio/VAI and the French St. Lys Radio/FFL. However at the time of writing, our UK Long Range station at Portishead/GKA is still on the air.

The teaching of Morse code is being phased out in the few Marine Colleges left and the Armed Services have already discontinued training. Quite a few ships have no Radio Officers onboard nowadays. The new Electronics Officer or Systems Engineer is appearing who will care for all things electronic from washing machines to automatic radar plotting aids.

In the very near future the Iridium Project will place in orbit a batch of Low Orbiting Satellites to provide worldwide cellular phone facilities at a relatively low cost. This will enable the Ship's Captain and anyone else onboard to talk from anywhere on the oceans to anywhere on the globe.

Sadly, it will soon be good bye to 'sparks' as we welcome in the 21st Century.

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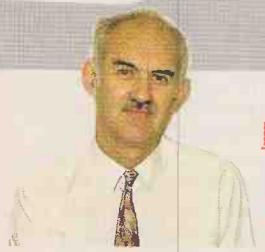

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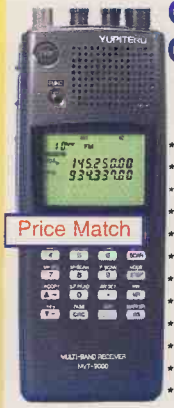

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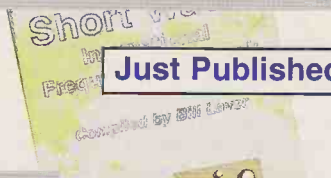

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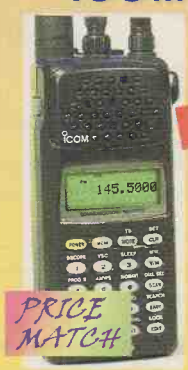

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COMPETITION

WIN!

Yupiteru MVT-3300EU Multi-band Receiver

Yupiteru have a well-deserved reputation with their high-performance and fully-featured portable communications receivers. The MVT-3300EU is a multi-band scanner, rather than a continuous coverage all-mode receiver and provides coverage of 68-88, 108-170, 300-470 and 806-1000MHz. This includes all of the v.h.f. (civil) airband, plus a section of the military airband, as well as most v.h.f. and u.h.f. land mobile communication bands. There are 200 memory channels provided, in which you can store your favourite frequencies, these being arranged in ten banks of twenty channels each for easy scanning.

Chris Lorek found it was "easy to operate, with plenty of handy features such as the 'auto-write' scan and the extremely useful frequency 'pass' function for searching around. It gave a good level of performance when used out and about, pulling in signals well."

The MVT-3300EU retails at £180 from **Nevada Communications, 189 London Road, North End, Portsmouth PO2 9AE. Tel. (01705) 662145** and you can read what Chris Lorek thought about this latest offering from Yupiteru on page 18 of this issue.

Nevada Communications have very kindly donated the review MVT-3300EU receiver as the prize in a competition open to *SWM* readers.

To enter all you have to do is correctly answer the three simple questions. Send your answers, together with the corner flash from this page, to *Short Wave Magazine*, Yupiteru Competition, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. The first correct entry drawn out of the Editorial Box will win the receiver. The Editor's decision is final and no correspondence can be entered into. You may send your entry on plain paper to avoid mutilating your copy of *SWM*, but you **must** send the corner flash from this page with your entry. The closing date for the competition is Friday 27 February 1998.

ENTRY FORM

Question 1: What is the MVT-3300EU's scanning speed?

Question 2: What size are the internally fitted cells used to power the MVT-3300EU?

Question 3: What are the two reception modes available on the MVT-3300EU?

Name.....

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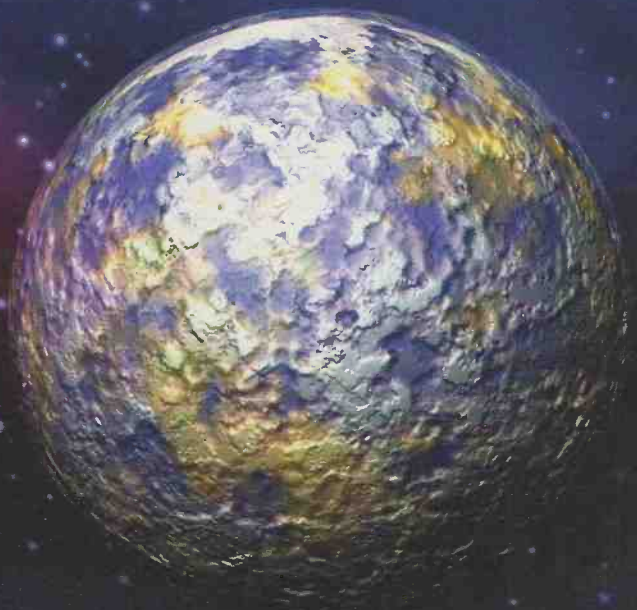

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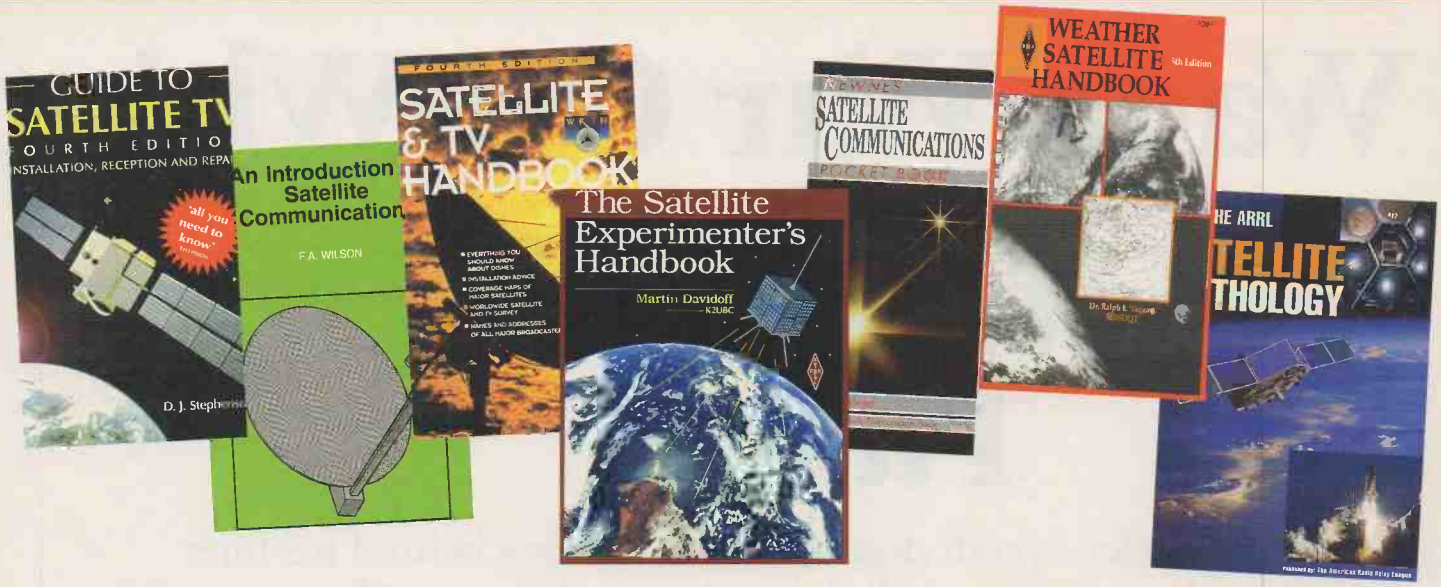

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The technical level of this book is moderate. It has not been written with the expert in mind, but rather for the general electronics engineer or enthusiast wishing to get to grips with the basic technology. However, the uninitiated are not forgotten, as long as they have some leaning towards the subject of electronics, there should be little difficulty for the book is written in as simple a fashion as possible, considering the complexity of the subject.

For those more expert, there is additional technical detail in the Appendices so that they may grapple with the subject in greater depth. Little more than elementary mathematics is required for the main text. There is almost plenty for the DIY enthusiast with practical advice on choosing and installing the most problematic part of the system, the dish antenna. £5.95.

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der Form in this issue or telephone Michael or Shelagh on (01202) 659930.

Wage War On Whistl

A Notch/Peak Filter Part 2

Last month Peter Rycraft described the thinking behind his filter design. In this part he concludes with a description of how to build and use the unit.

Construction of the filter is quite straightforward using a piece of Veroboard on which to mount the components and placing the potentiometer and rotary switch on the front panel of a suitable instrument case. The arrangement of the components and the positions where the tracks have to be cut is shown in **Fig. 2.1**. The layout shown is for two filters, but readers who are interested in constructing only a single filter, should ignore Filter A and start their board at track 13.

Even if one chooses to build two filters, only one buffer stage and one power amplifier is required and the whole lot can be accommodated using just 39 tracks, which means that most readily available pieces of Veroboard will be suitable.

Maplin Electronics sell a piece which is exactly 39 tracks wide. Connections from the board to the front panel controls are made using 1.0mm dia. p.c.b. pins and thin flexible hook up wire. The p.c.b. pins are all single ended, facing the front panel, except the input, output and ground pins which are double ended, and also in filter A, the pin marked 'S1c wiper' (track 12A) which should have 12V taken to the track side of it. This is easier than trying to fit wire links on the board.

The layout of the components is slightly untidy, due mainly to the feedback resistors going from one stage to the next, but note carefully the orientation of the LM324N (IC1), with pin 1 being in the top right hand corner. With a two-filter version, the output coupling capacitor C5 of Filter A can be left out, and the wiper of S1b is taken directly to the input of Filter B, otherwise C5 would be put in series with C3. The wiper of S1a is not taken to the board, but wired directly to R8.

In the buffer amplifier stage, the board layout has been designed to accommodate a TO18 transistor, such as the BC109, but the holes in the board are sufficiently close to enable other types of transistors to have their leads bent to suit. The input and output connections to the unit are made via a 4-way lever terminal block which is mounted on the rear of the instrument case, along with a d.c. power input socket for the 12V supply.

If headphone listening only is intended, the power amplifier stage need not be constructed and a headphone jack may be fitted to the front panel and wired directly to the buffer stage output. However, if loudspeaker reception is also required, not only will you need the power amplifier, but the headphone jack will have to be of the switched type, and either have an insulated fixing bush, or have its metal bush insulated from ground, as it switches the earthy side of the loudspeaker.

With reference to the component layout in **Fig. 2.1**, when using the power amplifier with the volume control R20, the buffer stage output pin, track 28P, will go to the slider of the volume control. The high end of R20 will be wired to the power amplifier input pin, track 29L with the low end to ground at 28S. If the volume control is not going to be used, tracks 28M and 29M must be linked and a 10kΩ resistor soldered between points 29N and 29Q.

One refinement that I strongly recommend is the use of a slow motion drive for the tuning potentiometers, although this does involve some extra mechanical work as it is best supported on a sub panel. With the extremely sharp tuning in both the notch and peak positions, a slow motion drive makes life a lot easier, and enabled spot on tuning to be achieved. An epicyclic ball drive, with a reduction ratio of 6:1 is ideal.

If the unit is to be built into an instrument case, a suitably sized one is the Maplin Blue Case 212, which

es With

measures 150 wide x 100 deep by 75mm high. It is of two part construction and includes a separate internal chassis. As will be seen from the photographs of the prototype unit, the stripboard can be mounted across the width of the case giving quite short connections to the potentiometer and switch. It is positioned by the use of two Belling-Lee p.c.b. supports, but if these are unobtainable, small 'L' shaped brackets may be used instead.

The version in the photographs consists of two filters and the buffer stage, but no power amplifier, as it was designed to feed into another unit containing its own amplifier.

The sub-panel, on which the slow motion drives are mounted, is cut from thin aluminium sheet with a flange along the bottom, bent at right-angles for fixing to the chassis. If there is to be an On/Off switch, and perhaps an l.e.d. on the front panel, a clearance hole must be drilled in the sub-panel through which the wires from the 12V input socket will pass.

The arrangement of the front panel controls on the prototype unit ensures that the wiring is kept short, but anyone constructing a single filter will have more room in which to position the controls and may prefer to place them side by side, rather than one above the other. Construction of two filters is well worth the extra time and expense, as the completed unit is that much more versatile. The use of a slow motion drive means that a 20mm dia. hole must be cut in the front panel to enable the front flange of the drive to protrude through slightly (about 0.5mm) allowing a pointer to be attached to it.

This front flange rotates at the same rate as the potentiometer, whereas the knob moves at six times that rate. The l.e.d. power on indicator is wired across the 12V supply in series with a 560Ω resistor (R19) and draws about 18mA from the supply.

The front panel of the Maplin Blue Case is cream and is ideal for labelling using black Letraset or a stencil and black drawing ink. If the latter is preferred, the surface must be given a matt finish, using a Nylon abrasive pad, so that the ink will adhere to it. Any lettering should be sprayed, when dry, with a clear aerosol spray lacquer.

An alternative method is to complete the lettering on a suitable coloured piece of card and then stick that to the front panel of the instrument case. I have used this method on the unit illustrated, choosing matt black card and white drawing ink to match my other home constructed units.

It will be seen in the photographs that the front panel of the case has been made more rigid by the addition of two diagonal bracing struts cut from thin aluminium. It is most important that there is no movement in the front panel when using a slow motion drive if one is to have the pointer as close as possible to the printed scale. The fixing holes in the sub panel should have enough clearance to enable it to be moved slightly towards or away from the front panel, in order to find the correct position for the slow motion flange.

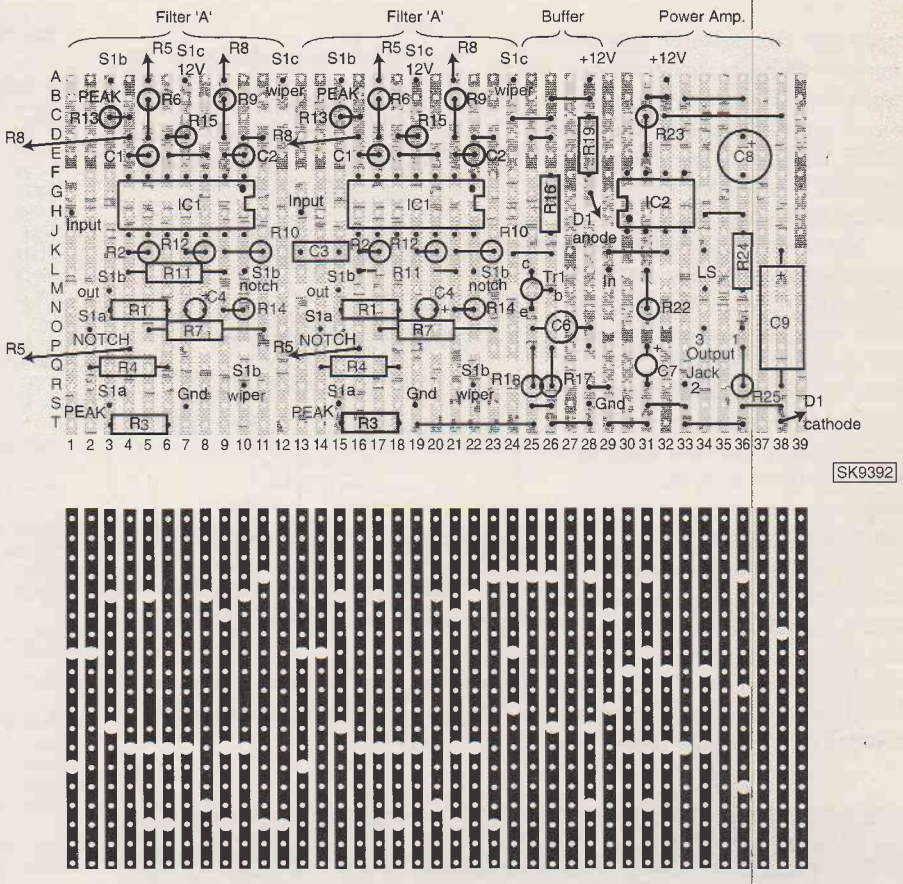


Fig. 2.1: Suggested Veroboard layout of the two-filter version of the Notch/Peak Filter Unit.

Maplin Electronics sell a ready drilled pointer intended for use with their epicyclic slow motion drive, which, as it stands, is too large to use with this particular instrument case, but which can easily be reduced in size. Some readers may prefer to make their pointers from scratch and this was my own solution.

Testing

The wiring is straightforward and should present no problems, and now it is time to test the completed unit. The current consumption can be calculated from figures already quoted in the text and should it be unduly high (or low) it is well to investigate before proceeding further.

With connections made to the receiver output, and to headphones or loudspeaker, set the switch(es) to the OUT position and search the bands for a speech or music station with an interfering whistle. There must be plenty of them, because this is why you made the filter in the first instance, remember?

However, the chances of finding one when you want one are minimal, there is a law that relates to this - so tune instead to the maritime beacon band between 285 and 315kHz and switch the receiver to c.w. with the b.f.o. on. Select a good, strong signal, then switch the filter to the NOTCH position and tune very slowly through its frequency range until the signal disappears.

Quite probably you will now hear some weaker

signals that were previously drowned by the strong one. Without altering the filter tuning, switch NOTCH from PEAK and protect your ears, or better still, reach for the volume control. If everything is working correctly, the signal will be loud and clear with greatly reduced background noise.

Tune around for a weak Morse or data transmission, and see how the PEAK mode of the filter can bring it to life. Those readers who have built the twin filter version can enhance a signal still further by switching both filters to the PEAK position and tuning them to the same frequency. The same thing applies when both filters are in the NOTCH mode, even the strongest of signals can be virtually eliminated.

Whilst it is a simple matter to tune the filter to the frequency of a constant whistle, it is not always quite so easy to tune it to a c.w. signal, when the tone is being switched on and off, but practice makes perfect, and this, with a little patience should produce dividends. I hope that the time spent in building this unit will be rewarded with better, pleasurable QRM-free reception.

Errors

The gremlins had a great time with the first part of this article.

The 5th paragraph in the right-hand column on page 60 should begin:

The reason that resistors R3 and R4 differ in value is that ...

In Fig. 1.2, capacitors C1 and C2 should be 1.5nF - the values given in the components list are correct. Also, the rotary switch S1 (Fig. 1.2) has some incorrect component references in its connections. A revised drawing of S1 is reproduced here (Fig. 2.2).

The Components List really suffered. Here is the list as it should have appeared.

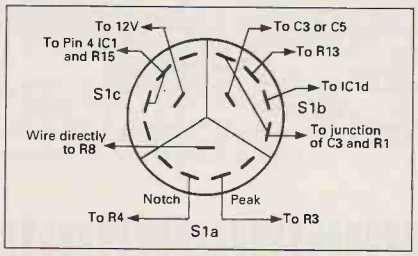


Fig. 2.2: Revised version of rotary switch S1. One of these is required for each filter section.

You Will Need

Resistors		
Carbon Film 0.25W 5%		
82Ω	1	R23
150Ω	2	R24, R25
220Ω	1	R22
560Ω	1	R19
2.2kΩ	1	R18
10kΩ	1	R21 (optional, see text)
27kΩ	2	R6, R9
47kΩ	1	R14
100kΩ	7	R1, R2, R7, R10, R11, R15, R12
220kΩ	1	R16
470kΩ	2	R13, R17
1MΩ	1	R4
3.3MΩ	1	R3
Potentiometers		
10kΩ *log.*	1	R20 (optional, see text)
470kΩ *lin.*	1 (per filter)	R5/8 dual-gang
Capacitors		
Polyester		
1.5nF	2 (per filter)	C1, C2
470nF	1	C6 (see text)
Ceramic		
0.1μF	2	C3, C5 (3 needed for 2 filters)
Tantalum		
10μF 16V	1 (per filter)	C4
47μF 6V	1	C7
47μF 10V	1	C6 (see text)
100μF 16V	1	C9
Electrolytic		
470μF 16V	1	C8
Semiconductors		
Diodes		
5mm l.e.d.	1	D1
Transistor		
BC109	1	Tr1
Integrated Circuits		
LM324N	1	IC1
TBA820	1	IC2

Miscellaneous

Maplin Blue Case 212; 4-way lever terminal block; 2.1mm d.c. power socket; on/off switch, Slow motion drive (1 per filter); Pointer (see text); Rotary switch 3p 4w (S1) (1 per filter); Headphone jack (optional); Headphone jack; Veroboard 39 tracks x 19 holes; PCB guides or 'L' brackets; Instrument knobs (2 per filter), Clip for D1; PCB pins and hook-up wire.

Dual-gang Test Rig

Readers with a mechanical turn of mind may be interested in a little gadget that I have built as a by-product of experiments involving tuned filters and oscillators. Very often, designs such as the 'state variable' or 'Wien-network' require a dual-gang potentiometer for tuning, and maybe the correct value cannot be found in the junk box.

Furthermore, it is not always practical to go out and buy the correct value, particularly, if the lash up may come to nothing, and so a device that uses two single potentiometers can enable the experiment to continue without incurring any extra expense.

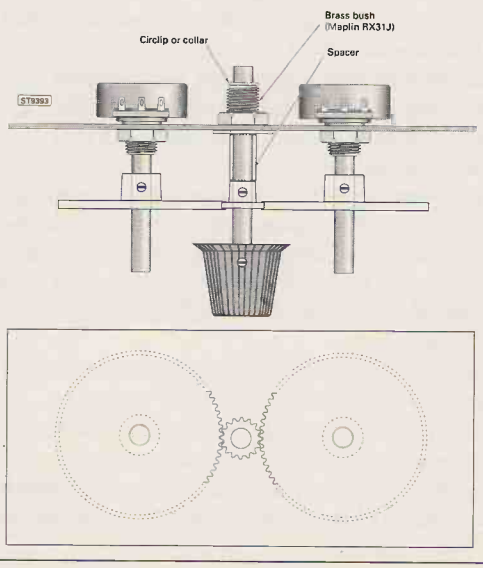
Although the potentiometers must be the same nominal value and have the same law, i.e. *log* or *linear*, they need not be identical. Even with a slight mismatch, you will still be able to tell whether or not the circuit is going to work. They are mounted on a strip of metal or piece of angle and are geared together by brass or Nylon gears obtained from a model shop.

A small idler gear is used to ensure that both controls rotate in the same direction. Although this could be taken care of in the wiring, the idler also serves as a useful slow motion drive. Fig. 2.3 shows the arrangement from above and from the front. The actual gear ratio is unimportant and depends mainly on what can be purchased locally - my set-up uses 80 teeth for the large gears and 12 teeth for the idler. The gears must have a bush with a 0.25in dia. hole and the ability to be secured with grub screws. The idler shaft is a length of 0.25in dia. rod, supported in a brass bush which is mounted on the metal panel. A piece of discarded potentiometer shaft is ideal for this. A suitable length spacer is used to align the idler with the two large gears, and its shaft is located at the rear by either a circlip or a metal collar.

In order to accurately mark out the metal panel for drilling the three mounting holes, first lay the gears, in mesh, in a straight line, on a piece of white card, and mark their centres with a thin pencil. This should result in three small circles on the card so that the distance between their centres can be carefully measured and transferred to the metal.

When drilling the holes for the potentiometer bushes, allow a very small amount of free play so that there is room for adjustment to enable the whole assembly to rotate freely. I have constructed a couple of these devices, and found that the time spent in making them well worthwhile. Once you are satisfied that the circuit is going to work correctly, the appropriate value dual-gang potentiometer can then be purchased.

Fig. 2.3.



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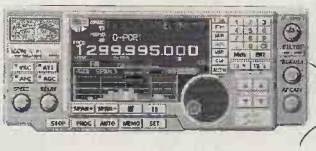

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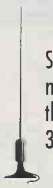

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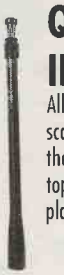

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Allows the connection of any HF antenna to any scanner that has a BNC connector. Simply connect the long wire antenna to the push terminal on the top of the interface and attach to your scanner in place of your existing antenna.

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POLICE STYLE HOLSTER HHC-2

Matches all handhelds can be worn on the belt or attached to the quick release body holster.

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Deluxe over the ear earpiece.

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Mobile holder for handhelds

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A fully adjustable desk top stand for use with all handhelds. Fitted coaxial fly (FAI) with BNC & SO239 connectors

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REGULAR-GAINER RH-770 BEWARE OF COPIES

21cm flexible whip that is ideal as replacement

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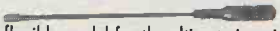

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TSA-6671 BNC magmount.....£22.95

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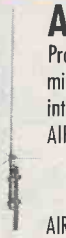

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Q-TEK APOLLO 2000

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

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Q-TEK HYPER SCAN

Receive 25-2000MHz. A high performance wideband antenna with PL-259 fitting. Complete with mounting brackets.

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A high performance wideband antenna offering superb performance from 25-2000MHz. Transmit range:- 6m, 2m, 70cm, 32cm & 23cm (power handling 200W). Fitted with low loss 'N' type connector. Supplied with mounting brackets.

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SONY SW-100E
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Portable SW receiver with SSB and RDS. RRP ~~£199.95~~.

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Portable all mode SW receiver with built-in cassette recorder.

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UK Scanning Directory
6th Edition
New UK Scanning Directory (6th edition). 25-1.8GHz.

£18.50 (P&P £2).

THE Q-TEK INTRUDER MODEL QT-2000
Superb quality wideband receiving antenna. Covers 100kHz-2GHz (all mode). ★ Size only 290 wide x 430 high x 45mm deep. ★ Can be mounted like a picture frame on a wall ★ Can be loft mounted ★ Mounted externally like an alarm box ★ 2 x SO239 sockets.
For HF:- this unit utilises 6 independent HF "inductively" shortened verticals and has a separate wire connection for using the internal MLB (Magnetic Balun).
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Ideal indoor or out. £99.95 + £6 P&P.

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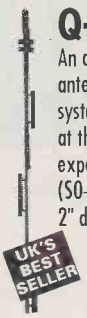

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An amazing new design concept in compact HF antennas. Thanks to its six-stage multi resonant coil system stacked vertically utilising a magnetic balun at the base you can obtain better results than ever experienced from a compact-vertical HF antenna. (SO-239 fitting:- 4' high – clamps to any mast up to 2" dia). 0-30MHz.

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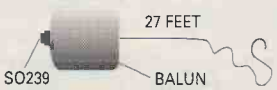
NEW SP–1 SPYWIRE
Ideal for any receiver. Receives all short wave bands. All mode, no ATU required. Built in balun. SO239 connection.



£24.95 + £3 P&P

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The ultimate in high quality long wire antenna kits. Complete ready to go wire antenna that should last forever – don't forget you get what you pay for! (0-30MHz) length - adjustable up to 150ft.

£39.95 P&P £5.

(All parts - high quality and replaceable)

PALSTAR AA30
Short wave active antenna.

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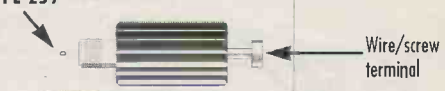
HOWES CT-U9
SW ATU with built-in balun. SO239 fittings.

ONLY £69.95 P&P £4

NEW Q-TEK BALUN
Short wave magnetic long wire adaptor for any short wave receiver. Simply screw onto receiver & connect the wire via supplied screw terminal. (It's brilliant).

ONLY £19.95 P&P £1



AN-71 PORTABLE ANTENNA
1.8-30MHz unwinds to 28ft. Supplied with clip adaptor. Winds back in seconds. Great for portable use, indoors etc.
Connects to any receiver. OUR PRICE £9.95 P&P £1

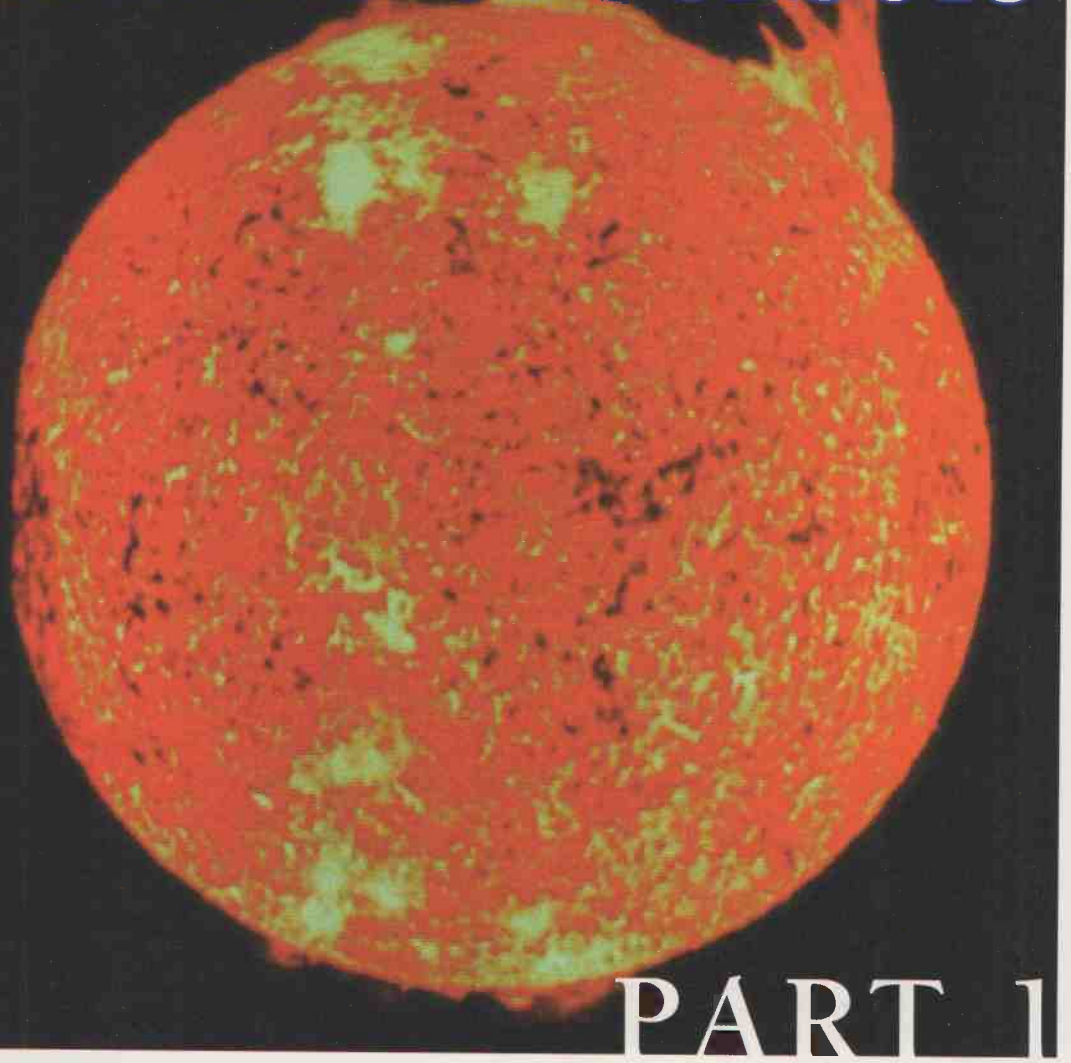
AN-1 .....Sony active base antenna. 0-30MHz..**£69.95** P&P £5

RADIOSCIENCE OBSERVATION

Magnetometer Sensors

PART 1

This month, Joe Carr reveals some theory, and provides some practical details to allow construction of actual measurement instruments using magnetometer sensors.



NASA/JPL photograph

Magnetic fields are of significant interest to scientists and engineers, so it is not surprising that there are a number of magnetic sensors available. Amateur radio operators and short wave listeners who study propagation often use magnetometers to measure the earth's magnetic field as a function of time. The usual kit is a kluge called the 'jam jar magnetometer'. It works, but its elegance leaves something to be desired (which is a charitable way of putting it!). In this article we will look at a version of the flux gate magnetic sensor that is available to amateurs, plus some applications such as magnetometers and gradiometers. Some of these are useful to the propagation students, while others are used by detectorists, amateur scientists and RadioScience Observers.

Magnetometers are used in a variety of applications in science and engineering. One high tech magnetometer is used by naval aircraft to locate submarines. Metal detectorists and archeologists use magnetometers to locate buried treasure, marine archeologists and treasure hunters use the devices to locate sunken wrecks and sunken treasure. In industry magnetometers and related sensor circuits are used to detect anything made of ferrous metal. One such application is counting or detecting the presence of parts on an assembly line.

Gradiometers are differential magnetometers, i.e. a system of two balancing magnetometers, usually in the vertical plane, that produce equal outputs when there are no magnetic anomalies in the vicinity of either sensor.

Flux-gate Sensors

Flux-gate magnetic sensors are basically over-driven magnetic core transformers in which the transducible event is the saturation of the magnetic material. These devices can be made very small and compact, yet provide reasonable accuracy.

The most simple form of flux-gate magnetometer sensor is shown in **Fig. 1**. It consists of a nickel-iron rod used as a magnetic core, wound with two coils. One coil is used as the excitation coil, while the other is used as the output or sensing coil. The excitation core is driven with a square wave, **Fig. 2**, with an amplitude that is high enough to saturate the core. The output current signal will increase in a linear manner so long as the core is not saturated. But when the saturation point is reached, the inductance of the coil drops and the current rises to a

level limited only by the coil other circuit resistances.

