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RadioUser

January 2022 £4.99

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We test the ATS-909X2 portable world band radio



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RSPdx

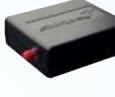
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Aircell 7 per metre..... £2.99 price per 102m drum..... £269

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£259.95



AOR	ALINCO	ICOM	POWEREX
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BEARCAT	BEARCAT	BEARCAT	BEARCAT
<p>BCT-15X Latest Base Mobile Scanner with 'Close Call'</p> <ul style="list-style-type: none"> • 25-1300MHz (with gaps) • 9000 memories • AM/FM/WFM • Band scope • CTCSS/DCS decoding • Alpha-numeric tagging feature • GPS enabled <p>Supplied with: • Mains adaptor • DC Car Power Plug • Telescopic Antenna • Mounting Bracket and Hardware</p> <p>£249.95</p>	<p>SDS-100E Advanced Digital & Analogue Scanner</p> <ul style="list-style-type: none"> • Frequency: 25-1300MHz (w/gaps) • Weather Resistant IPX4 <p>Standard Version (licence required to activate DMR, NXDN) £599.95</p> <p>Activated Version (DMR, NXDN already activated) £649.95</p>	<p>Bearcat SDS-200E Digital Scanning Receiver</p> <ul style="list-style-type: none"> • With DMR, NXDN, and ProVoice monitoring modes • Covers: 25 - 512MHz, 806 - 960MHz, 1240 - 1300MHz • Too many features to list here - visit our web site for more details! <p>£779.99</p>	<p>UBCD-3600XLT Digital Scanner with 'Close Call' and Analogue AM/FM</p> <ul style="list-style-type: none"> • Receives: 25-1300MHz • SD card slot <p>£425</p> <p>UBCD-3600XLT - NXDN Same specs as above but with NXDN activated NXDN digital protocol is used by Kenwood & Icom</p> <p>£479.95</p>
ALBRECHT	ALBRECHT	WHISTLER Digital Scanners	
<p>Albrecht AE255M Wideband Base Scanner</p> <ul style="list-style-type: none"> • Covers 25-960MHz (w/gaps) • Step sizes: 5/6.25/8.33/10/12.5/20kHz • Turbo search (180 steps/sec) • 300 memories, Clock Display, Skip feature, c/w Mains adaptor, Car adaptor, Antenna, Mounting bracket <p>£99.95</p>	<p>Albrecht AE125H 500 Channel AM/FM Scanner</p> <ul style="list-style-type: none"> • 5-960MHz (w/gaps) • Civil/Military Air bands • Close Call feature • Hyper search -300/sec • CTCSS & DCS • Supplied c/w: Mini USB lead, 2 x AA 2,300 mAh NiMH Batteries <p>£129.95</p>	<p>Whistler TRX-1E £419.95</p>	<p>Whistler TRX-2E Base version of TR-X1E £479.95</p>
		<p>Whistler TRX-1E and Whistler TRX-2E</p> <ul style="list-style-type: none"> • Receives 25-1300MHz (with gaps) • Covers DMR, MotoTRBO - and more! • Upgradable CPU, DSP, and library • Store Scan lists 	<p>Whistler WS1065 Advanced scanner using cutting edge technology</p> <ul style="list-style-type: none"> • 25-1300MHz (with gaps) • 1,800 memories <p>£299.95</p> <p>Whistler WS1040 Analogue scanner covering Trunked systems</p> <ul style="list-style-type: none"> • 25-1300MHz (with gaps) <p>£299.95</p>

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Robert Connolly casts his net wide, to update you on MF/ HF data and voice comms in the maritime bands, taking in DSC, Fax, and RTTY on the way, and delineating some cruise ship SAR operations.

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Tim Kirby brings you a technical and historical overview of Direct Broadcast Satellite Radio, presenting two key examples of the format – one defunct, but recalled by many, and one ongoing.

The Return of HF & the End of an Era

Georg Wiessala
wiessala@hotmail.com

Hello and welcome to the first issue of *RadioUser* for the New Year. I wish all our readers, expert contributors, advertisers, friends and team members at Warners a very happy, successful and healthy new year.

As I write this, I am still reeling from the news that *WRTH Publications* have decided that 2022 is to be the final year for the *World Radio TV Handbook*. Here at RU/PW, we have enjoyed a mutually supportive relationship with the WRTH for many years, and we wish the WRTH team all the best for their personal and professional futures. I have relied on this publication for many years, and it would be nice to be able to say that, in one way or another, it will survive into another lease of life.

In contrast to this news, and to evidence that HF radio is certainly not dead, we bring back, beginning in this issue, a column on traditional HF radio, from long- to short wave. Scott Caldwell will take care of the logs, stories, events and equipment for this area and will alternate this new venture with his popular history section.

As for other 'new beginnings', from this issue onwards, Keith Rawlinson offers a new basic series on aerial topics for beginners, looking at the theory, technology and practice of aerials, software and accessories.

You will also find a few special features this time around, such as the *Annual Index* and a review of activities of our friends at the *EDXC* and *BDXC*.

In our main stories this month, we begin 2022 with a look at the 100th Anniversary of the BBC: Keith Hamer, Garry Smith and David Harris all shine a light on different aspects of the BBC's development; this will be somewhat of a theme for this year.

In matters American, David Harris reviews a new title on those US radio pioneers you might not have heard about.



And – speaking of things you may not have been familiar with – did you know how interesting it can be to take a look at the 'basement-band', from 3-30kHz?. ELF and VLF signals are a litmus test for many natural and man-made processes. I have a few suggestions as to what aerials you can use to get started.

I am also taking a look at the new *Sangean ATS-909X2* portable, which now includes Airband coverage. In our other regular sections this month, you can learn about radio on gaming and leisure, the search for MH370, Leeming RAF, the *Radiodays Europe 2021* conference, and the *WorldDAB Summit*.

Take a close look also at Robert Connolly's wide-ranging article on the shape of maritime comms, both voice and data, and at Time Kirby's history of satellite radio – remember *WorldSpace*, anyone? Moreover, do not forget this month's *competition*, which will enable one lucky winner to start the year with a shiny new Tecsun H-501x receiver.

And, last but certainly not least, remember that your main New Year's Resolution this time was to take out a subscription to this magazine. Surely, you have not forgotten that already ...?

Whatever your resolutions, enjoy this issue. I am looking forward to offering you exciting new radio content throughout the year. Stay in touch and let me know what you would like to see covered here.

Georg Wiessala
Editor, *Radio User Magazine*
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PRICES QUOTED ARE CORRECT AS OF 30TH DECEMBER 2021 BUT MAY BE SUBJECT TO CHANGE.

What's New

Have you got something new to tell our readers about? If so, then drop a line to wliessala@hotmail.com



The AnyTone AT-D878UVII Plus is now being advertised with the following five new features (USA): (1) Dual-band with Analogue and DMR capability, so you can have 'one radio for everything'. (2) APRS RX AND TX capability, so you can beacon your location and see other operators on your radio too. (3) 500K contact list capacity, so you can have every DMR user in your radio no matter how many there are. (4) Bluetooth capability for hands-free communication in your vehicle, so you can connect to your favourite Bluetooth audio device or hearing aid for added safety and convenience. (5) A dedicated support team available for questions.

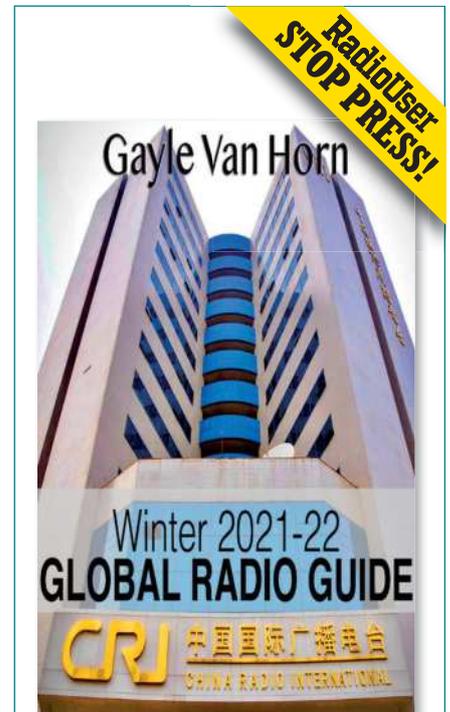
<https://network-radios.com>

AnyTone AT-D878UVII Plus: DMR & APRS

AN-SOF News: Software Update

Louis Bergman, Sales Manager for the AN-SOF Antenna Simulator has been in touch with the following update: "We are pleased to announce the release of AN-SOF 6.40. We can highlight the following improvements: (1) Tabular input of linear wires as well as sources and loads. AN-SOF has many tools to make drawing wires an easier task. However, for those who prefer to enter wires in spreadsheet format, we have added a tabular entry. (2) List of 'recently open' projects in File menu. Access the last projects you have been working on much faster by going to the main menu > File > List of recently open projects. (3) Zoom in and out by rotating the mouse wheel (or using the touchpad in a laptop with two fingers). You can continue to zoom by first clicking on the magnifying glass icon and then moving the mouse but using the mouse wheel is more direct - Among these improvements, we have also fixed some bugs. Those users who are subscribed to an update plan will soon receive the link to download AN-SOF 6.40."

www.antennasimulator.com



17th Edition of the Global Radio Guide: B-21 Schedules

Gayle Van Horn's 17th Edition of her *Global Radio Guide (Winter 2021-22)* is now available at online booksellers. In it, you will find coverage of China Radio International (CRI) in the context of contemporary world affairs, as well as information and frequencies on other 'hotspots', such as Cuba, India, Iran, North/South Korea, Taiwan, Hong Kong, and many other countries. There is an in-depth (24-hour) station/frequency guide with schedules for the selected AM band, long- and short wave radio stations. The GRG is claimed to be the only radio publication that lists by-hour schedules that include all language services, frequencies, and world target areas for over 500 stations worldwide. The schedules included in this edition of the GRG are valid from the 31st of October 2021 until the 26th of March 2022 - the B21 broadcast schedule period. [RadioUser will carry a full user evaluation of the GRG in its February 2022 edition - Ed.]. (Source: Gayle Van Horn | SWLing Post)

For the latest news and product reviews, visit www.radioenthusiast.co.uk

Butel: New Features for ARC125/30

Butel reports that the ARC125 software suite for the Uniden (U)BC125 scanner now has an added new feature to use global bank names. The (U)BC125 scanner does not store bank names. ARC125 now includes a new option to set fixed global bank names in the software. In terms of the ARC30 software package for the Icom IC-R30 scanner, a new option has been added to preview the contents of the CSV files. The bank browser now shows how many channels are in use per bank. Butel also upgraded the ARC30 *radioreference.com* import option. Moreover, ARC software is now available on USB.

<https://www.butel.nl/shop>
shop@butel.nl

The Cortex Marine VHF Radio

New Zealand firm **Vesper Marine** offers a new VHF transceiver. The maker calls it a "revolution in marine technology that will change your VHF experience forever". An intuitive touchscreen that is engineered for durability to withstand the rigours of the harsh marine environment. Audio is said to be as loud as a train but clear as a bell. You can initiate direct calls (DSC) with other vessels by simply tapping the vessel on your handset. Initiate VHF calls to friends or quickly hail another vessel when every second counts. The screen allows you to zoom in to focus on a single vessel, or out for a wider view of everything around you. Enjoy crisp clear sound through an 85db speaker. Instead of ambiguous bells or tones, Cortex sounds the alarm with voice alerts that escalate until acknowledged. The system allows you to communicate from anywhere onboard, with up to 10 handsets. Locate a tethered handset wherever power is convenient. There's no need to run any wires to the Cortex M1. Cortex is the world's first VHF with high-speed SOTDMA AIS transponder technology, making your boat visible to others. A built-in heading sensor tells other vessels your direction, helping them more accurately predict potential collisions. Be armed with critical information about vessels, AIS marks (AtoNs) and 'man-overboard' devices on your MFD, mobile or Cortex handset. SmartAIS technology proactively alerts you of potential collisions, anchor drag and 'man-overboard' situations – smartAIS consumes very low power and continuously alerts even if your power-intensive MFD or smartphone is switched off [...].

www.vespermarine.com/cortex/vhf
www.marathonleisure.co.uk



AOR AR 2300: Black-Box Power for the 'Prosumer'!

The AR2300 is a 'Black-Box' version of the AR5001D, the high-performance communications receiver from AOR. The AR2300 is ideally suited for radio and spectrum monitoring in various commercial and government applications, as well as for use in radio investigation services. A typical application of AR2300 can include:

- Signal detection; Signal search in frequency and memory scan mode
- Spectrum occupancy and on-the-air monitoring
- Coverage and field-strength check
- Signal and spectrum analysis (through optional I/Q board with the supplied AR-IQ software).

Detailed applications are as follows:

- Monitoring of given frequencies, e.g. storage of 1-2,000 frequencies, receiving

modes, antenna port, attenuator settings, constant monitoring of one frequency or scanning of selected frequencies.

- Searching in a frequency range with freely selectable start and stop frequency and step widths of 0.001 kHz (1Hz) to 999.99kHz.
- Detection of undesired emissions including pulsed emissions.
- Detection of unlicensed transmitters communicating illegally or interfering with any licensed transmissions.
- Protection against tapping by detecting miniature transmitters (bugs)
- Monitoring of one's own radio exercises in a service band and monitoring of selected transmissions.
- Remote-controlled operation via an optional LAN controller in coverage check.

www.aorja.com

AIRCRAFT-SCATTER, WSPR AND MH370:

Time and again, there are news stories in the professional and popular press about the fact that log data from the WSPR data network can help locate aircraft. In particular, an effort has been undertaken to determine the actual crash site of **Malaysian Airlines Flight MH370**. This effort essentially amounts to detecting 'unusual' level-jumps and frequency changes ('drift') in the archived WSPR log data and attributing them to reflections from specific aircraft ('aircraft scatter').

In his latest blog entry **RadioUser contributor Nils Schiffhauer (DK8OK)** is the first expert to evaluate this theory more critically. His findings are based on years of observation of aircraft scatter on short wave, as well as on an investigation of about 30 Doppler tracks. The results of this complex analysis of more than

10,000 data in one example alone are sobering: The effects of aircraft scatter on the overall signal are almost always well below 0.3 dB. To prove a correlation between level changes of the overall signal and aircraft scatter seems hardly possible based on the WSPR data material. The reasons are manifold but lie mainly in short wave propagation, where level changes of 30 dB within a few seconds are the rule rather than the exception. However, since the local and temporal state of the ionosphere is not known in previous investigations on the WSPR data material - it is recorded in parallel in professional OTH radar systems and calculated out of the received signal - level jumps cannot be unambiguously assigned from the sum signal alone [see also *David Smith's Airband News this month - Ed.*].