If the sensor of **Fig. 1** were in a magnetically pure environment, then the magnetic field produced by the excitation coil would be the end of the story. But there are magnetic fields all around us, and these either add to or subtract from the magnetic field in the core of the flux-gate sensor. Magnetic field lines along the axis of the core have the most effect on the total magnetic field inside the core. As a result of the external magnetic fields, the saturation condition occurs either earlier or later than occurs with only the excitation field in operation. Whether the saturation occurs early or later depends on whether the external field opposes or reinforces the excitation field.

The variation in entering saturation state is the transducible event on which this type of sensor is based. Unfortunately, it's also a bit difficult to recover this information. A better solution is shown in **Fig. 3**. In this version of the flux-gate magnetometer there are two independent cores, each of which has its own excitation winding. A common pick-up winding serves both cores. The excitation coils are wound in the series-opposing manner such that the induction currents in the cores precisely cancel each other if the external field is zero. The external field causes pulses to arise in the pick-up coil that can be integrated in a low-pass filter to produce a slowly varying d.c. signal that is proportional to the applied external magnetic field.

Toroidal Core Flux-gate Sensor

The straight core flux-gate sensors suffer from two main problems. First, the desired signal is small compared with the signal on which it rides, so is difficult to discriminate properly. Second, there must be a very good match between the cores and the excitation winding segments on each winding. While these can be overcome, it becomes expensive and thus suffers in popularity.

A better solution is to use a toroidal or 'doughnut' shaped magnetic core, **Fig. 4**. This type of core relieves the problem of picking off small signals in the presence of large offset components. It also reduces the drive levels required from the excitation source.

In the toroidal core flux-gate sensor we can get away with using a single excitation coil wound over the entire circumference of the toroidal core, **Fig. 4**. The pick-up coil is wound over the outside diameter of the core, rather than around the ring as is the excitation coil.

Another advantage of the toroidal core form of magnetometer sensor is that a pair of orthogonal - i.e. right angle - pick-up cores can be installed that will allow null measurements to be made.

Figure 5 shows the orientation of the toroid core flux gate sensor as a function of sensitivity. The maximum sensitivity occurs when the magnetic H-field is orthogonal to the pick-up coil, while minimum sensivitity occurs when the pick-up coil and H-field are aligned with each other. As you can see, when there are two pick-up coils at right angles to each other, then one will be most sensitive as the other goes through the null condition.

A Practical Flux-gate Sensor

A compact and reasonably low cost line of flux-gate sensors, designated FGM-x, is made by **Speake & Co. Ltd., Elvicta Estate, Crickhowell, Powys, Tel: (01873) 810302, FAX: (01873) 810958** and distributed in the United States by Fat Quarters Software, 24774 Shoshonee Drive, Murrieta, CA 92562, USA; Tel: 001-909 698 7950 and FAX: 001-909 698 7913. The FGM-3, **Fig. 6**, device is the one that I evaluated when preparing this article. It is 62mm long by 16mm diameter. These devices convert the magnetic field strength to a signal with a proportional frequency. One of the things I found fascinating about the FGM-3 is that a set of only three leads provides operation:

Red	+5 V d.c.
Black	0V
White	Output Signal

The magnetic detection rating of the device is ±0.5oersted (±50tesla). This range covers the earth's magnetic field, making it possible to use the sensor in earth field magnetometers. Using two or three sensors in conjunction with each other provides functions such as compass orientation, three-dimensional orientation measurement systems and three-dimensional gimballed devices such as virtual reality helmet display devices. It can also be used to provide magnetometry (including earth field magnetometry), ferrous metal detectors, underwater shipwreck finders, and in factories as conveyer belt sensors or counters. There are a host of other applications where a small change in magnetic field is the important transduction event.

Fig. 1.

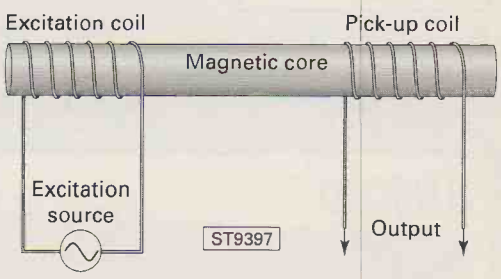


Fig. 2.

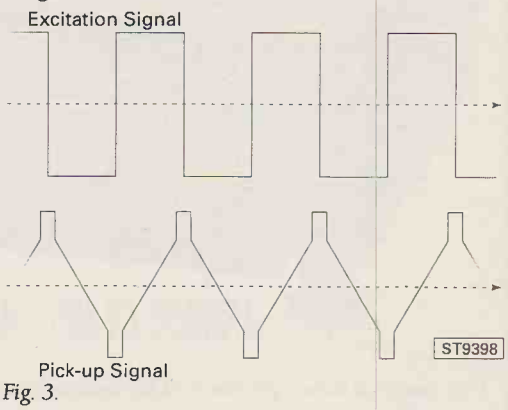
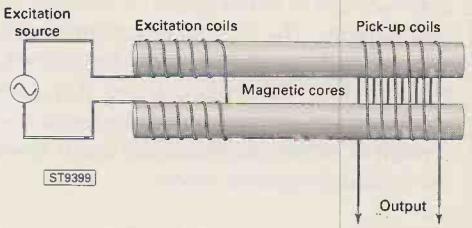


Fig. 3.



The packages for the FGM-1 and FGM-3 sensors are shown in **Fig. 7**. The FGM-3 has the three leads discussed above, and is of the 62 x 16mm size. The FGM-1 device is smaller than the FGM-3, being 30mm long by 8mm diameter. It has a small connector on one end consisting of four pins: 1) feedback; 2) signal output; 3) ground, and 4) +5 V d.c. power. The signal, output and ground terminals are essentially the same as on the FGM-3, but the feedback pin provides some extra flexibility. The feedback pin leads to an internal coil that is wound over the flux-gate sensor. It is used to alter the zero field output frequency, or to improve linearity of the sensor over the entire range of the sensor.

The FGM-series device output is a +5V (TTL-compatible) pulse whose period is directly proportional to the applied magnetic field strength. This relationship makes the frequency of the output signal directly proportional to the magnetic field strength. The period varies typically from 8.5 to 25μs (see calibration curve in **Fig. 8**), or a frequency of about 120 to 50kHz. For the FGM-3 the linearity is about 5.5% over the ±0.5oersted range.

The FGM-1, FGM-2 and FGM-3h sensors are related to the FGM-3. The FGM-1 is the smaller version of the FGM-3, with a range of ±0.7oersted (±70tesla). The FGM-2 is an orthogonal sensor that has two FGM-1 devices on a circular platform at right angles to one

ARD-2

Compact self powered portable ACARS & NAVTEX decoder with built-in display

£295 inc VAT + £4.00 P&P

If you think that data reception of aircraft ACARS and marine NAVTEX is only for experienced professional commercial operators, the ARD-2 may cause you to think again. This decoder & display unit has been designed with both the newcomer and experienced "go anywhere and everywhere" operators in mind.

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

Imagine sitting at an airfield with the ARD-2 in one hand and a hand-held receiver in the other (such as the AR8000) with just a single connecting cable between them... its that simple. As ACARS activity is highest during take off and landing, you will see first-hand 'what is happening'... 'who & what' is going 'where & when' !

The ARD-2 is just as capable at home offering reception of ACARS and NAVTEX. NAVTEX traffic (audio signal from a short wave receiver tuned in SSB such as the AR7030) is every bit as interesting with search & rescue, weather warnings and other routing traffic being regularly transmitted.

Getting started could not be easier, the ARD-2 is as simple as connecting audio from a suitable radio receiver and switching on:

1) Connect the AOR AR5000 to the AF IN of the ARD-2 using the supplied lead.
2) Select the local ACARS VHF airband primary frequency in AM mode: 131.550 MHz in the USA, Canada & Pacific, 131.450 MHz in Japan and 131.725 MHz in Europe.
3) Adjust the volume of the AR5000 to the 11 o'clock position.
4) Switch on the ARD-2 and away it goes, text will be decoded automatically by the ARD-2 and displayed on the LCD two lines at a time.

NAVTEX is easy too... select NAVTEX-E, tune the AR5000 to a NAVTEX frequency (such as 518 kHz), select SSB... and a whole new world opens up. Changing receive data mode is easy, just press one of the four mode keys:

[1] ACARS-1 mode (default) - airband ACARS

[2] ACARS-2 mode, raw data output, ideal for computer control - airband ACARS

[E] NAVTEX-E English language - marine NAVTEX

[J] NAVTEX-J Japanese character set

☆ 'Go-anywhere' portable ACARS / NAVTEX decoder with built-in LCD

☆ Simple to operate

☆ Operation from 4 x AA internal batteries or 12V external d.c.

☆ COM connector for RS232

A built-in speaker with volume control allows you to monitor activity and assess what is going on, this is particularly useful for fine tuning of NAVTEX and enables you to shut the sound off completely when not required. A LEVEL control provides threshold adjustment to achieve the best capture of weaker signals for improved differentiation between noise and data.

Sockets are provided on the front and rear panels for external speaker and earphone connection etc. A 9-pin ***RS232*** socket is also provided to enable ***connection to a computer*** for improved comfort when viewing for extended periods of time (Windows95TM Hyper-Terminal may be easily configured), the RS232 connecting lead is supplied with the ARD-2.

Don't get left behind... take a close look at the ARD-2 today and enjoy the digital revolution.

Specification

Model	ARD-2 ACARS/NAVTEX decoder
Power Supply	12V dc or 4 x AA battery cell
Current Consumption	Max. 280mA
Fuse	1A instantaneous
Decode Signal	
ACARS	Modulation MSK Carrier 2400 Hz Bit rate 2400 bps Code type NRZi Length of 1 character 7 bit+1 parity
NAVTEX	CCIR Rec476-2B Mark 1615 Hz Space 1785 Hz Shift 170 Hz Bit rate 100 bps Length of 1 character 7 bit
Display	LCD 16 character x 2 line
Control	LED 4 x Mode Selection (green) 1 x DECODE (red)
Key	4 x Mode Selection 1 x Scroll UP 1 x Scroll DOWN 1 x Back Light ON/OFF 1 x Decode Restart
Audio signal	
Input	3.5 mm mono jack Input impedance 1k OHM Input level 0.2 - 2V p-p External speaker 3.5mm mono jack Earphone socket: two, each on front and rear panel
Serial Interface	Connector: D-Sub 9-P male Baud rate: 9600 bps Data length: 8 bit Stop bit: 1 Parity: None Flow control: RTS hard flow
Operating temp	0 - 45°C
Dimensions	158L x 109W x 53H mm excl projections
Weight	330g excl. batteries *E&OE*

AR8000UK wide band hand held receiver

The AR8000UK provides a frequency coverage from 500 kHz to 1900 MHz without gaps in the range (actual acceptable frequency input from 100 kHz). The AR8000 combines full computer compatibility with advanced wide-band radio receiver technology. The all-mode reception provides AM, USB, LSB, CW, NFM and WFM. Step size is programmable in multiples of 50Hz for smooth tuning. The high visibility dot matrix LCD provides great detail including a signal strength bar meter, band-scope etc. Computer control and clone of data between two AR8000UK receivers (optional interface required) **£349**

Fig.4

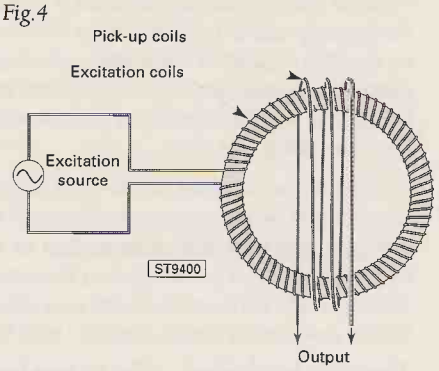


Fig.5

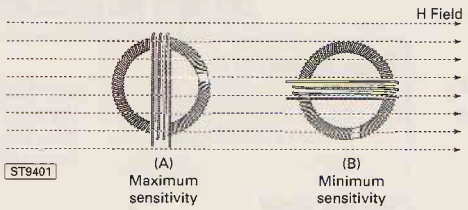


Fig. 6.

Fig. 7.

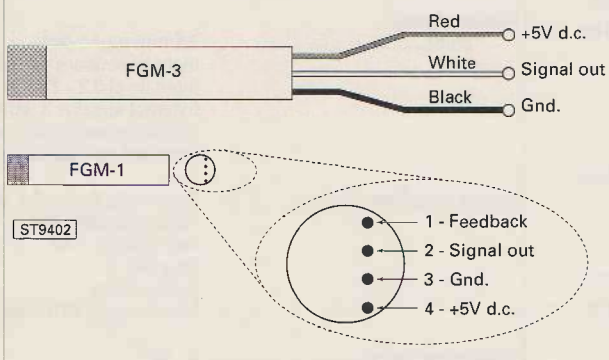
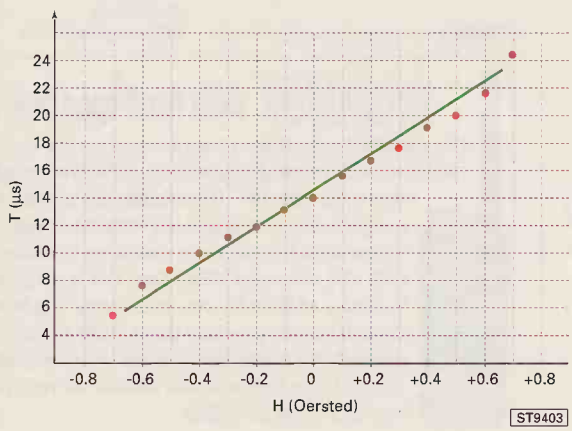


Fig. 8.



another. This orthogonal arrangement permits easier implementation of orientation measurement, compass and other applications. The FGM-3h is the same size and shape as the FGM-3, but is about 2.5 times more sensitive. The output frequency changes approximately 2 to 3Hz per gamma of field change, with a dynamic range of 0.15oersted (about one-third the earth's magnetic field strength).

The response pattern of the FGM-x series sensors is shown in **Fig. 9**. It is a figure-of-eight pattern that has major lobes (maxima) along the axis of the sensor, and nulls (minima) at right angles to the sensor axis. This pattern suggests that for any given situation there is a preferred direction for sensor alignment. The long axis of the sensor should be pointed towards the target source. When calibrating or aligning sensor circuits it is common practice to align the sensor along the east-west direction in order to minimise the effects of the earth's magnetic field.

Powering the Sensors

The FGM-x series of flux-gate magnetic sensors operates from +5V d.c., so is compatible with a wide variety of analogue and digital support circuitry. As is usual for any sensor, you will want to use only a regulated d.c. power supply for the FGM-x devices. In fact, the manufacturer recommends that double-regulation - **Fig. 10a** - be used. Ripple in the d.c. power supply can cause output frequency anomalies, and those should be avoided. In the circuit **Fig. 10a**, an unregulated +12 to +15V d.c. input potential is applied first to a 9V 78L09 or 78M09 three-terminal IC voltage regulator (IC1). This produces a +9V regulated potential that is then applied to the input of the 78L05 or 78M05 device (U2). The second regulator reduces the +9V from IC1 to the +5V needed for the FGM-x sensors.

When other digital devices are being powered from the same d.c. power supply it is prudent to provide a separate d.c. source for the FMG-x sensors. In **Fig. 10b** we see the type of circuit that would accomplish this task. There are two separate +5V d.c. outputs, labelled V1 and V2. Both are derived from 78L05 devices that are powered from a single 78L09. Care must be taken to not exceed the maximum current limits of IC1, especially if the same size i.c. voltage regulators are used for all three (IC1, IC2, and IC3). One of the +5V d.c. sources, either V1 or V2, can be used for powering the FGM-x device, while the other powers the rest of the circuitry.

Calibration of the Sensors

The FGM-x devices are not precision instruments out of the box, but can be calibrated to a very good level of precision. The calibration exercise requires you to generate a precise magnetic field in which the sensor can be placed. One way to generate well-controlled and easily measured magnetic fields is to build a coil and pass a d.c. current through it. If the sensor is placed at the centre of the coil (inside), then the magnetic field can be determined from the coil geometry, the number or turns of wire and the current through the coil. There are basically two forms of calibrating coil found in the various magnetic sensor manuals: solenoid-wound and the Helmholtz pair.

The solenoid coil is shown in **Fig. 11**. A solenoid is a coil that is wound on a cylindrical form in which the length of the coil (L) is greater than or equal to its diameter. This type of coil is familiar to radio fans because it is used in many LC tuning circuits. The magnetic field

(H) in oersteds is found from:

$$H = \left(\frac{4\pi NIL}{10\sqrt{(L^2+D^2)}}\right)$$

Where:
H is the magnetic field in oersteds
N is the number of turns-per-centimetres (t/cm) in the winding
I is the winding current in amperes
D is the mean diameter of the winding in centimetres (cm)

The winding is usually made with either #24 or #26 enamelled or Formvar covered copper wire. The length of the solenoid coil should be at least twice as long as the sensor being calibrated, and the sensor should be placed as close as possible to the centre of the long axis of the coil.

The Helmholtz coil is shown in **Fig. 12**. It consists of two identical coils (L1 and L2) mounted on a former with a radius R, and a diameter 2R. The coils are spaced one radius (1R) apart. The equations for this type of calibration assembly are:

$$H = \frac{0.8991NI}{R}$$

and

$$B = \frac{9.1\times10^{3}NI}{R}$$

In the practical case, one usually knows the dimensions of the coil, and needs to calculate the amount of current required to create a specified magnetic field. We can get this for the Helmholtz pair by rearranging Eq.[2]:

$$I = \frac{RH}{0.8991N}$$

The coils are a little difficult to wind, especially those of large diameter (e.g. 100mm). One source recommends using double-sided tape (the double-sticky stuff) wrapped around the form where the coils are to be located. As the wires are laid down on the form they will stick to the tape, and not dither around.

The above equations, plus a lot of magnetic theory and calibration suggestions, plus information on other sensors, are found in *The Magnetic Measurements Handbook*.

Figure 12 shows a type of assembly that can be used for either the solenoid or Helmholtz coil. I first saw this type of assembly in a college freshman physics laboratory about 25 years ago. It consists of a PVC pipe section used as the coil former. End caps on the coil former also serve as mountings. The mounts at either end consist of smaller segments of PVC pipe and Nylon (non-magnetic) hardware fasteners. Another segment of PVC pipe, of much smaller diameter than the coil former, is passed through the former from one end cap to the other, such that its ends protrude to the outside. This pipe forms a channel into which the sensor can be placed. The base is a plastic or wooden box (again, non-magnetic materials). One thing nice about this type of assembly is that the sensor is always in approximately the same position in the coil, close to the centre of the field.

Analogue Interface to FGM-3

A method for providing an analogue interface to the FGM-3 and its relativesis shown in **Fig 14**. The output of the sensor is a 40 to 125kHz frequency that is proportional to the applied magnetic field. As a result, we can use a frequency-to-voltage (F/V) such as the LM-2917 to render the signal into a proportional d.c voltage. That voltage, in turn, can be used to drive an analogue or digital voltmeter or milliammeter. The LM-2917 is selected because it is widely available at low cost from mail order parts distributors.

The output circuit consists of a bridge made up of R1, R2 and R3, along with the output of the LM-2917 device. R2/R3 form a resistive voltage divider that produces a potential of 0.5 x V+ at one end of the 22kΩ sensitivity control (R4). If the voltage produced by the LM-

Fig. 10b.

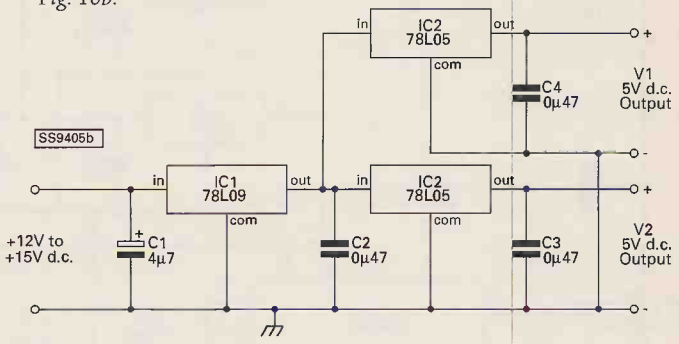


Fig. 10a.

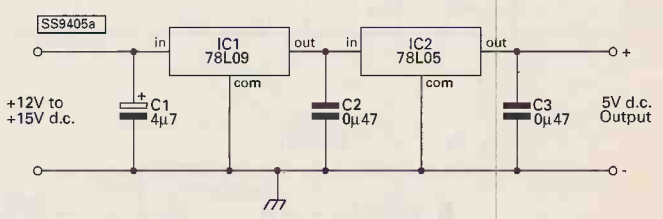


Fig. 9.

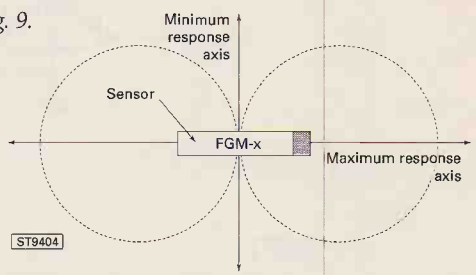


Fig. 11.

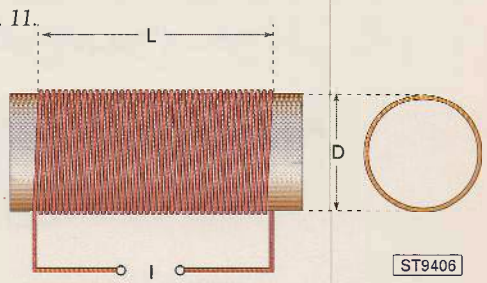


Fig. 12.

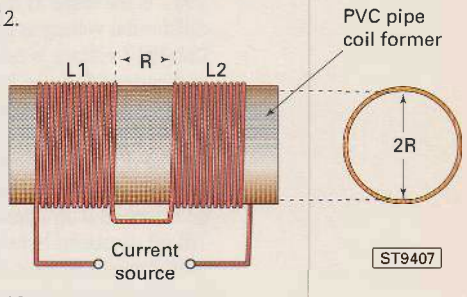


Fig. 13.

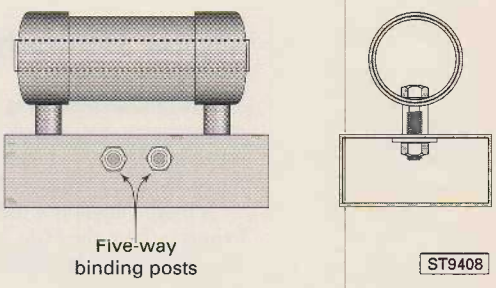


Fig. 14.

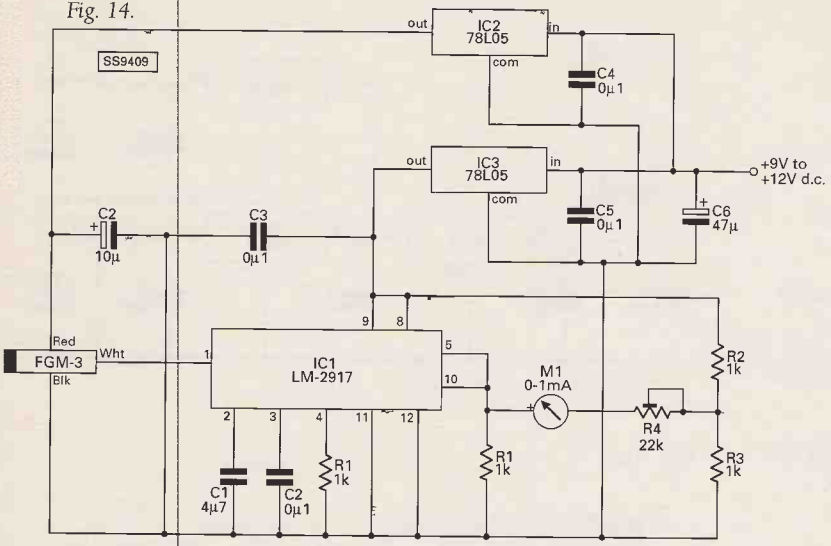


Fig. 15.

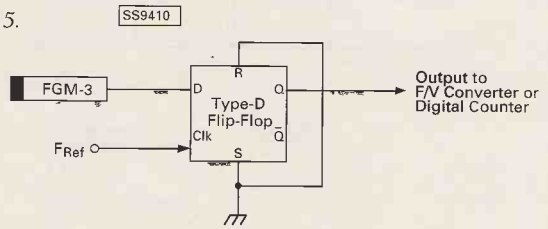
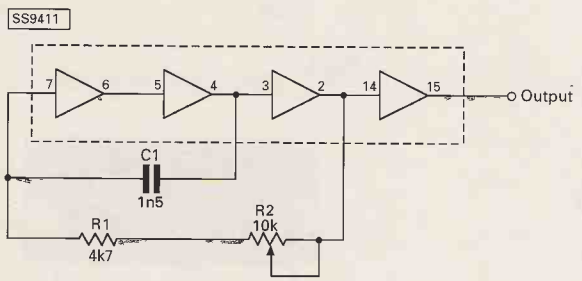


Fig. 16.



2917 is the same as the voltage at R4, then the differential voltage is zero and no current flows. But if the LM-2917 voltage is not equal, then a difference exists and current flows in R4/M1. That current is proportional to the applied magnetic field. Meter M1 and R4 can be replaced with a digital voltmeter, if desired.

The d.c. power supply uses two regulators, one for the FGM-3 and one for the LM-2917. Even better results can be obtained if an intermediate voltage regulator, say a 78L09, is placed between the V+ source and the inputs of IC2 and IC3. That results in double regulation, and produces better operation.

Digital 'Heterodyning'

The method shown in **Fig. 15** results in a more sensitive measurement over a small range of the sensor's total capability. The circuit makes it possible to measure small fluctuations in a relatively large magnetic field.

A D-type flip-flop is used in **Fig. 15** to 'mix' the frequency from the FGM-3 with a reference frequency F_{REF}. The FGM-3 literature calls this process 'digital heterodyning' (dare we call it 'digidyning?' *let's not eh Joe! - KN.*), although it is quick to point out that it is really more like the production of alias frequencies by undersampling than true heterodyning.

Two types of frequency source can be used for F_{REF}. For relatively crude measurements, such as a passing vehicle detector, the CMOS oscillator of **Fig. 16a** is suitable. This circuit is based on the 4049 hex inverter chip connected in an astable multivibrator configuration. The exact frequency can be adjusted using R2, a 10kΩ, 10-turn potentiometer.

Where a higher degree of stability is needed, for example when making Earth field variation measurements or testing magnetic materials, a more stable frequency source is needed. In that case, use a circuit such as **Fig. 16b**. This circuit uses a crystal controlled oscillator feeding a binary divider network. Crystal oscillators can be built, or if you check the catalogues you will find that a large number of frequencies are available in TTL and CMOS compatible formats at low enough costs to make you wonder why you would want to build your own.

The reference frequency is adjusted to a point about 500Hz below the mean sensor frequency. This frequency is measured when the sensor is in the east-west direction. This arrangement will produce a frequency of 0 to 1000Hz over a magnetic field range of 500 gamma.

A Magnetometer Project & Kit

The circuit for a simple magnetometer based on the FGM-3 flux-gate sensor is shown in **Fig. 17**. It can be obtained in kit form from Fat Quarters Software. The connections to the printed circuit board are shown in **Fig. 18**. This device takes the output frequency of the FGM-3, passes it through a special interface chip (IC1) and then to a digital-to-analogue converter to produce a voltage output.

The sensitivity switch (S1) produces the following sensitivies when the FGM-3 sensor is used:

S1 Position	Sensitivity (gamma)
4	±150
3	±250
2	±550
1	±1000

These ranges translate to a d.c. output voltage between 0 and +2.5V. If the FGM-3h sensor is used instead of the FGM-3, then divide the sensitivity figures by two. These figures are approximate. If greater accuracy is needed, then each sensor should be individually calibrated.

The heart of this magnetometer project (**Figs. 17** and **18**), other than the FGM-3 device, is the special interface chip, Speake's SCL006 device. It provides the circuitry needed to perform magnetometry, including earth field magnetometry. It integrates field fluctuations in one-second intervals, producing very sensitive output variations in response to small field variations. It is of keen interest to people doing radio propagation studies, and who need to monitor for solar flares. It also works as a laboratory magnetometer for various purposes. The SCL006A is housed in an 18-pin DIP package.

The D/A converter (IC2) is an Analog Devices type AD-557. It replaces an older Ferranti device seen in the Speake literature because that older device is no longer available. Indeed, being a European device it was a bit

hard to find in unit quantities required by hobbyists on this side of the Atlantic. The kit from Far Quarters Software contains all the components needed, plus a printed circuit board. The FGM-3 device is bought separately.

The external connections are shown in **Fig. 18**. The circuit is designed to be run from 9V batteries so that it can be used in the field. A sensitivity switch provides four positions, each with a different overall sensitivity range. The output signal is a d.c. voltage that can be monitored by a strip-chart or X-Y paper recorder, voltmeter, or fed into a computer using an A/D converter.

If you intend to use a computer to receive the data, then it might be worthwhile eliminating the D/A converter and feed the digital lines (D0-D7) from the SCL006A directly to an eight-bit parallel port. Not all computers have that type of port, but there are plug-in boards available for PCs, as well as at least one product that makes an eight-bit I/O port out of the parallel printer port. (*See the rear advert sections of most computer magazines, to find details of this type of card - KN.*)

Sensor Head Mechanical Construction

When evaluating the FGM-3 sensor I built a magnetometer based on **Figs. 17** and **18**, using the kit provided by Far Quarters Software. The printed circuit, switches and meter were mounted on a small sloping front cabinet. The goal was to build a sensor head that could be rotated to find the magnetic field (the FGM-x sensors are direction sensitive). The solution was to place the sensor inside a 19mm PVC plumbing 'tee' connector (**Fig. 19a**). Three end caps were provided, one for each port on the 'tee' connector. The end cap that was on the down stroke of the 'tee' is fitted with a 6.35mm stereo phone plug (see detail in **Fig. 19b**). When this plug is mated with a jack socket on the top of the project's case, it can be rotated at will.

Mounting the FGM-3 sensor inside the PVC 'tee' connector is shown in **Fig. 19c**. The sensor is mounted horizontally in the cross piece of the 'tee', while the wires are routed to the down stroke section. The sensor is held centred in the cylindrical PVC 'tee' with small plugs made of styrofoam or some other material. I used a small hobbiest razor knife to carve the larger size Styrofoam 'peanuts' of the sort used for packing fragile items for shipping. The finished sensor assembly is mounted on top of the project's case.

Fig. 17.

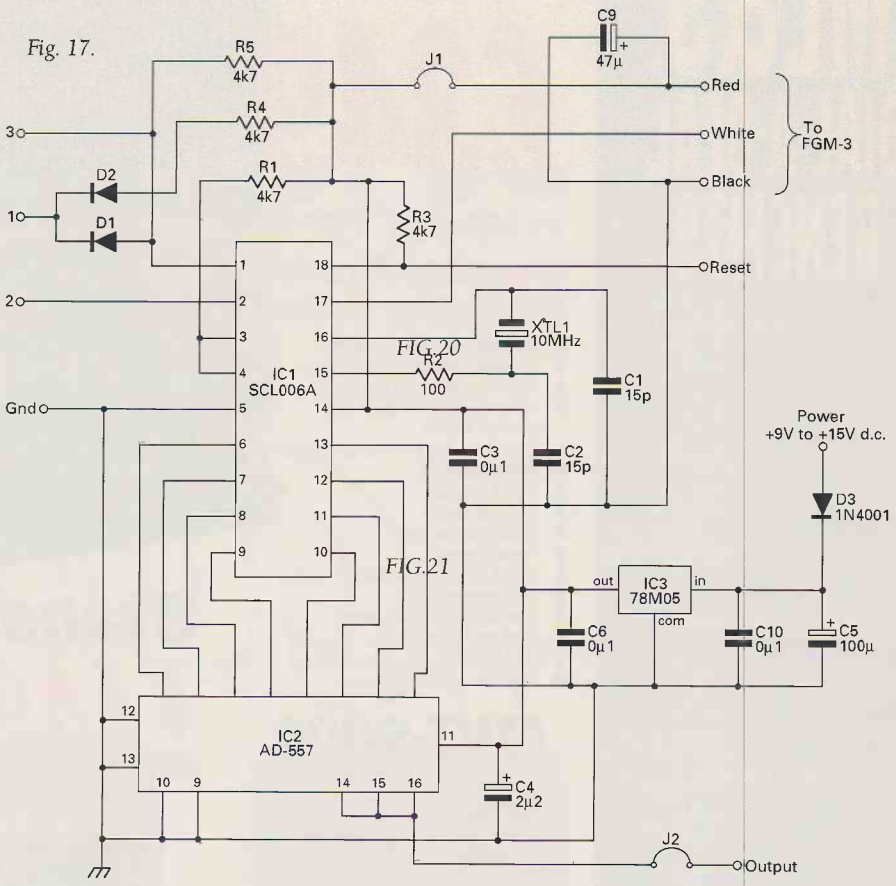


Fig. 18. SS9414

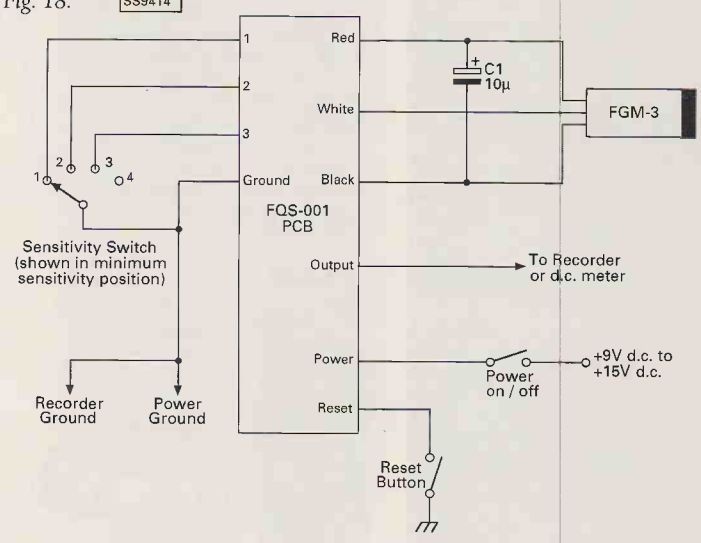


Fig. 19a.

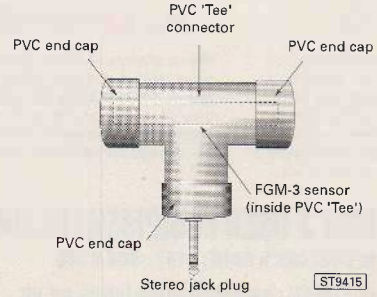


Fig. 19b.

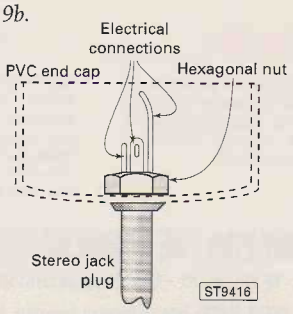
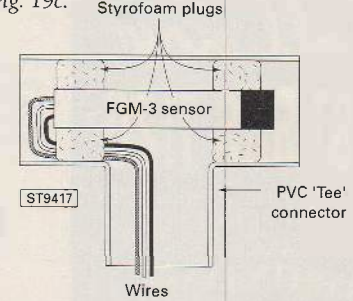


Fig. 19c.



Part 2 will conclude this look at Magnetometer Sensors with gradiometers and interfacing with microcontrollers.

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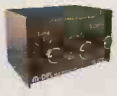

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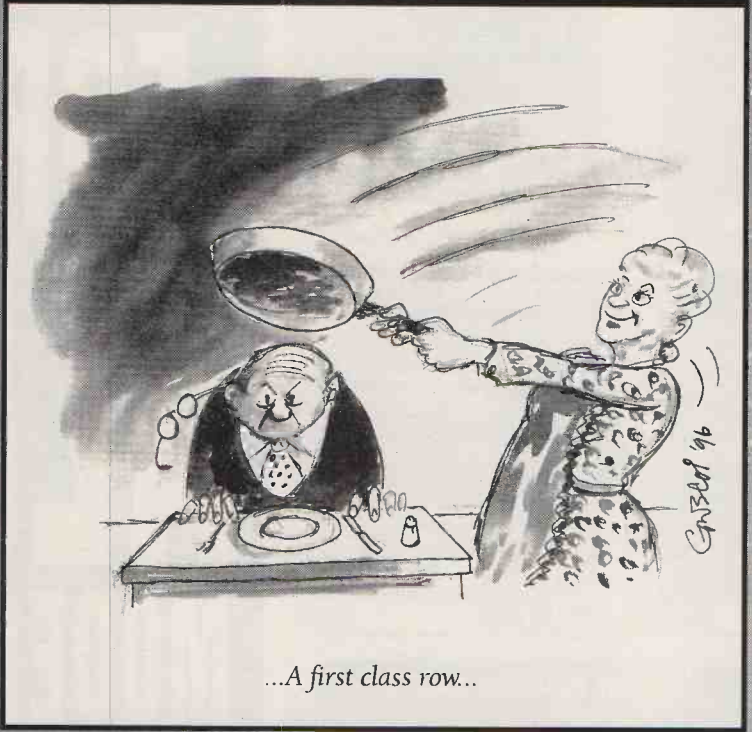

...A first class row...

Mary Hewitt well remembers the day in 1923 when her father brought home from London a crystal set and two pairs of headphones. She recalls that the headphones cost 25/- (£1.25) each, and together must have amounted for more than his week's wages as a railwayman, but she no longer remembers the price of the crystal set. In any case, it was a big outlay for her father, but the lure of the modern miracle, wireless, was too strong for him to resist.

The next day, Mr Hewitt erected a pole, ten metres high, at the end of his garden, and strung an aerial wire from it to the house. In the evening, he connected up his crystal set and he and Mary donned the headphones.

After her father had manipulated the catswhisker for some time, Mary was thrilled to hear in her 'phones a children's programme and, later, the Orpheus Choir. Naturally, in the custom of those times, admiring neighbours were invited in to hear the new wonder.

When the Hewitts had owned their crystal set some time, a detached house was built next door to their's, in the Midlands village of Crudworth, and the new Headmaster of Mary's school, together with his wife and baby daughter, moved in. The two families got on well together and the newcomers were greatly impressed by the Hewitts' wireless. Eventually, the Headmaster, too, bought a crystal set and erected an aerial for it the length of his garden.

Keen Singers

Mary's parents happened to be keen singers with good voices, and when one started singing in the home, the other would join in and harmonise. One evening, after they had enjoyed an impromptu song together, there was a knock at the back door and the Headmaster's wife burst in. She told Mary's mother excitedly that they had

A SEVENTY YEAR OLD M

put their wireless on, and in the headphones had heard quite clearly a duet that sounded like Mr and Mrs Hewitt singing.

Mary and her father glanced at the table on which their crystal set stood with the two sets of headphones plugged in and lying face upwards. Somehow, it seemed, their wireless had transmitted the singing which had then been picked up by their neighbours' set. Mr Hewitt surmised that the two aerials being close and parallel had something to do with it.

After the neighbour had gone back to report to her husband, Mrs Hewitt recalled an incident that had puzzled her a few nights before. She had heard in her headphones a man and a woman having a 'first class row' and couldn't find out from her *Radio Times* what it was. Now she knew: it was the highly respected headmaster and his wife engaged in a slanging match, unwittingly transmitted through their crystal set.

Eager For Details

Mary was eager for details of the quarrel, but those were the halcyon days when children were supposed to be seen but not heard, and she was threatened with severe punishment if she breathed a word about it at school. Mary puts these events in 1926 or thereabouts, when she was perhaps ten years old.

Many years later, she questioned her father about the affair, and he assured her that it had happened: he and Mary's mother really had 'broadcast on the wireless', though they did not know it had come about. Told about the phenomenon recently, a wireless engineer proffered an explanation as follows:

The long wire aerial and the associated crystal set's tuned circuit together comprise a free-running oscillator powered by the remote transmitter. The earphones used in those days were of the iron diaphragm type that function as microphones and so generate audio signals when acted upon by sound.

When a radio frequency and an audio frequency source are joined in series with a non-linear device (the crystal) the r.f. is modulated at the audio frequency in classical transmitter manner. Next door's aerial and crystal set reproduce not only the local programme but also the sounds picked up by the 'transmitting' headphones. For the interaction between the two sets to occur, they must both be tuned to the same frequency - that of the carrier of the local station.

Valved Set

If the Hewitts' receiver had been a valved set with reaction (positive feedback), it could have raised the effective Q of the Headmaster's crystal set greatly and increased its power as a transmitter: Mrs Hewitt would have heard her neighbours' quarrel at greater volume.

It was frequently claimed in the early days of broadcasting that someone had shouted into the horn loudspeaker of his valve radio and had been heard on other sets in the neighbourhood. This was probably true.

...Manipulated the catswhisker...

The weak audio currents produced by the loudspeaker acting as a microphone could, if the sets were held near or in oscillation, modulate the radio frequency currents in parts of the set, for many parts of such receivers were woefully non-linear.

Mary Hewitt is an old lady now, although she might have understood the radio engineer's explanation, she is happy to have it confirmed that, nearly 70 years ago, her parents did transmit their duet through the family crystal set, and the headmaster and his wife, although they never knew it, did broadcast their domestic set-to through their own similar receiver.

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A high-specification scanner offering 100 channels in 10 banks, with 1 Priority Channel in each bank. For speed and ease of use it offers Jetscan, which can scan 100 channels per second, and also Jetsearch, which can search at up to 100 steps per second. It also features progammable band search, lock-out for up to 10 frequencies, channel look-out, 2 second scan delay, data noise/birdies skip, a key lock and a green back-lit display. 66-88, 108-174, 406-512, 806-956.

£119.99 + £5 P&P.

(COM205)
400 CHANNEL SCANNER

The B111 is the last word in programmable scanners. A free standing desk top unit covering nine radio bands in the 25-512MHz and 806-1300MHz ranges. Operates from AC mains or car cigar lighter via suitable adaptor. It incorporates a microprocessor avoiding the need to change crystals and gives special functions such as scan delay, memory back-up, priority channels and many more.

£249.99 + £5 P&P.

(COM102)
10 CHANNEL SCANNER

This state of the art 10 channel scanner is fully programmable and can receive a variety of PMR communications. It is robustly designed and offers a full frequency LCD display for ease of use. Also features an in-built circuit for recharging Nicad batteries. 66-88, 137-174, 380-512.

£49.99 + £5 P&P.

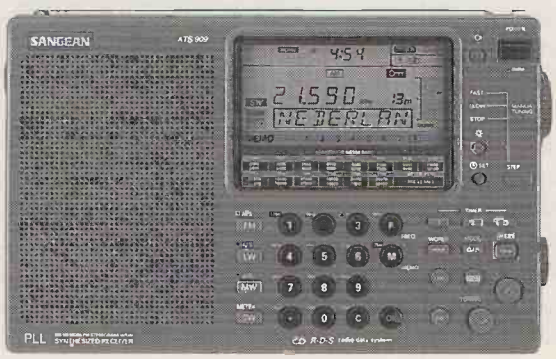
(COM215)
200 CHANNEL SCANNER

A highly-featured desktop scanner offering 200 channels arranged in 10 scanning banks, with one Priority Channel in each bank. For ease of use it offers Turbo Scan at 100 channels per second max with Autosort for maximum scan speed and Turbo Search at up to 100 steps per second. Other features include direct search programmable band search, auto station program mode, lock-out for up to 10 frequencies, manual frequency sort, programmable auto-recording and optional CTCSS tone squelch. The unit is powered by AC mains or 13.8Vdc. 66-88, 108-174, 216-512, 806-956.

£219.99 + £5 P&P.

SANGEAN ATS 909 FM-Stereo/MW/LW/SW PLL Synthesized receiver

The ATS-909 is a continuously tunable receiver from 153kHz-29999kHz. This receiver is capable of receiving and tuning all the short wave bands and any stations in between



- 307 memories (261 in SW, 18 each in MW/FM, 9 in LW plus priority station)
- Five tuning methods – direct frequency tuning, auto scan, manual tuning, memory recall and rotary tuning
- ATS (auto tuning system) – auto scan and preset in priority of signal strength in FM/MW/LW bands
- E2 PROM for memories back-up
- FM stereo via earphones
- 29 pages SW stations name memory, 9 memories in every page
- Automatic search strongest signal station within SW station pages
- SSB (USB/LSB) 40Hz/step on fine tuning
- AM RF gain control
- Built-in 42 world cities time plus D.S.T. device
- 3 individual timers
- Adjustable sleep timer
- Alarmed by radio or HWS (Humane Wake System) buzzer
- Battery and signal strength indicator
- Direct key to recall favourite station in one button
- Dual conversion device
- REC out and standby control output
- Pre-programmed station name and frequency according to customer's requirements before ex-factory
- AM wide/narrow filter and FM mono/stereo selector
- Optional features for European market
- RDS (Radio Data System) on PI, PS and CT for station name and clock time
- Size in mm: 215 x 133 x 37.5
- Weight: 850g without batteries

£169.95 + £5 P&P.

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RADING

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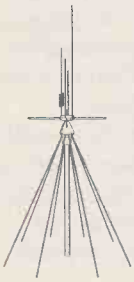
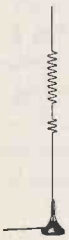
Super Syncro 1100 – 1100mAH Nickel Metal Hydride (NiMH) AA size rechargeable cells. No memory effect. Twice the capacity of NiCds. **£3.00** inc P&P.

Skyscan Desktop Antenna Model Desk 1300 disconne – Built and designed for use with scanners. Coverage: 25 to 1300MHz. Total height 36" and 18" wide at widest point. Comes complete with 4m of RG58 coax cable and BNC connector. High performance antenna, ideal indoor or as a car antenna when vehicle is stationary. **£49.00** + £3 P&P.



Skyscan DX-V1300 base disconne – Most disconnes only have horizontal elements and this is the reason that they are not ideal for use with a scanner. Most of the transmissions that you are likely to receive on your scanner are transmitted from vertically mounted antennas. The DX-V1300 has both vertical and horizontal elements for maximum reception. Constructed from best quality stainless steel and aluminium and comes complete with mounting pole. **£49.95** + £3 P&P.

Airband mini-mag antenna – Civil (108-137MHz) and military (225-400MHz) dual band receive antenna featuring super strong miniature magnet and coax cable terminated in BNC connector. **£24.95** + £3 P&P



Wideband mini-mag antenna – Wideband (25-1300MHz) receive antenna featuring super strong miniature magnet and coax cable terminated in BNC connector. **£29.95** + £3 P&P.

Yaesu FRG-100 communications receiver – Award winning 50kHz to 30MHz base station AM, CW, USB, LSB, FM (optional) communications receiver. Features include two clocks and timer, 50 memories, FM option, remote control jack. Superb value at **£449.95** + £7 P&P.

NEW 6th edition UK Scanning Directory

£18.50

+ £1.50 P&P

Radio shack DX-394 communications receiver – 150kHz to 30MHz base station AM, CW, USB, LSB communications receiver. Features include clock and timer, signal meter, 100+ memories, RF gain control and direct frequency entry. A steal at **£149.95** + £7 P&P.

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, backlit orange LCD display. Scan rate of 100/300 channels/sec. **£249.95** + £10 P&P.

AKD Target HF3 communications receiver – 30kHz to 30MHz mobile or base station AM, USB, LSB communications receiver. Very simple to operate. Ideal for the novice, but with a performance more demanding listeners will appreciate. **£159.95** + £5 P&P.

Commtel COM 206 – AM/FM handheld VHF/UHF scanning receiver. Covers 66-88MHz (FM), 108-137MHz (AM), 137-174MHz (FM), 380-512MHz (FM). Full civil airband coverage, comes complete with free case and rechargeable batteries. **£129.95** + £5 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.

£199.99 + P&P. (10 only)

Realistic PRO-2042 – AM/FM/WFM switchable base station HF/VHF/UHF scanning receiver. Covers 25-520 and 760-1300MHz. Features 1000 memories, 100 monitor channels, backlit orange LCD display. Scan rate of 50 channels/sec. **£249.95** + £10 P&P.

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The Ionosphere Indoo

The late Fred Judd G2BCX concludes with the application of the Theory Of Similar Structures to produce a working model system capable of displaying functions of the Ionospheric Regions E and F and Radar.

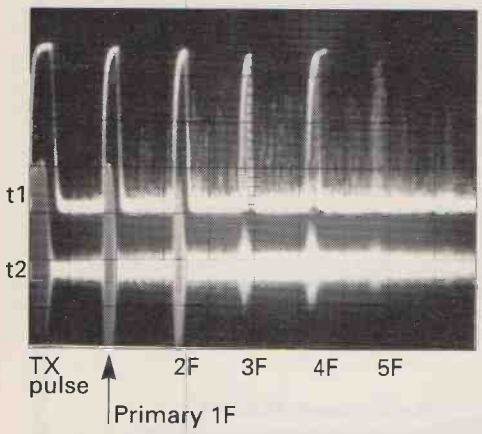


Fig. 2.1: Real primary and multiple echoes from the F region. Frequency 6.5MHz, p.r.f. 35Hz, pulse width 0.75ms.

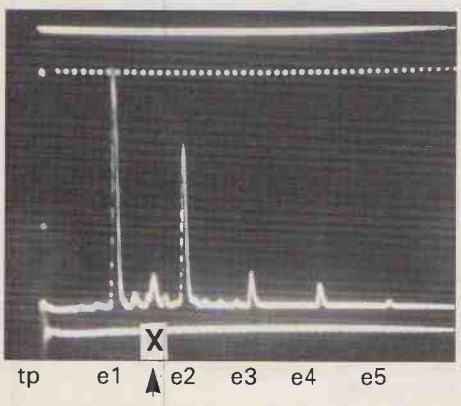


Fig. 2.2: Indoor simulation with ultrasonics of multiple echoes from a psuedo reflecting F region, i.e. the ceiling. Frequency 40kHz; p.r.f. 20Hz; pulse width 1ms; Markers (m) 1ms; (tp) transmitted pulses; (e1) primary echo; (e2, e3, e4, e5) multiple echoes; (x) see text.

Fig. 2.3: Angles of refraction related to angles of incidence (see text).

The Real Thing

The photograph, **Fig. 2.1**, shows real echoes from the (1) ionospheric F region obtained with relatively high power h.f. pulse transmission. The 'primary echo' i.f. indicates the F region virtual height as approximately 290km. The additional echoes 2F, 3F, 4F and 5F are further reflections 'time related' to the primary, i.e. the pulse responsible for 2F has travelled to the region and back twice and so on, *pro-rata*, for 3F, 4F and 5F. The 'rectified' echoes along trace 1 (t1) appear to have the same magnitude to the high gain d.c. amplifiers in the receiver.

The 'un-rectified' versions long trace 2 (t2) show the normal attenuation that occurs with repeated travel between the F region and Earth. This photograph was taken during nearly five years of ionosphere observations carried out by the writer on behalf of the Rutherford Appleton Laboratory in Oxfordshire.

Simulation (Multiple Echoes)

How close can we get the real thing as above? A 'simulation' example was included in Part 1, **Fig. 1.6**, which was measurement of the height of a reflecting region (the ceiling) above a pseudo earth (the bench). This showed only the primary echo and one secondary because the timebase of the scope in use was set for 20ms duration. Continues repetition of echoes, if any, would only be seen with a slower timebase.

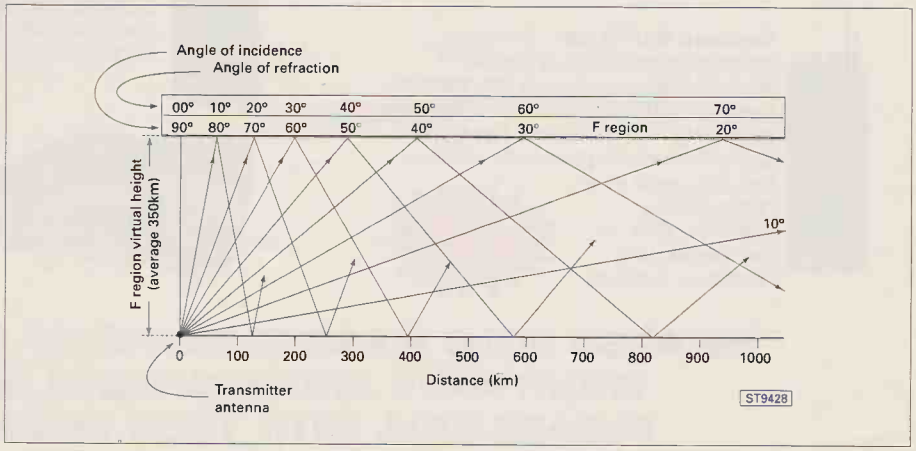
The photo, **Fig. 2.2**, shows that with the duration of the time base set to 50ms (the 50th marker is just out of the photo) there were more echoes, ie. (3), (4) and (5) as well as the primary and echo (2). Note also the gradual attenuation of the multiples die to repeated travel as explained above.

As the 'height' of the 'ceiling' reflecting region above the 'bench' pseudo earth was constant, the time interval between each echo is the same. In the case of **Fig. 2.2** this was 8ms, same as the time between the transmitted pulse and the first echo. The height of the reflecting region was, therefore, (334 x 8/1000/2) or 1.336m - the same as the example simulated in Part 1. The few small echoes above (x) in **Fig. 2.2** are from nearby obstacles in the room.

Skip Distance

Also called the 'hop distance' this is really the 'surface' distance covered when h.f. signals are transmitted at one particular place, refracted by an ionospheric region and returned to earth a considerable distance away. Commonly referred to as *being bent back to earth*. In the first instance, the signals would have been transmitted at some particular angle from earth, known as the angle of elevation (usually the vertical angle of maximum radiation from the antenna). On reaching an ionospheric region this becomes the angle of incidence., however, the angle at which the signals leave the region after refraction, is known as the angle of refraction.

The illustration **Fig. 2.3** shows how these angles are related to an angle perpendicular to earth, i.e. 90°. The



rs Part 2

angle of refraction is therefore 90 minus the angle of incidence. The skip or surface distance related to signals initiated at some given angle of elevation (or maximum vertical radiation) and refracted by the F region, may be derived from

2 x virtual height of region x tan θ

where θ= the angle of refraction.

Example: Virtual height of region = 350km. Angle of incidence θ = 40°. Angle of refraction = 90 - 40 = 50°. The skip distance will be 2 x 35 x tan 50° = 834km (rounded).

Simulation

Now, referring back to Part 1, **Fig. 1.2** top shows the arrangement for the simulation of skip distances. Signals from the transmitting transducer TX (B) travel via the reflecting region (ceiling) to the receiving transducer RX (B). As an example, take the height of the (ceiling) reflecting region to be 1.336m above the pseudo earth (bench) and the angle of incidence of the transmission with the ceiling as 40°. The angle of reflection from the 'ceiling' will be 50°, i.e. 90 - 40. The surface distance (across the bench) from TX to RX is: 2 x (tan 50 x 1.336) = 3.18m (rounded). Note: Using a hard surface, such as a plaster ceiling, the ultrasonic signals are **not** refracted, they are reflected. Ionospheric 'N' and 'M' Mode Propagation.

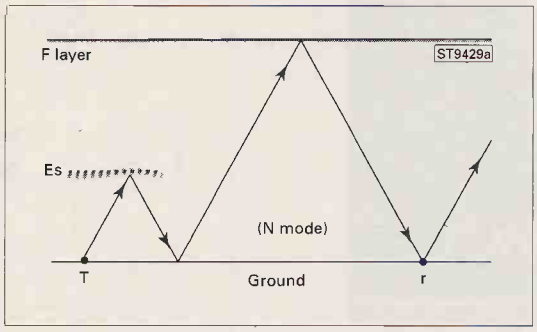
The ionospheric paths for these modes are shown in **Fig. 2.4**. Transmitter signals intended for propagation via the F region maybe refracted by an intervening sporadic E cloud, i.e. returned to earth, but afterwards continue along an Earth/F region path.

Simulation (N Mode Propagation)

An arrangement to simulate the 'N' mode is illustrated in **Fig. 2.5** A pseudo sporadic E cloud (small sheet of thin plywood or Perspex) is supported about one third of the height between the bench and the ceiling, the latter being the pseudo F region. The TX and RX transducers are both set so that the angle of elevation is 50°.

The transmitted signal path to the receiver is therefore via 'two' upper reflecting regions one at H1 the other at H2. The height of H2 is 1.336m and H1 is one third of that height. The angle of reflection for both regions is 40°. What are the surface distances D_1 and D_2 and the total distance D_{tot}, i.e. from TX to RX? Using the equation above and remember, the angle of the reflection points (r) is 40°, then D_1 = 0.747m, D_2 = 2.242m, so D_{tot} = 2.989.

M mode propagation may be simulated in much the same way but there are occasions when a sporadic cloud can intervene during ionopsheric sounding and which may allow echoes to be receive simultaneously from the E cloud and the F region. This effect, produced by simulation, is shown in **Fig. 2.6**. The first three echoes



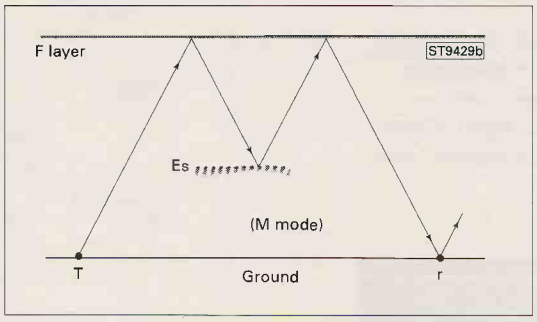


Fig. 2.4. Ionosperic propagation (A) 'N' mode. (B) 'M' mode. Es: Sporadic E cloud (see text).

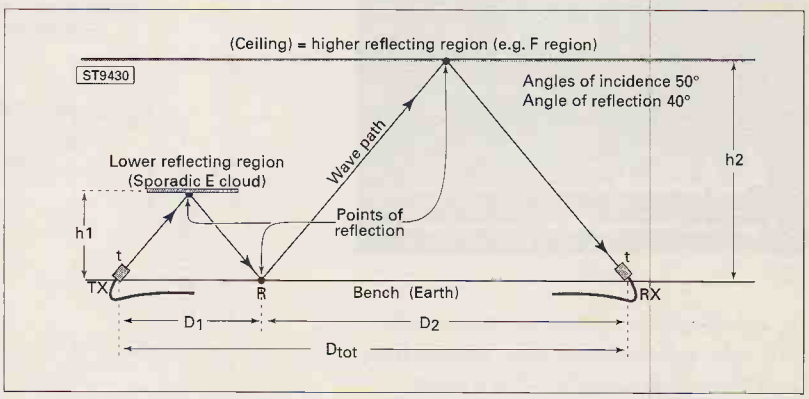


Fig. 2.5. Arrangement for simulating 'N' mode propagation with ultrasonics.

(e) are multiples from a simulated sporadic E cloud (as in **Fig. 2.5**), whilst (f) and (f2) are primary and secondary from the simulated F region (ceiling).

Reflectors For The Transducers

Unwanted echoes from other items in the room can sometimes be quite prolific and misleading. Moving one or other of the transducers by a very small amount may help get rid of them. However, they can be reduced very considerably, often to nil, by using small glass or plastics bowls, or corner reflectors made from thick cardboard as outlined in **Fig. 2.7**. The use of such reflectors narrows the radiation and sensitivity patterns of the transducers and at the same time will produce some directivity gain.

Simulation (Over The Horizon Radar)

Known as 'OTHR', this long distance, ionospheric radar system has been in use for a number of years. It makes use of backscatter propagation in which h.f. signals are reflected along a reverse path, Ref. 2. With the development of satellite radar systems, OTHR may no longer be used but a simplified simulation can be carried out as illustrated in **Fig. 2.8**.

The TX and RX transducers are mounted on a piece

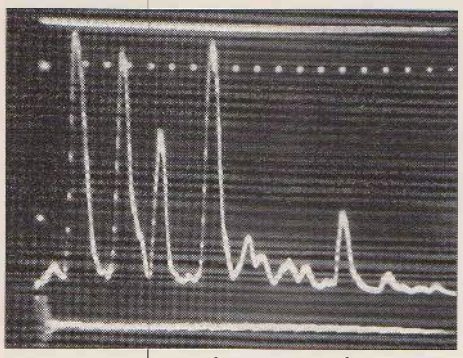


Fig. 2.6: Photo from oscilloscope. Simulation of 'N' mode propagation (tp) transmitted pulse. (e,e,e) pseudo sporadic E primary and two multiple echoes (f, f2) pseudo F region primary and one multiple echo (x) small spurious echoes (see text); (m) 1ms: markers.

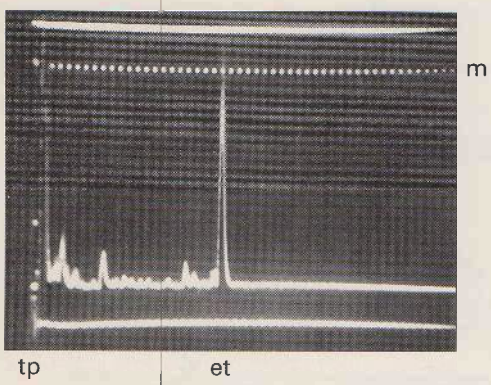


Fig. 2.9: Photo from oscilloscope. Simulation of OTH radar. (tp) transmitter pulse; (et) echo from target located near earth (bench) at a surface distance of 2.24m; (m) 1ms markers (see text).

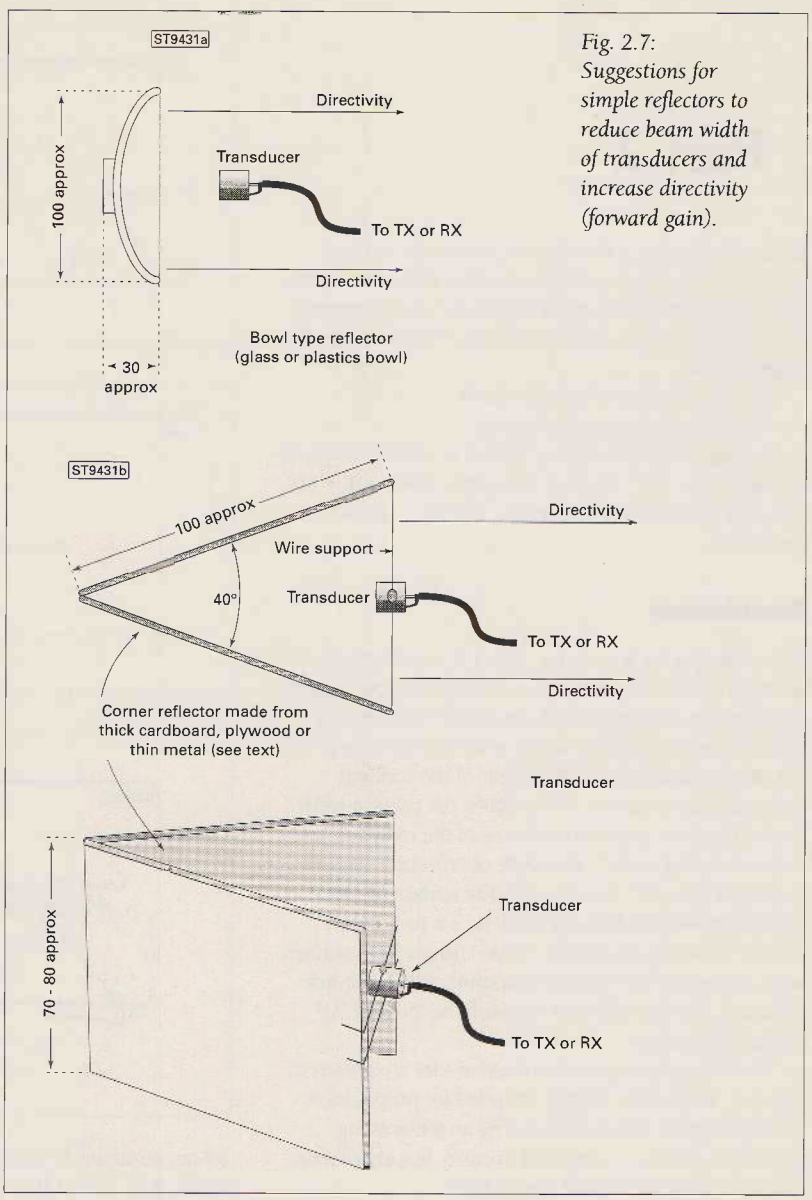


Fig. 2.7: Suggestions for simple reflectors to reduce beam width of transducers and increase directivity (forward gain).