<https://tinyurl.com/5y7y2b8d>
www.dk8ok.org

Enter our competitions at www.radioenthusiast.co.uk/competitions



Emo-Radio: Just Don't Make a Face

Creative studio *Uniform* has made *Solo*, a radio that reads your facial expression and plays music according to your mood. The 'emotional radio' combines facial feature recognition software with *Spotify's* music valence ratings, which attribute different moods to certain tracks. The wall-hung device has a circular screen at its centre, which takes a photo of the person standing in front of it and sends the image to a Microsoft programme that analyses facial features. This calculates an 'emotional breakdown' with values of happiness, sadness and anger. *Solo* translates this information into a valence rating and uses *Spotify* to play a track with corresponding valence ratings, therefore matching your mood. The face on the screen also changes its expression to mirror yours. *Solo* was launched at the V&A's Digital Design Weekend as part of the *London Design Festival*. The beautifully-designed prototype is encased in wood with a bright yellow facade and stripy antenna, which is intentionally approachable, playful and engaging. According to Mike Shorter, senior creative technologist at *Uniform*, the idea is to prompt discussion around the creative potential of AI technology beyond data-driven service design and towards something more human. "*Solo opens up the conversation on how technologies can be broken down and mean something to people, not just the tech industry*," he says. "*When you try Solo, you think not only about how technology is changing, but more importantly, how its relationship with us is changing.*"

(Sources: 'It's Nice That' | BBC Business)

<https://tinyurl.com/uwn6j7kh>

<https://tinyurl.com/yw8urbya>

<https://tinyurl.com/thdyfy2f>



RadioUser
STOP PRESS!

HanRongDa Mini-Portable

The (USA) *SWLing Post* reports on the new HanRongDa mini portable called HRD-700. Information about it is still rare, and, of course, this is not a 'professional' radio. But it is interesting as it is said to be a special analogue tuner with a digital background. (Source: *SWLing Post*)

<https://tinyurl.com/2xydcdm>

AIS BEACONS: A new law introduced by Beijing appears to have resulted in ships turning off their automatic AIS beacons (161.975 MHz or 162.025 MHz) when in Chinese waters. Since the start of the month, vessels from around the globe, from tankers to cargo ships, have disappeared from global tracking systems as they have entered some of the world's busiest shipping lanes close to Chinese ports. As the ships leave Chinese waters they reappear again. By some estimates, tracking pings from ships near China have fallen by 90 per cent in just a few weeks. On 1st November 2021, a new law came into effect in China restricting foreign access to any data – potentially including shipping data – deemed to have a bearing on national or economic security. On the same day, a report on the government-controlled China Central Television (CCTV) Focus news program stated that "suspicious radio equipment" had been found in the home of a radio enthusiast close to a military base and commercial port in Zhanjiang in the country's south, west of Hong Kong. The broadcast said the radio ham had installed the

equipment, which would aid in the global tracking of ships "in real-time via the internet". The man had no qualms about his high tech delivery. After all, collecting data on the movement of ships is nothing new. The major way maritime vessels are tracked is through the automatic identification system, or AIS, which is a kind of air traffic control for the seas. It uses transceivers fitted on vessels to transmit their position. This data is then picked up by other vessels, satellites or AIS base stations on land. The information can show an individual vessel's position, speed, name and destination. It's considered vital in modern shipping and allows ships, particularly in busy sea lanes, to know where the positions of other vessels are, to avoid collisions. It also gives an overview of maritime congestion and allows anyone who wishes to keep a tab on commercial vessels.

(SOURCES: news.com.au | ICQ Amateur/ Ham Radio Podcast/ Colin Butler)

<https://tinyurl.com/38e8r9s5>

<https://tinyurl.com/4a86yhz5>

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IC-M804 Class E MF/HF Marine SSB Transceiver

Launching at the *METS Marine Trade Show*, the **Icom IC-M804** is a new long-range MF/HF Class E DSC radio for ocean-going sailors and commercial non GMDSS operators. The IC-M804 is packed with features to keep users safe, including an intuitive user interface, colour TFT LCD display, audio replay, GPS and more. The IC-M804 is currently the only CE-marked Class E DSC Marine MF/HF radio available in the market. * Much like its predecessors, the IC-M804 features a remote head that can be neatly installed near a chart table or NAV station while the control box can mount discreetly out of the way and out of sight. The controller can be interfaced with a computer or email modem to make a complete communication system. Connections are also available for an external loudspeaker. The IC-M804 - much like the rest of the Icom range - features a user-friendly interface. Its large colour TFT LCD display allows for relatively simple operation. With the near-180° wide viewing angle, the screen allows various installation possibilities. The large control knob and keys provide easy access to functions

such as accessing MMSI numbers, ITU channel numbers and keying individual frequencies via the easy to use keypad. Using NMEA 2000™ connectivity, the IC-M804 can exchange GNSS, DSC call information, radio information and PGN list data on the network. NMEA 0183/-HS GNSS position data can also be converted to NMEA 2000™ data for other equipment. Other features on the IC-M804 include a distress call button, dedicated DSC receiver scanning, integrated GNSS receiver and supplied with a 5-metre cable GNSS antenna, two-minute instant replay audio function and HF email capabilities. The IC-M804 also features an advanced RF direct simple sampling system that improves receiver sensitivity and delivers high-quality audio. The IC-M804 Class E DSC MF/HF radio is now available from authorised Icom marine dealers. For more information, visit the dedicated *IC-M804 Class E DSC MF/HF Radio Product Page* on the ICOM website:

sales@icomuk.co.uk

https://icomuk.co.uk/IC-M804/HF-SSB_Marine_Radio

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Chrissy Brand

chrissyLB@hotmail.co.uk

For 55 years, the European DX Council has promoted goodwill and closer cooperation between DX clubs and organisations and promoted DXing in Europe, and beyond. It also helps to improve contact between DXers, s and radio stations. In recent years, the main activity of the Council has been its annual conference, which brings together enthusiastic DXers from around the world.

This consists of a few days together in an exciting location, with visits to local radio stations, interesting presentations and talks on all aspects of the hobby. This might antennae discussions, FM and free radio, QSL card collecting, the latest technical developments and celebrating the radio and DX community's heritage.

It also provides an opportunity to socialise, meet old friends and make new ones. Unfortunately, due to Covid-19, the conference has not been able to take place since 2019, when it was held in Andorra. See *Alan Pennington reports from the Pyrenees*, in *British DX Club's Communication*, October 2019.

www.bdx.org.uk/edxc19.pdf

It is hoped that the 2022 conference can take place in Bucharest, Romania from May 20th to 22nd. All DXers from anywhere in the world are very welcome to attend.

In 2021, the EDXC held two meetings on Zoom, which attracted people from around 16 countries in total, including India and Japan. An advantage of online meetings is, of course, that anyone with internet access can attend.

However, the limitations of global time do play a part. It is difficult to schedule a time that all would suit all continents (apologies to Oceania, we will try and find a solution).

Along with a general radio chat, four excellent speakers gave enthralling talks. In March, Jim Salmon spoke about Radio Emma Toc.

This station aired a monthly programme of music, radio history and DX chat on short wave a few years ago and produced a further 16 programmes from May 2020 to July 2021. Past programmes can be heard on the station website.

www.emmatoc.org/worldserviceindex

From Florida, Ronald W Kenyon spoke about his book *QSL: How I Traveled the World and Never Left Home*. It can be



The European DX Council & the British DX Club in 2022

Regular columnist and EDXC Secretary-General **Chrissy Brand** provides an update of the activities at the European DX Council (EDXC) and the British DX Club (BDXC).

purchased from Amazon in 17 countries around the world.

amazon.com/author/ronaldwkenyon

In November, Sheldon Harvey gave a presentation about the Canadian International DX Club.

It is in a healthy state, with a monthly publication that runs to around 80 pages, full of DX news and tips, broadcast and utility. Refreshingly, other areas are also covered, such as podcasts, and radio in the wider media of films and television.

The club website is under construction at present, but you can send an email or join the CIDX Facebook group

cidxclub@yahoo.com
<https://tinyurl.com/628um5rn>

From a presentation in Quebec, we travelled to Finnish Lapland. Mika Mäkeläinen gave an insight into the joys of DX at the cabin in Aihkiniemi. There is an introductory video of what the facilities consist of.

<https://tinyurl.com/MikaMAih>

There are two DX cabins, (a second one was built in 2020, Fig. 1). These are jointly owned by eight Finnish DXers and are available to rent. Mika also runs the *DXing Info* website, where logs, well-written DXpedition reports, and amazing photos are to be found, along with other features on radio.

www.dxing.info

The EDXC online meetings will continue, regularly, even if we get to a post-Covid world where people are happy to meet up in person in larger groups once more. The two 2021 Zoom meetings can be viewed at the EDXC YouTube channel.

<https://tinyurl.com/EDXCYouTube>

Membership of the EDXC is free.

There are at present 20 member clubs and organisations. People who are not a member of a DX club or organisation can also become individual members. Updates on the Council can be found on its website. There is also a YouTube channel.

<https://edxcnews.wordpress.com>

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Fig. 1: The Aihkiniemi cabins in the moonlight.
Fig. 2: A 1980s 'Anoraks-UK' loop, dusted off for use at Durlston, and still able to peak signals and null-out co-channel interference.

BDXC

The British DX Club held a successful DX meeting in Durlston Country Park, Dorset in September, where some good catches were made (Fig. 2). The comment of the day, regarding medium wave and short wave was, "it was a real delight listening on medium wave and short wave at Durlston – so quiet and interference-free."

Dutch low-power AM station Freya AM on 1134 was considered to be the 'medium wave catch of the day'. It is also mentioned in one of the many free guides that the club has on its website.

www.bdx.org.uk/lpam.pdf

The mainstay of the club is its monthly publication, *Communication* (available in print or PDF). Each issue is packed with a good variety of broadcast band news.

The logbook sections are detailed and presided over by a team of section editors, carefully collating logs sent in by members: *Beyond the Horizon* covers FM DX, RSLs and community radio; Medium Wave Logbook

always contains an interesting array of DX catches, with a couple of recent examples being KCNZ Cedar Falls, Iowa, on 1650kHz and 792 Radio Dechovka, from Hradec in the Czech Republic on 792kHz (0400 UTC; Czech medium wave stations leave the band at the end of 2021).

In the *Tropical Bands Logbooks*, you may find Bangladesh Betar on 4750kHz and Radio Clube do Pará, Belém on 4885kHz. *HF Logbook* covers the rest of the licensed broadcasts in the short wave bands, while *Alternative Airwaves* specialises on the free radio scene, with many Dutch and German stations heard regularly.

Elsewhere in *Communication*, Alan Roe's *Listening Post* is always a great read that will inspire you to tune around the bands for quality programme content; Stefano Valianti reports on the radio scene in Italy, Tony Rogers monitors the Helpdesk station, David Morris presides over the member's mailbox section and David Harris tackles many different radio themes.

On top of that is a range of one-off features, which in 2021 included the BBC British Antarctic Survey Broadcasts and revitalising interest in short wave listening.



In May and December, *Broadcasts In English* is sent free to members and is available to purchase to non-members: www.bdx.org.uk/bie.html

Time Adjustment Software and GPS Tool from Icom

The ST-4003W is a new Windows-based software suite. It is compatible with the IC-705, IC-7100, IC-7300, IC-7600, IC-7610, IC-7850/IC-7851, and IC-9700 radios. It allows you to set the radio's time from your PC's time by connecting your radio to a PC. Also available to download for free from *Google Play* is an Android app called the ST-4003A. To download the software, please visit the *ST-4003W Time Adjustment Software Download Page* (First URL, below). Furthermore, Icom has also announced a new GPS tool for Android OS devices called the ST-4002A. The ST-4002A is

available to download for free from both the Icom website and *Google Play*. It will automatically allow you to input GPS location data from an Android™ device to your transceiver. The software is compatible with the IC-7100, IC-9100, IC-9700, ID-4100A/E, and ID-5100A/E transceivers. For more information and to download the software/app, please visit the *ST-4002A GPS tool Download Page* (Second URL, below).

https://www.icomjapan.com/support/firmware_driver/3428
<https://www.icomjapan.com/lineup/options/ST-4002A>



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- EQ20B-DSP QST Dec 2019 review "easy-to-use device that improves the audio clarity of amateur signals"

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EA & O

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Rallies & Events

All information published here reflects the situation up to and including 16th December 2021. Readers are advised to check carefully with the organisers of any rally or event, before setting out for a visit. The Radio Enthusiast website will have updates, please check here regularly. To get your event onto this list, please, e-mail full details as early as possible: wiessala@hotmail.com

2 January

SPARKFORD WIRELESS GROUP

RALLY: Davis Hall, Howell Hill, West Camel, nr. Yeovil BA22 7QX. Open 9.30 am to 1 pm, entry is £2. (FP | CR)
wjh069@gmail.com

30 January

LINCOLN SHORTWAVE CLUB WINTER

RADIO RALLY: Wragby Town Hall, Louth Road, Wragby, Market Rasen, Lincolnshire LN8 5PH; Doors open at 10 am, with disabled visitors gaining access at 9.30 am. Indoor event; CR; entry £2.
contact@m1dhv.co.uk
m5zzz@outlook.com

6 February

RED ROSE RALLY: St Joseph's Hall, Mather Lane, Leigh WN7 2PR; (D | FP | CR | RSGB | TS). Individual stands, LAMCO dealership stand, low-cost Bring and Buy.
rally@wmrc.co.uk
<http://wmrc.co.uk/rally.htm>

22 February

RADIOACTIVE FAIR: Mid Cheshire ARS;

Nantwich Civic Hall, Cheshire CW5 5DG (BB | CR | D | FP | RF | RSGB | TS)
<https://midcars.org>
<http://www.radioactivefair.co.uk>

6 March

EXETER RADIO & ELECTRONICS

RALLY: America Hall, De La Rue Way, Pinhoe, Exeter, EX4 8PW.
g3zvi@yahoo.co.uk

9 April

YEovil ARS 36TH QRP CONVENTION:

The Digby Hall, Sherborne, Dorset, DT9 3AA. Doors open 09:30 am to 2:00 pm; Admission £3 (regrettably, no dogs except guide dogs) BB | TS | Club Stalls. Supported by RSGB, RAFARS & BYLARA. Regrettably, there will be no talks this year, due to Covid.
<https://tinyurl.com/fyj9vtca>

1 May

NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION EXHIBITION:

Blackpool Rally, Norbreck Castle Exhibition Centre, Blackpool FY2 9AA
www.narsa.org.uk

20-22 May

DAYTON HAMVENTION

<https://hamvention.org>

11 June

ROCHDALE & DISTRICT AMATEUR RADIO SOCIETY SUMMER RALLY:

St Vincent de Paul's, Caldershaw Road, off Edenfield Road (A680), Norden, Rochdale OL12 7QR.
m0nvq@outlook.com

12 June

JUNCTION 28 RADIO RALLY: South Normanton, Alfreton and District Amateur Radio Club
www.snadarc.com

24-26 June

HAM RADIO FRIEDRICHSHAFEN

www.hamradio-friedrichshafen.de

26 June

NEWBURY RADIO RALLY:

Newbury And District Amateur Radio Society (NADARS)
<http://www.nadars.org.uk>

17 July

McMICHAEL RALLY

<https://mcmichaelrally.org.uk>
rally@radarc.org

24 July

FINNINGLEY ARS RALLY: Car-boot style rally. Food bar. Near J2 M180, Doncaster.
www.g0ghk.com

12-14 August

19TH INTERNATIONAL EME CONFERENCE, PRAGUE

<http://www.emec2020.cz>

BB Bring-and-Buy CBS Car Boot Sale CR Catering / Refreshments D Disabled visitors FP Free Parking L Lectures RF Raffle RSGB (RSGB) Book Stall RU/PW RU/PW in attendance SIG Special-Interest Groups TI Talk-In (Channel) TS Trade Stalls

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<https://tinyurl.com/xdr7yipc>



Winradio WR-G69DDCe 'Artemis' SDR

The WinRADIO WR-G69DDC 'Artemis' is a top performance, software-defined, wide-band, ultra-fast search speed 3 GHz/s, HF/VHF/UHF/SHF receiver. Two independent and mutually exclusive inputs are provided, one for each range: 8 kHz to 80 MHz and 43 MHz to 8 GHz. A real-time 80/34 MHz-wide spectrum analyser is included with a 32 MHz wide instantaneous bandwidth available for recording, demodulation and further digital processing over the whole frequency range. The receiver's superior performance results from its innovative, combination of direct-sampling and superheterodyne, digital down-conversion architecture along with the use of leading-edge components and design concepts. These all result in excellent sensitivity, phase noise and dynamic range, highly accurate and stable tuning, high scanning speed and perfect demodulation. These key features create a receiver in a class of its own, making it capable of filling not only the role of a monitoring receiver but also that of a fast search receiver and measuring receiver, with many operational and instrumentation features not usually found on receivers of any price category. The entire 32 MHz DDC (digitally down-converted) bandwidth is available for recording and demodulation and is ideal for hopping frequencies analysis. Three demodulators allow



the simultaneous reception and decoding of radio signals within the entire band. The WR-G69DDCe also features optional external reference frequency inputs and outputs as well as 1PPS pulse input. In addition, stereo analogue output is also possible, as well as wide audio (10 Hz-150 kHz). The special data port offers numerous possibilities which include GPIO (general purpose I/O), HSP (high-speed data output), or traditional RS232 interface. Check out this astonishing new radio's key features on the Winradio website.

[The WinRADIO WR-G69DDCe will be reviewed in-depth in one of the next issues of RadioUser – Ed.]

<https://tinyurl.com/yf62sttn>

<https://www.winradio.com/home/g69ddce.htm>

<https://www.winradio.com/home/g69ddce-s.htm>

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WORLD RADIO TV HANDBOOK 2022

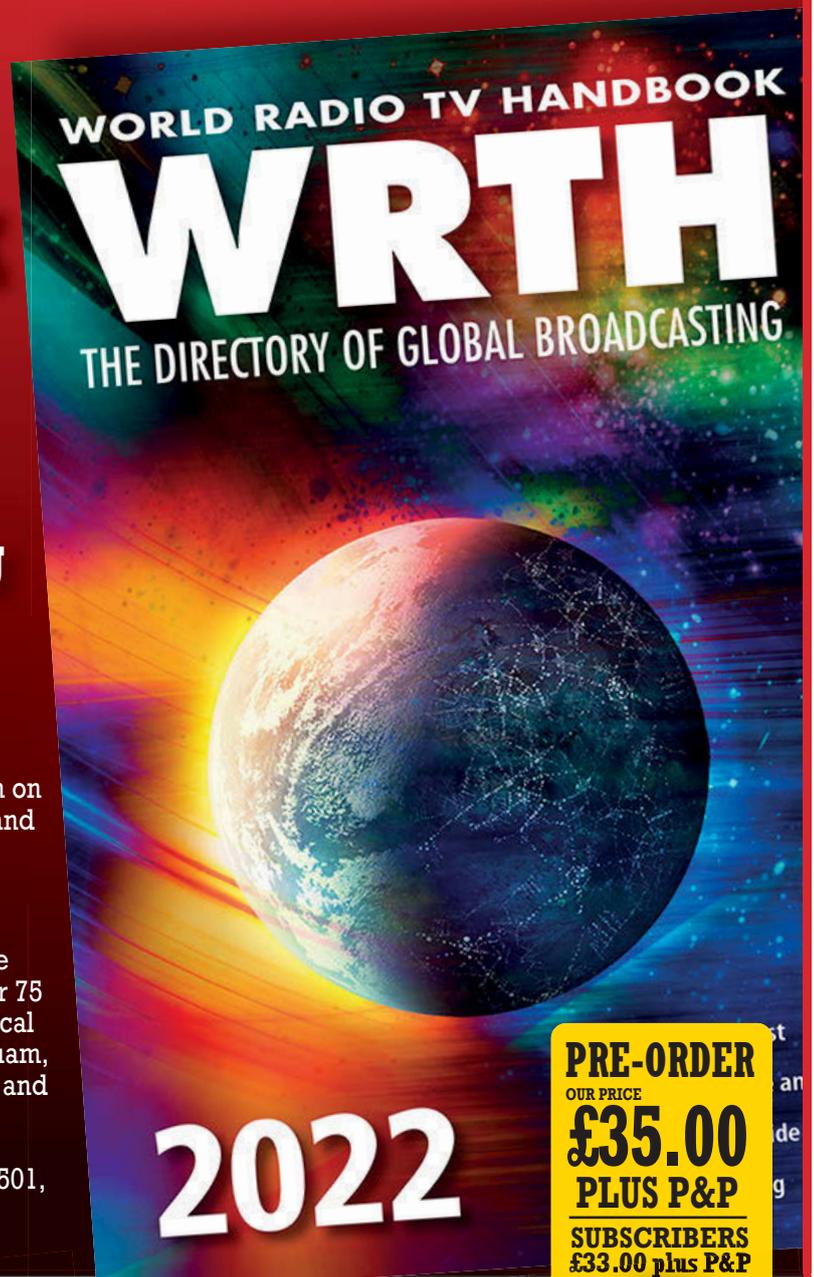
The Directory of Global Broadcasting

This is the 76th edition of World Radio TV Handbook and this great directory continues to offer the most comprehensive guide to broadcasting on the planet. With the help of international network of contributors, WRTH 2022 provides the most up-to-date information on mediumwave, shortwave and FM broadcasts and broadcasters available in any publication

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Chrissy Brand
chrissyLB@hotmail.co.uk

Games Without Frontiers – Radio Without Tears

The winter months inevitably draw people indoors, which in turn offers plenty of opportunities to catch up on radio programmes, podcasts and the plethora of other entertainment options and channels in an age of video and audio abundance. There are many podcasts and programmes to uncover that focus on all aspects of gaming. There is a generational difference in the types of games that are played, with the under-40s dominating the Xbox, PlayStation and Nintendo Switch. The middle-aged market may prefer smartphone *Solitaire*, *Tetris* or games they remember from childhood. However, there is a middle ground, from what I can see in my friends and family (that straddle all age brackets), of board games, such as *Karuba* and *Settlers of Catan*, which can be addictive across all generations. The popularity of board games has rocketed in recent years and there are board room cafes in many locations, including *The Treehouse Café* in Sheffield, *The Boardroom* in Todmorden and *Chance Encounters* in Bristol. This is reflected in the number of podcasts on the topic.

Chrissy Brand looks at programmes and podcasts about games and pastimes. She also illustrates how individuals can create fame as presenters, on their own terms and through their own channels.

Gaming For All

If this is lost on you, I suggest a listen to one of the podcasts that cover these exciting, alternative worlds. The *Secret Cabal Gaming Podcast* has reached an impressive milestone of over 250 bi-weekly programmes, during which the founders, Jamie, Tony, Chris, Steve and Brian, talk about tabletop gaming of all kinds: board games, card games, miniatures, role-playing games and more. In each episode, you will hear reviews, gaming industry news and discussions.

<https://tinyurl.com/msrnaz42>

Others worth starting with include *Gaming in the Wild* with John Rogers in Iceland, *The Cross Players* in the UK and *The JRPG Report*, from Tennessee, USA, which is dedicated each week to the Japanese Role Playing Game.

If you want to join those making a career out of live-streaming, you can join Pete Wilkins and Ben Green in London each week for *The Gaming Careers Podcast*.

Fig. 1: Ian Greensmith and Berth of the Cool, good enough for radio. Fig. 2: Aoife Wilson and Julia Hardy present the BBC radio series *This Game Changed My Life*. Fig. 3: Brent Underwood video-blogs from a Californian ghost town. Fig. 4: The Seoul Tower looks out across the K-Pop scene of South Korea.

<https://tinyurl.com/yc3nb4w3>
<https://tinyurl.com/y8a63xbt>

Such programmes are not exclusively the territory of niche individuals. BBC Radio covers all aspects of gaming on several of its national radio stations. For instance, BBC Radio 3 highlights soundtracks from games in *The Sound of Gaming*, a “regular jaunt into the latest, brightest and best gaming soundtracks”. Statistics have shown how these experiences are good for your well-being and presenter Louise Blain stated that, “it’s time to take a deep breath and relax with these meditative experiences.” In 2020, Louise cited five games she considers are essential to aid relaxation: *Animal Crossing: New Horizons*, *Spiritfarer*, *Firewatch*, *Stardew Valley*, and *The Sims 4*.

Proof of this came in a study of *Animal Crossing* players by Oxford University, which concluded that, “contrary to many fears that excessive playtime will lead to addiction and poor mental health, we found a small positive relation between gameplay and affective well-being.”

<https://tinyurl.com/GamingWellBeing>
www.bbc.co.uk/programmes/m0009rfp

There are 13 episodes in the 2020 and 2021 BBC radio series called *This Game Changed My Life* (Fig. 2). Aoife Wilson and Julia Hardy have worked in the games industry for years. During this time, they found, “the most shocking, moving and inspiring true stories about how gaming changed people’s lives forever. Join them to hear about the guy who works for NASA because of a game, the couple who fell in love on an [online role-playing game], the man who turned his escape from civil war into a video game and the gamers who caught a killer in real-time.”

www.bbc.co.uk/programmes/p0874xc6

In the BBC Radio 4 series of *Just One Thing* that began on September 26th, Michael Moseley revealed how, “...video gaming can sharpen your attention and your eyesight, and which types of games give the greatest brain benefits.” Other programmes focused on the benefits given through singing, houseplants and drinking water.

www.bbc.co.uk/programmes/m00101jt



In Canada, CBC weekly news magazine programme *Day 6* covers a broad range of topics. On October 29th, *Day 6* had features on climate change in Afghanistan, racism in the US legal system, a mountain of fake body parts in the English countryside; and a review of the new *Guardians of the Galaxy* game.

<https://tinyurl.com/rjdndycp>
www.cbc.ca/listen/live-radio

Life Is Strange

A narrative adventure game with its own community radio station sounds enticing. My sometimes co-author, Tim Sutton Brand, gives an overview of *Life is Strange: True Colours*, which is the latest entry in the ever-popular *Life is Strange* series of games.

For those unfamiliar with the franchise, these narrative adventure games, published by *Square Enix*, focus on storytelling and decision making, with the games’ strengths being their character development, beautiful settings and a mesmerising soundtrack.

This game is no exception, with the player controlling the adorably awkward Alex Chen as she moves to the fictional mountain town of Haven Springs, Colorado. The developers have done an exceptional job of making the town feel like a real, lived-in place that encourages you to explore it throughout several chapters of the game.

Another area that the game excels in is creating a diverse cast of supporting characters that players will no doubt find themselves caring about. Fans of the previous *Life is Strange* games will be pleased to see Katy Bentz reprising her role as Steph Gringich, with a wonderful performance as the local community radio station’s DJ.

The *Deluxe Edition* of the game includes a bonus sixth chapter, *Wavelengths*, where the player takes control of Steph, putting them in charge of the town’s community radio station, KRCT 104.3. By no means is this additional chapter a ‘must-play’, with some moments of it seeming slightly tedious and repetitive compared to the

Date	Time (UTC)	Station	Programme	Podcast	URL/ Stream/ Frequency
Daily	24/7	Radio Clarin	Traditional music of Uruguay	www.radioclarin.com	580 kHz in Uruguay and www.radioclarin.com
Daily	0500 to 0800	Radio Kuwait	News, music, features	Not available	15530kHz https://media.gov.kw/LiveRadio1.aspx
Daily	1200 to 1500	RMN (Radio Montagnes Noires)	Brittany in Music	Les Indés Radios app	FM and www.rm.n.bzh/la-bretagne-en-musique
Daily	1500 to 1600 2200 to 2230	KBS World, South Korea	News, K-Pop, Culture, travel	KBS Kong app	9515, 11810kHz and Channel 2 at http://world.kbs.co.kr/service/index.htm?lang=e
Monday to Thursday	2200 to 0030	BBC Radio Wales	The Late Show with Eleri Sion, music and chat	BBC Sounds	DAB, FM and www.bbc.co.uk/sounds/brand/m000nskk
Monday	0001 to 0500	FM108, Halton Hills, Ontario, Canada	Erin Montgomery, oldies music	www.fm108.ca	www.fm108.ca
Tuesday	0700 to 0800	RTÉ 1	The Innovation Show with Aidan McCullen, digital disruption, cutting-edge thinkers	www.rte.ie/radio/rte-radio1-extra/the-innovation-show	FM, 198kHz, Smart speaker www.rte.ie
Friday	0000 to 0200	Jazz FM	The Late Lab with Anne Frankenstein, Funk, soul and jazz	https://tinyurl.com/23kht32f	DAB, Smart speaker and https://planetradio.co.uk/jazz-fm
Friday	1100 to 1200 2100 to 2200	BBC Radio 4 Extra	Podcast Radio Hour	BBC Sounds	DAB, Smart speaker and www.bbc.co.uk/programmes/b09n14fm
Friday	1700 to 1900	Radio Wimborne	Graham Clarke Show, music and comedy	www.radiowimborne.co.uk	94.6 MHz locally and http://radio.canstream.co.uk:8057/live.mp3

Table 1. Chrissy's Top Listening Recommendations for the Month Ahead in International Radio.

thrilling main five chapters of the game, but for any fans of community radio it's a fun simulator featuring cameos from characters in the main game, as well as the previous *Life is Strange* games.