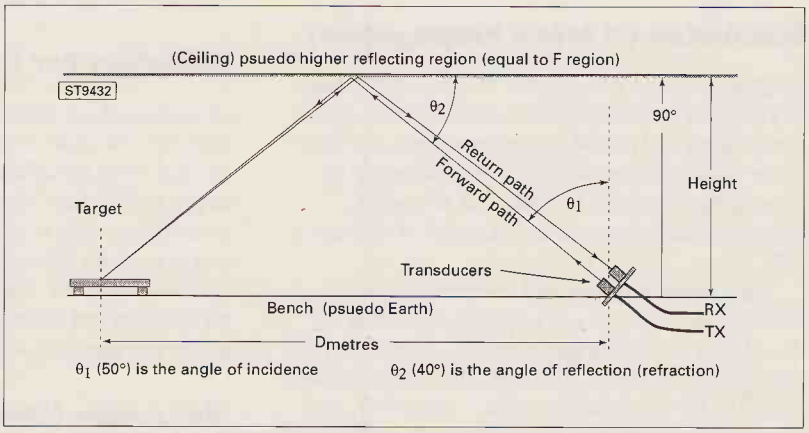


Fig. 2.8: Arrangement for simulation of Over The Horizon Radar (OTHR).

of folded cardboard so they can be set at an angle (θ_1). The 'target' may be a sheet of Perspex or metal, area about 300 x 300mm, raised about 20mm above the bench but moveable. As an example, if the transducers are set to say, 50° the angle of incidence with the ceiling will be the same. The reflecting angle (θ_2) will be 40°. It is now a case of moving the target a little in one direction or another to obtain an echo as in the photo **Fig. 2.9**.

With real OTH radar the computations required to determine the target distance and its height above land or sea are extremely complex and because of the very long ranges possible, the curvature of the earth must be taken into account. On a simple basis however, if we take the ceiling (reflecting region) height, as before, 1.336m, the surface distance of the target from the transmitter will be (tan40° x 1.336) x 2 or 2.242m (rounded).

The signals from the transmitter will of course have travelled a much greater distance i.e. TX to region, region to target, target back to region and region back to RX. The 1ms markers (m) in the example **Fig. 2.9**, indicate this to be approximately 7m.

It is hoped that the simulation experiments described in this article may be a worthwhile project for schools and colleges as well for radio amateur and s.w.l. readers of *SWM*. As mentioned in Part 1, there are other applications for the ultrasonic transducers specified offering a further range of interesting experiments. Circuit notes are available from the suppliers.

SWM

By the way, the answer to the question at end of Part 1 is 5.464m.

MilAir

PETER BOND
c/o EDITORIAL OFFICES
BROADSTONE
E-MAIL: milair@pwpub.demon.co.uk

One Year On

I was quite surprised when it was pointed out to me the other day that the 'MilAir' column was one year old - Doesn't the time fly when your enjoying yourself! With the passing of our first anniversary I would like to thank all of you who have written in with a wide variety of Military Aviation related information. Sometimes, there is just not the material available to include new frequency or callsign information every month and so I have diversified with subjects such as the Black Projects. From your letters I am pleased to say that most of you have taken a keen interest in the different articles. I am pleased to tell you that from this month the 'MilAir' column has been extended to a full page and in the future I hope to include some photographs and when possible maps or diagrams. To keep the column up to a whole page I need you to keep sending the information, no matter how small. Also, any suggestions for articles on 'MilAir' related subjects. Incidentally, you can now E-mail me at: **milair@pwpub.demon.co.uk**

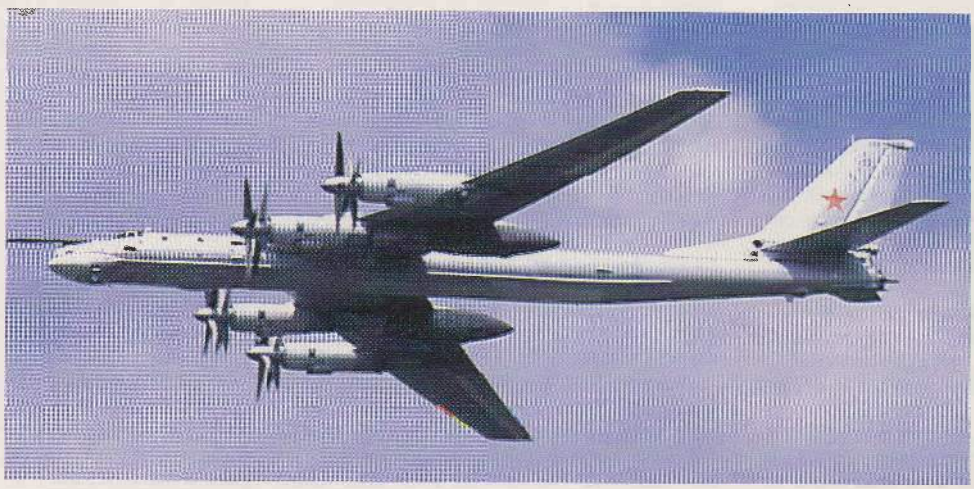
Air Defence Radar

As I was writing the article on Air Defence Radar I had this sixth sense telling me that I was about to invoke 'Sods Law'. (Can I say that Ed?). Despite attempts to get some background information from different sources, on certain subjects I made little progress. It therefore came as no surprise to me that literally two days after I had received my copy of *Short Wave Magazine*, I opened a copy of the *Sunday Telegraph* and there was RAF Ash splashed all over a half page spread. This opened the floodgates and a plethora of information on ADR poured in by post and by E-mail, (Including, several copies of the *Telegraph* article). I am grateful to the following who contributed information: **Robert T**, **Gomer D**, **Ray**, **JWF**, **JMT**, **Bill L**, **Ian**, **Costas**, **Steve F**, and several Anons.

I was reminded of the old adage, "When you do your job well, no-one remembers, when you do your job badly no-one forgets", certainly a couple of 'MilAir' readers soon spotted a bit of a hiccup in the Air Defence article. Consequently, I have to put my hand up for allowing the gremlins to creep into the text. Firstly, between my original computer designed map and the one that was printed, I somehow managed to move RAF Ty-Croes down the coast of Wales, (no easy task). Ty-Croes is actually located about 10km Southeast of RAF Valley on the Isle of Anglesey, near to the village of Aberffraw - more on this subject later. Secondly, I had a brainstorm and completely misread my notes, it was of course RAF Machrihanish that closed as a military field to become Campbeltown, not Benbecula! I am pleased to say the ADR article prompted several people to send in some very useful information to supplement the December column - So here goes.

RAF Ty-Croes

Using the callsign 'Dragon', Ty Croes was home of No.144 Signals Unit. Their main function was the control of aircraft on practice interceptions in the Danger Areas D201, D201B and D202. This task is now controlled from Neatishead with remote links available to both Boulmer and Buchan. The unit ceased operations during autumn of 1995 and was disbanded on the 30th of that month. The site is apparently up for sale and may have been acquired by the adjacent Motor Sport Centre; the radar and 'golf ball' have been long removed with a suggestion that it has been relocated at Trimmingham? It has been noted that the old Ty-Croes ADR frequencies/TADS now appear to be allocated to RAF Valley although my correspondent believes that there is no Air Defence Radar unit at this site. I must presume 'therefore' that as with other units they are operated remotely.



RAF Ash

As suggested in the December feature, RAF Ash closed in July 1997. Built in the Fifties, the site was upgraded in the sixties with extensive new aircraft tracking equipment. In recent years it was the evaluation centre for new Air Defence computer hardware and software. The site is now up for sale so if you fancy a new Des-Res with a difference, around a quarter of a million will buy you an 18-acre site with an air-conditioned bunker 90m below the surface. The over and underground facility extends to 7162 square metres and is completely self-contained including its own cafeteria, fire station, sewage works and a pair of communications masts. (They would be handy to plug the Icom into). The bunker has a central core with walls up to three metres thick. This core is pressurised against radiation and chemical attack and is fitted with an electromagnetic pulse shield and a zonal fire detection and control system. It goes to prove that at the height of the cold war, the MOD certainly took the possibility of nuclear attack very, very seriously. If you bought RAF Ash for your new home you could certainly play your Led Zeppelin albums at full tilt without annoying the neighbours! By the way, I forgot to mention that the view isn't up to much! There are no windows! (My thanks to the *Sunday Telegraph*).

RAF Staxton Wold

In the same week as the *Telegraph* article, Ray sends me a cutting from his local paper, (*The Post*), regarding the radar at Staxton Wold. The old Type 91 transportable air defence radar system was retired into storage at the end of November, in these more moderate times it was deemed to be obsolete and surplus to requirements. Operated by No.129 Signals Unit, this was the first fully transportable radar system of its type. The great advantage being, that it could operate from remote, covert locations and consequently continue to provide air defence radar cover if the primary fixed sites were put out of action. This type of mobile radar was deployed during many different tactical exercises and provided a very important part of the UKADGE. Staxton Wold continues in the Air Defence roll using the more modern Type 93 Radar, this is located inside a 20 metre 'golf ball' which has been colour co-ordinated to blend in with the local countryside. Has anyone any pictures of these radar sites we could possible use in a future column?

Alert Status

Four readers have written to me on the subject of military aircraft alert status in the UK, one of which was an E-mail from Costas in Athens! The general consensus is that two Tornados remain on a 24-hour alert status in the UK at any one time. Another correspondent has suggested that there were four aircraft on alert split between two airfields so that a response could be made from a second source if the first airfield was put out of action. Any further thoughts on this subject?

Photographs

Continuing with our Air Defence Radar theme, the first photograph to be included is the aircraft that caused many a fevered brow in the ADR units in the North and East of the UK during the Cold War. The photograph shows the first 'official' visit of a TU-95MS Bear-H to the UK, seen here at the IAT in 1993.

Stop Press: I have just received more information on the above subjects but it is too late to include it! See you next month.

Amateur Bands

Round-up

PAUL ESSERY GW3KFE
PO BOX 4
NEWTOWN
POWYS SY16 1ZZ

As I sit down to write, having collected my mail yesterday, the forecast cold snap has happened - at lunch-time white patches remain where sun has not been able to reach. So - an indoor topic to open with?

And, lo! when we opened the mail two readers pointed us in the right direction.

Best Receiver

What is the best receiver? There ain't no sich animal! Look at it this way. A good operator will get the best out of whatever he happens to have to hand. No two stations ever have or had the same surrounding conditions - and if you did find two such miracles, when you measured the owner's hearing response, speed of reaction and intelligence, they would be different!

To paraphrase the sports-car enthusiasts 'it's the nut between the ears'. At least, that's so for 90% of the time. You listen at the right time; you calibrate your receiver as accurately as you can so if you know a DX-pedition will be on 14.025MHz, you can come within a gnat's whisker by setting the dial before switching on, leaving it to warm up and then just listening! The pile-up on a rare or new station will be several kilohertz wide, so since you should be able to set **any** receiver to closer than 1kHz, by way of the calibrator, you can hardly miss!

So - where do you find the 'grapevine' that tells you so much? If you have a DX operator locally, follow him around. Subscribe to *DX News Sheet*, and get hold of a copy of the latest edition of the *Prefix List* - both are published by the RSGB. For each band know and record what is the best time to listen out for each area. You can simplify things a little: Eastern USA, Western USA, South America, Asia, Oceania. Make a table running from midnight to midnight in hourly intervals horizontally with bands on the vertical axis. You need a copy for each quarter of the year. Now you have at least a clue about the best times to listen for a given prefix and on which band.

Given all that data, you can now switch the receiver on. Perhaps we want 'XY4AB' - DXNS tells perhaps that he hangs out at some favourite spot on a pet day of the week and his operating times are thus-and-thus. Set the receiver to that spot now; listen at the appropriate time and you are more than half-way there! If the band is open and XY4AB is about and on his favoured spot, you've got him! To actually **listen** almost anything will do - **Ron Pearce** in Bungay sticks as he has done for years now, to his latest manifestation in the 0-V-0 line, I might use my old Heathkit GC1 - it's actually the prototype of the UK version - or a TS-520SE or my TS-440S - and I guarantee that in no case will the DX station fail to appear in the headphones regardless of which one I use - if he's audible on one, he's audible on all of them.

Your casual listening session will now have more meaning too. If you listen to h.f. in the morning soon after sun-up, you expect to hear VK/ZL/JA and are decidedly startled to hear an East Coast 'W' at that hour - so you'll log him as a 'questionable' or listen more carefully to see if he has a /MM callsign, or is maybe signing VK/home call. In the evenings, you will hear mainly East Coast Ws orchestrated by what used to be known as the Red Army choir - now the CIS choir!

So what must our receiver do? It must be able to receive s.s.b. on either sideband and it must be sensitive enough to get down to your local noise level - check this when the band is dead so you don't confuse your local noise level with the noise the receiver will generate when it is hit by strong local signals. Stability, in the limit, isn't too important so long as you can 'spot' a frequency well enough after the receiver has warmed-up The 'Operability' is maybe a matter of jacking-up the receiver so the hand falls naturally to the tuning dial - and a left-hander will realise how he is handicapped!

Letters

Totally different questions from **Frank Lennon** in Hyde, Cheshire. Frank has heard of a long wire earthed at the end by a resistor. This is probably the Beverage antenna. It needs to be, for Top Band, one to three wavelengths long, preferably over poor ground, but the (non-inductive) resistor at the far end must go to a good earth, using buried wires, radials, etc. It is sharply directive in the direction to the resistor. Not many amateurs have the space to lay out 250 metres of wire at 3-5 metres high though, because it is the 'tops' for directive low-Band reception. Frank's second query is that he has heard of people who ground the lower element of a Datong active antenna? I don't really know and I don't intend to find out hi!! Seriously, a vertical tends to be better at low elevations, horizontal at higher; but the picture is confused by the presence of man-made noise which for some reason tend to be vertically polarised. Anyway, Frank listened to 5H3NG, ZL1AB, VK6AC, ZL1AV, VK4ATV, VK8TM, W7BUD, NL7TZ, K7REG, VQ9KH on 14MHz while 18MHz gave ZL4DJ. On 21MHz he found K7YTL, W5ISF, K0TPF, D44BC, XB2SO, XT1YQQ, 5R8EE, before heading for 24MHz and 5B4AGC, W3KDD, K4IBP, 5N0T, and on 28MHz he noted W4AUU, and KD5ATA in Texas.

The letter from **Ted Hearn** of Newcastle, Staffs, is quite brief. Ted had the misfortune to have a car prang on his way home earlier that day - we all hope Ted was no worse than shaken-up by it. On Top Band G0VSN, G3YNC, IK1XHZ and SM6DOI were booked in, with 3.5MHz producing UT7M, F5JFU, SP8DJB, OH5BR, OH1TX, DK2BL, EZ8CQ, OE1EMS, 4Z5GN, UA2FB, F2PR, ON4NA, S52BT, DL9AWI, HZ1CCA, HB9FAN, IK2VFI, CS7BWW, PT7VB, Z31JA, 4U1WRC, F6DLM, LA9VDA, CT2FY, EA7AUP. On 7MHz Ted noted 9A4RU, RZ1AWT, RA3WA, DL3ZAI, and UT5DX. On 14MHz Ted mentions EK7DX, W4FLA, OZ1DWH, CT1XK, ZL1AJM, EA7BA, YL2TW, and T99A but when he looked into 18MHz he found VA3GA, HZ1AB, IC8SDL, ZB2IB, 9H4CM, R3ANI, I0SAA, IK7UXW, UA9LBR, TI4CF, 4X1MO, and LZ1ND. Finally 21MHz saw Ted pulling out of the bag YM2IYK, K1IED, 9K2MU, 9H1DF, UY3LA, UX2LM, CU7BA, 5A1A, K4NV, K1MFZ, SV1DI, LZ5RX, 9K2AR, EC8AUZ and SV1DVX.

Colin Dean in Barnsley comes in at this point, and we immediately notice he has turned to 3.5MHz for a change; CM6BN, C31SD, DJ5RNM, FR5DX, FS5UQ, JA2KIW, JO1WKO, JW0M, NQ4I/AM overt the N. Atlantic, UN7JX, VK4BER, W6, W7, 4L2M, 5B4/RV0AR, 5B4/UA0AGI, and 9K2MU. Now we come to the normal list - the one for 7MHz where Colin mentions A92FK, CE4RPM, CT3DZ, C33RI, DS5RNM, EK4JJ, ET3BT, EZ1CJN, FR/DF6PW, HL3ERJ, HP1RIP, HZ1RT, JA2-8, R1ANZ, RV0AM, SU3AM, TA2BK, TT8KM, TT8ZB, T77WI, VK1MJ, YC2PBX, YC6HDF, YK1AO, YM3SV, ZB2FX/M, ZL4BO, ZL4PO, ZP7GCA, ZS4DT, ZS6WPX, 4L5D, 4S7BRG, 6C500, 6W1QV, 8P6DA, 8P9DX, and 9K2UB.

The QSL System

This one comes up in an offering from EI7GW, who QSLed ZA1AM via IK1FLE. EI7GW had the QSO in May, but the return card from IK1FLE turned up during October. Now, most QSL managers ask for return postage, whether in the form of dollar bills or IRCs; the idea is that the op - in this case ZA1AM - ships his log to the Manager every so often, the manager checks incoming cards against the log, and if present sends the return card. Fine, and usually such a QSL Manager is doing a good job. However, if the DX station doesn't ship the logs or they go missing *en-route* to the manager or whatever, it is the poor old manager who takes the can back! The 'QSL Manager' practice has grown up enormously over the past forty years. Originally it was the case that a manager was only used by real rare DX so they could maximise their operating time, or in places where no QSL Bureau existed or direct mail was not useable. Today, the world and his wife use QSL Managers, and, alas, in so many cases all the manager does is to take the enclosed money for direct return postage and then ship a card - if at all - via the Bureau system to his own pecuniary benefit.

Here & There

EP2FM is active again as the "first legal amateur station here since my station was closed down in 1983". Find him between 1600-1700z especially on Fridays, around 14.200MHz.

FO5JR has postponed his trip to Rimatura Island, until July 1988. On the other hand Dominique J28DB is there for three years. QSLs go via F5AAQ. R1FJR and R1FJL, by RA1PC, will be active until March. P40MR is VE3MR until the end of April - cards to him at VE3MR.

Don Ireland G4KPO referred to my piece about SETI and the *Birmingham Mail* and has become interested in the question of Long-Delayed Echoes. If a signal travels right round the globe, it will be heard about 1/7 second later, producing some odd effects. Long Delayed Echoes (LDEs) are signals which appear after a much longer period - for example an operator may have finished his over and hear his own previous transmission coming back at him. This implies that a signal has been round the globe many times. There are various allegedly well-attested cases of this happening, and since he sent me an s.a.e. I was able to give him some information on articles in the amateur radio press and elsewhere - all alas many years old. Still with the same theme, Don mentions the alleged American siting of long-forgotten test cards appearing on TV; personally I would guess these are figments of someone's imagination - after all, where a c.w. signal would probably largely keep it's integrity, TV signals are well up in at least the v.h.f. region, and so far as I know, no-one has confirmed reception of amateur v.h.f.

Continued on page 59

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DX Television

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November was not quite as lively as the previous month but nevertheless there was still a reasonable amount of Sporadic-E activity. The most productive days were the 17th, 18th and 19th with prolonged openings and strong signals. Meteor-Scatter (MS) was prevalent around the middle of the month with mainly 'pings' of unidentified programmes. Tropospheric enhancement occurred at both ends of the month producing the usual crop of Benelux transmitters.

Sporadic-E Openings

On November 17th, **Stephen Michie** (Bristol) discovered a Scandinavian opening around mid-morning which included Swedish and Norwegian stations on Channel E3. From the north-west, **Peter Barber** (Coventry) saw Icelandic programme schedules from the Skálafell E4 transmitter. On the following day, an intense opening to south eastern Europe produced several countries and also many OIRT f.m. radio stations between 63 and 72MHz. Italy was logged on the 19th.

Dutch Regional Tests

Stephen Michie (Bristol) has successfully identified three of the new regional Dutch u.h.f. stations during a recent tropospheric opening. These were Omroep Flevoland on E26 (showing text and a caption featuring a building with a logo in the top-right of the picture), TV Drenth on E25 (with programme previews and a line-sawtooth test pattern) and blank raster on E36 which is thought to have been TV Noord.

November Log

Many thanks to Stephen Michie, Peter Barber and **Tom Crane** (Essex) for submitting the following logs. All the times shown are in GMT/UTC.

2: Tropo: Netherlands, Belgium and France in Band III and u.h.f.
4: Unidentified Sporadic-E on E3 at 1200; Unid E2 signals at 1215.
11: Norway (NRK-1) E4 (Kongsberg or Bremanger transmitter).
13: Unidentified Sporadic-E on E3 at 1110.
14: Norway E4 with schedules at 1025 via MS.
16: Unid programme on R2 with 3 white letters in the top-right corner.
17: Sweden (SVT-1) E3; Norway E4; Iceland (RUV) E4; Spain (TVE-1) E2.
18: Italy (RAI UNO) IA; Serbia (TVS-1) E3; Croatia (HRT-1) E4; Slovenia (SLO-1) E3; Czech Republic (TV NOVA) R2; several OIRT f.m stations.
19: Italy (RAI UNO) IA and IB.
23: Serbia E3.
24: Tropospheric reception from Belgium E8 (RTBF-1) and E10 (BRTN-1); France (Canal Plus) L5.

Arabic Broadcast

It is unusual to get reports of Arabic stations outside the normal Sporadic-E season but last October (19th), Tom Crane (Hawkwell, Essex) noticed Arabic writing on Channel E4. The signal has since been identified as RTT Tunisia from the Remada outlet. The signal was first noted at 1130UTC and continued for well over two hours. The video frequency was measured as 62.239MHz and came in on a bearing of S30°E.

Where's The Tropo?

Super-tropos which stick in the mind forever seem to be thin on the ground these days. **Chris Howles** (Birmingham) recently reminded us of the big tropo of November 1987. It lasted almost a week and Czechoslovakian u.h.f. stations were coming in thick and fast in SECAM colour over the entire weekend. Even Polish stations were resolved at u.h.f. East German signals provided perfect colour pictures for hours on end as conditions wreaked havoc with BBC and ITV broadcasts.

TEP & F2 Reception

Encouraging news has arrived from **Lt. Col. Rana Roy** of northern India who is now regularly receiving signals from a south-east Asian transmitter on Channel E2 via Trans-Equatorial Propagation (TEP). The pictures are fluttery and display multiple images and they appear between 1430 and 1730UTC. Sound has been noted on one occasion and it is thought that the signals originate in Thailand.

Over in the USA, **Michael Schulsinger** (Springfield, Ohio) feels that the next bout of F2-Layer activity may be the last opportunity to see some real DXTV reception. Digital TV is about to be introduced in the USA with analogue transmissions being rapidly phased out. Digital reception from distant transmitters is not expected to be received as successfully as analogue broadcasts.

Exotic CIS Stations

Stephen Michie (Bristol) would like to know whether anyone in the United Kingdom has ever received exotics such as Armenia, Georgia or any of the other Central Asian Republics. The only reception we are aware of is Azerbaijan which **Roger Bunney** (Romsey) received in the early Seventies when a 'Baku' caption was resolved on Channel R3. Reception from the 5kW outlet was ultimately confirmed by the station authorities in Baku.

In those days, the same programmes were aired throughout the USSR, although time-shifted, so clocks played an important part in working out from which time zone the signal was coming from. Nowadays, most CIS countries have independent TV networks so DXing the R channels (RI, R2, etc.) is suddenly more interesting.

The downside is that it can be confusing because some stations occasionally display alternative logos. Networks keep changing hands, too, but no doubt this will settle down shortly. Apart from EESTI TV (Estonia) which has always used its own 'blockboard' test pattern, all other

Fig. 1: Opening caption of TSS-1, the former Russian TV service.

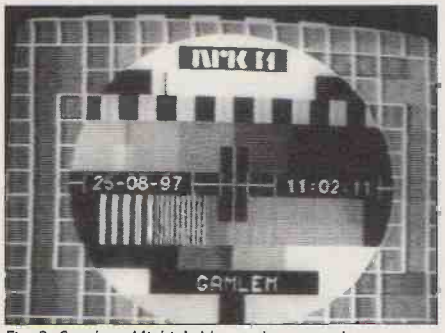


Fig. 2: Stephen Michie's Norwegian reception on Channel E3. The date and time are displayed across the PM5534 test card.

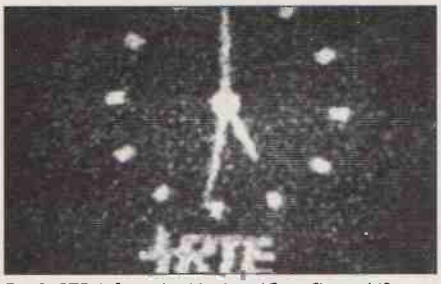


Fig. 3: RTE-1 from the Maghera/Gort Channel IB

Fig. 4: SSTV from Italy on 14.230MHz, received by Keith Artherton.

stations still use the G-204 test card with confusing identifications. Two variations of this test card were shown in the last column.

Slow Scan TV

Keith Artherton (Fakenham, Norfolk) has forwarded a selection of SSTV callsigns received on 14.230MHz (**Fig. 4** and **Fig. 5**). For h.f. reception, a Yaesu FT-840 transceiver and MFJ-949E De-Luxe Versa tuner is used fed from a full-size G5RV antenna arranged as an inverted 'V' with its centre at 13 metres above the ground.

Keith would like to hear from newcomers or fellow SSTV enthusiasts and can be contacted on **(01328) 864068**, but please note that he is **only available during weekend evenings**.

BBC Archive Publications

Two more books are now available from the *SWM* Book Store covering the development of the BBC Colour Television Service and the introduction of BBC-2.

The Story Of BBC Colour Television features over 40 illustrations (some in colour) and charts the history of the BBC Colour Television Service. Some of the topics covered in the 32-page publication include early colour research work, u.h.f. field trials in the 1950s, colour test charts, experimental mobile colour O.Bs, the BBC Colour Test Card 'F' plus a full list of BBC-2 Trade Test Colour Films.

The First 30 Years Of BBC-2 is a 60-page book which traces the history of BBC-2 and includes detailed information about various aspects such as the engineering techniques involved, early programmes, the introduction of colour, and historical dates associated with the launch of BBC-2. The book features over 40 photographs with a section covering various aspects of BBC-2 graphics.

Further details about the *SWM* Book Store can be found at the back of this issue. If you can't find the books listed, just give the Book Store a ring for details of prices, etc. on (01202) 659930.

Service Information

To keep us up-to-date, various DXers have volunteered information. Our thanks to **Trygue Thue** (Norway), Stephen Michie (UK) and **Lazlo Kozari** (Hungary).

Norway: NRK-1 has opened a new transmitter on Channel E4. No further details are currently known.
Switzerland: A second German-language network, DRS SF-2 has been established but it is only being distributed via cable at present.
Hungary: The MTV-1 Budapest transmitter on Channel R1 is to close within the next two years, leaving only the Pecs outlet on R2 in Band I.
Croatia: HRT is using a new logo consisting of a vertical '1' in the top-left of the screen. It is similar to Portugal's but without the letters underneath.
Slovenia: A stylised 'SLO-1' logo is now displayed in the top-right of the screen.

Archive BBC Ident

During the BBC's recent celebrations to commemorate 75 years of broadcasting, Stephen Michie noticed that his local station was showing the old 'BBC West' Ident Symbol as used during the Fifties. Did anyone make a video recording or notice other local BBC stations showing old captions and Idents from the archives?

Fig. 5: SSTV callsign from Reunion.

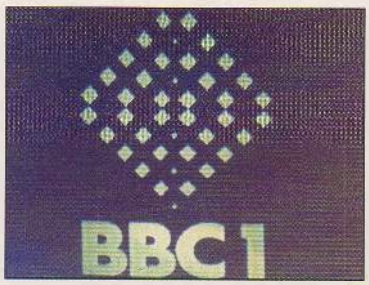


Fig. 6: This month's journey down Memory Lane takes us back to September 1973 when this ingenious BBC-1 Schools caption (consisting of moving yellow diamonds on a blue background) was introduced. Does anyone have a ***complete*** *video recording of this?*

Keep On Writing!

Please send DXTV and f.m. reception reports, news, off-screen photos and information to arrive by the 1st of the month to:- **Garry Smith, 17 Collingham Gardens, Derby DE22 4FS.**

Continued from page 56

Amateur Bands

Round-up

signals across the Atlantic without help from either satellite or moonbounce. And, there is an incentive - that handsome trophy put up by IRTS for the first successful contact!

Going back to our first paragraphs, it was **Christopher Lewis** in Bridgnorth who sparked it off initially by asking the question and by saying that over the past twelve-months he has found several receivers "not quite good enough". Again, I have written to Christopher direct to try and unravel the problems for him.

No sooner had I opened Christopher's letter than one came in from **Ron Pearce** in Bungay, arch-apostle of the 0-V-0 receiver, notably for its low noise and simple construction. Ron included a photograph of his current version, which uses an AR8 valve to receive a.m., s.s.b. and c.w. between 1.6 and 30MHz using four plug-in-coils. On the power side, Ron gets 36V h.t. by way of four PP3 batteries in series, and 2V of l.t. An interesting point is that Ron has a variable capacitor in the back of the receiver which he can adjust for hand capacity effects on the higher frequencies.

Just as I was preparing to ship the copy disk to the Editor, a couple of late letters came in. One was from **Arthur Oglesby** in Harrogate to say that he has obtained some improvement to his FRG-100 by using a different antenna, but he still finds the receiver 'down' on 14MHz as compared with 21MHz. The other came in from fellow-columnist **Godfrey Manning** who points out that the FRG-100 has a tiny slide switch on the rear panel to change from the SO-239 socket to the pair of wire antenna terminals. Godfrey says that if the slide switch - which he says is 'well disguised' - is in the wrong position, then the receiver is bafflingly deaf. Clearly Godfrey has had the problem himself! As Arthur sent an SAE, I have enclosed Godfrey's note in it and mailed it off.

It grieves me to admit that I had a letter from **Ted Trowell** in Sheppey but I have managed to mislay it! Problem - large-scale redecorating operations, and all sorts of stuff being moved from their usual hidey-holes in the process. Of course, the shack is where most of it is moved to! Doubtless when we get back to something approaching completion the letter will re-surface, in which case it'll be used.

Morse & 7MHz

One of the things set down for the WRC97 just concluded was the proposed agenda for WRC 99 in two years time was the revision of article S25 - this is the one which lays down the shape and form of amateur radio world-wide. Because of the need for consultations, the proposals to 'harmonise' 7MHz to be 300kHz wide world-wide, and to solve the morse question have both been put back. The ITU of course is the body who control radio-frequency allocations and so forth world-wide - the IARU is the worldwide *amateur radio* body who put our point of view to the ITU.

Finis

That's it for another month. All your letters, lists, comments and whatever, to me please at PO Box 4, Newtown, SY16 1ZZ to reach me by the first of the month, every month. The more letters you send, the more I can batter on the door of the Editorial sanctum for more space - it's up to you!

Scanning

JOHN GRIFFITHS
132 HOWARD STREET
OXFORD
OX4 3BG
TEL: (01865) 241065

A letter from a reader in Barnstaple asks for information on where to find information which could be of use to him as a newcomer to the hobby. I've covered this in previous columns but maybe I should quickly review what publications are out there for the newcomer, and what ones I'd use if I was starting out again.

Firstly, the *SWM* Book Store is a good place to browse and take a peek at. Many books are stocked covering all aspects of the hobby and is perhaps almost a shop in itself. Some of the titles may be confusing to the newcomer and so I'll look at what I know and give you some idea where you should be looking to start.

Firstly, the late, great Peter Rouse's books - *Scanners 2 International* (£10.95) and *Scanners 3 - Putting Scanners into Practice* (£10.95) are both excellent guides which give more than just a passing mention to the hobby. They cover antenna, connectors, add-ons, filters and have a good scanner review section plus a general frequency guide as to what's what. These are two books which adorn my shelves and I use them on a regular basis. They provide a good, simple approach to the hobby and explain all you need to know in an easy and understandable manner. Well worth buying with the money you've got left over from Christmas!

Another good book to start with is *An Introduction to Scanners and Scanning BP311* by I.D. Poole (£4.99), containing a fund of information aimed at the user and written in understandable and clear text. It is part of the excellent Bernard Babbani series whose collection as publisher encompasses a great deal of interest to the radio fraternity - transmitting or listening.

A look at *Scanning the Marine Bands* by F.F. O'Brien (£9.50), opens up the marine v.h.f. area for those whose interest lies here. And I'd also recommend Ken Davies' *Ship to Shore Radio Frequencies* (£5.99) and *Marine VHF Operations' by Michael Gale* (£7.95). If your scanner covers h.f., then you could also get *Marine SSB Operation* (£11.95) and *Shortwave Maritime Communications* by B.E. Richardson (£16.50). This should keep you well happy!

Airband I'd leave to the expert Godfrey Manning, but if I was pushed, I'd look at having both *Airwaves '97* and *Callsign '97* (£8.95 each) as well as *VHF/UHF Airband Frequency and Callsign Guide* (£12.50). These three cover both civil and military communications and are well worth having at the side of the set.

Frequency guides are always a bit of a miss, given that the info they contain is often out-of-date very quickly. However, they do provide a wealth of information and allow you to spot stations of all frequencies, sometimes stations which do not appear anywhere else. Over the years I've come to have my favourites in this section and, with no apologies, would certainly list them here for the benefit of others. These are: *UK Scanning Directory 6th Edition* (£18.50), *VHF-UHF Scanning Frequency Guide* (£12.95) and no radio shack is ever complete without the *World Radio-TV Handbook 1997* (£17.95). This latter book contains a fund of information useful when you are maybe DXing and hit a broadcast station which you can identify the language of, but you're unsure of the ID! It's not unusual to hear, for example, Polish and Spanish stations on Band 2 v.h.f. - this book helps you to identify who it might be.

Reference books that you would find useful come in all forms and sizes but the simplistic ones are usually the best for starters. To get the most from the hobby - and to discover ways of making it cheaper to operate - I'd be looking at some of those books to educate me into finding new directions to take. From operating a scanner to decoding RTTY, FAX, METEOSAT; to Internet connections...the whole world is out there and accessible by radio!

Dean Forester of Crowmarsh Gifford in Oxfordshire is an absolute novice to scanning and was the lucky recipient of a COM 102, ten-channel scanner for his birthday just before Christmas. Dean asked me for ten 'interesting' frequencies to put in, I gave him a choice of fifty or so. He's finding the unit brilliant and asks what he could trade up to next? Common enough question and as Dean has expressed an interest in airband, I have no reluctance whatsoever in recommending a VT-225 for this purpose. This also shows that a lot of you, having bought multi-band scanners, are developing listening interests in certain areas like h.f., but on a budget. Dean asked me to recommend a cheap portable that he could access short wave bands with and again, I pointed him in the direction of the Sangean ATS-909. Why? Dean had seen a Roberts R861 and said it looked pretty neat....and it was with some surprise that he took my advice to look closer and found that he saved himself nearly £20 in the process! Eagle-eyed readers will have noticed these two sets are the same....just differently badged! There are some slight variations in the after-sales package but they are small potatoes really. The same can be said of scanners - there are many on the market badged and priced by major manufacturers but essentially the same as one three pages up in the magazine which costs a little bit less! Take a look at last month's advert from Martin Lynch for the Standard AX700 Mk2...now, where have I seen that set before...?

Peter Acton of Nantwich asks me if I've any information on Q-Tek and their HF Minitune product, said to be suitable for scanners with h.f. ability. The short answer is no. However, looking at an ad, it appears to be a bit of kit which improves your scanner's h.f. performance and it appears is in essence to be an a.t.u. It seems like a good idea to me as anything that improves h.f. reception on a scanner is a bonus. Q-Tek seem to be an up and coming manufacturer and if they'd like to get in touch with some info, perhaps I could look at what they've got on offer, which may benefit the scanner user. They seem to be making good, affordable entry level products and I particularly like the look of their h.f. antenna - the HF-30. The problem with radio gear is its price, and anything which reduces this is good news! If you're reading, then do get in touch!

Lastly, a perennial question. **Thomas Llewelyn-Hughes** of Prestatyn asks whether I would recommend a home made dipole that is cheap and easy to make and is proven. On that score, I can indeed! A friend of mine - **Oxford Ears** - made a design from a magazine that appears now and again in books and articles and he is reporting very good results from it. It is cheap to make, and serves a purpose in that it can be interior or externally mounted. The antenna is shown **Fig. 1** and, if you get around to making it Thomas, do get in touch and report what it is like.

To make an antenna for use with the marine and p.m.r. bands which run 150 to 174MHz an area which is relatively popular with scanner users as this is one area they will undoubtedly pick something up when using a scanner.

The antenna should be trimmed to resonance midway between 150 and 174MHz, i.e. 162MHz. The dimensions are therefore 465mm per element. That gives a total dipole length of 930mm. Not too big! Bear in mind that you need this distance between the mounting pole and the

Fig. 1.

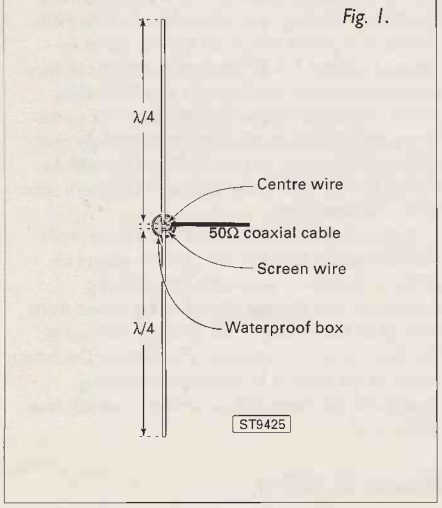
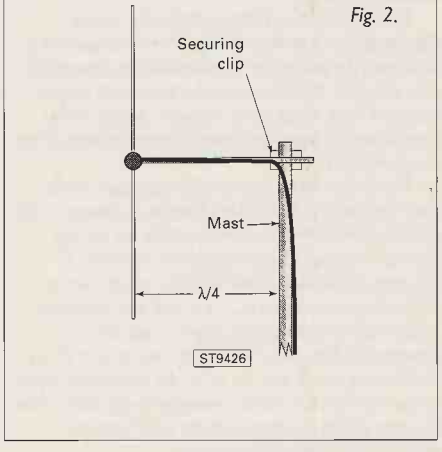


Fig. 2.



Continued on page 64

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Grumman G44 Widgeon. Christine Mlynek.

On Sunday afternoon November 23, Chris and I watched one group of Lynx helicopters after another transit the airspace over Aylesbury. They were mainly in loose boxes of four and I lost count of the total number seen during the afternoon.

Arriving from the east, they passed the north of the town before turning left to head south-west. Why? What are they doing, where were they going? It's not like the military to do any routine work at weekends and it's a bit late in the year for an airshow or a families' day at an air base. Can any reader explain this unusual sight?

ACARS

Aircraft Communications Addressing And Reporting System (ACARS) is a means by which aircraft and ground stations can exchange coded data over a v.h.f. radio link. For example, the first rotation of an aircraft's wheels (following engine start) is the 'off-blocks' time.

The airline's operations department needs to know this time so as to be certain that the flight is running to schedule, so the crew might radio in on a company voice frequency. They would wait until in the climb so as to be in range of the ground station. ACARS does this for them. It transmits brief bursts of data pulses conveying important times, engine parameters, etc.

Because the ACARS system measures so many items of data it is also a useful source of diagnostic information to the crew and engineers. Some aircraft have a printer in the cockpit to enable the crew to retrieve this sort of information.

In the Air Accidents Investigation Branch *Bulletin* 11/97, a British Airways Boeing 747-400 is mentioned (ref: EW/A97/4/01). Interestingly, the cockpit printers had been disabled across the fleet but are to be re-instated. For example, the equipment could report heavy landings where a normal (90° vertical to the wings) acceleration of 1.8g is exceeded on touchdown.

Short Wave Magazine carries advertisements from traders who supply ACARS decoders. The equipment is fed from the audio output of a radio and displays the decoded data on a computer screen. However, whereas some codes are standard or obvious, certain ones are specific to one airline and look cryptic even when printed out. (*For more info. on decoding ACARS, see Understanding ACARS available from the SWM Book Store* - **KN**).

Aircraft Instruments

Peter Wade (Sevenoaks) has acquired a Pioneer Instrument Remote Indicating Compass 10061-1A-A1 (AN 5730-2) made in the USA. Unfortunately, the paint colour looks like the radioactive sort to me, Peter, so don't open the instrument up! If it fluoresces under ultra-violet then the paint is probably safe.

Judging from the photo's that Peter sent me, there is a fixed compass card. You can remind yourself of the required bearing by turning a knob that rotates a pointer. This pointer is wide and consists of two parallel lines. Then, the superimposed single pointer is electrically driven. When its single line rests precisely within the other parallel lines then the correct bearing is being flown. Am I correct so far, Peter?

To drive the single pointer you need the output from a synchro such as a Magnesyn. Both this and the instrument need a supply of 400Hz power (as inscribed on the instrument). Don't worry about the 52V supply, though, as the synchro should generate this for you. As there are only four connecting pins, I'll guess that the rotor and stator of the internal synchro are wired together (commoned) but if the dial is radioactive then you won't be dismantling the instrument to find out!

Can Peter connect this to a communications receiver? Not really. The best bet would be to couple a synchro to a loop antenna. Then the instrument will indicate the bearing to which the loop is pointing. On the other hand, a mechanical pointer and a protractor attached to the loop would be far simpler!

In Flight

On which frequencies might **Len Adlard** (Leigh-On-Sea) expect Europe-bound aircraft to be controlled when departing Heathrow? It depends on the route and which frequencies are operational on that day. Pilots always know which frequency to call next as the controller tells them! Then the pilot reads the frequency back for confirmation prior to changing the new channel.

As a guide, let's assume a Dover departure (all MHz). Heathrow: 118.5, 118.7, 124.47. London Airways: 128.425, 132.45, 132.6, 134.9. Paris Airways: 120.375, 127.3, 128.275, 131.35. Brussels Airways: 128.8, 131.1.

I can confirm a few frequencies for **R. M. Illman** (Oxford), all MHz. 5.658: Bombay but shared with others. 118.82: London Terminal Manoeuvring Area outbound. 120.17: London LUMBA/TIMBA inbound. 121.9: Heathrow Ground. 127.1 & 127.42: London Airways.

Information Sources

When you board a flight, how about following its progress on the radio? Now, you know that you **must not** operate your own receiver on board. There are documented incidents where a passenger's radio has made the aircraft's navigation systems inaccurate. If this does happen, the pilot will have difficulty in finding the cause.

Now, that's not what **Ian Theobald** (Worthing) suggests. He tells me that United Airlines (for example) connect the pilot's radio to channel 9 on the passenger entertainment system (except B.747-400 and some 737 aircraft).

Unfortunately, the cabin crew confiscate the

Continued on page 64

Nord 854S. Christine Mlynek.

Airband

Continued from page 62

headsets prior to landing (it saves them time) so take your own with a 3.5mm stereo jack plug. (Of course, you could be unlucky enough to fly in a place that uses the 'acoustic tube' variety - as did the Continental DC10 that I recently flew to the States in. ***Ed***).

Thanks to **Martin Sutton** (CAA) for a 'preview' of the new format *Aeronautical Information Publication* (formerly known as the *UK Air Pilot*). This official promulgation tells you everything you need to know about aerodrome and airways frequencies, facilities at aerodromes, rules of the air, etc. It has now been simplified into three sections.

I don't recommend the *AIP* as a routine information source for enthusiasts as it is expensive, bulky and so detailed that it can even cause confusion to the uninitiated. As an occasional reference, though, it is of great value. To avoid buying one, why not approach your local aerodrome or flying club/school. They're bound to have the up-to-date version for all to see and a courteous request to the Chief Flying Instructor is likely to be greeted favourably.

Navigation

One page (ENR 6-3-5-2) of the new *AIP* shows military TACAN routes in upper airspace. Few if any civil aircraft are equipped with TACAN receivers but most military ones are. Routes are designated by the letter T (e.g. TB2, TR1) and reporting points by two letters and a digit (e.g. QN9, WD4) except for some at the Flight Information Region boundary. There's no secret about these routes but I think the CAA chart is clearer than the RAF publications.

I will be covering the various radio navigation aids (beacons) in a special article later this year. Most of the information about v.o.r. beacons in my *Aeronautical Radio* series (June 1987 *SWM*) is still valid. I'm asked about this subject by **Ian Harling G7HFS** (Eastbourne) whose brother holds a Private Pilot's Licence.

So, how far does a v.o.r. signal travel? As they transmit at 50kHz intervals in the 108-118MHz navigation band, their propagation is the same as any other v.h.f. signal such as the 144MHz amateur band. That's to say, it's usually line-of-sight. I've noticed that obstructed paths (and possibly the intended radiation pattern) make these hard to receive at ground level even over relatively short distances.

The sky's the limit! Once airborne, the path is more favourable. Cruising airliners receive a solid signal at far more than 40nm distant. Unusual propagation might well extend the range at ground level, of course.

In effect, these beacons produce a signal that can be decoded to find out the compass bearing on which the aircraft lies relative to the transmitter. Compare with the n.d.b. on frequencies close to the medium wave broadcast band. In this case, the airborne receiver must operate a direction finding technique to find out where the transmitter is in relation to the aircraft.

Brian Oddy covers LW Maritime Radio Beacons in his quarterly article, but Ian might write to Brian and the Editor to see if there's any interest in extending this to aeronautical n.d.b.s.

Frequency & Operational News

As previously mentioned, some airports relay Ground and/or Tower transmissions on the u.h.f. channels assigned to operations vehicles. This is so the vehicle drivers can co-ordinate their movements with aircraft without blocking the aeronautical channels with their own messages. Ian tells me that this happens at Lydd where 120.7 is duplicated on 455.8375MHz.

In *AIC* 134/1997 from the CAA, I see that the Stornoway TACAN (STZ, channel 98) has been withdrawn, but the d.m.e. (ISY, response 1007MHz) continues in operation.

Next Deadlines

The next deadlines (for topical information) are February 9, March 9 and April 6. replies always appear in this column and it is regretted that **no** direct correspondence is possible.

Abbreviations

AIC	*Aeronautical Information Circular*
B.	Boeing
CAA	Civil Aviation Authority
d.m.e.	distance measuring equipment
g	acceleration due to gravity
Hz	hertz
kHz	kilohertz
MHz	megahertz
n.d.b.	non-directional beacon
nm	nautical miles
TACAN	TACtical Air Navigation
u.h.f.	ultra high frequency
V	volts
v.h.f.	very high frequency
v.o.r.	v.h.f. omni-directional radio range.

Scanning

Continued from page 60

simple to make as you can buy f.m. radio antenna elements and use those. Being aluminium, they are easy to cut. You then need to make the connection to the feeder. Begin by stripping the dielectric of the coaxial cable (See **Fig. 3** - the white part you get to, under the braided copper you find there when you strip back the outer insulation. Separate the braid and attach it through a hole drilled into the aluminium, using a screw or nut and bolt to make the connection. Do the same with the centre conductor. When finished, weatherproof the connection by capping it with a top and mounting it to the arm. Then clamp the arm to the mast using an angle bracket - tape the coaxial cable - the feed - to the arm and mast to stop it flapping about and then mount the whole assembly onto a pukka - that is proper - chimney mount.

If you want to cut the antenna for the civilian airband, then the element lengths are as follows:

Band	Range (MHz)	Mid (MHz)	Length (mm)
Civil Air	108 - 140	124	620
Amateur 2m	144 - 145	145	513
Military u.h.f.	225 - 329	275	270

You will usually find that this form of antenna works out quite cheaply, and is really very good considering its limited cost. As in all manner of home construction, make sure that the mounting at the roof is safe and that there are no power lines close by. Also, that you take all precautions when on the roof to guard against slipping or falling. Secure the antenna well and connect to the scanner with the right type of plug.

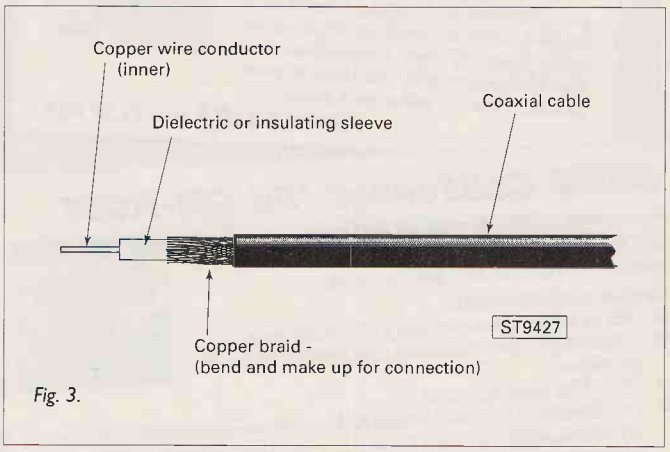

Fig. 3.

A note on cable: For v.h.f., 50Ω is fine and for short runs, 'normal' cable could be used where the distance from point to point is less than, say, 10 or 12m. Anything over that distance, do use low-loss cable - especially if you are into military u.h.f.

That's it for now - I hope you'll write in with queries as the Christmas rush seems to have left me devoid of frequency questions and info! In the meantime, good listening and catch you down the log sometime.

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World Propagation Forecasts

JACQUES D'AVIGNON
VE3VIA

February 1998
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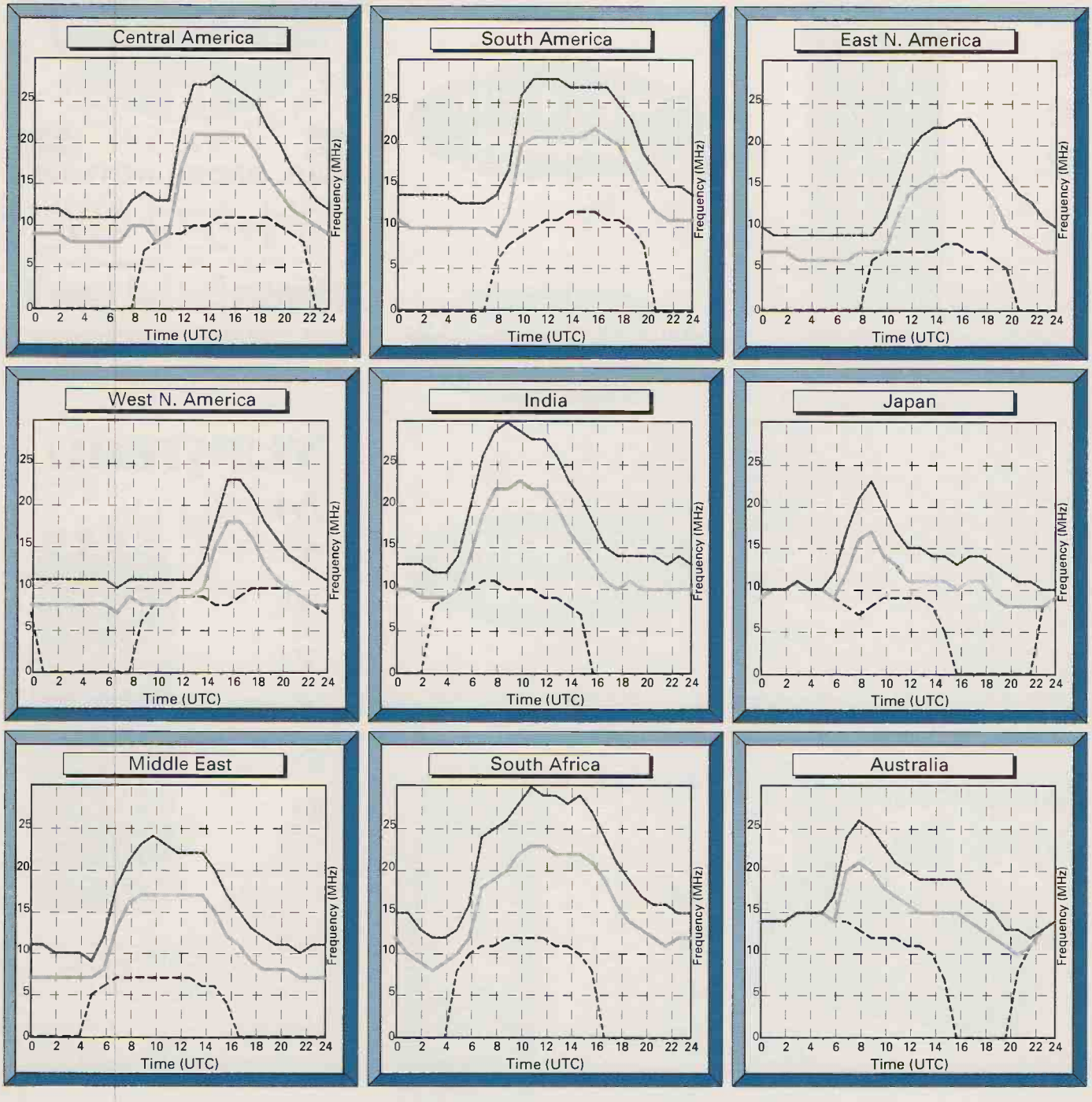

How to use the Propagation Charts.

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.

Propagation Extra

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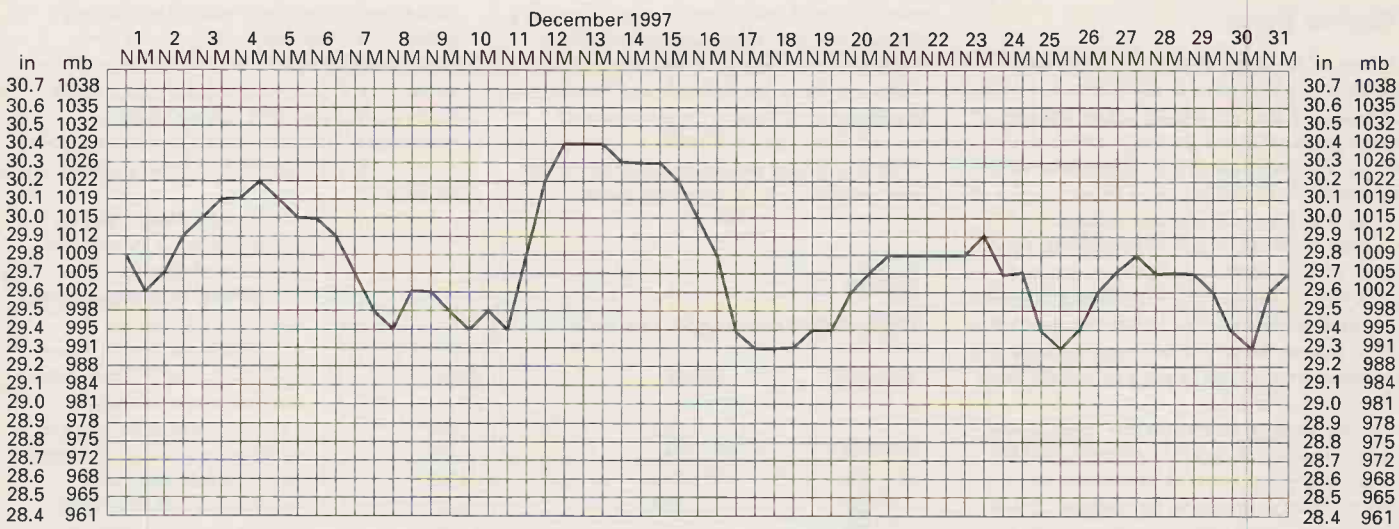
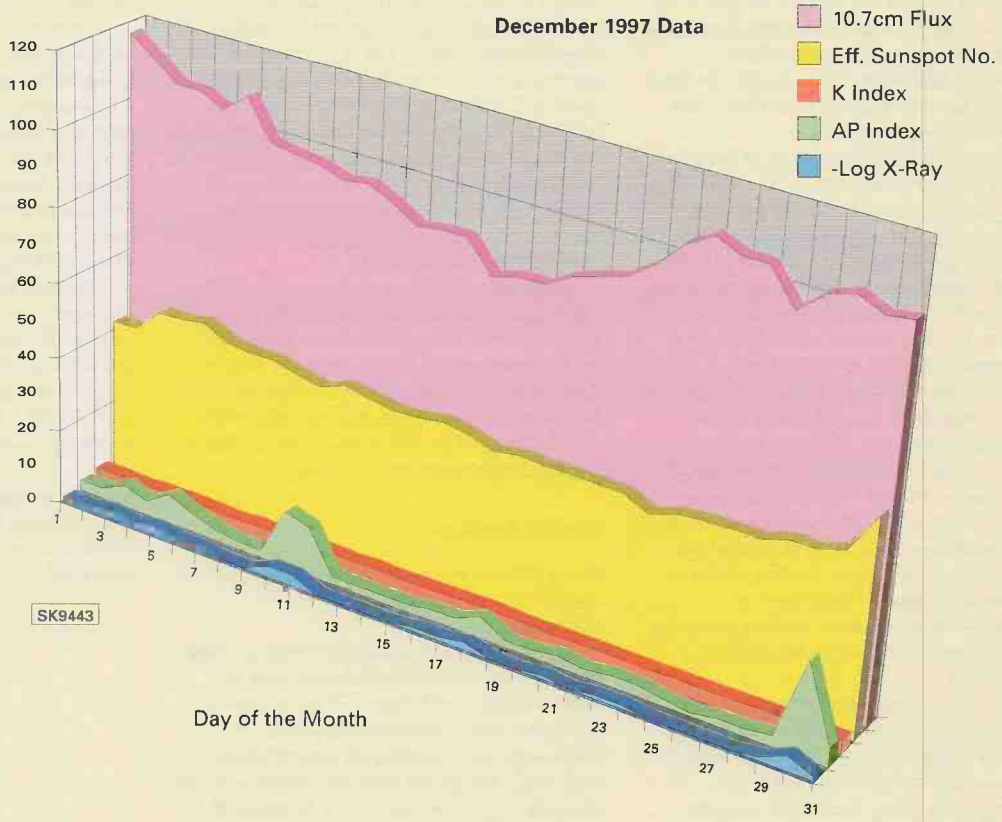
BROADSTONE

Ron Ham's barometric pressure chart, taken at Storrington, W. Sussex, December 1997.



Guide to the Chart

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



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MIDDLESEX UB4 9JE
INTERNET:
graham.tanner1@virgin.net

Marine Band

Advice on listenining to marine traffic is why David Clarkson writes. He says that he has a DX-394 receiver, but can't get any coastal shipping or shore stations, but can get most of the aircraft frequencies. His antenna is a random-wire which runs from the roof of his house to the bottom of the garden, then back into the receiver.

Well David, this is certainly a perfectly good setup for s.s.b. utilities, and it should produce good results. The fact that you are able to receive aeronautical transmissions proves that your setup is working, so the only other factors must be the frequency that you are listening to, and the times that you are listening.

I am not going to pretend that I'm an expert on maritime signals, as I have a lot of problems receiving them myself. In David's case, it is probably best to start with UK stations, as they are closer to home and when they transmit you have a better chance of understanding their transmissions. Many maritime stations keep to a definite (and published) transmission schedule, so obviously the easiest answer to David's problem is to tune in at the relevant time. But the problem is - what are times for each of the UK stations?

There is a book which lists all the UK coast stations and their h.f. frequencies (as well as their v.h.f. frequencies, but that is beyond the scope of this column). I reviewed the book a few years ago, and the information is still correct. Im glad to say that it is available from the *SWM* Book Store. The book that you want is *Ship to Shore Radio Frequencies* by Ken Davies; if you look in the Book Store pages towards the back of this issue, it is under the Marine category.

The timings of the transmissions of the coastal stations is another matter. I can't remember if the above book lists transmission times for each station (I gave my own copy away about a year ago!), - *Yes it does Graham, I've just checked* - ***KN*** - but simply spending some time tuning around the marine frequencies should yield results.

As ever, the first place to start with marine transmissions is 2.182MHz. This is the International distress, safety and calling channel. If anything is happening, it usually starts on this frequency, and then often moves to another frequency (or pair of frequencies in the case of duplex signals). The two three-minute silence periods at H+00 and H+30 are very good times to listen for distant stations. At the end of the silence period, many stations list frequencies where they have weather broadcasts or navigation warnings, and many stations announce lists of ships and ships callsigns for which they hold messages.

There are a number of other marine-band allocations in the h.f. spectrum, and they all have at least one calling channel. If you want to try to hear signals from further afield it is worth monitoring these calling channels to see what crops up. In each case, there is a coast frequency and a ship frequency - I have been told that it is best to listen to the coast frequency. In most cases, contact is established on one of the calling channels, and then the ship and shore station move off to another pair of frequencies (almost always chosen by the shore station); these new frequencies tend to be in the same band of marine frequencies - see **Table 1**.

One frequency that I have had some success with, and have seen many reports for, is 2.670MHz. This frequency is used by coast stations in many countries, including the UK. Lands End Radio uses 2.670MHz for weather and navigational broadcasts, and also Traffic Lists. The morning after I received David's letter, I simply tuned to 2.670MHz at 0730UTC, just as Lands End Radio started its broadcasts. The contents of that broadcast were not that important (to me, at least), but the fact that I could hear the signals loud and clear just confirms what I have been saying - the signals are there, you just have to pick the right time and frequency.

Other than the above recommendations, I can only suggest patience and perseverance in very large measures. The signals are there, but they are (or appear to be) very random. At different times of the day, propagation will affect the distance that signals travel, and that determines whether you will (or will not) hear them. That is why listening is an art, not a science.

Table 1.

Marine calling channels (all in MHz u.s.b.)

Channel	Coast	Ship
	2.182	2.182
421	4.417	4.125
606	6.516	6.215
821	8.779	8.255
1221	13.137	12.290
1621	17.302	16.420
1806	19.770	18.795
2221	22.756	22.060
2510	26.172	25.097

GHFS Again

Kevin W from Hertfordshire writes to ask about several subjects relating to USAF communications.

Firstly, Kevin wants to know if there is a map showing the location of USAF bases such as Andrews, Hilda and Edwards. These are places that he has heard mentioned on GHFS frequencies, and would like to pinpoint them. Well, this is a large and complex subject, and a bit too large to cover in this column (it would fill several pages). Suffice to say, almost all USAF bases in the continental USA are named after historical figures, so there is no town of Edwards with an airfield next to it. Hilda is actually not a place, it is a code-word used by an Air Force department based at an Air Force Base in Illinois - so you would never find Hilda on a map. Finally, Andrews Air Force Base is just outside Washington DC. Can anyone recommend a good book which gives details of US bases and their locations?

Secondly, Kevin wants to know why he can hear Thule GHFS so strongly on 11.175MHz. Well, until recently, this station did not use 11.175MHz; however it is now available for use 24 hours a day, and has been since early in 1997. I think that the strength of Thule's signal may be related to its position (the north-western coast of Greenland) and the favorable propagation conditions from such a northerly site.

Plymouth

Several people wrote to me regarding the closure of Plymouth Rescue Control Centre on the 1st December. From the various letters and information received, I was able to compile the following.

The closure was effective from 1200UTC on 1st December, and there were several stations active at that time. Plymouth called all the aircraft it was keeping watch with and delivered the following message at 1200UTC: "Sierra 125, Sierra 169, Sierra 193 and Alpine 95, this is Plymouth Rescue now ceasing operations. Contact your new controlling agency Kinloss Rescue, best wishes and safe flying. This is Plymouth Rescue out."

Moments later, Kinloss Rescue then welcomed all the above stations with the following message: "Sierra 125, Sierra 169, Sierra 193 and Alpine 95, this is Kinloss Rescue. ARCC Kinloss has assumed operational control from ARC Plymouth at time 1200. Welcome, we look forward to providing you with our best service in the future over."

All four stations then called Kinloss Rescue and confirmed that they had copied the message.

So, another busy and favourite station has now been consigned to the history books.

Info in Orbit

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E-MAIL: info.orbit@pwpub.demon.co.uk
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Firstly, a very happy New Year to all 'Info' readers. Although there is a delay between the writing of 'Info' and its appearance with the other columns in *SWM*, the time is little over four weeks, and can be shorter. Contrast this with columns in some computer magazines which appear to have been written months in advance, often losing topicality and relevance. I recently ended my subscription to one magazine because of its dated content - a feature talking about the instability of Internet Explorer 4 beta-2, some two months after the release of the final (non-beta) version! I hope that 'Info' can retain topicality during the year ahead.

Please note my new E-mail address and web page (for those with access to the Internet). The previous addresses will remain valid for a short period.

E-mail to **info.orbit@pwpub.demon.co.uk**
Web Site **http://www.peverell.demon.co.uk**

Feel free to suggest topics when you write. Currently, the largest proportion of mail is for Kepler elements, with basic WXSAT questions a close second. The hardest type of question to answer remains "What is the best system for me"?

This year I shall be attending the weekend conference being held in South Wales between 1st and 3rd May in Newport by the Remote Imaging Group. These conferences are invariably of excellent quality and I am looking forward to seeing many of the people whose names are so familiar in this field. RIG members should contact Dave Cawley on **(01440) 820040** to arrange booking. My own minor contribution will be a short talk on my own involvement with satellites and writing for *Short Wave Magazine*.

Current WXSATs

With the sun so low over the northern hemisphere, visible-light images from all the WXSATs remain at their worst of the year. NOAA-12 does not switch over to visible-light images during either its evening north-bound, or its morning south-bound passes, leaving us instead with the two infra-red channels. **Harry Wagg** of the Wirral sent a NOAA-14 (afternoon) image on disk - see **Fig. 1**. This shows the scene from the early afternoon on 22 November. A minute or two after such passes are received, NOAA-14 switches from transmitting the low-level visible-light channel to the infra-red, the two channels (night-time) mode used when the WXSAT moves into the winter darkness of the north polar region.

To show how much detail remains present in the visible-light (right-hand) section, even at such low levels of illumination, I did a contrast-stretch of Harry's original image (which he supplied on disk), and the result is quite good - see **Fig. 2**.

The other polar WXSAT METEOR 3-5 continues to transmit imagery only when in sunlight. A look at its current orbital plane (as seen on any good satellite tracking program) shows that south-bound passes are currently in darkness over Britain, but the satellite is in sunshine during the north-bound afternoon passes, so we can monitor transmissions until cut-off during the approach to the dark northern polar region.