Overall, *Deck Nine* have done an exceptional job at creating a compelling story with beautiful graphics – definitely worth picking up for fans of the genre. A ten-minute video of footage in the radio station and records store is on YouTube, and a quick search will soon reveal many more.

<https://tinyurl.com/KRCTSteph>

In reality, a station with the call sign KRCT first appeared back in the 1940s. However, fictional KRCT 104.3 has more in common, geographically at least, with KCRT The Mountain, which is an oldies station (playing music from the 1970s to 1990s) in the town of Trinidad and Raton in Colorado. It has a sister station, KBKZ Coyote Country.

www.kbkzradio.net

New Life in Old Games

New media channels reflecting old pastimes have seen an increase in popularity since the start of the pandemic, with the impact still rippling outwards in a form of celebratory nostalgia. Historically, this time of year sees people come together indoors to enjoy and indulge in old favourites. Through the autumn, the Yesterday TV channel aired a touching if, inevitably, a little geeky, series called *Hornby: A Model World*. This looked at the processes in designing new diecast replicas of models of trains and planes for the Hornby company, aimed at a new market as well as people of a certain vintage. Series 1 Episode 2 saw

Eddie Izzard and her fellow modellers recreate a model railway of a snowy Bexhill-on-Sea, set in 1940.

<https://tinyurl.com/2p9c3y49>

In a similar vein, I am hoping that BBC Radio 4 Extra repeats its 2010 programme, *The Doll's House*. It saw writer and illustrator Lauren Child explore the world of the miniature doll's house. "It's the classic little girl's favourite toy and in this programme, we hear about the influence the doll's house has had on the imagination of now grown-up women and the occasional man, as well as the hobby of doll's houses for adults."

There are plenty of dolls and action figure podcasts, especially for collectable brands such as Star Wars and Marvel. The Doll Podcast is a high-quality production, hosted by Louisa Maxwell, who has presented features on vintage fashion and toys for ITV, Channel 4 and BBC TV and Radio.

www.dollpodcast.com

<https://tinyurl.com/bdeaamu7>

Table Football Monthly is another highly polished production. Keith Littler, Andy 'Smiffy' Smith and Danielle Goscomb put together vlog cast series on the history of table football games, from the early days, through the presenters' childhoods and up to the present day. There are 30 episodes for you to enjoy on YouTube.

<https://tabletopyears.com>

<https://tinyurl.com/22w8t5jk>

Go Your Own Way

There is no shortage of talented and exciting presenters and adventurers out there. Many of these are professional and charis-

matic enough to deserve their own mainstream radio or television series. However, the decision-makers tend to play safe, so it is usually the ubiquitous Clare Balding who gets another series of countryside walks or former MP Michael Portillo sets off on another all-expenses-paid mega train trip. In the past, this exclusive club was an immovable barrier that prevented many new names from breaking through.

However, the 'Internet-Age' of new media changed that forever. I eagerly follow maverick English vlogger Benjamin Rich, aka *Bald and Bankrupt*, in his fascinating trips around the world from South America to Asia and Africa. He is highly entertaining as well as informative. Highlights in 2021 were his toughing it out in Ukraine, Armenia and taking the lesser-used BAM route on the Trans-Siberian railway, in search of Soviet mosaics and tales. *Bald and Bankrupt* is popular too, as there are over three million subscribers to his YouTube channel.

<https://tinyurl.com/yckn3n8k>

In 2018, Brent Underwood purchased Californian ghost town, Cerro Gordo, for \$1.4 million. Subsequent YouTube and TikTok channels have catalogued the renovations that have taken place, along with tantalising glimpses into the history of the town. *Ghost Town Living* makes for compulsive viewing with around sixty videos uploaded and 1.3 million subscribers (Fig. 3). Cerro Gordo has also been discussed on a few radio programmes and podcasts, including BBC World Service's *Outlook*, the podcast of *Glenn Beck Program* on Blaze TV and *The Daily Stoic*.



4

<https://tinyurl.com/4ms33k47>
<https://tinyurl.com/yckpdp8y>
<https://tinyurl.com/2p8rxcdf>

DJ and drummer Ian Greensmith (Fig. 1) and Resonance FM presenter Ben Thompson (*The London Ear*) host a monthly night of vinyl at the White Rock Hotel in Hastings. Called *Berth of the Cool*, it is worthy of being a live radio programme in its own right. However, at present, only a select few dozen aficionados get to enjoy the, “jazz, Latin, film soundtracks, and [the] cool lounge hangout, in the very groovy, very chic, maritime-themed basement bar.”

<https://tinyurl.com/se5yekse>

Korean Kitsch

KBS World in South Korea (Fig. 4) lightens my weekdays with the ‘bubblegum music’ from

the ‘K-Pop’ genre. *One Fine Day* is presented by Lena Park. She plays request songs and reads listeners’ messages. “Expect great music, interesting guests and generally a feel-good experience.” However, you need to listen to the programme live from 0810 to 1010 UTC, to hear the actual music, as that is edited out of the Listen-Again option.

In addition, Angela Park hosts *K-Pop Connection*, daily from 1100 to 1200 UTC. It is one of my favourite music radio programmes and songs such as *Eight* by IU featuring Suga, always lift my spirits. Scroll to the four schedule boxes, (KBS World TV, KBS Korea TV, KBS World Radio multilingual and KBS World Radio English) at the KBS website.

<https://tinyurl.com/w8px3bjw>
<https://tinyurl.com/KBSLenaPark>

Radio News



ANDREW MARR LEAVES THE BBC TO JOIN GLOBAL:

Long-serving BBC broadcaster Andrew Marr is leaving the corporation and joining Global to host programmes on LBC and Classic FM. He will host a brand new, opinion-led programme, broadcast on LBC and fully visualized on Global Player where he will give his view on the biggest issues of the moment. Andrew Marr will also present a brand-new programme on Classic FM playing music as well as interviewing guests from the worlds of politics and the arts. In addition to his new programmes on LBC and Classic FM, Marr will also present a new weekly podcast on Global Player and will write a regular column for *LBC.co.uk*. Andrew has hosted the BBC’s flagship political programme, *The Andrew Marr Show*, for the past 16 years and regularly presents on BBC Radio 4. Andrew Marr said: “Coming to Global gives me new freedom – to do fast-paced, very regular political journalism on LBC with no filter – in entirely my own voice. On Classic FM, I’ll be exploring my love of classical music, and culture generally, with some surprising guests. I feel I’m joining a young, hungrily ambitious and exciting company and I can’t wait to get stuck in.” [...].

(Sources: BBC | RadioToday | Global | National and Radio Press | the *ontheradio* blog | eRadio with Broadcast Bionics)

<https://tinyurl.com/7adxj7a9>
<https://tinyurl.com/er9drfkv>

ALAN ROE: *A Selection of Music Programmes on Shortwave* (B-21 Broadcast period; 31 October 2021 to 26 March 2022) has once again been meticulously compiled by Alan Roe. The latest version of this ever-popular guide to enjoying music broadcasts on the short waves is now available for download here:

<https://tinyurl.com/4ey5m4kj>
alan-roe-sw@randa33.co.uk

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David Harris
mydogisfinn@gmail.com

David Harris reviews a 30th Anniversary Edition of a leading text covering the lives of three famous US American radio pioneers, including the changing economic, social and technical environments in which they worked.

This is a special 30th Anniversary reprint of *Empire of the Air*, which was first published in 1991. The book relates the story of three American radio pioneers; Lee de Forest (1873-1961), Edwin Howard Armstrong (1890-1954) and David Sarnoff (1891-1971). As the author himself stated back in 1991, "the names of de Forest, Armstrong and Sarnoff have passed into a dim twilight".

Here in the UK, we sometimes tend to see radio as the product or invention of Marconi (see my review of *Marconi: The Man Who Networked the World* by Marc Raboy. *RadioUser*, December 2016: 56).

We might also credit Lord John Reith (1889 – 1971) for creating the BBC.

This book throws a lot of new light on the development of radio and television in the USA; especially on FM broadcasting, which was developed by Edwin Armstrong. The author competently weaves a compelling narrative that pulls together the inter-related lives of these pioneers. DeForest was an inventor who created the three-element tube (or valve). Armstrong developed de Forest's valves by creating circuits that could receive and transmit. He then went on to create FM broadcasting.

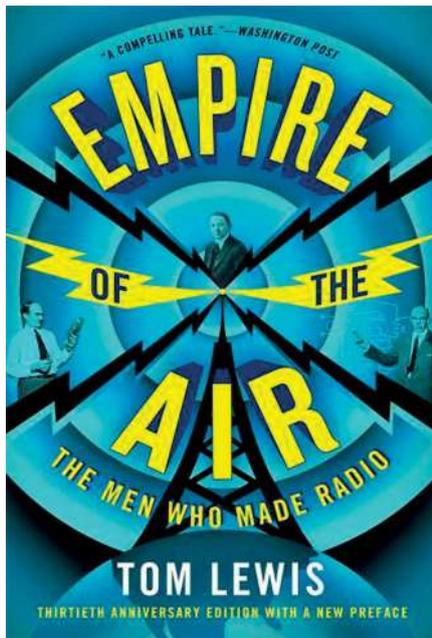
Sarnoff rose to become head of RCA, the biggest electronic corporation in the USA who brought radio, black-and-white television, and then colour television, to America.

Radio began to be taken seriously during the First World War (1914-1918) when there was a tremendous demand for two-way radio communications. In 1920 the very first licensed commercial AM broadcast was made by KDKA Pittsburgh, which is still in operation as a News and Talk format broadcasting on both AM and FM. Radio was quick to take off; by 1930, there were 618 commercial AM stations in the USA.

The backgrounds of the three pioneers were very different:

DeForest went to the prestigious Yale University where he remained to complete a Ph.D. on the work of German physicist Heinrich Hertz (1857-1894). He then set up several different companies to take forward his inventions, the most notable of which was the 'audion' (or radio valve).

A 30th Anniversary Group Biography



Empire of the Air. The Men Who Made Radio
by Tom Lewis
Three Hills (Cornell University Press) 2021
(first published 1991)
421 pp. Pbk. £18.99.
ISBN 9781501759321.
www.threehillsbooks.com

Edwin Howard Armstrong attended Columbia University in New York where he remained as a researcher and was eventually appointed as a professor. He pioneered the concept of regeneration and superheterodyne circuits and FM radio.

David Sarnoff was an example of the 'American Dream'. He was born in Minsk (now in Belarus) to a very poor family. He emigrated to the USA where by chance he obtained a job as a messenger boy for a cable company. He learnt Morse code and eventually became a ship's radio officer for the Marconi company. He rapidly advanced to the position of a protégé of Marconi. Sarnoff then became the commercial manager of the newly formed RCA. RCA was set up by General Electric and the American Marconi company to avoid US communications being controlled by the British Marconi company.

The 1920s were the era of the big corpo-

rations who displaced the role of individual inventors in the development of the new technology. Westinghouse, AT&T and RCA were manufacturers of broadcast equipment, as well as owners for radio stations.

RCA set up the first US-wide network when it started NBC (National Broadcasting Company).

Much of the book is taken up with detailed accounts of the numerous court cases involving patent infringement. DeForest and Armstrong were involved in litigation to do with regeneration circuits. In the 1950s Armstrong makes it his life's work to try to obtain payment from RCA for patent violations concerning his development of FM broadcasting. RCA was also involved in anti-trust litigation with the US government over its control of the industry.

The most interesting chapters in the book are those that cover the development of FM by Edwin Armstrong. It was back in 1933 that he filed his first patent and began test transmissions in 1937. During this time, the commercial development of television was underway. By 1939, the first FM receivers were manufactured, but RCA decided to invest in television with the first commercial broadcasts beginning in 1939.

The Second World War (1939-1945) put such developments on hold as firms geared up to supply the military. In 1945, the Federal Communications Commission (FCC) forced FM stations from their original band (42-50MHz) up to 88-108MHz This was to make the lower VHF frequencies available for television. It also limited the output of these stations. In this way, FM was effectively strangled at birth and the USA today continues to have both AM and FM stations.

Empire of the Air is a very ambitious book in that it provides a comprehensive biography of three of the leading figures in US radio history. The new edition could have benefited from an updated bibliography and few pictures but is still a compelling read for anyone with an interest in the history of radio and television.

[See also: **Scott Caldwell** in *RadioUser*, May 2019: 23-25 (David Sarnoff); February 2021: 24-27 (Edwin Armstrong) May 2021: 46-47 (*The World's Fairs*); *The Spectrum Monitor*, July 2020 (David Sarnoff); – Ed.]

Radio News

AUDIO CONTENT FUND: The Audio Content Fund (ACF) has announced the recipients of grant funding for 17 more public service radio projects that will be broadcast across commercial and community radio in the UK. The projects will all be produced by independent production companies, 11 of which are based outside London, with seven 'indies' [independents - Ed.] receiving funding from the Audio Content Fund for the first time. The fund, which is financed by the UK Government, has allocated £334k to the projects and estimates the content will be heard by 9.3m listeners.

The bids come with commitments of broadcast on at least 40 different radio stations, with broadcast partners from Bauer, Wireless, Communicorp UK, Fun Kids, Union Jack and a range of community radio stations across the country. Details on the 17 funded projects can be found at the URLs below: (SOURCES: ACF | RadioToday)

<https://tinyurl.com/5ep7pf3a>

<https://www.audiocontentfund.org.uk>

BBC SOUNDS: Ofcom has published its final statement on the market position of BBC Sounds, following concerns raised by commercial radio regarding its regulation and impact on competition. As part of the consultation, *Radiocentre* highlighted several specific issues relating to the BBC's crowding out of competition; the true extent of cross-promotion; and the BBC's impact on the podcast market. Despite this evidence, Ofcom has found that there are not currently reasonable grounds to proceed with a full BBC competition review.

However, it has confirmed that it will monitor any future changes and developments that could affect competition in the UK audio market. In addition, it noted the need for high levels of transparency with the rest of the audio sector on planned changes to *BBC Sounds*. A *Radiocentre* spokesperson said: "BBC Sounds plays an important role in underpinning the dominance of the BBC in the UK audio sector. Whilst we are disappointed Ofcom is not prepared to undertake a full competition review of its impact at this stage, we welcome the fact that it will be monitoring any proposed changes and intends to ensure greater transparency and active engagement from the BBC in the future." You can access the full Ofcom Statement at this URL: (SOURCE: Radiocentre | Ofcom)

<https://tinyurl.com/bdf5k2n5>

<https://tinyurl.com/yckj3f4a>

European Private Shortwave Stations

December 1st 2021

Only **legal** stations are included. Most stations use low power, but a few use several kW. Note that UTC is used here – not CET/CEST. D = Germany, DNK = Denmark, FIN = Finland, NL = Netherlands, NOR = Norway F.pl.: future plan, Int'l = International, Irr. = irregular, 24/7 = twenty-four hours a day, seven days a week Mo = Monday, Tu = Tuesday, We = Wednesday, Th = Thursday, Fr = Friday, Sa = Saturday, Su = Sunday.