METEOSAT-7 Continues Tests

The newest WXSAT in the METEOSAT series is METEOSAT-7 which was launched by Ariane-4 on 3 September. It is currently undergoing commissioning tests. Latest news is that because of the precision of the launch and early orbit manoeuvres, there is enough on-board fuel to last until 2004. Hand-over of the satellite to EUMETSAT happened on 8 September. The first visible-light image was obtained on 18 September (and published in this column shortly after), and there have been scheduled periods of continuous imaging to allow data quality monitoring, and verification of the image processing system. Still under discussion is the decision concerning whether METEOSAT-7 will become the primary or back-up satellite.

Measures have been taken to avoid a recurrence (with METEOSAT-7) of the anomaly which hit the METEOSAT-6 radiometer while in orbit. The anomaly showed up as a variation in the brightness of the infra-red and water vapour images, which would fluctuate in time-scales ranging from minutes to hours, making the images unusable. Techniques to identify and correct the anomaly in each of the 2500 scan lines, which make up each full resolution scanned disc, were developed by ESA between 1994 and 1995, and, within the EUMETSAT system, further developed up to operational status. The final anomaly-correction process for METEOSAT-6 images was proved to be accurate to about 1%, when compared with METEOSAT-5 data.

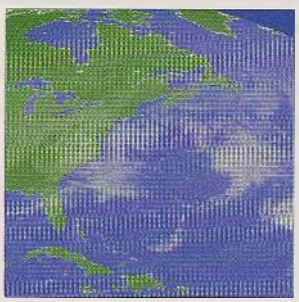

Fig. 4: GOES-8 image December 1997.

METEOSAT-5 To Move East

With METEOSAT-7 near to full commissioning, METEOSAT-5 has a new life ahead of it. Plans now confirmed call for it to be drifted to longitude 65°E. Drifting should have started by the end of last month, and a trip of some 150 days should find the satellite able to provide full imaging data for the *Indoex* project. *Indoex* is an international field experiment designed to study atmospheric aerosols, clouds and pollutants over the Indian Ocean.

Other Geostationary WXSATs

GOES-8 remains the operational WXSAT in the GOES-E (east) position at 74°W, and GOES-9 occupies the GOES-W (west) position at 135°W. GOES-10, located at 104(west, is in a stand-by mode in case of failure of either GOES-E or GOES-W. There is an anomaly condition with its solar array, but two months of testing produced a solution which enables the satellite to remain ready for operations. Images from GOES-E are re-transmitted from METEOSAT-6 on channel A2, according to the WEFAX schedule.

FENGYUN-2

China's first geostationary WXSAT is located at 103°E longitude, and continues to undergo commissioning. Its first images were produced last June and published in this column shortly after. Mike Kenny of Australia has reported that both h.r.p.t. and WEFAX are being transmitted, though there is no official timetable yet.

GMS-5

The Japanese Meteorological Agency controls GMS-5 which is positioned at 140°E. A number of image formats are also re-transmitted on a three-hourly basis from METEOSAT-6.

GOMS

The Russian GOMS-N1 is located at 76°E. Its main image output is infra-red scans. As with GMS and GOES, these are also re-transmitted from METEOSAT-6 on channel A2. The Launch of N2 is currently scheduled for the end of 1998.

Fig. 5: GMS-5 image 10 December 1200UTC.

Australian Fires - From Space

A set of NOAA-14 h.r.p.t. images showing the fires on the east coast of Australia were sent from **Arthur Andrews** in Australia to **Dave Cawley** of Timestep, who kindly E-mailed them to me. As at early December, the Coonabarabran fire had destroyed some 180000 hectares and was out of control. Arthur tells me that their weather bureau is forecasting the hottest summer ever recorded, and due to the three year drought, they will have extreme fire danger through to March. The temperature there was 36°C!

WXSAT in CIS

This is the first in a series of articles on the reception, data processing and image dissemination carried out in the CIS. It has been made possible by the considerable help provided to me by scientists working in the Space Monitoring Information Support laboratory (SMIS), of which **Dr. Michael Zackharov** is the Head of software development. His colleagues within the SMIS laboratory include scientists **Dr. Yulia Krasheninnikova**, **Dr. Petr Rutkevich** and **Dr. Alexei Mazurov**, Laboratory head **Dr. Eugeny Loupian**, and leading software developer **Eugene Flitman**. These staff are co-authors of documents made available to me about the work of the Laboratory.

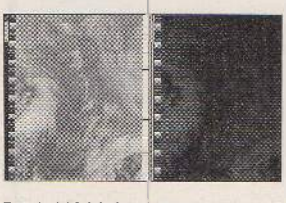

Fig. 1: NOAA-14 mid-day 22 November from Harry Wagg.

Fig. 2: Enhanced visible-light section of Fig. 1.

Fig. 3: METEOR 3-5 image 10 December 1520UTC.

Fig. 6: GOMS image 10 December 1230UTC.

Fig. 7: NOAA-14 h.r.p.t. image of Australian fires on east coast.

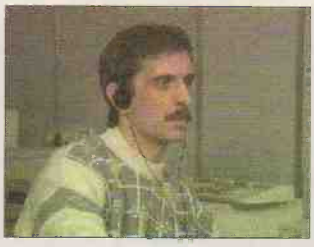

Fig. 8: Courtesy of Dr. Michael Zackharov.

Fig. 9: SCANOR tracking dish used for receiving NOAA h.r.p.t.

The SMIS laboratory, Space Research Institute, has been maintaining the Satellite Data Information System since the summer of 1994. It was developed to support weather satellite data users and the owners of satellite data acquisition stations. The system was primarily oriented to the users of satellite data covering Russia's territory.

The Laboratory uses the Scanor system, a data receiving and processing unit, to collect high-resolution-picture-telemetry (h.r.p.t.) from NOAA-12 and NOAA-14 for monitoring the Earth's surface and atmosphere. Software is 'state-of-the-art' and is all written in-house, Satellite data is processed and laid on standard mapping projections and overlaying coastal lines from the CIA World Map.

The computer requirements for the SCANOR system are fairly minimal, even running on a PC with an 80386 processor. The system enables the production of recent cloud maps of Europe, European Russia and Western Siberia, and are updated four times a day. Daily animations of cloud movement are also created from the latest data and cover a time span of approximately three days.

Composite maps of clouds over the whole of Russia are automatically created twice a day using data acquired at IKI RAN (Moscow) and ISZF SO RAN (Irkutsk) - all obtained from the h.r.p.t. stream (1698.0 or 1707.0MHz) from NOAA satellites. Additionally, selected regions within Russia (such as Baikonur, Moscow and St. Petersberg) are updated automatically after each satellite pass.

This data is not restricted to Russian scientists and meteorologists. Those having access to the Internet can 'surf' to:
http://smis.iki.rssi.ru/data/today/sched_e.shtml
and see the current schedule of NOAA passes, from which recent images can be selected from the archive. This feature on the SMIS Laboratory and WXSAT operations in the CIS continues in future editions.

Image Display Software

A number of readers have asked about the availability of PC software that can perform small amounts of image manipulation. Although the most well-known general image processing programs are probably *Paint Shop Pro* and *Graphics Workshop for Windows*, both are multi-megabyte programs. A search on the Internet led me to several 'freeware' programs, of which *Visua* and *PicView* seem to fit the bill.

Visua, now in version 2.3, was written by **Fabrizio Pignotti** (Italy), and I have been using it for a few weeks to try it out. It comes as a zipped collection of about 500Kb of files, which takes about 30 seconds to install! You can use it to view, convert and manage your graphics files, and it supports a multitude of file formats, including JPEG, GIF, BMP, DIB, RLE, AVI, WMF. If you have a scanner you can use the Twain interface. There is a 'thumbnail' viewer for previewing the images in a specific directory, and print preview capabilities. The special effects option, like *PaintShop Pro*, has a number of facilities that are unlikely to be used for WXSAT images (unless you go in for image distortion curiosities - blur, oil paint, mosaic, page curl, wave, mirror, and others). There is an option to view 'movie' files, and this worked perfectly with one I retrieved from the Internet, showing a 'quick-time' movie of Sputnik-1 in orbit. The file-management functions (move, copy, and rename) work normally, making this a space-saving, economical and efficient program.

PicViewer, currently in version 1.3 as freeware, was written by **Andrew Anoshkin**, and is an even smaller program, occupying some 335Kb in zipped form. It is essentially a viewing program rather than for image processing, but I have found it speedy to run and much less memory intensive than the larger programs. When set to a specific directory, a list of the images available is presented, and any can be selected for viewing by moving the cursor to highlight the filename. Alternatively, a 'slide-show' option provides a sequential look at each image using an adjustable time delay.

Correspondence

Trevor Burns of Mountmellick is preparing for his amateur B licence, but having a computer and selection of receivers, decided to delve into the world of WXSAT monitoring. He obtained a little-used '486' PC having minimal specification, but it can still run satellite tracking software, and at least one of his receivers may be able to monitor the 137MHz band (see the frequencies listed at the end of this column), even if the equipment is not suitable for producing a usable signal for decoding.

Victor Spiteri lives in Gibralta and also has a number of receivers, of which his Realistic PRO-2005 (similar to my PRO-2004) should be able to monitor the 137MHz band, at least for listening purposes. I leave my PRO-2004 scanning between 136.0 and 137.95MHz whenever possible, and invariably hear a selection of known satellites - not all of which are WXSATS.

George Newport of Canterbury sent me another batch of high quality prints. He uses the TH2 imaging system and an HP-850C inkjet printer, and uses special paper for his submissions. His NOAA-14 image, **Fig. 11**, shows snow over the hills of Norway. George raises the question of coverage of North Africa by NOAA WXSATS passing over the UK. Obviously those living in the south of Britain can receive signals from the satellites during the earlier (or later) stages of any particular pass. Signals in the 137MHz (v.h.f.) band are attenuated by physical obstructions, so generally, the height of the antenna dictates reception limits. Using good quality, low-loss, matched cable (usually 50 or 75Ω) to feed your receiver, you should not require a pre-amp in order to hear the WXSAT signals.

Fig. 10: NOAA-14 South-west coast of the Caspian Sea, from SMIS.

Fig. 11: NOAA-14 on 27 October at 1345UTC from George Newport.

Shuttle Launch Schedule

STS-89 (*Endeavour*) is scheduled for launch on 20 January at 1531UTC (subject to change). This is a MIR docking to deliver the Space-Hab-DM unit.

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.

Software & Kepler Elements

For any software mentioned in this, or previous columns, please send me a 3.5in HD PC-formatted disk, together with secure 50p coin and stamped, return addressed envelope.

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 all operating satellites. This data originates from NASA. I send all Kepler elements by return-of-post.

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

Alternatively, 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.

SWM

Frequencies

NOAA-14 transmits a.p.t. continuously on 137.62MHz
NOAA-12 transmits a.p.t. continuously on 137.50MHz
NOAAs transmit beacon data on 137.77 or 136.77MHz
METEOR 3-5 transmits a.p.t. on 137.85MHz when in sunlight
OKEAN-4 and SICH-1 transmit a.p.t. for brief periods on 137.40MHz
METEOSAT-6 (geostationary) uses 1691 and 1694.5MHz for WEFAX
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MIR uses 143.625MHz for voice.

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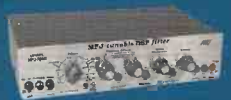

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Satellite TV News

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As 1997 draws to a close we can look back to an increasing number of digital satellite feeds now becoming the norm, though with a greater demand for satellite links so analogue activity has remained significant. Clearly digital will take over within the next few years on grounds of cost, lower suplink transmission levels and reduced transponder spectrum - as satellite observers we need to move eventually into the new technologies. For the end of 1997, there have been many analogue sightings from readers so don't all rush out to Comet and buy the latest Nokia digital box!

Manchester United played Juventus in Turin night of December 11th and the live satellite feed was carried via Orion-1 @ 37.5° W @ 1930hrs (12.668GHz vertical, low level commentary + fx at 7.00, 7.20MHz; + blank carrier 7.40MHz). This was preceded @ 1700 with colour bars and ident 'UKI-77 TEST' alternating with 'BT TES 9 0044 802852221' and several live interviews and promotions. Unusual to see an Italian feed via Orion rather than the 18 West Intelsat. The VT clock at half time indicated 'Champs League for Central TV Birmingham' (UEFA Champions League actually).

Ski-ing freaks have enjoyed spectacular viewing from British Columbia during mid November carried live via Intelsat K 21.5°N and PAS-3R @ 43°W. Various identifications were noted including 'BC Park City' and 'PSSI NYBC Mammoth Ca'.

The TV's big guns were wheeled out on November 21st with the UN Symposeum on TV from New York City carried via PAS-3R 12.640GHz horizontal from 1730 onwards. The TV Forum was a compilation of the action over the 19-21st and included speakers were Dan Rather, lead anchorman and Rupert Murdoch heading News Corporation.

The audio carrier at 6.20MHz carried original English commentary whereas the 6.80MHz carrier included a voice over in Spanish. A few days later the 'Armenia Telethon Fung '97' was transmitted via Intelsat K at 11.620GHz horizontal, the usual sort of scrolling caption of money pledges at bottom screen though oddly abruptly cutting carrier at 2000 hours mid flight.

I'm uncertain as to whom the transmission was intended - odd! Equally odd was the 'Shell Test' caption on bars November 12th @ 0730 hours, 11.680GHz vertical, audio 6.60MHz on Intelsat 601/803 27.5° - radiated for considerable period which I presumed to preceed a corporate feed for Shell petrol/oil.

Well known Bournemouth Bay sat spotter **Tim McClellan** (Christchurch) comments on the Telecom 2D @ 5 °W early December the France-3 service was hit with strikes and transmitted a test card - a rare sighting these days - with a national radio programme on the sound subcarrier. The test card was captioned 'due to unforseen circumstances'. Tim uses an 80cm dish feeding a Pace receiver with a SECAM to PAL transcoder to display. French SECAM colour on his PAL TV. High quality pictures are available on this bird if you're a French expat or seeking help with learning French - several of the channels remain unscrambled.

Another reader of our UK satellite magazines is **Paulo Raymundo** in Bahia, Brazil, he lives on the 8th floor of a tower block and yet has managed to rig 2 dishes on his balcony, one being a 1.8 metre! There are 2 digital TV services now available, that from DirecTV on Galaxy-3R @ 95W with 45 video + 23PPV + 33 radio channels - this rivals the Sky service on PAS-6 43°W which sports 35 video + 4 PPV + 16 radio channels with a further 9 video + 48 PPV + 16 radio channels (NB PPV = Pay Per View).

Roy Carman (Isle of Wight) has researched those recently featured off-screen pictures of mine showing test flights of an unmanned aircraft with surveillance TV pictures to the ground. Seen via Intelsat 601 @ 27.5°W- no audio.

It is thought that the unusual craft is a replacement for the U2 spy plane - the new version will be unmanned and preprogrammed with flight particulars. IR technology will allow sighting through cloud and smoke - perhaps more important through desert haze where normal thermal imaging is not too efficient. Amazing what you see on satellite - I wonder now if these pictures were restricted and should have been transmitted in hard scrambling.

The new Sirius-2 satellite is now operational at 5°E, Roy watched the launching carried live on Telecom 2C @ 3°E (12.650GHz vertical) November 12th @ 2100 - the satellite was seen on test transmissions November 25th early morning at 12.459GHz horizontal. Another odd caption on November 20th - Intelsat 601 - 11.012GHz horizontal @ 1814 - 'Test Transmission for Anyone out Here' supered across colour bars!

News In Orbit

Autumn 1998 and China's Great Wall Industry Corp launch their own 'Chinasat' bird via a Long March 3B rocket for operation early 1999 with 16 x KU band and 26 x C band transponders. And 'Australia Television' that was to be closed has been saved by merging with the Seven Network and a new revamped English language only service will now transmit across SE Asia for expats, English/American viewers and affluent English speaking Asians. Nippon TV in Japan is to launch a SE Asian satellite service April '98 with a Japanese/English language channel intended for tourists and expats.

The French AB Sat and Television par Satellite (TPS) have merged into a single satellite package with elements of the AB channels retained within TPS (e.g. wildlife channel Animaux and adult XXL). Both channel groupings had previously agreed the Simulcrypt encryption standard. Canal+ has postponed plans for an all-news channel until further discussions early '98. Originally planned to open in April, the take-over of Euronews by ITN may have well brought about the delay - Canal+ had previously considered buying Euronews.

'Superfoot 98' is a World Cup football channel operated by France 2, France 3 and TF1 to air on the TPS digital platform from June 10th for at least 10 hours daily.

With Sirius-2 satellite now operational at 5°E check out the new Swedish TV's 'SVT International' that has been promised an opneing on Sirius. Intended for Swedes living across Europe, the service compiles programme offerings from the terrestrial SVT channels.

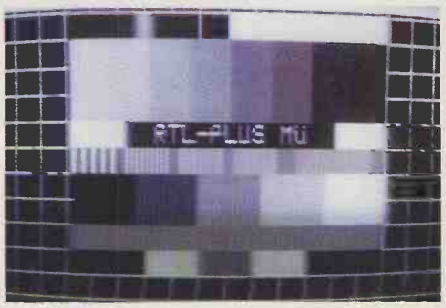
Orion @ 37°W is transmitting an MPEG TV service - news and sports - from Dublin on weekdays for cable distribution in New York and Boston areas via Celtic Vision. An Israeli company Tadiran Scopus provided MPEG equipment for the one-way service.

'African Independent Television (AIT) International' hit the satellite air wave early November via Intelsat 601 @ 27°W covering Nigeria and other African states and with future plans to target Europe, the Americas and Asia. The Minaj Africa Network is another Nigerian TV pan African service to go onto satellite early 1998.

MTV changes for Summer '98 with their new music video channel M2 across Europe and a splitting of it's Northern European service into separated Scandinavian and Dutch feeds.

Iridium now has over 40 LEOs (low earth orbiting) satellites in their eventual 66 LEO fleet to provide a global mobile 'phone service reckoned to open Autumn '98.

Finally, for Spanish language students, tune up to Eutelsat's Hot Bird slot at 13° E for 'Canal 24 Horas', a 24 hour news service at 11.658GHz vertical. Owned by the Spanish state broadcaster TVE, it joins the other Spanish language TVE International service.

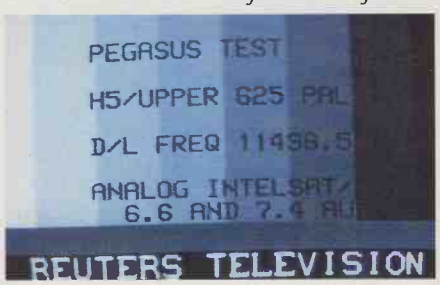


An unusual John Locker catch, the RTL digital Orion transponder - the fuzzy mono pix may be due to the NTSC-PAl conversion (JL).

Eutelsat II F4 @ 7 East. A Spanish regional ident card (JL).

In-car ENG video editing/voice over dubbing via Intelsat K (JL).

Familiar PM5544 test card from the Gulf.



'Pegasus' tests via Intelsat K - see text.

Decode

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C/O SWM EDITORIAL OFFICES,STATION APPROACH,BROADSTONE BH18 8PW
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Baby Sitter

Hello and welcome to a special edition of 'Decode'. I'm Kevin Nice and as you know I am the Assistant Editor of your favourite radio read. This month Mike is taking a break as he's not been too well. Please join me in wishing him all the best for a speedy recovery.

When I'm not busy producing *SWM* and not perusing some of my other many and various hobbies, you'll catch me in my shack busy with my decoders and my receivers. Just for the record, I now have two Plessey PRS2282 professional h.f. receivers. A far cry from my first s.w. receiver of 1970, a Bush portable! The Plesseys are a bit rare and are very well specified, you can find more details in *Jane's Military Communications*. I've got the 1990-91 issue and it is included in that one, but I'm not sure about later issues.

Actually I'd be interested to hear from anyone else using this particular receiver to compare notes. I also have a couple of v.h.f. receivers and some less specified but capable h.f. receivers. Not every thing is installed in the shack yet as I have just moved home. Decoder wise I'm quite a fan of software decoders, and I currently run the ubiquitous *HAMCOMM* and *JVFAX* shareware offerings along with the more recent *RadioRaft*. On the non-shareware front, as regular readers will know, I have a Hoka Code30. I'm in the process of evaluation a Code3 Gold, which, if you look else where in this issue, you'll find a short review of this particular Hoka offering's abilities.

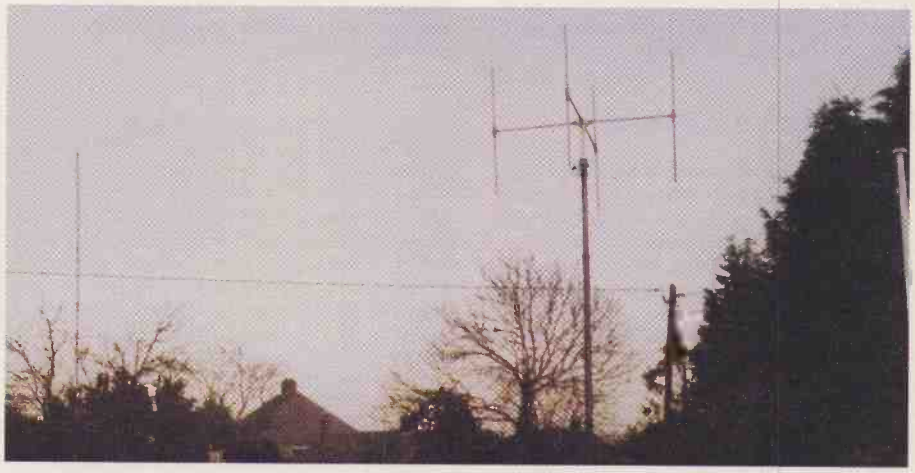
From an antenna perspective I currently have a (true) random length, long wire - I haven't got a clue how long it is! A balanced doublet and an active loop - more of the loop in a future issue of *SWM*.

Different Slant

To change the slant of this column a little, this month we are going to examine a question posed by **Dr Martin van Druinen** over three years ago in this very column. Martin had been monitoring some h.f. signals and had been attempting to analyse them with his Wavecom decoder.

If you have the back issue you can refer back to the specific question. It's on page 57 in the April 1994 issue of *SWM*. That is the very same issue that I joined the magazine! For those of you who don't keep your back issues - shame on you - **Fig. 1** shows the spectrum display that Martin sent in.

As it happens this kind of signal, which is an example of m.f.s.k. - multiple frequency shift keyed data signal is one of my specific areas of interest. The accepted designation for the mystery of April 1994 is CROWD36. So the puzzle of what it's called is solved. Now to explain how it works, who uses it and where to find traffic.



A rather serious monitoring tool, in use by an anonymous 'Decode' reader - have you guessed what it is yet?

CROWD36

The system is a Soviet m.f.s.k. system using 36 tones which is actually based on British Piccolo MK1 - for some interesting background reading on the MK1 and MKVI Piccolo and m.f.s.k. in general get hold of a copy of *Principles and practice of multi-frequency telegraphy* by JD Ralphs, Published by Peter Peregrinus Ltd. ISBN 0-86341-022-7.

The main user is the CIS Diplomatic service, with suspected use by CIS Intelligence and Military services. CROWD36 is found mostly found to operate at 40bd with a each single tone having a duration of 25ms. Hand keyed traffic is usually at 10bd with a single tone lasting 100ms. A spectrum analyser will show the tones arranged in three distinct groups of 10+11+11 tones, as per **Fig. 1**. Tones are spaced 40Hz apart and tone numbers 1, 12, 24 and 36 are rarely used so you are likely to see an 80Hz gap between the groups. Each of the 32 tones represents one ITA2 character code.

CROWD36 is also known as CIS/Russian Piccolo, URS multitone, CIS 10-11-11 MFSK or CIS-36. As of this date there are **no** publicly available decoders for this system although they do exist in the professional market and are no doubt in use at locations similar to GCHQ world-wide.

There are decoders commercially available **now**, possibly those proffered by Wavecom and definitely Hoka Code30, that provide tools that can be used to demodulate the tones. It is then possible, with much patience and time, to derive a character set for the mode. Various ITU documents have listed four CROWD36 variants that vary with tone duration and baud speed. **Table 1** shows

Table 1: CROWD36 Variants.

Variant	Duration (ms)	Shift between tones (Hz)	Tones Present	Baud Rate
1	25	40	34	40
2	25	10	34	40
3	100	40	34	10
4	100	10	34	10

Table 2: CROWD36 Tones and Alphabet.

Tone	Freq.(Hz)	Character/Figure
1	-640	unperf
2	-600	Q
3	-560	X
4	-520	W
5	-480	V
6	-440	E
7	-400	K
8	-360	space
9	-320	B
10	-280	R
11	-240	J
12	-200	ctl
13	-160	G
14	-120	T
15	-80	F
16	-40	fs
17	0	M
18	40	Y
19	80	C
20	120	cr
21	160	Z
22	200	U
23	240	L
24	280	****
25	320	D
26	360	I
27	400	H
28	440	ls
29	480	S
30	520	O
31	560	N
32	600	-
33	640	A
34	680	P
35	720	
36	760	

Key

ctl	control purposes
fs	figure shift
ls	letter shift
****	ref tone on 10bd 'op chat'

Notes:

This is a preliminary table!

The output of the alphabet in use may vary at customer request.

Watch for tone 24 to stay up before 10bd operator chatter.

the variants, with types one and three being commonly heard.

A few distinct patterns can be detected in a CROWD36 signal: selcal, idling and sending traffic. Selcal and idling are a series of five tones repeated in the same pattern. Traffic mode is most commonly, but not always, found as 40bd encrypted and many times operator traffic can be found in the clear at 10bd. Start-up and sign-off are usually 10bd and hand keyed.

Demodulation & Decoding

Using a Hoka Code30 V2, select the 'def general multitone' from the demodulators menu. Settings are 36 tones, 40Hz spacing and 40.1bd. This will produce output consisting of the raw tone sequences. Keep in mind that 10bd operator traffic will appear as a sequence of four repeated characters.

Correct tuning a CROWD36 signal is difficult. The signal is asymmetric so you can't use the centre of the middle tone group. Tones are only shifted by 40Hz and tuning errors as small as ±5Hz will start to induce errors.

From the raw tone sequences that are generated from the above procedure or similar you can use the data in **Table 2** to map the tone number to character and therefore decode traffic.

I wish anyone embarking on such an activity much luck. I wouldn't mind betting that there are some of you brave souls with sound cards and programming expertise who will give writing you own CROWD36 decoder a whirl - I'll be interested to hear if you do.

Thanks

My thanks go to WUN - the World Utility News club - and specifically to both Stan Scalsky and Mike Chace for allowing me to use some material from their invaluable *Digital Signals FAQ V5.0*. I personally use this authoritative document constantly. I can heartily recommend it to anyone who is either actively monitoring digital transmissions or to anyone who wishes to start. Contained within is a mountain of information as to the composition of many datamodes -more than you are likely to see in any other single publication!

Sounds Like?

For a sample of a CROWD36 signal you can check out the special *SWM* Web site at **http://www.pwpub.demon.co.uk/swm/** here you'll be able to find a 'zipped' .WAV file, and hopefully - if I get time - a RealAudio sample too. For those readers without Internet access, or those of you with a bit of patience - that is all of you, isn't it? - then take a look at **Table 3** for a list of likely frequencies for this mode.

If I've had the time, you will also find many other bits and pieces of interest to 'Decode' Readers. Including utilities and links to other fascinating radio sites and related resources around the globe. Keep your browser pointed at this URL from time to time as I'll be doing my best to keep it as fresh as possible - other commitments allowing!

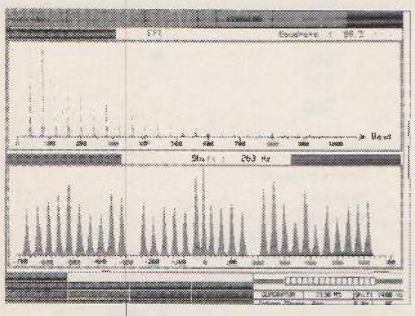


Fig.1: Martin's spectrum.

73

I hope that you have all enjoyed reading this decode special. If it is well received I may consider producing something similar in the future. I have just spoken to Mike who is doing fine and he has just informed me that all is well, so next month we are back to normal with Mike returning to the helm.
So from me - bye for now.

Offer

If you would like your own copy of the *FAQ* and have Internet access, then take a look at the *SWM* Web site - see column header for details. If you don't have Internet access then you can send me a 3.5in formatted floppy to me, Kevin Nice, at the Editorial Offices for an electronic version. Please ensure that the disk is either a PC or Mac flavoured type and is accompanied by a 50p piece and a return address and a stamp. If in the unlikely event that you read this column and don't yet have a computer, drop me a line or give me a ring and I'll see what can be done. Do bear in mind that the *Digital Signals FAQ* consists of some 80 A4 pages of 9 point fixed pitch text!

Table 3: Frequencies to hear CROWD36 signals.

MHz	Time	Baud	Comments
5.787	2101		SOUD Station?
6.7215	1930	40.1	SVR/FAPSI: Moscow wkg Africa? til 2000.
7.7425	1930	40.1	SVR/FAPSI: Moscow wkg Africa? til 2000.
8.015	2103	10	Russian Diplo,? opchat.
8.023	1625	?	
9.084	1716		Russian Diplo,? ack mode.
9.107	1804		Russian Diplo: in ack/selcal mode.
9.122	1800	40.1	SVR/FAPSI: Moscow til 1900 Selcall/Auto QSL mode.
9.373	1800	40.1	Tfc til 1815.
10.1613	1745	40.1	Wkg/western Europe Embassies til 1815.
10.1695	1730	40.1	Til 1800.
10.476	1610	40.1	Russian Diplo: crypto.
10.540	1557	40.1	
11.0725	1715	40.1	Tfc til 1745.
11.0745	1000	40.1	Tfc w/embassies W. Europe til 1715.
12.127	1305		SOUD Station: 5LGs.
12.154	0000		SVR/FAPSI: Moscow.
12.156	1800	40.1	SVR/FAPSI: Moscow til 1900 QSX for 9122?
12.181	1035		Encrypted.
12.200	0800	40.1	SVR/FAPSI: Moscow til 0830.
12.207	0845	40.1	SVR/FAPSI: Moscow tfc to Far East? til 0930.
12.228	1033		Encrypted.
12.276	0800		SVR/FAPSI: Moscow wkg Asia til 0900 and QRT.
13.4375	0900	40.1	Wkg/embassy, Lisbon? til 0900.
13.456	1302		Russian Diplo, crypto.
13.859	1630	40.1	Tfc til 1700.
13.877	1513		Russian Diplo, tfc ends "QSW 9340".
14.3485	1615	40.1	Tfc til 1645.
14.3975	0845	40.1	SVR/FAPSI: Moscow wkg African Sites til 1045.
14.419	0909		SOUD Station? 5LGs tfc.
14.4465	0830	40.1	SVR/FAPSI: Moscow til 0930.
14.7135	0800	40.1	Wkg/embassies cen. and W. Europe til 1030.
14.7135	0645	40.1	SVR/FAPSI: Moscow til 0900.
14.734	1542		Russian Diplo, crypto.
14.7425	0618		Encrypted.
14.9385	1200	40.1	SVR/FAPSI: Moscow til 1230 w/auto-ack and selcal modes.
16.012	0223	?	
16.143	0958		
16.1495	0845	40.1	Tfc til 0915.
16.1495	0900	40.1	SVR/FAPSI, Moscow wkg Unid site til 1130.
16.153	1015		Crypto.
16.155	0623	?	
16.276	0507		Encrypted.
16.347	1354		Russian Diplo?, opchat followed by selcal mode.
17.4735	0900	40.1	Tfc til 0930.
18.347	1100	40.1	SVR/FAPSI: Moscow wkg unid site til 1200.
18.464	0515		
18.741	0709		Encrypted.

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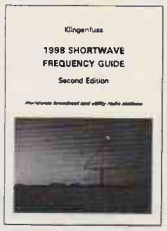

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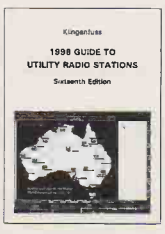

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73 from Dave G4KQH, Technical Manager.

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The 'World Propagation Forecasts' prepared for *SWM* by Jacques D'Avignon in Quebec now suggest that paths to India, S.Africa, S.America & C.America may be open in the 25MHz (11m) band for a while during the day.

Some improvement in reception in the higher frequency bands is becoming apparent as we gradually climb the steep slope of sunspot cycle 23, so it seems likely that test transmissions will commence in the 11m band before long.

Long Wave Reports

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

Unless otherwise stated, all logs were compiled during November.

A broadcast in Russian was picked up on **189kHz** by **Fred Pallant** in Storrington at 2130UTC on November 29. Adjacent channel interference made reception quite difficult and no ident could be obtained but it may have been the regional programme [R.Rossii] which is carried by a 500kW outlet at Tbilisi, Georgia on that frequency from 2000 to 1800UTC. It is seldom mentioned in the reports.