KHz	Country	Name	Transmitter site	Schedule (UTC)
3955	D	Radio Channel 292	Rohrbach Waal	Daily 0700-2000 & 2200-0600
3975	D	Shortwave Gold	Winsen	Daily 0700-2100
3985	D	Shortwavedservice	Kall-Krekel	Daily 1500-2100
3995	D	HCJB	Weenermoor	24/7
5895	NOR	The Sea / Radio Northern Star	Bergen	Daily 0428-2307. Silent from mid-Dec.
5920	D	HCJB	Weenermoor	Daily 0700-1705
5930	DNK	World Music Radio	Bramming	24/7
5955	NL	Sunlite	Westdorpe	From December 5th: Daily 0600-1800
5970	DNK	Radio208	Hvidovre	24/7
5980	DNK	Radio OZ-Viola	Hillerød	We 2200-2300, Sa-Su 1200-1400
5980	FIN	Scandinavian Weekend Radio	Virrat	1st Sa LT of the month 22-08 & 14-17
5990	NL	Studio Denakker	Klazienaveen	F.pl.
6005	D	Shortwavedservice	Kall-Krekel	Daily 0900-1700
6005	NL	Radio Delta International	Elburg	Summer period Sa 2000-0100
6020	NL	Radio Delta International	Elburg	Su 0600-1500
6055	DNK	Radio OZ-Viola	Hillerød	Alternative to 5980
6070	D	Radio Channel 292	Rohrbach Waal	24/7
6085	D	Shortwavedservice	Kall-Krekel	Daily 0800-1800 (Radio MiAmigo Int'l)
6115	D	Radio SE-TA 2	Gera	Irr. (1000-1200 UTC)
6125	NL	Radio Europe	Alphen a/d Rijn	Irr. (1400-2300 UTC)
6140	NL	Radio Onda, Belgium	Borculo, NL	Weekends
6150	D	Europa 24	Datteln	Daily 0800-1605
6160	D	Shortwave Gold	Winsen	0800-1500
6170	FIN	Scandinavian Weekend Radio	Virrat	1st Sa of the month 08-14 & 17-22
6185	NL	Radio Piepzender	Zwolle	Irr.
7220	NL	Rockpower	Nijmegen	Irr.
7365	D	HCJB	Weenermoor	0900-1500
7425	NL	Radio Piepzender	Zwolle	Irr. (1700-0700 UTC)
7445	NL	Radio Piepzender	Zwolle	Irr. (0800-1700 UTC)
9530	NL	Radio Onda, Belgium	Borculo, NL	Weekends
9670	D	Radio Channel 292	Rohrbach Waal	24/7
11690	FIN	Scandinavian Weekend Radio	Virrat	1st Sa of the month 08-10 & 17-22
11720	FIN	Scandinavian Weekend Radio	Virrat	1st Sa LT of the month 22-08 & 10-17
15785	D	FunkLust	Erlangen	DRM-modulation
15790	DNK	World Music Radio	Randers	Sa-Su 0700-2000 & irr. at other times
25800	DNK	World Music Radio	Mårslet, Aarhus	24/7

This list is compiled by Stig Hartvig Nielsen each first day of the month – and is based on details supplied by the various radio stations, the stations websites, monitoring observations, HFCC registrations, and some presumptions. The list is not copyrighted and may be published everywhere. Subscription by email is free of charge; write to shn@wmmr.dk.

Enter our competitions at www.radioenthusiast.co.uk/competitions

Scott Caldwell

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Hello and welcome to the return of *the Long, Medium, and the Short!* No need for a 'Flux-Capacitor' to make time travel possible! In this new, bi-monthly, column, I will always begin by offering some short, introductory, hints and tips on a choice of topics from the world of Dxing, share some of the latest news and developments from this side of the hobby and recommend some key times, broadcasters, frequencies, and resources (e.g. Fig. 1) for you to try out.

In some of my future columns, I will offer a brief focus on a particular broadcaster in these wavebands, beginning with Radio Romania International, on short wave, this month.

So, without further ado, let us begin as we mean to go on: With the up-and-coming DX season just around the corner, these are exciting times for all DXers. Hopefully, you have completed the necessary checks on your antenna during the long summer days. I had to replace the coax cable connecting my Wellbrook Loop to the interface, as the LED was flashing before it turned off.

On closer inspection, I discovered that the coax had indeed split, creating a short in the system. I also took the opportunity to check the nuts on the mounting of the antenna rotator and resealed the head of the loop in an attempt to prevent any water ingress.

The equipment I am currently using consists of an SDRplay RSPdx Software-Defined Radio, a Sony ICF2001D and a Wellbrook ALA 1530 Loop.

Topic of the Month: 'Grey Line' DXing

The ionosphere is subjected to drastic fluctuations during the transition from darkness to daylight and daylight to darkness. The 'Grey Line' is a theoretical band that transits the earth and delineates daylight from darkness. Propagation conditions along this Grey Line are, therefore, very efficient for long-distance radio signals.

One of the most fundamental concepts that underpin this theory is the finding that the D-layer that absorbs High-Frequency (HF) signals, will rapidly disappear on the sunset side of the 'Grey Line', and has not yet developed upon the sunrise side. DXers can optimise their valuable listening

The Return of the Long, Medium, and the Short

Scott Caldwell begins a new bi-monthly column on analogue radio, from long wave to short wave. It will alternate with his Radio History column and offer recommendations, DXpedition reports, hot topics and listening tips for HF radio.

time by monitoring the position of the 'Grey Line' as it moves across the Earth.

Medium Wave News

The outstanding news item this month, in my view, has been that Ofcom has approved an application by Radio Caroline 648kHz to increase its power output. Currently, Radio Caroline has been broadcasting 1kW, under the terms of its community radio licence. The power increase will extend its current coverage beyond the Suffolk and Essex areas and reduce man-

made interference.

In terms of Medium Wave Dxing, VOWR 800kHz (St Johns, Newfoundland and Labrador) has been reported off-air, due to a suspected lightning strike on Saturday 21st August 2021.

The station usually plays a range of interesting programmes, and I have been able to log this station during the winter months. New Country 930 has agreed to assist VOWR by broadcasting Worship Service at 11:00 hrs (local time) from Wesley United Church in St John's. More recent reports

Medium Wave Local

Frequency (kHz)	Station	Location	Power (KW)	Time (UTC)	Date	DXer
828	BBC Asian Network	Sedgley	0.2	10:34	30/09/2021	A
855	Sunshine Radio	Ludlow	0.2	11:05	01/10/2021	A
945	Gold	Derby	0.2	19:30	29/09/2021	A
945	Smooth Radio	Bexhill	0.7	23:35	01/10/2021	A
1026	Downtown Radio	Belfast	1.7	12:30	28/09/2021	A
1116	BBC Radio Derby	Burnaston	1	13:15	02/10/2021	A
1170	Greatest Hits Radio	Stoke	0.2	14:07	01/10/2021	A
1368	Manx Radio	Foxdale IOM	20	15:11	30/09/2021	A
1413	Premier Christian Radio	Multi-Site	1	01:20	02/10/2021	A*
1431	Smooth Radio	Southend	0.35	00:15	02/10/2021	A*

Table 1: Medium Wave Local Logbook.

Medium Wave DX

Frequency (kHz)	Station	Location	Power (KW)	Time (UTC)	Date	DXer
531	R Algeria Int	F'Kirniai ALG	600	00:37	02/10/2021	A
567	RNE R5	Murcia E	50	03:14	02/10/2021	A
576	RNE	Barcelona	100	20:21	02/10/2021	A
585	RNE	Madrid E	600	22:17	02/10/2021	A
711	COPE	Murcia E	25	23:21	02/10/2021	A
738	RNE	Barcelona E	600	20:14	02/10/2021	A
900	RAI	Milan ITA	100/50	22:05	02/10/2021	A

Table 2: Medium Wave DX Logbook.

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Fig. 1: The 2022 edition of the WRTH (order on page 17). Fig. 2: The simple VOXM Logo. Fig. 3: WPTX on 1690kHz AM. Fig. 4: Radio România Internațional is very active.

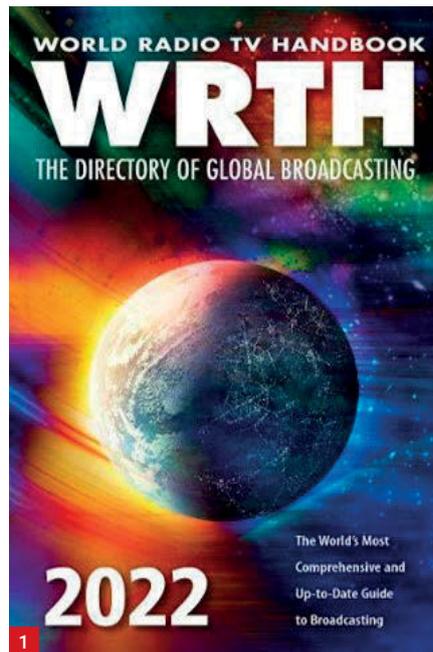
have suggested that the VOWR service is not back to normal with UK based DXers logging their broadcasts. Please let me know if you have managed to receive them!

Trans-Atlantic DXing Developments

Even in the late summer months, there is some interesting DX in the Medium Wave bands. Recently the powerhouses of VOXM (Fig. 2) St Johns on 590kHz and WBBR New York on 1130kHz have been audible at around 04:00 UTC. These stations are relatively 'easy' catches, and they can be received on a portable radio with an indoor loop in the winter months.

These two broadcasters have distinctively different formats: VOXM plays classic pop music from the 1960s, 70s, and 80s. By contrast, WBBR is a Bloomberg station that focuses on business reports and financial markets. Early September 2021 has also seen an exciting 'DX-window' from 04:00 UTC when stations in Canada are now becoming audible in the United Kingdom.

The sad demise of BBC local radio is not all unwelcome news for the radio listener. Thus, for example, the closure of BBC Radio Lancashire on 855 kHz has enabled



the reception of Sunshine Radio in Ludlow. This station was previously unobtainable in Warrington due to the power of the BBC's transmitter at Preston.

Broadcasts and Listening Tables

Tables 1-3 show some of the stations you are very likely to be able to receive on Medium Wave this month. All times are in UTC. I have sub-divided the listing into three key parts: Table 1 shows a selection of local UK Medium Wave stations, while

Table 2 widens the scope to include long-distance (DX) catches. Table 3, last but not least, homes in especially on transatlantic reception

X Band DXing

Moreover, the 'X-Band' is at the top of the Medium Wave frequency spectrum, between 1610 and 1710 kHz. It offers exciting DX opportunities as there is relatively little European broadcasting, apart from some Dutch pirates (Table 4).

Frequency (kHz)	Station	Location	Identification/ Slogan	Power (KW)	Time (UTC)	Date	DXer
570	CFCB	Corner Brook NL	Your VOXM	10/1	03:57	02/10/2021	A
590	VOXM	St Johns NL	Your VOXM	50	05:06	06/10/2021	A
620	CKCM	Grand Falls, NL	Your VOXM	10	05:08	04/10/2021	A
670	WSCR	Chicago	The Score		06:00	24/10/2021	A
680	WRKO	Boston MA	The Voice of Boston	50	04:00	02/10/2021	A
700	WLW	Cincinnati OH	News Radio 700 WLW		04:02	04/10/2021	A
710	WOR	New York NY	The Voice of New York	50	04:00	02/10/2021	A
740	CHCM	Marystown NL	Your VOXM	10	05:07	01/10/2021	A
750	CFRB	Bonvista Bay NL	CBC Radio 1	50	03:50	03/10/2021	A
760	WJR	Detroit OH	760 WJR	50	04:34	01/10/2021	A
780	WBBM	Chicago	News Radio 780		05:58	24/10/2021	A
880	WCBS	New York NY	News Radio 880	50	04:00	02/10/2021	A
930	CJYQ?	St Johns NL	KIXX Country	23/3.5	04:03	04/10/2021	A
1010	CFRB	Toronto ON	Newstalk 1010	50	04:59	01/10/2021	A
1010	WINS	New York NY	1010 WINS	50	04:00	02/10/2021	A
1130	WBBR	New York	Bloomberg 1130	50	04:17	03/10/2021	A
1280	CFMB	Montréal QC	Radio Montréal	50	05:00	01/10/2021	A
1500	WFED	Washington DC	Federal News Radio	50	05:03	03/10/2021	A

Table 3: Medium Wave North American Logbook.

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Frequency	Call Sign/ Slogan	Transmitter Location	Output Power (kW)	
			Day	Night
1620 kHz	CHHA/ Radio Voces Latinas	Toronto ON	6.25	n/a
	CHRN/ Radio Humsafar	Montreal QC	1	n/a
	WNRN News R. 92.3 FM, 16-20 AM	Gulf Breeze FL	10	1
	WTAW News Talk 16-20	College Station TX	10	1
	KSMH Relevant Radio 16-20 AM	Auburn CA	10	1
	KOZN 1620 The Zone	Bellevue NE	10	1
	KYIZ The Z Twins	Renton WA	10	1
	Radio Rebelde	Multi-Site	n/a	n/a
	Radio Bayamo	Bayamo	n/a	n/a
	XECSSU CREO Radio	Guachochi	n/a	n/a
1630 kHz	WDHP The Caribbean Powerhouse	Frederikstead	10	1
	KCJJ The Mighty 16-30 KCJJ	Iowa City IA	10	1
	KKGM 16-30 KKGM	Fort Worth TX	10	1
	KRND La Jota Mexicana	Fox Farm WY	10	1
1640 kHz	XEUT Radio UABC	Tijuana BC	10	1
	WTNI 103.5 The Possum	Biloxi MS	10	1
	WSJP Relevant Radio 16-40 AM	Sussex WI	10	1
	KDIA The Light at the Top of the Dial	Vallejo CA	10	1
	KZLS AM 16-40 The Eagle	Enid OK	10	1
	KDZR AM 16-40 The Patriot	Lake Oswego OR	10	1
1650 kHz	KBJA K Talk 1640	Sandy UT	10	1
	HIC 80 Radio Juventus Don Bosco	Santo Domingo	1	0.5
	CINA Radio	Mississauga ON	5	0.68
	CKZW La Radio Gospel 16-50 AM/ Montreal Christian Radio	Montreal QC	1	1
	WHKT Praise 104.9	Portsmouth VA	10	1
	KFSW 98.7 The Cross	Fort Smith AR	10	1
	KFOX Radio Seoul	Torrance CA	10	0.49
	KBJD Radio Luz	Denver CO	10	1
	KCNZ 16-50 The Fan	Cedar Falls IA	10	1
1660 kHz	KSVE La Suavecita 93.9	El Paso TX	8.5	0.85
	XEAZR Radio ZER	México DF	5	5
	WCNZ Relevant Radio	Marco Island FL	10	1
	WQLR AM 16-60 The Fan	Kalamazoo MI	10	1
	WBCN Fox Sports Charlotte 16-60 AM	Charlotte NC	10	1
	WWRU AM 16-60 K Radio	Jersey City NJ	10	1
	KBRE 105.7 The Bear	Merced CA	10	1
	KWOD Am16-60 The Score	Kansas City KS	10	1
	KQWB Bison 16-60	West Fargo ND	10	1
	KRZI ESPN Central Texas	Waco TX	10	1
WGIT Faro de Santidad	Canóvanas PR	10	1	

Table 4: Try These: X-Band DXing for Beginners.

In previous DX seasons, I have noticed that the band usually opens up in January and February. However, WPTX Lexington on 1690kHz (Fig. 3) is a relatively easy catch during November here in Warrington (North-West England). WPTX plays a truly varied and interesting range of music; the station is well worth a listen.

Short-Wave News: Spotlight on Radio Romania International

Radio Romania International (Radio România Internațional, RRI, Fig. 4) is one of the last remaining Eastern European radio stations that continues to broadcast on the short waves. RRI is the external service of Romania's public broadcasting service, covering Europe, the Americas, the Near-East, Asia, Northern Africa, and Australia.

A variety of media platforms broadcasts or rebroadcasts programmes on short wave (analogue and digital), satellite, the Internet, and cable television networks. An hour-long English programme contains on average several diverse segments: current affairs, history of Romania, culture featuring the arts and music, political debates, places to visit, and a *DX Mailbag*.

Radio Romania International is very prompt in issuing QSL cards. Table 5 offers some basic information about this broadcaster, which, for many, is the entry point to the wonderful world of short wave listening.

The World Radio and Television Handbook 2022

The 76th edition of the World Radio and Television Handbook 2022 (Fig. 1) is scheduled to be released on December 8th with a recommended retail price of £40. Members of the *BDXC* and the *Medium Wave Circle* have the option of purchasing a copy at a reduced price of £28.

This book provides, in my opinion, the most comprehensive guide to broadcasting on the planet, with much up-to-date information on short, medium and long wave, and on FM broadcasters.

Feature articles for 2022 include pieces on such topics as the further development of HF Transmitters, Technical Monitoring at VOA, 75 years with radio by Ullmar Qvick, KTWR on Guam, and Radio in Lesotho.

Several reviews featuring the latest equipment, including the Sangean ATS-909x2, Tecsun H-501, Tecsun PL-330, ICOM-705, and the ATS25 Si4732 have been written by my fellow-columnist Keith Rawlings.

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<https://tinyurl.com/hawwnbfh>

[N.B.: The Sangean ATS909x2 is tested elsewhere in this issue, and the 2022 WRTH will be reviewed in one of the forthcoming issues of RadioUser – Ed].

Conclusion

Please feel free to send me your reception reports and logs for inclusion in future editions of this column. Next time, I will continue to look a little more at the Winter 2021/22 short wave frequency changes relating to your favourite radio stations and, of course, bring you more listening tips.

Target Area	UTC	Frequency (kHz)
West Europe	06:30 – 07:00 12:00 – 13:00 18:00 – 19:00 21:30 – 22:00 23:00 – 00:00	6040 (DRM), 7345 13750, 15460 6030, 7350 (DRM) 6030 (DRM), 7375 6040 (DRM), 7220
Africa	12:00 – 13:00	17800, 21470
North America (East Coast)	21:30 – 22:00 01:00 – 02:00	6170, 7310 5990, 7325
North America (West Coast)	04:00 – 05:00	6020, 7410
Japan	23:00 – 00:00	7325, 9620
Australia	06:30 – 07:00	17780, 21470

Table 5: Radio România Internațional Winter Short Wave Schedule (30th October 2021 to 26th March 2022).

Win this Tecsun H-501x

WORTH
£329

Thanks to the generosity of our friends at Nevada, we have one of these fabulous new radios to give away to one lucky winner. The Tecsun H-501x is an FM (Stereo) | LW | MW | SW-SSB PLL Synthesized Receiver with Bluetooth Audio Player and Computer Speaker Mode and a setting of up to 9kHz bandwidth on MW AM.

The H-501x has two large speakers, volume, bass and treble control, two batteries, a synchronous detector, innovative auto-scanning /tuning/ storage features, as well as advanced tuning, memory-management (including auto-sorting) and information display systems. This receiver is still compact enough to be taken on your DXpeditions but is a heavyweight when it comes to sensitivity, selectivity and interference rejection.

To be in with a chance of winning this fabulous prize worth £329, all you need to do is visit our website at bit.ly/ru-jan22comp and correctly answer this question...



What is the widest bandwidth setting of the Tecsun H-501x on MW AM?
 a. 4kHz b. 6kHz c. 9kHz d. 12kHz

Entry is only via our website. Entries close at midnight on 27th January 2022. To enter you must answer the question correctly and answers received after the end date will not be accepted. The winner will be notified by email by 7th February 2022. Warners Group Publications Plc standard competition terms apply, to view visit warners.gr/compterm. For information on how your personal data is processed, secured and your rights, our Privacy Policy can be viewed here – warners.gr/privacy or available in hard copy upon request. The winner will also be announced in the March 2022 issue of RadioUser.

Georg Wiessala

wiessala@hotmail.com

The Sangean name is a well-known brand, widely recognised by radio enthusiasts, world travellers and short wave listeners.

Some of us may have owned an earlier model of one of a range of world band receivers made by the company over the decades. I have fond memories of the ATS-818CS myself – the one with the inbuilt cassette recorder, remember? I have also worked with the ATS-803A (also marketed under the *Realistic* name) and the model immediately previous to the one reviewed here, the ATS-909X.

This new model – the 3rd Generation ATS-909X2 FM Stereo / AIR / MW / LW / SW PLL Synthesized Receiver – is the most recent incarnation in a long line of world band receivers (Figs. 1 and 3)

It offers some interesting new functions and a few positive ergonomic changes. Therefore, when Martin at ML&S asked us to review this 'new kid on the block', I was happy to oblige.

The medium-size portable radio comes in 'graphite' and white (not in black anymore), measures 208 x 41 x 135 cm and weighs in at a considerable 1.6kg. The promotional materials emphasise several noteworthy features, such as the smart battery function (which detects faulty batteries), the airband mode (118-136MHz), the advanced bandwidth, memory and squelch features, and some of the nifty automatic tuning options.

The key specifications of the ATS-909X2 are summarised in Table 2 and can also be found in the online manual.

<https://tinyurl.com/aakmh7sn>

Out of the Box and Basic Operation

In the box, you get the radio, the ANT60 portable short wave reel antenna, a set of earphones, a stylish carrying bag and a power adapter (continental; have an EU-to-UK adapter handy). I put my *Eneloop pro-Ni-MH* rechargeable batteries in (min 2,500 mAh), set the time zone, local time and one other world time – and away I was.

The set covers Airband, FM (with RDS), LW, MW and SW (100-29999.00kHz). Notice that the ribbed tuning wheel is at the *front* (think: 'Sony ICF SW77') and the (non-ribbed) volume control is on the right-hand side of the set. If you like, you



The Sangean ATS-909X2

The editor has had the brand-new Sangean ATS-909X2 in the editor's shack and shares his evaluation of this stylish portable world band radio from one of the most traditional and well-known makers on the market.

can just use the comfy Automatic Tuning System (ATS), where the radio performs a comfortable scan-and-store routine on all bands; this works slightly differently, depending on the frequency band you are after.

This is always a useful thing to do when you arrive at a new destination. In manual scan mode, the scan stops (and does not resume) at any stations found. You can also tune by meter band, which can save time.

Table 1 illustrates the available tuning steps for the rotary tuning knob and the tuning up/ down controls, in relation to the wavebands. The set does not ('soft-') mute between stations in manual tune – an extremely important issue for many SWLs and DXers. All aspects of memory management (storing-locking-recalling-deleting-moving-renaming) are simple and intuitive, and the radio offers 1,674 memory places, in three banks of 558. Most on SW, naturally.

More than enough space here and no PC is needed for this radio – nor it is possible to 'program' it with one.

In Use

A few points may be noted about this receiver; these may be helpful before you make a purchase decision:

Like other Sangean models, this set does not offer synchronous detection (SYNC), you have got to decide as to how significant this is for you; as far as I am concerned, I very rarely find this feature useful, even on 'big' receivers.

Another point to note is that frequency entry requires first pushing the 'F' key ('Frequency') before you enter the numbers, as well as a subsequent confirmation with the 'Enter/ Return' key.

For many, this radio will stand out on account of its good sensitivity, dynamic range and selectivity on the telescopic aerial. This, and the added airband coverage (118-137MHz), make it an excellent travel companion.

In common with some other early users, I have also observed that the auto-bandwidth function can act as a kind of noise-blanker; this can make a difference, and it will be up to you whether you find the automatic changes useful.



SSB signals and utility monitors should note that the ATS-909X2 is restricted to a single bandwidth; however, the set does offer the convenience of 10Hz tuning steps.

The ATS-909X2 can be connected to a matching Tecsun DAR-101 digital recorder to make (timed) recordings (of up to 60 minutes in duration); as it is, the set does not offer a digital record function; however, there are three timers.

		AIR	FM	LW	MW	SW
Rotary Tuning Knob	STOP	0	0	0	0	0
	FAST	25KHz	100KHz	9KHz	9KHz 10KHz	5KHz
	SLOW	5KHz	50KHz	1KHz	1KHz	1KHz
Tuning Up/Down (scan or seek)		25KHz	50KHz 100KHz 200KHz	9KHz	9KHz 10KHz	5KHz
Quick Tuning		1MHz	1MHz	--	-	100KHz

Table 1: The Sangean ATS-909X2: Operation, Tuning Steps and Wave Bands.

Small things make a difference, and many will note that the radio has a high overall build quality, reflected in its weight; the jacks for *aux-in*, *record (standby and line out)* and *headphones*, for example, are made out of metal. The socket for external aerials is plastic-rimmed, but it does work for LW, MW, and SW antennas. The small AM RF gain-wheel on the side is a nice touch, and it is sensitive enough to make a difference. The sound quality from the speaker is excellent. Table 3 shows a host of medium wave stations received on the review model, in November/ December 2021, by our columnist and fellow medium wave DXer Scott Caldwell. The Sangean ATS-909X2 retails at £214.95 (see back page).

[Information and reception reports by Scott Caldwell; Many thanks to Martin Lynch and his team at ML&S Martin Lynch and Sons Ltd., for the loan of the review unit – Ed.]

- Radio for Air / FM / LW / MW / SW broadcasts
- Automatic Tuning System for FM / LW / MW / SW band
- A total of 1674 radio station presets
- 3 memory banks for preset stations allow the radio to store presets for different users and/or different areas
- Local / World Time with 2 customizable city names
- FM RDS with PS, PTY, RT and CT features
- Comes with RF Gain Control for AM band
- SSB (Single Side Band): USB / LSB, 10/20 Hz / Tuning-Step
- 3 alarm timers with snooze feature
- Large LCD screen with backlight
- Built-in battery charger [...].

Table 2: The Sangean ATS-909X2: Key Specifications (ATS-909X2 Manual, p. 03).

Frequency	Station	Location	Power	Time	Date	SINPO	Remarks
540 kHz	MR Kossuth R	Solt	1000 kW	22:26	13/11/21	54444	TX, MX, Excellent Signal, ID
576 kHz	RNE	Barcelona	100 kW	00:33	13/11/21	33333	TX, Moderate Noise, ID, SS
585 kHz	RNE	Madrid	600 kW	00:31	13/11/21	44444	TX, Slight Noise, ID, SS
590 kHz	VOCM	St Johns	50 kW	02:30	14/11/21	33222	VOCM MX, Signal Fading
657 kHz	RNE R5	Madrid	50 kW	00:37	13/11/21	33333	TX, Moderate Noise, ID, SS
729 kHz	RNE	Multi-Site	n/a	01:00	13/11/21	32333	ID RNE, PIPS, SS
738 kHz	RNE	Barcelona	600 kW	23:58	13/11/21	44444	ID RNE NX, Very Good
750 kHz	CBGY	Bonavista Bay	10 kW	04:00	14/11/21	32222	CBC News, ID, EE
774 kHz	RNE	Multi-Site	n/a	20:58	13/11/21	32333	ID RNE, PIPS, SS
792 kHz	SER Radio	Sevilla	50 kW	20:33	13/11/21	43444	TX, OM, SS, ID
855 kHz	RNE	Multi-Site	n/a	20:00	13/11/21	43333	ID RNE NX, Very Good
864 kHz	NMA Koran Progs	Santah	400 kW	00:40	13/11/21	43333	Prayers, ID, AA
900 kHz	RAI	Milan	50/100 kW	00:54	13/11/21	44333	TX, Good, Noise, ID, I
963 kHz	Asian Sound Radio	Haslingden	0.2 kW	21:21	13/11/21	54444	Asian Sound Network, ID
999 kHz	COPE	Madrid	50 kW	21:50	13/11/21	33333	TX, ID COPE, SS
1044 kHz	SER Radio	San Sebastian	10 kW	00:34	14/11/21	33333	TX, SS, Noise, ID, SS
1278 kHz	Greatest Hits Radio	Bradford	0.4 kW	22:00	13/11/21	33333	Greatest Hits of the 70s, 80s, & 90s, ID
1413 kHz	Premier Christian Radio	Multi-Site	1 kW	02:00	14/11/21	33222	Christmas and Stress, ID
1458 kHz	Gold	Manchester	5 kW	01:00	14/11/21	54444	This is Gold, NX, ID
1548 kHz	Gold	London	98 kW	02:10	14/11/21	44444	This is Gold, ID
1593 kHz	Bretagne 5	Saint-Gouéno	5kW	02:44	14/11/21	33333	FF POP MX; Noise, ID.

Table 3: MW stations received (DXer: Scott Caldwell, Warrington, with a TECSUN AN200 Indoor Loop; Fig. 2).

For the latest news and product reviews, visit www.radioenthusiast.co.uk

David Smith

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On the morning of 8 November 2021, the reopening of the USA to UK travellers was marked with a spectacular synchronised, parallel take-off from Heathrow – a rare occurrence. Heathrow's runways are 'only' 1,414m apart, which is too close to be able to perform parallel departures outside of some very specific weather and visual conditions. The controllers must rely on what is called '*Reduced Separation in the Vicinity of an Aerodrome*' to ensure the aircraft remain safely apart as they climb out of the airport.