Medium Wave Reports

The broadcasts from several m.w. stations in E.Canada and E.USA were received during some nights in November by listeners in the UK. Those from WQEW in New York, NY on **1560kHz** were picked up at 0035 on the 1st by **Harry Richards** in Barton-upon-Humber. The transmission rated SINPO 22222. Later, he heard CJYQ in St.John's, NF on **930**, which peaked 23232 at 0100. Favourable conditions were noted on the 5th by **Robert Connolly** in Kilkeel. He listened to CKVO Clarenville, NF on **710** at 0035; also CHAM in Hamilton, ON on **820** at 0045. Both rated 22222. On the 6th he logged WTOP in Washington, DC on **1500** at 0155 (22222). He also heard CHAM and CKVO on the 23rd.

In Wallsend **David Edwardson** found the conditions quite good mid-month. On the 16th, VOCM in St.John's, NF on **590** became audible at 2048 (SINPO 25552), with adverts and a station ident. Later, he logged CFBC St.John, NB on **930** at 2330 (25532); also WCBS New York, NY on **880** at 2337 (23532). Quite a few unidentified stations were then heard including a Latin American one on **760**, with a football commentary in Spanish which peaked 24542. During the next two nights he logged CKGA Gander, NF on **650** at 2340 (23532); CKCM Grand Falls, NF on **620** at 2350 (24542); WABC New York, NY on **770** at 0120 (14541); WQEW on **1560** at 0135 (24542). Tentatively noted were WFAN New York, NY on **660** at 2355 (25532); WEEI Boston, MA on **850** at 2335 (25532) and WBZ Boston, MA on **1030** at 0130 (24532). Up in Shetland **John Slater** (Scalloway) found that WBBR in New York, NY on **1130** was still audible (SIO222) at 0820 on the 27th!

The broadcasts from some stations in the Middle East, N.Africa and Scandinavia and many from Europe were also received in the UK after dark - see chart. **George Millmore** (Wootton, IoW) was surprised to pick up the sky waves from Tallinn, Estonia (150kW) on **1035**; also Bordeaux, France (300kW) and Wroclaw, Poland (200kW) on **1206** because usually they are under co-channel transmissions from other stations.

Late at night, after the 600kW station at Wien-Bisamberg, Austria has closed down on **1476**, **Ross Lockley** can often receive co-channel ILR County Sound via Guildford. During his search for distant local radio stations he noticed that ILR Radio **1521** in Craigavon, NI is now using the ident 1521AM.

Short Wave Reports

The reports suggest that the **25MHz (11m)** band was unused for broadcasting during November.

Owing to daily propagation variations in the **21MHz (13m)** band no reliance should be placed on receiving a particular broadcast, but the following were logged quite often during November: Voice of Turkey **21.715** (Tur to W.Asia, Australia 0500-1000), rated 44333 at 0849 by **Rhoderick Illman** in Oxted; Vatican R, Italy **21.850** (Port, Sp to S.America 1000-?) 44444 at 1030 by **Thomas Williams** in Truro; BSKSA Saudi Arabia **21.495** (Ar [Holy Quran] to S.E.Asia 0900-1200) 35433 at 1059 by **Darren Beasley** in Bridgwater; UAER, Dubai **21.605** (Eng to Eur 1030-1100) SIO222 at 1100 by **Tom Smyth** in Co.Fermanagh; R.Portugal Int via Sines **21.655** (Port to Brazil 0700-2000 Sat/Sun) 24532 at 1158 in Storrington; HCJB Quito, Ecuador 21.455 (Eng, u.s.b. + p.c.) 34333 at 1120 in Scalloway; BBC via Ascension Is **21.660** (Eng to W/E/S.Africa 1100-1700) 44433 at 1225 by **Stan Evans** in Herstmonceux; BBC via Ascension Is **21.490** (Eng to S.Africa 1400-1430, Sat/Sun) 12121 at 1405 by **Robert Hughes** in Liverpool; RFI via Issoudun **21.620** (Fr to E.Africa 0900?-1500) 45544 at 1410 by **Simon Hockenhull** in E.Bristol; R.Portugal Int via Sines **21.515** (Eng to M.East, India 1430-1450) 24222 at 1430 by **Eddie McKeown** in Newry; BBC via Cyprus 21.470 (Eng to E.Africa 1400-1700) 33333 at 1435 in Kilkeel.

Daily propagation variations have also been evident in the **17MHz (16m)** band. Noted during the morning were the BBC via Ascension Is **17.830** (Eng to W/C.Africa 0730-1000, 1100-2100), rated 45544 at 0740 in Herstmonceux; R.Slovakia Int **17.485** (Eng to Australia 0830-0857) SIO444 at 0841 by **Francis Hearne** in N.Bristol; BBC via Rampisham, UK **17.695** (Eng to CIS? 0900-0930) 55555 at 0915 by **Bernard Curtis** in Stalbridge; DW via Rwanda? **17.800** (Eng to Africa 0900-0950) 25343 at 0918 in Storrington; R.Austria Int via Moosbrunn **17.870** (Ger, Eng to Australia 0800-1100) 34333 at 0935 in Truro; AIR via Bangalore **17.387** (Eng to Pacific areas 1000-1100) 34443 at 1010 in Kilkeel; R.Prague, Czech Rep **17.485** (Eng to W.Africa 1000-1030) 44444 at 1010 by **Sheila Hughes** in Morden; DW via Rwanda? **17.800** (Eng to W.Africa 1100-1150) SIO222 at 1100 in Co.Fermanagh; R.Pakistan, Islamabad **17.835** (Eng to Eur 1100-1120) 44444 at 1116 by **Tony Hall** in Freshwater Bay.

After mid-day Voice of Russia **17.610** (Eng [WS]) was 34343 at 1130 in E.Bristol; R.Ukraine, Kiev **17.725** (Eng to Eur? 1200-1300) 44444 at 1200 by **Clare Pinder** in Appleby; RFI via Fr.Guiana? **17.575** (Eng to N.America 1130-1300) 44333 at 1206 by **Chris Shorten** in Norwich; R.Romania Int **17.745** (Eng to Eur 1300-1356) 54454 at 1317 in Newry; BBC via Skelton & Woofferton, UK **17.640** (Eng to E.Eur, M.East, E.Africa 0700-1500) 44444 at 1400 by **Ernest Wiles** while in Malta; RFI via Moyabi, Gabon **17.560** (Eng to E.Africa, M.East 1400-1455) 22232 at 1415 in Liverpool; Africa No.1, Gabon **17.630** (Fr to W.Africa 0700-1600) SIO333 at 1430 by **Phil Townsend** in E.London; WYFR via Okeechobee, USA **17.555** (Eng to Eur 1600-1945) 33333 at 1615 by **Tom Winzor** in Plymouth; BBC via Antigua, W.Indies **17.840** (Eng to N/C.America 1400-1900) 44433 at 1757 in Oxted; WEWN Vandiver, USA **17.695** (Eng to Eur 1730?-1930?) 35333 at 1901 in Bridgwater.

For many listeners the **15MHz (19m)** band is the hub of their activity. In the morning R.Finland via Pori **15.225** (Eng to Australia, Asia 0900-0930) was SIO444 at 0922 in N.Bristol; Voice of Armenia, Yerevan **15.270** (Eng, Fr to Eur 1000-1100 Sun) 54444 at 1015 in Herstmonceux; BBC via Masirah Is, Oman **15.310** (Eng to S.Asia 0300-0915, 1000-1400) 22332 at 1105 in Kilkeel; BBC via Cyprus **15.575** (Eng to E.Eur, Africa 0600-1500) 24322 at 1115 in E.Bristol; Voice of Russia **15.465** (Eng [WS]) 44444 at 1130 in Morden; Israel R, Jerusalem **15.640** (Eng to Eur? 1130-1200?) 34333 at 1130 by **Martin Dale** in Stockport.

During the afternoon HCJB Quito, Ecuador **15.115** (Eng to N/S.America 1100-1600) was 34232 at 1210 in Scalloway; VOIRI Tehran, Iran **15.084** (Home Sce relay) 43444 at 1215 in

LONG WAVE CHART

Freq (kHz)	Station	Country	Power (kW)	Listener
153	Donebach DLF	Germany	500	A*,B,C,E,F,G,H,I
162	Allouis	France	2000	A*,E,F,G,H,I
171	Nador Medi-1	Morocco	2000	F*
171	B'shakovo etc	Russia	1200	A*,D*,E*,F*,H,I
171	Lvov	Ukraine	500	C*,D*
177	Oranienburg	Germany	750	E,F,H,I
183	Saarlouis	Germany	2000	A*,C*,D*,E,F,G,H,I
189	Tbilisi	Georgia	500	F*
198	Droitwich BBC	UK	500	A*,C,D*,E,G,H
207	Munich DLF	Germany	500	A*,B*,C*,E,F,H
207	Azilal	Morocco	800	F*
216	Roumoules RMC	S.France	1400	A*,B,C,D*,E,F*,H
225	Raszyn Resv	Poland	?	B
234	Beidweiler	Luxembourg	2000	A*,C,D*,E,F,H
234	Ark'gelsk etc	Russia	500	D*
243	Kalundborg	Denmark	300	A*,B,C,D*,E,F,H
252	Tipaza	Algeria	1500	F*
252	Atlantic 252	S.Ireland	500	A*,E,F,G,H
261	Burg(R.Ropa)	Germany	200	A*,B,E,F*
261	Taldom Moscow	Russia	2500	C*,D*
270	Topolna	Czech Rep	1500	A*,B,C*,D*,E,F,G,H
279	Sasnovy	Belarus	500	C*,E*,F,G,H

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

Listeners:-
(A) Ted Harris, Manchester.
(B) Simon Hockenhull, E.Bristol.
(C) Sheila Hughes, Morden.
(D) Eddie McKeown, Newry.
(E) George Millmore, Wootton, IoW.
(F) Fred Pallant, Storrington.
(G) Tom Smyth, Co.Fermanagh.
(H) Phil Townsend, E.London.
(I) Ernest Wiles, NE.Bedford.

Liverpool; R.Romania Int **17.745** (Eng to Eur 1300-1356) 54343 at 1318 in Newry; Voice of Turkey, Ankara **15.290** (Eng to Eur, N.America 1230-1330) 33333 at 1410 in Truro; RCI via Sines, Portugal **15.325** (Eng to Eur, M.East, Africa 1430-1500) 44444 at 1430 by **Gerald Guest** in Dudley; WEWN via Vandiver, USA **15.745** (Eng to Eur, Africa? 1200-1755?) 43333 at 1430 in Stalbridge; WWCR Nashville, USA **15.685** (Eng to N.America, Eur 1100-2200) 53443 at 1453 in Plymouth; WYFR via Okeechobee **15.695** (Eng to Eur, Africa 1600-1845) 44344 at 1607 by **Vera Brindley** in Woodhall Spa; Africa No.1, Gabon **15.475** (Fr to W.Africa 1600-1900) SIO433 at 1630 in E.London.

In the evening Channel Africa via Meyerton **15.240** (Eng to C/W Africa 1630?-1830?) was 23333 at 1700 in Malta; VOA via Morocco **15.410** (Eng to Africa 1600-1758) SIO444 at 1700 in Co.Fermanagh; KTBN Salt Lake City, USA **15.590** (Eng to N.America 1600-0000) 24332 at 1708 in Oxted; RDP Portugal **15.200** (Port to USA 1200-2000 Sat/Sun) 45554 at 1715 in Wallsend; RAE Buenos Aires, Argentina **15.345** (Eng, Fr, Ger, It, Sp to Eur, N.Africa 1800?-2300?) 42233 at 1855 in Bridgwater; RNB Brazil **15.265** (Port, Eng, Ger to Eur 1630-2020) 33223 at 1901 by **Tom Read** in Macclesfield; VOA via Greenville, USA **15.580** (Eng to Africa 1800-2130?) 44444 at 1919 in Storrington; R.Nederlands via Bonaire, Ned.Antilles **15.315** (Eng to Africa 1830-2025) 24233 at 1952 in Freshwater Bay.

In the **13MHz (22m)** band SRI via Sottens? **13.685** (Eng, It, Ger, Fr to Australasia 0830-1030) was 33333 at 0839 in Oxted; R.Austria Int via Moosbrunn **13.730** (Eng to Eur 0830?-0900?) SIO444 at 0852 in N.Bristol; UAER, Dubai **13.675** (Eng to Eur 1030-1055) 54444 at 1035 in Herstmonceux; SRI via Sottens? **13.635** (Eng, Ger, Fr, It to SE.Asia 1100-1330) 44433 at 1120 in Kilkeel; R.Denmark via RNI **13.800** (Da to SE.Asia 1230-1300) 44444 at 1230 in Scalloway; R.Norway Int **13.800** (Norw [Eng Sun] to N/C.America 1300-1330) 33333 at 1300 in Truro; UAER, Dubai **13.675** (Eng to Eur 1330-1355) SIO422 at 1330 in E.London; SRI via Sottens? **13.635** (Eng, Ger, Fr to S/C.Asia 1400-1615) 53444 at 1400 in Newry; R.Nederlands via Flevo **13.700** (Eng to S.Asia 1330-1525) 22122 at 1419 in Liverpool; WEWN Birmingham, USA **13.615** (Eng to N.America, Eur 1600-2000) 34333 at 1611 in Woodhall Spa; UAER, Dubai **13.675** (Eng to Eur 1600-1640) 44334 at 1630 by **Peter Pollard** in Rugby; VOA via Selebi-Phikwe, Botswana **13.710** (Eng to Africa 1600-2130?) 55344 at 1652 in Macclesfield; WHRI South Bend, USA **13.760** (Eng to E.USA, Eur 1500-2200?) 43333 at 1830 in Morden; R.Havana Cuba **13.605** (Eng [USB] to Eur 2030-2130?) 14241 at 2105 in Bridgwater; R.Havana Cuba **13.680** (Sp to Eur 2100-2300) 35444 at 2100 in Storrington; RCI via Sackville **13.650** (Fr, Eng to Eur, Africa 2000-2200) 55555 at 2112 in Plymouth.

R.New Zealand has been reaching the UK in the **11MHz (25m)** band. Their transmission to Pacific areas on **11.905** (Eng 0459-0816 Mon-Fri, 0459-0758 Sat/Sun) rated 24432 at 0715 in Galashiels. It has also been received in Cyprus by **John Parry** (Larnaca) - he logged it as 34553 at 0500.

Also received during daylight were the Voice of Greece, Athens **11.645** (Gr, Eng to Eur 0600-0800), rated 54444 at 0731 in Plymouth; Georgia R. via Dusheti 11.910 (Eng, Ger to Eur 0800-0900) 34222 at 0837 in Macclesfield; R.Australia via Shepparton 11.880 (Eng to Asia 0900-1100) 43433 at 0905 in Herstmonceux; R.Jordan via Al Karanah **11.690** (Eng to W.Eur, E.USA 1000-1630) 43333 at 1200 in Dudley; BBC via Skelton & Woofferton, UK **12.095** (Eng to Eur, N/W.Africa 0500-2100) 35322 at 1210 in E.Bristol; Voice of Greece, Athens **11.645** (Gr, Eng to Africa 1200-1250) 32232 at 1245 in Rugby; HCJB Quito, Ecuador **12.005** (Eng to N.America 1100-1530) 41144 at 1321 by **David Hall** in Morpeth; Polish R, Warsaw **11.815** (Eng to Eur 1300-1355) 43333 at 1330 in Morden; Voice of Vietnam, Hanoi 12.020 (Eng to F.East 1330-1400) 32223 at 1335 in Stalbridge; R.Australia via Shepparton **11.660** (Eng to Asia 1330-1700) SIO333 at 1400 in E.London; Voice of Israel, Jerusalem **12.080** (Eng to Eur 1400-1430) 44344 at 1428 in Newry; RCI via Skelton, UK **11.935** (Eng, Fr, Russ to Eur 1430-1659) 33333 at 1430 in Truro; Voice of Israel, Jerusalem **12.080** (Eng to W.Eur, N.America 1500-1530) 55555 at 1500 in Appleby.

Later, WWCR Nashville, USA **12.160** (Eng to N.America, Eur 1400-2200) was 44444 at 1559 in Stockport; R.Pakistan, Islamabad **11.570** (Eng to M.East 1600-1630) 34343 at 1619 in Woodhall Spa; R.Japan via Sri Lanka **11.880** (Eng to M.East, N.Africa 1700-1800) 33333 at 1715 in Malta; Israel R, Jerusalem **11.585** (Heb to Eur 1600-1900) 44544 at 1735 in Liverpool; R.Nederlands via Meyerton **11.655** (Eng to Africa 1730-2025) 44334 at 2006 in Freshwater Bay; R.Kuwait via Kabd **11.990** (Eng to Eur, N.America 1800-2100) 34443 at 2020 in Kilkeel; RCI via Sackville **11.945** (Fr, Eng to Eur, Africa 2000-2300) 35433 at 2125 in Bridgwater.

R.New Zealand has also been received in the UK in the **9MHz (31m)** band. Their 100kW transmission from Rangataiki, N,Island on **9.700** (Eng to Pacific areas Mon-Fri 0816-1206, Sat/Sun 0758-1206) was rated 33333 at 0900 in Truro. Later, their broadcast on **9.810** (Eng to Pacific areas 1650-2215 Mon-Thurs, Fri 1650-2007 Fri) was 24533 at 1809 in Wallsend.

During the morning WYFR via Okeechobee, USA **9.985** (Eng to Eur, Africa 0400-0750) was 33553 at 0515 in Larnaca, Cyprus; AWR via Slovakia **9.435** (Eng to Eur 0700-0730) 44444 at 0700 in Morden; R.Nederlands via Bonaire, Ned.Antilles **9.830** (Eng to Pacific 0730-0925)

LOCAL RADIO CHART

Freq (kHz)	Station	ILR BBC	e.m.r.p	Listener (kW)
558	Spectrum, London	I	0.80	B,E,G
585	R.Solway	B	2.00	A,F
603	Cheltenham R.	I	0.10	A,B,E,G
603	InvictaSG,Litt'brne	I	0.10	C,D*,E,G,J
630	R.Bedfordshire(3CR)	B	0.20	A,C,E,G,H*,J
630	R.Cornwall	B	2.00	A,E,G
657	R.Clwyd	B	2.00	A,B,G,J
657	R.Cornwall	B	0.50	A,E,G
666	Gemini AM, Exeter	I	0.34	A,B,E,G
666	R.York	B	0.80	A,J
729	BBC Essex	B	0.20	E,G,J
738	Hereford/Worcester	B	0.037	B,E,G,J
756	R.Cumbria	B	1.00	A,F
756	R.Maldwyn, Powys	I	0.63	B,E,G
765	BBC Essex	B	0.50	E,G,H*
774	R Kent	B	0.70	C,E,G,J
774	R.Leeds	B	0.50	A
774	Cl.Gold 774, Glos	I	0.14	G,H*
792	Cl.Gold 792,Bedford	I	0.27	E,G,J
792	R.Foyle	B	1.00	A
801	R.Devon & Dorset	B	2.00	A,B,E,G
828	Cl.Gold 828, Luton	I	0.20	E,H*,J
828	2CR CG, Bournemouth	I	0.27	B,G
828	Townland R, Ulster	I	0.80	A
837	R.Cumbria/Furness	B	1.50	A,F
837	Asian Netwk Leics	B	0.45	E,G,H*,J
855	R.Devon & Dorset	B	1.00	A,G,K
855	R.Lancashire	B	1.50	A,F
855	R.Norfolk, Postwick	B	1.50	E,J
855	Sunshine 855,Ludlow	I	0.15	B,E,H*,J
873	R.Norfolk, W.Lynn	B	0.30	E,G,H*,J
936	Brunel CG, W.Wilts	I	0.18	B,E,G
936	Yks Dales R, Howes	I	1.00	A,E,FH*
945	Derby (Gem AM)	I	0.20	A,E
945	S.Coast R, Bexhill	I	0.75	E,G,J
954	Gemini AM, Torquay	I	0.32	E,G
954	Cl.Gold-954, H'ford	I	0.16	B,E
963	Asian Sd,Manchester	I	0.80	A
963	963 Liberty (Viva)	I	1.00	E,G,F
990	R.Aberdeen	B	1.00	F
990	R.Devon & Dorset	B	1.00	A,E,G,I
990	WABC, Wolverhampton	I	0.09	E
999	Gem AM, Nottingham	I	0.25	E,H*
999	Red Rose 9-99 P'stn	I	0.80	A
999	R.Solent	B	1.00	E,G,J
999	Valleys R, Aberdare	I	0.300	C*
1017	WABC, Shrewsbury	I	0.70	A,C*,E,H*,J
1026	R.Cambridgeshire	B	0.50	E,H*,J
1026	Downtown, Belfast	I	1.70	A,I
1026	R.Jersey	B	1.00	E,G
1035	RTL Country 1035	I	1.00	E,G*
1035	N.Sound, Aberdeen	I	0.78	A
1116	R.Derby	B	1.20	A,E,FH*,J
1116	R.Guernsey	B	0.50	E,G
1116	Valleys R.Ebbw Vale	I	0.50	C*
1152	Amber, Norwich	I	0.83	F*
1152	Clyde 2, Glasgow	I	3.06	F*
1152	LBC 1152	I	23.50	E,F*,G
1152	Pic'ly 1152,Manch'r	I	1.50	A
1152	PlymSnd AM,Plymouth	I	0.32	K
1152	Xtra-AM, Birmingham	I	3.00	B
1161	R.Bedfordshire(3CR)	B	0.10	E,J
1161	Brunel CG, Swindon	I	0.16	A,B,E
1161	Big Easy Magic 1D	I	0.35	F*
1161	Southern Counties R	B	1.00	E,G,I
1161	Tay AM, Dundee	I	1.40	E
1170	Amber SGR, Ipswich	I	0.28	F*
1170	GNR, Stockton	I	0.32	A,F*
1170	SCR, Portsmouth	I	0.50	E,G,I
1170	Swansea Snd,Swansea	I	0.58	F
1170	1170AM,High Wycombe	I	0.25	E,J
1242	InvictaSG,Maidstone	I	0.32	E,J
1242	IoW Radio, Wootton	I	0.50	B,G
1251	Amber SGR,Bury StEd	I	0.76	E,F,J
1260	Marcher G, Wrexham	I	0.64	
1260	SabrasSnd,Leicester	I	0.29	H*
1260	R York	B	0.50	A
1278	Cl.Gold 1278 W.York	I	0.43	H*
1296	Radio XL,Birmingham	I	5.00	A,E,F,G,H*,J
1305	Big Easy Magic AM	I	0.15	A
1305	Premier via ?	I	0.50	E,F*,G
1323	S.Coast R, Southwick	I	0.50	C,E,G,J
1323	SomersetSnd,Bristol	B	0.63	A,B,E
1332	Premier, Battersea	I	1.00	E,F*,G
1332	Cl.Gold 1332,Pt'bo	I	0.60	F*,H*
1332	Wiltshire Sound	B	0.30	B,E,F,G
1359	BreezeAM,Chelmsford	I	0.28	F
1359	Cl.Gold 1359, C'try	I	0.27	E,H*
1359	R.Solent	B	0.85	G
1359	Touch AM, Cardiff	I	0.20	F,I
1368	Southern Counties R	B	0.50	E,G,J
1368	Wiltshire Sound	B	0.10	A,G
1413	Premier via ?	I	0.50	E,F,G
1413	Yks Dales R,Skipton	I	0.10	A
1431	Breeze AM, Southend	I	0.35	E,F*,G,J
1431	Cl.Gold, Reading	I	0.14	E,G
1449	R.Peterboro/Cambs	B	0.15	A,G,H*
1458	R.Cumbria	B	0.50	A
1458	R.Devon & Dorset	B	2.00	A,E,G
1458	1458 Lite AM Manch'	I	5.00	F
1458	R.Newcastle	B	2.00	F
1458	Sunrise, London	I	50.00	E,G,I
1476	CountySnd,Guildford	I	0.50	B,E,F*,G,J
1485	Cl.Gold, Newbury	I	1.00	B,E,F
1485	R.Humberside (Hull)	B	1.00	F
1485	R.Merseyside	B	1.20	A,G,I
1485	Southern Counties R	B	1.00	E,G,J
1503	R.Stoke-on-Trent	B	1.00	A,C*,E,F
1521	R.1521 Craigavon NI	I	0.50	A,F,I
1521	Fame 1521, Reigate	I	0.64	E,F,G,J
1530	R.Essex	B	0.15	E,G,J
1530	Cl.Gold W.Yorks	I	0.74	A,F,I
1530	Cl.Gold Worcester	I	0.52	E,F,G
1548	R.Bristol	B	5.00	G
1548	Capital G, London	I	97.50	E,G
1548	Magic 1548 Liverp'l	I	4.40	A
1548	Forth AM, Edinburgh	I	2.20	F,I
1557	R Lancashire	B	0.25	A
1557	Mellow, Clacton	I	0.125	E,F,J
1557	Cl.Gold 1557,N hant	I	0.76	E,F
1557	S.Coast R, So'ton	I	0.50	E,G
1584	KCBC, Kettering	I	0.04	C*
1584	London Turkish R	I	0.20	E,G
1584	R.Nottingham	B	1.00	C*,E,F
1584	R.Shropshire	B	0.50	A,E
1584	Tay, Perth	I	0.21	E
1602	R.Kent	B	0.25	C,E,G,J

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

Listeners:-
(A) Robert Connolly, Kilkeel.
(B) Simon Hockenhull, E.Bristol.
(C) Sheila Hughes, Morden.
(D) Rhoderick Ilman, Oxted.
(E) Brian Keyte, Bookham.
(F) Ross Lockley, Galashiels.
(G) George Millmore, Wootton, IoW.
(H) Peter Pollard, Rugby.
(I) Tom Smyth, Co.Fermanagh.
(J) Phil Townsend, E.London.
(K) Tom Winzor, Plymouth.

MEDIUM WAVE CHART

Freq (kHz)	Station	Country	Power (kW)	Listener
520	Hof-Saale (BR)	Germany	0.2	A*
531	Ain Beida	Algeria	600/300	K*
531	Torshavn	Faeroe Is.	100	E,L
531	Berg	Germany	20	F*,G
531	RNE5 via ?	Spain	?	F*
531	Beromunster	Switzerland	500	G
540	Wavre	Belgium	150/50	A*,F*,G,L
540	Sidi Bennour	Morocco	600	F*,G*
549	Les Trembles	Algeria	600	G*
549	Thurnau (DLF)	Germany	200	A*,F*,G,L
558	RNE5 via ?	Spain	?	F*,G
567	Tullamore(RTE1)	Ireland (S)	500	A*,B,C,D*,E,G,K,L
576	Muhlacker(SDR)	Germany	500	F*,G
576	Riga	Latvia	500	G*
576	Barcelona(RNE5)	Spain	50	G*
585	Paris(FIP)	France	8	G,L
585	Madrid(RNE1)	Spain	200	A*,D*,F*,G,L*
585	Dumfries(BBCScot)	UK	2	E,F*,K
594	Frankfurt(HR)	Germany	1000/400	D*,F*,G*,L*
594	Oujda-1	Morocco	100	F*,G*
594	Muge	Portugal	100	F*
603	Lyon	France	300	C
603	Sevilla(RNE5)	Spain	50	F*,G*
603	Newcastle(BBC)	UK	2	F*
612	Athlone(RTE2)	Ireland (S)	100	A*,B,D*,E,G*,L*
612	Sebaa Aioun	Morocco	300	G*
612	RNE1 via ?	Spain	10	G*
621	Wavre	Belgium	80	A*,C,F*,G*,L
621	RNE1 via ?	Spain	10	D*
621	Barcelona(OCR)	Spain	50	F*,G*
630	Vigra	Norway	100	F*,G*
630	Tunis-Djedeida	Tunisia	600	F*,G*
639	Praha(Liblice)	Czech	1500	A*,F*,G*,L*
639	RNE1 via ?	Spain	?	F*,G*
648	Jeddah	Saudi Arabia	2000	G*
648	Orfordness(BBC)	UK	500	A*,B,C*,E,G,K,L
657	Napoli	Italy	120	G*
657	Madrid(RNE5)	Spain	20	F*,G*
657	Wrexham(BBCWales)	UK	2	A*,E
666	MesskirchRohrd(SWF)	Germany	150	A*,F*,G*,L
666	Sitkunai(R.Vilnius)	Lithuania	500	F*
666	Lisboa	Portugal	135	F*,G*
675	Marseille	France	600	F*
675	Lopik(R10 Gold)	Holland	120	A*,B,C,F*,G,L
684	Sevilla(RNE1)	Spain	500	F*,G*
684	Avala(Beograd-1)	Yugoslavia	2000	F*,G*,L
693	Tortosa(RNE1)	Spain	2	F*
693	Droitwich(BBC5)	UK	150	A*,G,L,O
702	Flensburg(NDR)	Germany	5	F*,G*
702	Monte Carlo	Monaco	40	G*
711	Rennes 1	France	300	B,F*,G,L*
711	Laayoune	Morocco	600	F*,G*
720	Norte	Portugal	100	F*
720	Lots Rd,Ldn(BBC4)	UK	0.5	E,G
729	Cork(RTE1)	Ireland (S)	10	A*,B,F*,G
729	RNE1 via ?	Spain	?	F*,G
738	Paris	France	4	G
738	Poznan	Poland	300	F*,G*
738	Barcelona(RNE1)	Spain	500	F*,G*,L*
747	Flevo(Hilv2)	Holland	400	A*,B,F*,G,L
756	Braunschweig(DLF)	Germany	800/200	A*,F*,G*,L*
756	Bilbao(El)	Spain	5	G*
756	Redruth(BBC)	UK	2	K
765	Sottens	Switzerland	500	F*,G*
774	RNE1 via ?	Spain	?	C,F*,G*
774	Plymouth(BBC)	UK	1	O
783	Leipzig(MDR)	Germany	100	A*,F*,G*
783	Miramar(R.Porto)	Portugal	100	G*
792	Limoges	France	300	G,L*
792	Lingen(NDR)	Germany	5	G*
792	Sevilla(SER)	Spain	20	F*,G*
792	Londonderry(BBC)	UK	1	K
801	Munchen-Ismaning	Germany	300	F*,G*,L*
801	RNE1 via ?	Spain	?	F*,G*
810	Madrid(SER)	Spain	20	F*,G*
810	Westerglen(BBCScot)	UK	100	A*,B*,E,G*,L*_
819	Batra	Egypt	450	G*
819	Toulouse	France	50	F*
819	Warsaw	Poland	300	F*,G*
828	Hannover(NDR)	Germany	100/5	F*
828	Rotterdam	Holland	20	L*
837	Nancy	France	200	L*
837	COPE via ?	Spain	?	F*,G*
846	Rome	Italy	540	G*,L
855	Berlin	Germany	100	F*
855	RNE1 via ?	Spain	?	F*,G*,L*
864	Santah	Egypt	500	G*
864	Paris	France	300	F*,G,L
864	Socuellamos(RNE1)	Spain	2	G*
873	Frankfurt(AFN)	Germany	150	A*,B*,E,F*,G*
873	Zaragoza(SER)	Spain	20	G*
873	Enniskillen(R.Ul)	UK	1	F*
882	COPE via ?	Spain	?	F*
882	Washford(BBCWales)	UK	100	A*,C,E,G,K,L
891	Algiers	Algeria	600/300	F*,G*
891	Huisberg	Netherlands	20	F*,G
900	Brno(CRo2)	Czech Rep	25	G*
900	Milan	Italy	600	B*,F*,G*
900	Qurayyat	Saudi Arabia	1000	G*
900	COPE via ?	Spain	?	G*,L*
909	B'mans Pk(BBC5)	UK	140	A*,G*,K
918	Plesivec(Sloven'nR)	Slovenia	600/100	G*
918	Madrid(R.Int)	Spain	20	G*
927	Wolvertem	Belgium	300	A*,F*,G,L
936	Bremen	Germany	100	A*,F*,G*,L
936	Venezia	Italy	20	G*
945	Toulouse	France	300	F*,L*
954	Madrid(CI)	Spain	20	F*,G*
963	Pori	Finland	600	F*,G*
963	Tir Chonaill	Ireland (S)	10	G*,K*
972	Hamburg(NDR)	Germany	300	A*,F*,G*
972	RNE1 via ?	Spain	?	F*
981	Alger	Algeria	600/300	G*
990	Berlin	Germany	300	G*
990	R.Bilbao(SER)	Spain	10	F*,G*
990	Pedmoss(BBC)	UK	1	F*
999	Schwerin (RIAS)	Germany	20	F*
999	Madrid(COPE)	Spain	50	C*,F*
1008	Flevo(Hilv-5)	Holland	400	F*,G,L
1017	Rheinsender(SWF)	Germany	600	A*,C*,F*,G*,L
1026	SER via ?	Spain	?	F*,G*
1035	Tallinn	Estonia	500	G*
1035	Lisbon(Prog3)	Portugal	120	F*
1044	Dresden(MDR)	Germany	20	F*
1044	SER via ?	Spain	?	F*,G*
1053	Talk R.UK via ?	UK	?	A*,G,K,O
1062	Kalundborg	Denmark	250	F*,G*,L
1071	R.France via ?	France	?	B,G
1071	Riga	Latvia	50	K*,L
1071	Bilbao(El)	Spain	5	F*,G*
1080	Katowice	Poland	1500	F*,G*
1080	SER via ?	Spain	?	G*
1089	Talk Radio UK via ?	UK	?	A*,G,K
1098	Nitra(Jarok)	Slovakia	1500	F*,G*
1098	RNE5 via ?	Spain	?	G*
1107	AFN via ?	Germany	10	F*
1107	Talk R.UK via ?	UK	?	A*,G,K,L
1116	Bari	Italy	150	G*
1125	La Louviere	Belgium	20	F*,G*
1125	Deanovec	Croatia	100	L
1125	RNE5 via ?	Spain	?	G*
1125	Llandrindod Wells	UK	1	E
1134	COPE via ?	Spain	2	F*,G*
1134	Zadar(Croatian R)	Yugoslavia	600/1200	F*,G*,L
1143	AFN via ?	Germany	1	F*,G*
1143	COPE via ?	Spain	2	G*
1179	SER via ?	Spain	?	G*
1179	Solvesborg	Sweden	600	A*,F*,G*,H*,N*
1188	Kuurne	Belgium	5	F*,G*,L
1188	Szolnok	Hungary	135	G*
1197	Munich(VOA)	Germany	300	A*,F*
1197	Virgin via ?	UK	?	G,K,L
1206	Bordeaux	France	100	B*,G
1206	Wroclaw	Poland	200	F*,G*
1215	Virgin via ?	UK	?	A*,G,K,O
1224	Lelystad	Holland	50	F*
1233	Liege	Belgium	5	F*
1251	Marcali	Hungary	500	F*
1251	Huisberg	Netherlands	10	F*,K*
1260	SER via ?	Spain	?	F*
1260	Guildford (V)	UK	0.5	G,L
1269	Neumunster(DLF)	Germany	600	A*,F*,G*,L*
1278	Dublin/Cork(RTE2)	Ireland (S)	10	E,G*,K
1287	RFE via ?	Czech Rep.	400	F*,G*
1287	Lerida(SER)	Spain	10	F*,G*
1296	Kardzali	Bulgaria	150	G*
1296	Valencia(COPE)	Spain	10	F*
1296	Orfordness(BBC)	UK	500	E,K
1305	Rzeszow	Poland	100	F*,G*
1305	RNE5 via ?	Spain	?	F*
1314	Kvitsoy	Norway	1200	F*,G,L
1323	W'brunn (V.Russia)	Germany	1000/150	A*,C,F*
1332	Rome	Italy	300	G*
1341	Lisnagarvey(BBC)	Ireland (N)	100	B*,E,G
1350	Cesvaine/Kuldiga	Latvia	50	F*,G*
1359	Arganda (RNE-FS)	Spain	600	F*,G*,K
1368	Foxdale(Manx R)	I.O.M.	20	B*,G*,I*,K
1377	Lille	France	300	G,L
1386	Bolshakovo	Russia	2500	A*,B*,C*,F*,G*
1395	Fllake	Albania	1000	F*,G*
1395	Lopic	Netherlands	120/40	F*,G,L
1404	Brest	France	20	B*,G
1413	RNE5 via ?	Spain	?	F*,G*
1422	Heusweiler(DLF)	Germany	1200/600	A*,F*,G*,K
1422	Valmiera	Latvia	50	F*
1431	Kopani	Ukraine	500	F*
1440	Marnach(RTL)	Luxembourg	1200	A*,B,F*,G*,J,L*
1440	Damman	Saudi Arabia	1600	G*
1467	Monte Carlo(TWR)	Monaco	1000/400	F*,G*
1476	Wien-Bisamberg	Austria	600	B*,F*
1494	Clermont-Ferrand	France	20	G,L*
1494	St.Petersburg	Russia	1000	B*,F*,G*
1512	Wolvertem	Belgium	600	A*,C*,F*,G*,H,L,N*
1521	Duba	Saudi Arabia	2000	G*,I*
1530	Vatican R	Italy	150/450	A*,C*,F*,G*,L,M*
1539	Mainflingen(ERF)	Germany	350(700)	A*,F*,G*,K
1557	Nice	France	300	L*
1566	Sarnen	Switzerland	300	G*
1575	Genova	Italy	50	F*,G*
1575	SER via ?	Spain	5	G*
1584	SER via ?	Spain	2	G*
1593	Holzkirchen(VOA)	Germany	150	F*,G*,K
1593	Oradea	Romania	2	M*
1602	SER via ?	Spain	?	G*
1602	Vitoria(El)	Spain	10	G*