Fortunately, on that day the weather was perfect. Preliminary discussions between NATS, Heathrow, British Airways and Virgin had started in May of this year, in the hope of a US reopening sometime over the summer. While that did not happen, the plans were shelved until it became clear that reopening was imminent. There were two priorities – making sure it could be done safely and working out how to do it in perfect synchronisation, with both aircraft starting their roll down the runway and lifting off at the same time.

Working with the airline flight planning teams, the organisers started by looking at the required take-off time and were working back from there. How long would passengers need to get through security? When would the baggage and catering be loaded? Which gates were being used? What was the likely taxi time? The weight of each aircraft? What runway entry point would work best? All those factors had to be taken into account.

With the plan calling for a 08.50 departure, it was agreed that push-back needed to take place no later than 08.20 to allow time for both aircraft to be lined up and ready to go. Typically, each runway is looked after by one of two air controllers, with one handling the arrivals and the other one the departures.

With a seven-minute gap in arrivals expertly created by the team in Terminal Control at Swanwick, both Air Controllers assumed departure responsibilities; one for BAW1 on runway 27 Right, the other for VIR3 on 27 Left.

Once both aircraft were lined up, the pilots were given the standard take-off clearance but with one very unusual addition. Both were told to 'standby for roll command'... before the final instruction of '3, 2, 1, Now' was given simultaneously.



A Parallel Runway Take-off and Military Airspace

David Smith reports on a Heathrow celebration and an RAF drive for new airspace. He also describes the continuing efforts to find a missing Malaysian airliner and shares some ATC frequencies for RAF Leeming.

Once both flights were climbing, at least 3 nautical miles apart and on clearly diverging routes, the pilots were handed over to the team at Swanwick to continue their journey across the Atlantic and ultimately, New York JFK airport. In the end, it all went entirely to plan thanks to the amazing teamwork of everyone involved.

Eurocontrol Expects Air Traffic Recovery

Recovery to the 2019 number of flights in Europe could occur as early as 2023, according to a new forecast issued by Eurocontrol. Eamonn Brennan, Director General Eurocontrol, commented as follows: "Last year we had only five million flights but this summer has been very encouraging. As a result, we expect to see about 6.2 million flights this year – still 44% fewer than we had in 2019. We are

optimistic about traffic recovering to 2019 levels earlier than anticipated, with the baseline scenario indicating 9.8 million flights in 2022, just 11% down on 2019. But we must be aware that there are still significant downside risks that could affect the recovery".

<https://www.eurocontrol.int>

New Military Airspace Requirements off the UK's East Coast.

The Ministry of Defence (MoD) has announced a requirement for the "generation of new, suitable and safe airspace in the UK to facilitate large scale exercises, allowing for modern military aircraft and systems to train to their full capabilities". With the introduction of 5th-generation aircraft into the RAF inventory in the form of the F-35 Lightning, larger,

rectangular portions of airspace are needed so that crews can participate in realistic training, employing tactics, which would be used in a hostile environment.

The existing *Danger Area* sections over the North Sea are suitable for routine flying training but lack the space required for a full simulated Combat Air Operation involving participants from the UK along with our NATO allies.

These current areas also lack the overland areas required on which to place targets and for training land-based threat systems.

In this context, the core military requirements are as follows:

- Minimising the risk of mid-air collisions while enabling full tactical employment of aircraft and weapons
- Supersonic flight and rapid height changes
- Overflight and loiter of rural overland target areas
- Use of high and low altitude activity concurrently
- Representative operational numbers
- Ability to oppose from ground and air simultaneously.

The preferred option is to create *Special Use Airspace* over the North Sea with overland portions in northeast England and southeast Scotland. The training area will thus be within efficient reach of RAF and USAF Europe main operating bases. Minimising impact on other airspace users, especially commercial traffic, will be a major consideration, along with environmental impacts, including CO₂ emissions and noise.

<https://tinyurl.com/4pxtt8hd>

Finding a Missing Airliner

A fascinating technology, Weak Signal Propagation Reporter (WSPR), a digital radio communications protocol, is proving a new tool to confirm the location of flight MH370 which disappeared in March 2014. It works on the principle that aircraft trip off invisible radio waves.

Richard Godfrey, one of the leading experts in the hunt for MH370, has just concluded a new study; it finds that MH370 tripped off a series of radio transmission detections which confirm it is in the location that satellite studies and drift modelling have suggested.

The technology works by tracking stored historical data of radio signals. The area where they are deflected by an aircraft flying through them can be established. This has given hope to experts that a specific

RAF ATC Profiles 9: Leeming

ICAO Code: EGXE IATA Code: QXL

Frequencies	(MHz)
Leeming Approach	278.225
	123.300*
	362.300*
Leeming Zone	372.300; 133.375
Leeming Director	233.900
Leeming Talkdown	373.550; 245.625; 123-300*
Leeming Tower	376.850; 120.500; 122-100*
Leeming Ground	379.900
Leeming Ops	377.750

* NATO Common Frequency. Available on request only.

ATIS

Leeming ATIS	369.475
Nav aids	ILS/DME CAT I; Runway 16 TACAN LEE !!2.600
Hold	15 miles west of aerodrome, based on LEE TACAN
Runways	16 (2291 x 45m) 34 (2291 x 45m) 03 (793 x 15m) 21 (793 x 15m).

NOTES (A-Z)

Helicopter Operations

Helicopter arrival/departure procedures at RAF Leeming are significantly restricted by aircraft noise sensitivity within the local area. In essence, helicopter arrivals/departures to/from the West of the airfield are prohibited within an area bounded by the following villages: Bedale, Leeming Bar, Londonderry, and Theakston. Helicopter overflights of this area may be permitted but only by light helicopters (e.g. Gazelle) not below 500ft, whilst medium/heavy helicopters (e.g. Puma/Chinook/CH-53) must not be below 2000ft.

Local Traffic Regulations

Military Aerodrome Traffic Zone (MATZ)
A circle 5nm radius up to 3,000ft above aerodrome level.
Military Instrument Departures (MID)
MID East and MID North.

Operational Hours

0800-2359 Mon, Tue, Wed, Thu. 0800-1800 Fri.
(24hrs notice required for armed diversion requests).

Use of Runways

Station-based fast jets have priority for take-off. Visiting aircraft, especially practice diversions, may have to break off the instrument approach to permit departures. Excessive use of thrust, or downwash from above, can cause serious damage to the arrestor barriers at RAF Leeming. As such, visiting jet/large aircraft with greater than 10,000lb dry or reheat thrust or jet/large aircraft/rotary with significant jet efflux/downwash are to move forward a minimum of 500ft from the threshold before applying reheat/full power. In addition, reheat departures must be requested from ATC and excessive downwash from low hovering aircraft directly over the barrier on approach is to be avoided unless required for flight safety reasons. After landing, the eastern side of the runway is designated as the 'slow-lane' for multi-aircraft recoveries.

Warnings

Instrument Approach Procedures for this aerodrome are established outside controlled airspace. Wind shear may be encountered in the undershoot of Runway 16 when the surface wind is between 210-250 /10-25kts. Uncontrolled glider activity outside aerodrome hours at RAF Topcliffe at all levels. Air Experience Flight cadet flying throughout the year within a 20nm radius of Leeming up to 8000ft.

underwater search area can be found. The information is stored in a database every two minutes, which records the location and timestamp. The contact helps provide timelines of the direction the aircraft took, which can be challenging to monitor.

When MH370 went missing, there were 200 signals on the database every two minutes. These detections can be used to track the flight when it went out of range of radar systems. The advantage of the end of

MH370's flight is that there were no other aircraft around.

For WSPR detection in crowded airspace, it is very difficult to work out which aircraft was detected. In empty airspace it is easy and a new search may be organised as a result.

<https://www.wsprnet.org/drupal>

This month's photograph shows a Belavia (Belarus) Boeing 737 on its final approach at Gatwick.

Enter our competitions at www.radioenthusiast.co.uk/competitions



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WHISTLER

TRX-1E Digital Handheld Scanner

We have worked with Whistler to customise a UK band plan for the scanners! This ensures the radios cover UK bands in the correct steps and the correct mode. The TRX-1 will receive both amateur and commercial DMR transmissions as apart from the frequency they are fundamentally the same mode. The radio is supplied with software and users can select mode when writing memories or select auto and it will work out the mode itself! This multi-system adaptive digital trunking scanner supports Motorola P25 Phase I, X2-TDMA, Phase II and DMR.

Buy the TRX-1E for just
£419.95



IN STOCK

419 WATTS


WHISTLER

TRX-2E Digital Desktop Scanner

The radios will receive both amateur and commercial DMR transmissions as apart from the frequency they are fundamentally the same mode. The radio is supplied with software and users can select mode when writing memories or select auto and it will work out the mode itself!

This multi-system adaptive digital trunking scanner supports Motorola P25 Phase I, X2-TDMA, Phase II and DMR making it capable of monitoring the following unencrypted channels/systems:

- Conventional DMR (Entered as a DMR trunked system)
- Hytera XPT
- MotoTRBO™ Capacity Plus
- MotoTRBO™ Connect Plus
- MotoTRBO™ Linked Cap Plus systems
- NXDN & DMR out of the box



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479 WATTS

Buy the TRX-2E for just

£479.95

KEY SPECIFICATIONS

- Frequency: 25-54MHz, 108-136.99MHz, 137-174MHz, 216-379.97MHz, 380-512MHz, 764-781MHz, 791-796MHz, 806-960MHz (excluding cellular), 1240-1300MHz
- Simple Zip Code programming
- Easy updating via Internet
- APCO P25 Digital Phase I & II
- Removable, remote magnetic head
- Scanning at up to 70 channels/second
- CTCSS and DCS subaudible decoder
- IF Discriminator Out • Store Favourites Scan List
- User upgradable CPU firmware
- Spectrum Sweeper • Clock / Calendar
- Tuning Steps: 2.5, 3.125, 5, 6.25, 7.5, 8.33, 10, 12.5 ad 25 kHz.


WHISTLER

WS1065 Desktop Radio Scanner



The Whistler WS1065 employs cutting edge technology to bring a high level of performance and innovative features. This model clearly raises the bar in the area of advanced trunking scanners. Frequency coverage is extensive including: 25-54, 108-17, 137-174, 216-512, 764-776, 795-805, 849-869, 896-960 and 1240-1300 MHz.

1800 memories are available and may be dynamically structured to bank sizes you prefer. Plus you can store 21 virtual scanners (so that is a total of 37,800 objects).

The large backlit LCD is four lines by 16 characters. The keys are also backlit. Supported trunking systems include Motorola Analog, EDACS, LTR and Digital APCO (9600 bps).

KEY FEATURES

- Alert LED • Audible Alarms • Automatic Adaptive Digital Tracking
- Backlit Liquid Crystal Display • Data Cloning • Digital AGC
- Flexible Antenna with BNC Connector • High Speed PC Interface
- Free-Form Memory Organization • LTR Home Repeater AutoMove
- Key Lock • Lock-out Function • Memory Backup
- Menu Driven Programming with Context Sensitive Help
- Multi-System Trunking • P25 NAC Functionality

Buy the WS1065 for just
£299.95

299 WATTS


WHISTLER

WS1025 Desktop Radio Scanner



This 300-channel scanner can be categorized into 10 separate memory banks. Plus one-touch searches of marine, air and ham Frequency Range: 29-54 VHF Low Band. 87.3-107.9: 108-137 Civil Aircraft Band Includes 833 kHz steps. 137-144 VHF. 144-148 Amateur Band 2 Meters 148-174 VHF High Band

Buy the WS1025 for just
£89.95

89 WATTS


WHISTLER

WS1010 Handheld Scanner

This 400-channel scanner lets you listen to FM radio bands and can be categorized into 10 separate memory banks. Also, it offers the convenience of one-touch searches of marine, air and ham

Key Features/Specifications:
200 Channel memory - plenty of memory to store all your favorite frequencies in 10 separate storage banks. Backlit Liquid Crystal Display - easy to read and program data even in low light situations.. Data Cloning - allows transfer of the programmed data to another WS1010 scanner.

Buy the WS1010 for just
£89.99



89 WATTS


WHISTLER

WS1040 Handheld Scanner

The WS1040 scans most common trunked radio system signalling formats, including Motorola, EDACS, LTR and P25 trunked radio networks. Talk group and individual call monitoring is supported.

When monitoring P25 digital systems, the exclusive Automatic Adaptive Digital Tracking instantly adapts the digital decoder to the digital modulation format of the transmitted signal, then analyses the signal over 50 times each second and adapts to any subtle changes caused by multipath or fading. No cumbersome manual adjustments are required.

Buy the WS1040 for just
£299.95



299 WATTS


WHISTLER

TRX-1 Leather case
Keep your treasured TRX-1 safe with this high quality leather case
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Three compatible antennas in this great pack
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SDRplay RSPduo Dual Tuner 14-bit SDR

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The SDRplay RSPduo is a dual-tuner wideband full featured 14-bit SDR which covers the entire RF spectrum from 1kHz to 2GHz giving 10MHz of spectrum visibility. Combined with the power of readily available SDR receiver software (including 'SDRuno' supplied by SDRplay) you can simultaneously monitor two completely separate 2MHz bands of spectrum anywhere between 1kHz and 2GHz. The RSPduo provides three software selectable antenna inputs, and clocking features ideally suited to industrial, scientific and educational applications. All it needs is a PC and an antenna to provide excellent communications receiver functionality. A documented API allows developers to create new demodulators or applications around the platform.

KEY BENEFITS

- Simultaneously receive on two totally independent 2MHz spectrum windows anywhere between 1kHz and 2GHz
- Simultaneous processing from 2 antennas enables direction-finding, diversity and noise reduction applications
- Ideal for cross band full-duplex reception, e.g. HF + VHF or VHF + UHF
- Simultaneous Dump1090 and VHF ATC reception
- Simultaneous monitoring and recording of 2 ISM bands
- Covers all frequencies from 1kHz through VLF, LF, MW, HF, VHF, UHF and L-band to 2GHz, with no gaps
- Receive, monitor and record up to 10MHz of spectrum at a time (single tuner mode)
- External clock input and output for synchronisation purposes, or connection to GPS reference clock

Buy the RSPduo for just

£239.95



HF Plus Discovery High Performance SDR Receiver

IN STOCK



Building on the proven Airspy HF+ architecture, Airspy have designed the Most Refined HF/VHF SDR with world class performance in the smallest form factor.

The Airspy HF+ Discovery sets a new standard in terms of reception performance with extra pre-selectors for all the supported bands and a New DSP Core to optimize the gain distribution and the filtering parameters in real-time and dig deeper in the noise. The signal path includes very high dynamic range data converters along with high performance passive mixers with an excellent Polypase Harmonic Rejection structure.