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

Listeners:-
(A) Ted Harris, Manchester.
(B) Simon Hockenhull, E.Bristol.
(C) Sheila Hughes, Morden.
(D) Rhoderick Illman, Oxted.
(E) Brian Keyte, Bookham.
(F) Eddie McKeown, Newry.
(G) George Millmore, Wootton IoW.
(H) Clare Pinder, while in Appleby.
(I) Peter Pollard, Rugby.
(J) Harry Richards, Barton-on-Humber.
(K) Tom Smyth, Co.Fermanagh
(L) Phil Townsend, E.London.
(M) Ernest Wiles, while in Malta.
(N) Thomas Williams, Truro.
(O) Tom Winzor, Plymouth.

34223 at 0900 in Newry; R.Finland via Pori Eng to Asia, Australia 0900-0930) 43333 at 0910 in Stalbridge; R.Vilnius, Lithuania **9.710** (Eng to Eur 0930-1000) 54444 at 0944 in Norwich; BBC via Skelton, UK **9.410** (Eng to Eur, N/C.Africa 0400-2230) 55555 at 1000 in Malta; SRI via Schwarzenburg **9.885** (Eng, Ger, Fr, It to SE.Asia 1100-1330) 44344 at 1100 in Appleby; Vatican R, Italy **9.645** (Eng to Eur 1120?-1130?) 43433 at 1124 in Oxted.

After mid-day BBC via Kranji, Singapore **9.740** (Eng to S.E.Asia 0500-2330) was 34433 at 1200 in Dudley; VOA via Poro, Philippines **9.760** (Eng to Asia 1100-1700) 23322 at 1229 in Rugby; RCI via Skelton, UK **9.555** (Eng, Fr to Europe, M.East, Africa 1430-1600) 32222 at 1455 in Stockport; Voice of Vietnam, Hanoi **9.840** (Eng to Africa 1600-1630) SIO433 at 1600 in Co.Fermanagh; TWR Manzini, Swaziland **9.500** (Eng to C.Africa 1600-1830) 34333 at 1755 in Woodhall Spa; R.Mediterranee Int via Nador, Morocco **9.575** (Fr, Ar to N.Africa, S.Eur 0500-0100) SIO444 at 1830 in E.London; R.Australia via Shepparton **9.435** (Eng to Pacific areas 1430-2200) 34333 at 2015 in E.Bristol; R.Thailand, Udon Thani **9.535** (Eng to Eur 2030-2045) 24232 at 2043 in Bridgwater; R.Cairo via Abis **9.900** (Eng to Eur 2130-2150) 31431 at 2130 in Galashiels; Voice of Turkey, Ankara 9.655 (Eng to Eur, N.America 2300-0000) 55454 at 2314 by **Martin Cowin** in Kirkby Stephen; VOA via Philippines? **9.770** (Eng to SE.Asia 2200-2400) SIO333 at 2334 in N.Bristol.

Noted in the **7MHz (41m)** band during the morning were R.Japan via Woofferton, UK **7.230** (Jap, Eng to Eur 0600-0800), rated SIO333 at 0700 in Co.Fermanagh; WJCR Upton, USA **7.490** (Eng to E.USA 24hrs) 41144 at 0830 in Morpeth; Monitor R.Int via WSHB **7.535** (Eng [Various Sat/Sun] 0400-0958) 43333 at 0920 in Plymouth; RFPI Costa Rica **7.385** (Eng 24hrs) 32222 at 0925 in Stalbridge; TWR Monte Carlo, Monaco **7.160** (Ger to Eur 0930-0945) 45344 at 0927 in Macclesfield; AWR (KSDA) Agat, Guam **7.455** (Eng to Asia 1000-1100) 34333 at 1000 in Scalloway.

Later, RAI Rome **7.230** (Eng to Eur 1935-1955) was 33233 at 1935 in Appleby; R.Tirana, Albania **7.135** (Eng to Eur 1945-2000) 44444 at 1945 in Morden; VOIRI Tehran **7.260** (Eng to Eur, M.East 1930-2028) 34433 at 1958 in Bridgwater; Israel R, Jerusalem **7.465** (Eng to Eur, USA 2000-2025) 44444 at 2005 in Woodhall Spa; Voice of Nigeria, Ikorodu **7.255** (Eng to W.Africa 1900-2100) 33443 at 2040 in Kilkeel; R.Romania Int, Bucharest **7.195** (Eng to Eur 2100-2156) 33433 at 2100 in Galashiels; VOA via Selebi-Phikwe, Botswana **7.415** (Eng to Africa 1900-2230) 43343 at 2109 in Freshwater Bay; AIR via Aligarh? **7.410** (Hi, Eng to Eur 1745-2230) 44444 at 2203 in Kirkby Stephen; Monitor R.Int, via WSHB **7.510** (Various to Eur 2000?-0000?) 44444 at 2210 in Truro; R.Tunisia Int via Sfax **7.475** (Ar [Rly of

Nat.Network] 0400-0600, 1700-2330) 43333 at 2250 in Liverpool; China R.Int via Russia **7.170** (Eng to Eur 2200-2257) 54433 at 2255 in Herstmonceux; R.Moldova Int **7.520** (Eng to Eur 2300-2325) 35233 at 2305 in Newry; VOA via? **7.205** (Eng to S.Asia 0100-0300) SIO444 at 0202 in N.Bristol.

In the **6MHz (49m)** band R.Havana Cuba **6.000** (Eng to N.America 0100-0500?) was 32233 at 0454 in Morpeth; HCJB Quito **5.865** (Eng to Eur 0700-0900) SIO333 at 0700 in Co.Fermanagh; SRI via Lenk **6.165** (Eng, Fr, Ger, It to Eur 0500-2030) 54444 at 0725 in Plymouth; WEWN Birmingham, USA **5.825** (Eng to Eur 2100?-1000) 43333 at 0920 in Stalbridge; R.Vlaanderen Int, Belgium **6.035** (Eng to Eur 0900-0930) 33333 at 0930 in Truro; R.Nederlands via Julich **6.045** (Eng to Eur 1130-1325) 55544 at 1140 in Herstmonceux; R.Estonia, Tallinn **5.925** (Eng to Eur 1615-1630) 32333 at 1615 in Morden; R.Prague, Czech Rep **5.930** (Eng to Eur, M.East, Africa 1700-1727) 55555 at 1704 in Norwich; R.Sweden via Horby **6.065** (Eng to Eur 1830-1858) 33333 at 1852 in Stockport; R.Slovakia Int **6.055** (Eng to Eur 1930-1957) 55555 at 1930 in Kirkby Stephen; RAI Rome **6.015** (Eng to Eur 1935-1955) 44444 at 1943 in Woodhall Spa; China R.Int via ? **6.950** (Eng to Eur 2000-2157) 32322 at 2041 in Bridgwater; RCI via Skelton, UK **5.995** (Eng to Eur, Africa 2100-2230) 44444 at 2130 in Appleby; Voice of Russia **5.965** (Eng [WS]) 44344 at 2150 in Rugby; R.Ukraine Int. **5.905** (Eng to Eur 2200-2300) 33223 at 2200 in Dudley; R.Austria Int via Moosbrunn **6.155** (Eng to Eur 2230-2300) SIO444 at 2253 in N.Bristol; R.Prague, Czech Rep. **5.930** (Eng to USA 0000-0027) 54544 at 0000 in Galshiels; BBC via Antigua, W.Indies **5.975** (Eng to C/N.America 2100-0800) 33433 at 0020 in E.Bristol; WHRI South Bend, USA **5.745** (Eng to E.USA 2200-0300) 44444 at 0130 in Kilkeel.

TROPICAL BANDS CHART

Freq (MHz)	Station	Country	UTC	DXer
2.310	ABC Alice Springs	Australia	2037	A,H
2.325	ABC Tennant Creek	Australia	1910	A
2.485	ABC Katherine	Australia	2037	E,H
3.230	SABC Meyerton	S.Africa	1910	A
3.255	R.Educadora 6 Agosto	Brazil	0220	A
3.255	BBC via Meyerton	S.Africa	1950	A,F,G
3.270	SWABC 1, Namibia	S.W.Africa	2109	A,H
3.290	Voice of Guyana	Guyana	0800	K
3.290	Namibian BC,Windhoek	S.W.Africa	2116	A,H
3.300	R.Cultural	Guatemala	0145	A
3.306	ZBC Prog 2	Zimbabwe	2116	A,H
3.315	AIR Bhopal	India	0130	A,K
3.320	SABC (RSG) Meyerton	S.Africa	2115	A,H
3.325	FRCN Lagos	Nigeria	1935	A
3.345	AIR Jaipur	India	0210	A,K
3.365	GBC R-2	Ghana	2039	A,C,G,H,K
3.365	AIR Delhi	India	1736	D,H,J,K
3.915	BBC via Kranji	Singapore	2355	A,D,G,J,N
3.950	Qinghai PBS, Xining	China	1442	K
3.955	BBC via Skelton	England	1920	A,D,E,G,N,O
3.960	Xinjiang PBS, Urumqi	China	2355	A,K
3.965	RFI Paris	France	1915	A,D,G
3.970	R.Korea via Skelton	England	2200	G,I
3.975	R.Budapest	Hungary	2200	A,E,F,G,I,M
3.985	Nexus, Milan	Italy	2005	F
3.985	China R via SRI	Switzerland	2200	G,I,J,L
3.985	SRI Beromunster	Switzerland	1925	A
3.995	DW via Julich	Germany	1955	A,D,F,G,N
4.005	Vatican R	Italy	2007	A,D,F,M
4.035	Xizang PBS, Lhasa	Tibet	2355	A,K
4.330	Xinjiang BS, Urumqi	China	0155	A,K
4.500	Xinjiang BS, Urumqi	China	0010	A,B,K
4.725	R.Myanmar, Yangon	Burma	1305	K
4.735	Xinjiang, Urumqi	China	0010	A,G,K
4.750	Xizang BS, Lhasa	China	0000	A,K
4.755	R.Educ CP Grande	Brazil	0205	K
4.760	Yunnan PBS,Kunming	China	0005	A
4.760	AIR Port Blair	India	1415	K
4.765	R.Rural, Santarem	Brazil	0825	K
4.770	FRCN Kaduna	Nigeria	2044	A,F,G,H,I, J,K,M
4.775	AIR Imphal	India	1739	H,K
4.777	R.Gabon, Libreville	Gabon	2113	A,H
4.783	RTM Bamako	Mali	2113	A,F,H,J,K,M
4.785	R.Super, Ibague	Colombia	0005	A
4.790	Azad Kashmir R.	Pakistan	1730	A,H
4.790	R.Atlantida	Peru	0200	G
4.795	Nova Difusora	Brazil	0825	K
4.800	AIR Hyderabad	India	1727	H,K
4.800	LNBS Maseru	Lesotho	2247	K
4.805	R.Nac.Amazonas	Brazil	0005	A
4.815	R.diff TV Burkina	Ouagadougou	2043	A,C,F,G,H
4.820	E.Prov.Huila	Angola	2059	H
4.820	R.Botswana, Gaberone	Botswana	1705	E,K,M
4.820	La Voz Evangelica	Honduras	0307	G
4.820	AIR Calcutta	India	1440	K
4.820	Xizang, Lhasa	Tibet	1302	K
4.830	R.Tachira	Venezuela	0035	A,K
4.832	R.Reloj	Costa Rica	0810	K
4.835	R.Tezulutlan, Coban	Guatemala	0010	A
4.835	RTM Bamako	Mali	2111	A,F,G,H,J,K,M
4.840	AIR Bombay	India	0040	A,H,K
4.845	ORTM Nouakchott	Mauritania	0205	A
4.850	R.Yaounde	Cameroon	1940	A,G,J,M
4.855	R.Tropical da Barra	Brazil	0035	A
4.855	R.Mozambique	Mozambique	0540	C
4.860	AIR Delhi	India	1912	A,C,E,H,K
4.865	PBS Lanzhou	China	2240	K
4.865	L.V. del Cinaruco	Colombia	0010	A
4.870	R.Cotonou	Benin	2102	G,H
4.870	Voz del Upano	Ecuador	0040	A
4.875	R.Roraima, Boa Vista	Brazil	0005	A,K
4.880	R. Difusora Acreana	Brazil	0010	A
4.885	R.Clube do Para	Brazil	0204	A,G,H
4.885	R.Difusora Acreana	Brazil	0030	A
4.885	KBC East Sce Nairobi	Kenya	1805	A,H
4.890	RFI Paris	via Gabon	0357	G
4.890	R.Port Moresby	New Guinea	1945	H
4.895	Voz del Rio Arauca	Colombia	0015	A
4.900	Haixia 2	China	1150	K
4.905	R.Relogio, Rio	Brazil	0755	K
4.905	R.Nac.N'djamena	Chad	2050	A,B,G,H,M
4.910	RTG Conakry	Guinea	1940	A
4.910	R.Zambia, Lusaka	Zambia	2041	H,K
4.915	R.Anhanguera	Brazil	2130	A,H,K
4.915	R.Difusora, Macapa	Brazil	2145	H
4.915	GBC-1, Accra	Ghana	2040	A,E,G,H,J,K
4.920	R.Quito, Quito	Ecuador	0417	B,E,K
4.927	RRI Jambi	Indonesia	2307	K
4.935	R.Capixaba, Vitoria	Brazil	0207	K
4.935	KBC Gen Sce Nairobi	Kenya	2043	A,H,K,M
4.935	R.Tropical, Tarapoto	Peru	0015	A
4.940	Haixia 1	China	1300	K
4.940	AIR Guwahati	India	0020	A,H,K
4.945	R.Difusora	Brazil	0210	A
4.945	R.Progresso	Brazil	0035	A
4.950	AIR Srinagar	India	1732	H
4.950	VOA via Sao Tome	Sao Tome	2044	H,I,M
4.955	R.Nac. de Colombia	Colombia	0225	A,K
4.960	R.Federacion, Sucua	Ecuador	0020	A
4.960	VOA via Sao Tome	Sao Tome	0506	G
4.965	R.Alvorada	Brazil	0020	A
4.970	PBS Xinjiang	China	0025	A,K
4.970	AIR Shillong	India	0210	A
4.975	Fujian 1, Fuzhou	China	0215	A
4.975	R.Uganda, Kampala	Uganda	2046	A,C,G,H,K
4.980	PBS Xinjiang, Urumqi	China	0020	A
4.980	Ecos del Torbes	Venezuela	2315	A,B,F,G,H,K
4.985	R.Brazil Central	Brazil	2317	A,F,K
5.005	R.Nepal, Kathmandu	Nepal	0032	K
5.009	R.TV Malagasy	Madagascar	2019	H,K
5.010	AIR Thiru'puram	India	0025	A,K
5.020	Xizang-Tb, Lhasa	China	2300	K
5.025	ABC Katherine	Australia	2132	H
5.025	R.Parakou	Benin	2014	A,G,H
5.025	R.Rebelde, Habana	Cuba	0200	A
5.025	R.Uganda, Kampala	Uganda	2047	H
5.030	AWR Latin America	Costa Rica	0030	A
5.030	RTM Kuching	Sarawak	2126	H
5.035	R.Aparecida	Brazil	2115	H,K
5.045	R.Cultura do Para	Brazil	0210	A
5.047	R.Togo, Lome	Togo	2135	A,C,G,H,J,K
5.050	Guangxi PBS, Nanning	China	1255	H,K
5.050	AIR Aizawl	India	0220	A
5.050	R.Tanzania	Tanzania	2047	A,G,H
5.055	RFO Cayenne(Matoury)	French Guiana	2115	A,G,H,K
5.060	PBS Xinjiang, Urumqi	China	1500	K
5.075	Caracol Bogata	Colombia	2327	A,F,H,K
5.090	Taiwan 2 Sce,Beijing	China	1155	K
5.100	R.Liberia, Totota	Liberia	2300	C,I,K
5.125	Taiwan 1 Sce,Beijing	China	1120	K

DXers:-

(A) Robert Connolly, Kilkeel.
(B) David Edwardson, Wallsend.
(C) David Hall, Morpeth.
(D) Simon Hockenhull, E.Bristol.
(E) Sheila Hughes, Morden.
(F) Rhoderick Illman, Oxted.
(G) Eddie McKeown, Newry.
(H) Fred Pallant, Storrington.
(I) Clare Pinder, while in Appleby.
(J) Peter Pollard, Rugby.
(K) John Slater, Scalloway.
(L) Tom Smyth, Co.Fermanagh.
(M) Phil Townsend, E.London.
(N) Ernest Wiles, NE.Bedford.
(O) Ernest Wiles, while in Malta.

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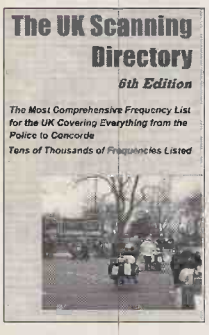
6th Edition



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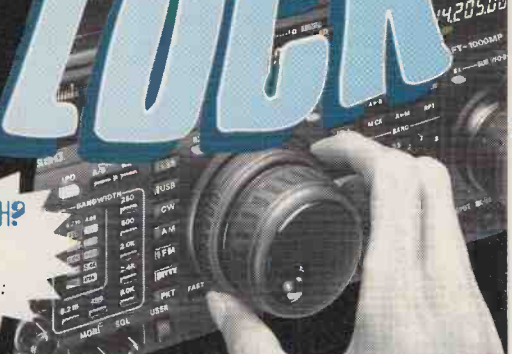

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ShackWare

JERRY GLENWRIGHT
23 DOWNLAND AVENUE
SOUTHWICK, WEST SUSSEX BN42 4RF
E-Mail: j.glenwright@ndirect.co.uk

Well! A surprising response indeed following last quarter's 'ShackWare' and its details of the Mac decode software, *Mac Multimode* - I didn't realise so many of you would be using Macs in our PC-dominated hobby of s.w.l.ing! I hope you've all managed to hook your first FAX picture or bit of RTTY from the ether by now.

For the benefit of Mac owners who missed the last instalment, *MacMultimode* is a clever little bit of software which will decode the output from your receiver via the sound input port of any Mac equipped with a 68020 or better. While admittedly in the very early stages of development (and therefore quite crude...), *MacMultimode* does, at least, work and enable Mac owners who are otherwise out in the cold, to have fun with basic FAX and text modes.

Your Letters

No sooner did I mention in the last instalment of 'ShackWare' that there were once commercial suppliers offering recordings of signals so that novices could familiarise themselves with the sounds, than **Ted Jackaman** sent me an E-mail couched in terms calculated to admonish (I'm joking, but it was stupid of me not to have a quick flick through the advertisers to see if anyone was still offering such recordings), and describing the *Shortwave Eavesdropper* CD-ROM from Interproducts (the company which publishes those excellent and cheap guides to short wave radio and weather - I have both *Weather Reports From Radio Sources* and *Interpretation of Facsimile Weather Maps and Charts*, both by Philip C. Mitchell, and both truly excellent, but I digress, sorry!) which features no less than 70 recorded signals to transform novices into experts in no time. Of course, recognising the signal is only half the battle - but it's a pretty important half! Contact Interproducts for further details.

Also on the E-mail front this issue is previous correspondent **Mark Harper** with details of a freeware ACARS decoder he's discovered on the Web. Some while ago, Mark very kindly supplied me with an early CGA-supporting version of JVFAX (5.1 dating from 1992) to use with hand-held and palm-top computers, after I mentioned portable decoding in an earlier 'ShackWare'. More later.

And that ACARS decoder provides a neat solution to correspondent **Andrew Green** of Barnsley, South Yorkshire. Andrew owns an Amstrad PC1512 - basic by anyone's standards, yet still able - and writes "my main interest is airband and I would like to know if you know of any ACARS decoding software that would run on my slightly upgraded Amstrad 1512. All the ACARS software I have seen advertised is for Windows".

Well thanks to Mark, Andrew's problem is solved. The somewhat strangely-named *Kracars* is a DOS-based ACARS decoder written by enthusiast Khalid Rafiq. The program requires a SoundBlaster or compatible sound card but, as cheap lookalikes can be had at under twenty quid via mail-order companies advertising in the PC press, that requirement should remain within reach of all but the shallowest of pockets. *Kracars* offers no-frills real-time ACARS decoding, logging transmissions to a disk file for later examination, in a freeware package. It can be had from **http://www.tardis.ed.ac.uk/~kr/kracars/index.html**, or me, if you send me a PC-formatted disk, s.a.e., and you're patient enough to wait the several weeks it seems to take to turn around my mail bag sometimes!

Finally on this subject, if you have an Internet account and want to find out what ACARS is all about, point your browser at the excellent ACARS-Link homepage **(http://www.grove.net/~acarslink/index.htm)**, which features guides for beginners, in-depth information and frequency lists for those already immersed, and plenty of links and software to download.

And now an interesting conundrum from **John Butters** of Stockport who writes "After you mentioned the Amstrad PPC computer in your 'ShackWare' column, I found one at a car boot sale and bought it for just £7. Mine is a PPC640 with two disk drives and a built-in modem. I've used this computer with a home-made comparator interface and my HF-150, with *Hamcomm* and *JVFAX*, and it works quite well, but I keep running out of space because the disks only have 720Kb. Is it possible to upgrade the drives themselves to the 1.44Mb high density ones? I've seen these drives for sale for around £12 in a local computer shop. Also, is it possible to hook up a hard drive of some description? Where would I plug a controller card?".

A bargain, considering the PPC cost several hundred pounds new around 1988, John. Bad news on the high density drive front though. To access these devices successfully, the computer's BIOS (ie the system-level software which essentially, tells the computer how to operate) must include code to control the drives. The PPC's BIOS was written long before HD floppy drives became widely available and so hooking them up is a bit of a non-starter. In a similar vein, I once tried to install a 5.25in 360K drive in a Pentium for the sake of compatibility but, try as I might, it wouldn't work. BIOS coding had moved on and left the poor old 5.25in drive far behind.

As far as hard drives go, it used to be possible to buy an expansion box which gave the PPC several standard PC 'slots' but finding this box today would be like looking for the proverbial needle, so that's a non-starter too I'm afraid!

However it isn't all doom and gloom. Salvation is available in the form of Iomega's Zip drive, a lightweight and cheap modern external drive of the 'removable media' type which combines the performance of a hard drive (not quite, but nearly) with the convenience of a floppy. That is, you plug the drive into a standard parallel printer port, fire up a bit of driver software, insert a disk the size of a 3.5in floppy but with a capacity of 100Mb and away you go. These disks can be had for around £10 each (less if you buy a half dozen or more) and give limitless storage - when it's full, spit it out and insert another. Zip drives can be had for less than £90 mail order and come in two flavours: parallel for PCs, and SCSI for Macs and SCSI-equipped PCs.

Fortunately, the PPC comes with a parallel port hidden beneath the fold-down flap at the rear of the machine, and the Zip drive is shipped with a driver which works perfectly under standard DOS (a refreshing change in these days of Windows with everything). And while I can't say for certain that a Zip drive will work with a PPC, there's no reason to suppose it won't! A hundred 'megs' at a time ought to provide plenty of space for the output from *Hamcomm* and *JVFAX*.

Small, But Perfectly Formed

And now to a subject close to my heart. Being a child of the 60s - the era when the likes of Clive Sinclair spent vast sums advertising matchbox-sized receivers in the hobbyist press - I am a solid devotee of miniaturisation, and while the sheer presence of say, an Eddystone has a special quality all its own, I can't help being massively attracted to sets such as Sony's SW-100 which put competent short wave listening right in the palm of your hand. And what's the logical evolutionary step for pocket short wave listening? Pocket logging, pocket predicting and pocket decoding.

When I first mentioned pocket stations way back in the second instalment of 'ShackWare' the response was very positive and it seems that there are many who would like the opportunity to carry around a portable station - on holiday say, or during business trips - for some on-the-fly decoding. At the time I thought that the solution to the hefty requirement for resources of programs such as *JVFAX7* might be to track down earlier versions intended for PCs with only base memory, CGA graphics, and small drives. Well since then, I've acquired more palmtops with greater memory and several early versions of *JVFAX* among others and had a lot of fun experimenting with decode on the move. There'll be a more complete description and review of my experiments in a future column (sorry to fob you off, but I just don't have the space!) but here's a potted list of what's working and with which machines.

First, *JVFAX 5.1* is still too hefty on resources, but I've discovered version 4.1 hailing from way back in 1990 (get it from the SimTel public archives at **ftp.coast.net**, initial remote directory/simtel). This is a CGA-based plain-vanilla *JVFAX* with instructions and program menus written entirely in German (though it's easy to find your way around) but requiring just 108Kb. There's disk space for the received pictures to add to that relatively tiny demand but even so, it's pretty efficient resource-wise. *JVFAX 4.1* works just fine on my Poqet PC.

Hamcomm 2.2 is also available from the same source (though 3.0 works fine in 640K of DOS on any 88/86 XT-class computer).

Pocket prediction could be useful for the busy WXSAT monitor who wants to listen but who doesn't want to bother with a desktop machine. Two programs put accurate prediction into the palms of anyone using either a DOS-based machine or one of the popular Psion range such as the Series 3A.

Tracksat for the Hewlett-Packard 200LX, Poqet PC (or Windows CE palmtop running a DOS emulator such as Ian Dean's *XT-CE*) features full graphical and text-based tracking of any object that can be described by standard two-line elements. The program runs on any XT compatible and above (it works fine on my 200MHz Pentium with Win95), with 460Kb RAM and CGA graphics (or Hercules, EGA, VGA and SVGA). The program is shareware and you're asked to pay author Paul Traufler $25 if you continue to use it after 30 days. Get *Tracksat* at **http://www.palmtop.net/super.html**

Psionsat written by Erwin PE1LZX for the Psion Series 3A palmtops does much the same as *Tracksat*, though it works with a maximum of 11 satellites at a time - surely enough for your favourites? *Psionsat* is freeware, works with standard two-line elements and is just under 9K.

Pocket s.w.l. stations certainly can be fun in the way that cut-down QRP stations are for licensed amateurs, and I have a lot of exploring to do yet - more details as and when.

Happy Birthday To Me...

Remarkable though it seems this issue marks 'ShackWare's' second birthday! I'd like to thank the legions of correspondents who make the column what it is and who never fail to give advice and help to their fellow s.w.l.s. Thank you all. Here's to birthday number three! Good listening.

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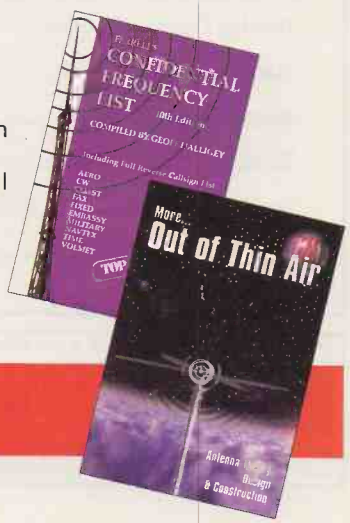

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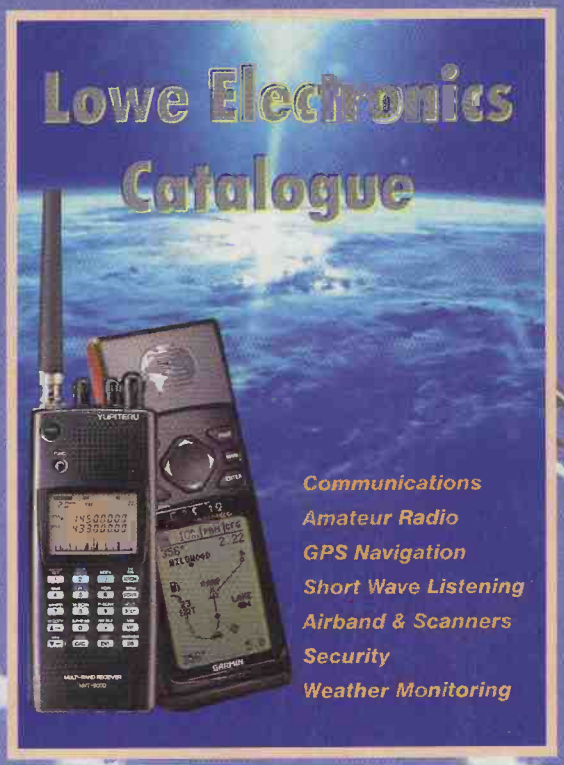

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