Buy the HF Plus Discovery for just

£199.95



SDRplay RSP-1A SDR Receiver

IN STOCK



The SDR-Play RSP1A is a major upgrade to the popular RSP-1, it is a powerful wideband full featured 14-bit SDR which covers the RF spectrum from 1kHz to 2GHz. All it needs is a PC and an antenna to provide excellent communications receiver functionality. Combined with the power of readily available SDR receiver software (including 'SDRuno' supplied by SDRplay) you can monitor up to 10MHz of spectrum at a time. Documented API allows developers to create new demodulators or applications around the platform

KEY FEATURES/SPECIFICATIONS:

- Covers all frequencies from 1kHz through LF, MW, HF, VHF, UHF and L-band to 2GHz, with no gaps
- Excellent dynamic range for challenging reception conditions
- Low levels of spurious responses
- Works with all the popular SDR software (including HDSDR, SDR Console, Cubic SDR and SDRUno)
- ExtIO based plugin available

Buy the RSP-1A for just

£99.95



R2 High Performance SDR Receiver

IN STOCK



Airspy R2 sets a new level of performance in the reception of the VHF and UHF bands thanks to its low-IF architecture, high quality ADC and state of the art DSP. The coverage can be extended to the HF bands via the SpyVerter up-converter companion.

Buy the R2 SDR Receiver for just

£199.95



MINI High Performance SDR Receiver

IN STOCK



An affordable high performance alternative to RTL-SDR and other TV dongles for the VHF and UHF bands. The coverage can be extended to the HF bands via the Spyverter up-converter companion. It is 100% compatible with all the existing software.

Buy the MINI SDR Receiver for just

£119.95



SDRplay RSPdx 1kHz-2GHz HDR SDR Receiver

IN STOCK



The SDRplay RSPdx is a complete redesign of the popular RSP2 and RSP2pro multi-antenna receiver. It's a wideband full featured 14-bit SDR which covers the entire RF spectrum from 1kHz to 2GHz. Combined with the power of readily available SDR receiver software (including 'SDRuno' supplied by SDRplay) you can monitor up to 10MHz spectrum at a time. The RSPdx provides three software selectable antenna inputs, and an external clock input. All it needs is a computer and an antenna to provide excellent communications receiver functionality.

KEY SPECIFICATIONS

- Covers all frequencies from 1kHz through VLF, LF, MW, HF, VHF, UHF and L-band to 2GHz, with no gaps
- Receive, monitor and record up to 10MHz of spectrum at a time
- Performance below 2MHz substantially enhanced – improved dynamic range and selectivity

Buy the RSPdx for just

£194.95



YouLoop Indoor HF Antenna

IN STOCK



This simple, lightweight travel loop is quick to deploy and the perfect companion for Airspy and similar SDR radios!

A New Magnetic Loop Concept

The success of our award winning Airspy HF+ series brought us a lot of feedback from hundreds of customers and enthusiasts. Most of the problems were related to ineffective RX antennas that were too sensitive to the surrounding noise, had excessive gain and lack the necessary linearity. So, we decided to bite the bullet and design a new Noise-Cancelling Passive Loop (NCPL) to fix the noise problem, leverage the low-noise performance of our SDR receivers while being perfectly suitable for portable operation.

Buy the YouLoop for just

£29.99



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Chrissy Brand
chrissyLB@hotmail.co.uk

After two pandemic postponements in 2020, the *Radiodays Europe* conference finally convened in lovely Lisbon last October. The hard-working team at the *Radiodays* organisation had hardly been idle in the meantime, though. The annual *Radiodays Europe Podcast Day* had taken place online, instead of in-person, in both 2020 and 2021.

Another successful spin-off from the *Radiodays Europe* brand has been *Radiodays Asia*. Its 2021 conference also took place virtually, in March, with dozens of high profile speakers. These included Suman Basnet, Asia-Pacific Regional Director, World Association of Community Radio Broadcasters (AMARC); Lim Bum soo, Editor-in-Chief, World English Service, KBS International Broadcasting Department; Jana Rangooni, CEO, New Zealand Radio Broadcasters Association; and Jing Yun, Senior Programme Director, DJ and Lecturer, Singapore.

Radiodays Europe 2021

Chrissy Brand reports from the recent Radiodays Europe Conference in Lisbon. The event showcased a host of inspired ways in which radio can save lives and support society as a whole.

Protective Portuguese

I was delighted to be able to attend the conference in person and, thanks to Portugal's pandemic protection procedures, I felt perfectly safe. In addition, the country had the highest vaccination rates in Europe.

Unlike a certain island in northwest Europe, the Portuguese authorities implemented clear guidelines and strict rules regarding mask-wearing. These are adhered to by the Portuguese public, visitors and

tourists; in shops, cafes, on public transport and throughout the conference venue itself.

For the Lisbon conference to take place, a clever compromise of a hybrid event had been arrived at. This gave delegates the option to either attend in person or to take part online (Fig. 1). This was a perfect solution for those who felt uneasy about travelling because of Covid-19 fears, or who were tied up with other work commitments.

In a world where we will have to live with the ongoing effect of this (and any

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Fig. 1: Attendance at the conference was, approximately 60% in-person and 40% online. **Fig. 2:** The *Monument to the Discoveries*, one of many impressive sights near the conference centre. **Fig. 3:** Musician Dino d'Santiago had people dancing in the aisles. **Fig. 4:** Colm Flynn with presenters Herman Flesvig, Mikkel Niva, Kamal Hassan and Hav Nabaz, on the *Virtual Sofa*. **Fig. 5:** Inspiring the audience to take fresh ideas back to their radio stations.

future) pandemic and the effects of climate change, we must be grateful that on-line technology can keep a sizeable proportion of the global population in touch with one another.

The conference used the *Swapcard* app, which is an, "end-to-end event and community platform for virtual and hybrid events, powered by artificial intelligence." As well as containing details of the packed and exciting programme of events, *Swapcard* enabled all delegates to network with each other by exchanging contact details, to access streams of each of the four parallel conference sessions, and to interact with the exhibitors and sponsors. For those who were only attending the conference online, there were also additional features, such as the *virtual radio sofa*, with interviews and features from speakers.

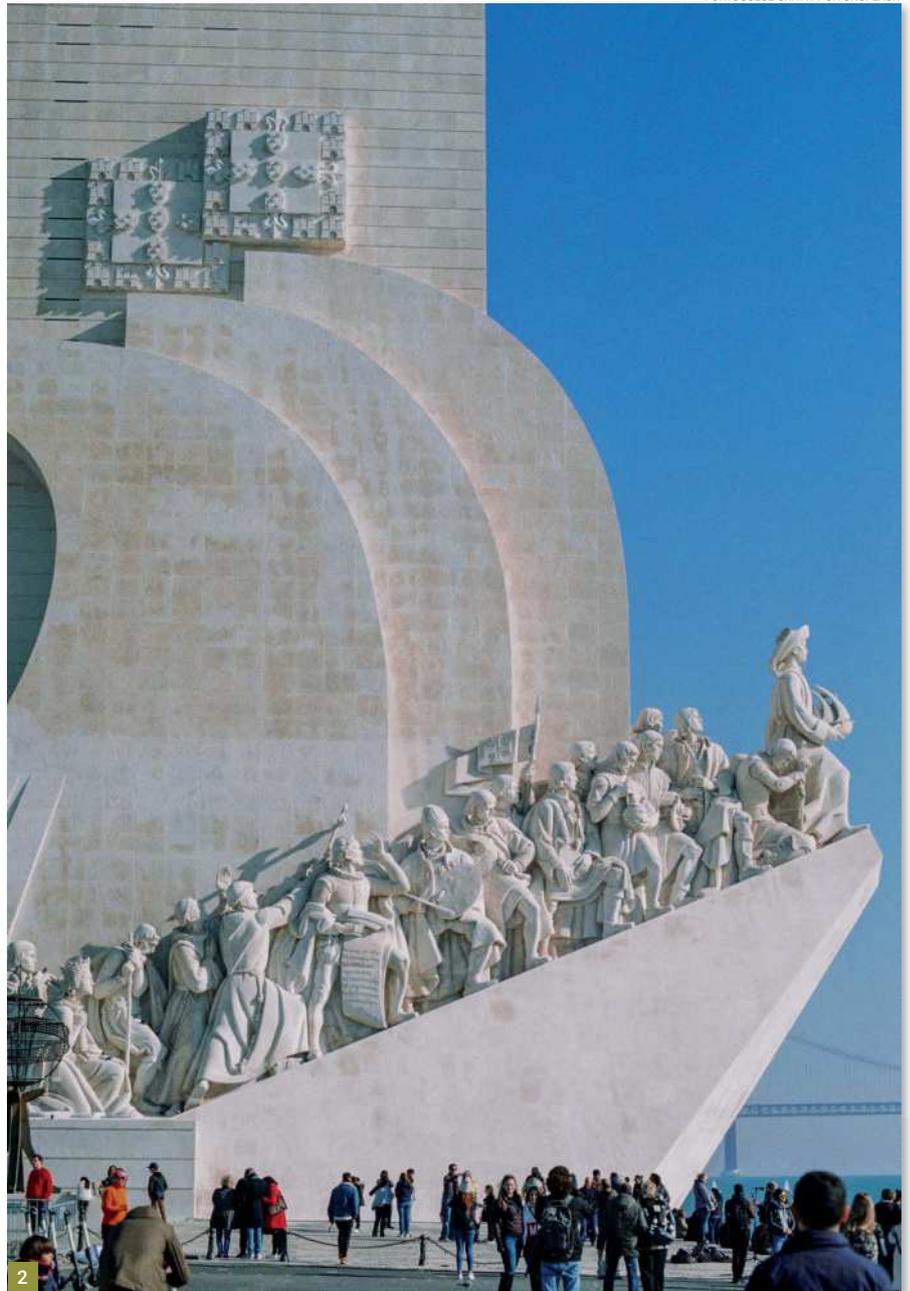
Another attractive feature was that the conference sessions were available to delegates for 30 days after the event. This was useful, as there are presentations that I would like to attend but, although I have a reputation amongst friends and colleagues for travelling around a lot, even I cannot be in four places at once!

It was helpful to be able to watch sessions at my leisure after the conference had finished, which I might otherwise have missed. At previous *Radiodays Europe* conferences, videos of all the sessions had been made available for delegates in a package to purchase. I appreciated the change to this more egalitarian nature of making all sessions available to anyone who took part.

Riverside Venue

As for the two and half days of conference presentations, sessions, socialising and exhibitions, I cannot express how euphoric I felt to be back at a large event.

The venue was perfect, the Lisbon Congress Centre being spacious enough for everybody to maintain a sensible social distance while networking, moving between sessions, talking with exhibitors, and in the lunch breaks.



The catering was, as always at these events, top-notch. Tasty and healthy options and the temptation of a local speciality, the *Pastéis de Nata* (custard tarts), went down very well in the mid-morning coffee breaks.

The venue is in the *Belem* area of Lisbon, by the River Tagus, close to the impressive *25 de Abril Bridge*, constructed back in 1966. Exploring westwards along the riverside takes you to a hove of cultural treasures and café life.

One of several historic monuments in the vicinity is the Monument to the Discoveries (*Padrão dos Descobrimentos*) (Fig. 2). I remember it featuring on an RDP

(*Radiodifusão Portuguesa*) QSL card, a few decades back. Incidentally, *Arild's DX Diary* blog is one of several blogs from DXers who confirm that state broadcaster RDP does still issue QSL cards. These are in the form of a black-and-white photo of an RDP building, a variant on the colour version from its old QSL stock. RDP broadcasts on FM and medium wave 630, 666 and 720kHz with Antena 1 programming.

Portugal Presenters

Reports on the various conference sessions and full details of the speakers can, of course, be found on the conference website. However, as always, I want



CHRISSEY BRAND



CHRISSEY BRAND

to share some of my impressions and highlights of the presentations I attended:

One of the many rewarding aspects of *Radiodays Europe* conferences is the opportunity to immerse yourself in the radio scene and culture of the host city and country. In Lisbon, one session saw representatives of three Portuguese radio stations talk about some successful programmes during Covid-19. Radio station, Antena 3, continued to promote new talent and music and RFM Somnii held a live beach party on the air, and a programme called *Christmas in the Night* became a huge live event.

The conference was opened by a performance of some Fado music, from Dino d'Santiago (Fig. 3). He grew up in Portugal with Cape Verdean roots, and it is that music that inspires him today. It was certainly the first time I have seen a conference commence with hundreds of people dancing at their seats. Check out some of his music online.

Dino sees radio as a channel for changing things for the better, with music being a unifying force. He also carefully monitors the streaming of his music on Spotify and in podcasts. The Spotify for artists tool enables him to see, in real life, both the location and demographic of people who are streaming his music.

Recordings of a music session Dino did for Radio Comercial are on that station's YouTube channel, whilst an interview he gave at *Radiodays Europe* can be watched on Facebook.

www.youtube.com/watch?v=qI3IMc5v4Zs
<https://tinyurl.com/c5vdc7u>

The President of Portugal, Marcelo Nuno Duarte Rebelo de Sousa, also sent a greeting,

during which he emphasised the importance of radio. Meanwhile, Nicolau Santos, President of Portuguese public broadcaster RTP, stated how radio continues to maintain a high level of popularity, with the audience reach in Portugal being at its highest in 20 years.

Quite rightly, there was a strong Portuguese presence throughout the conference, and it was co-hosted by Inês Lopes Gonçalves. She started her career as a reporter and currently has three jobs in the industry, which seems quite challenging when one is a late-night talk show (*5 Para a Meia Noite*, Five Minutes to Midnight) on RTP, and one a morning show on Rádio Renascença. She also hosts a RTP Memória talk show, *Traz Pra Frente* (*Bring Forwards*).

Amusingly, the sofa used on Inês' *5 Para a Meia Noite* programme was used for the virtual sofa sessions at the conference (Fig. 4).

Some Wise Words

Edita Kudláčová is Head of Radio at the European Broadcasting Union. She spoke of the growth in radio listeners ever since the pandemic first struck: this growth being to hear music and for other relaxation purposes, in addition to being able to access the latest information. Edita also spoke of the changing financial models, where paid-for podcasts are now becoming more commonplace. In tandem with this is the increase in the number of podcasts appearing daily, and of innovation in terms of content, production and distribution.

The low number of female musicians being played on radio led to an intriguing piece

of research by Augusta Glahn-Abrahamsen, who is Music Editor and Project Manager, at Danish public radio station DR P3. The dominance of male artists over female ones had led to increased difficulties for females to break into the music industry. Lots of blind spots and biases were spotted and the main reason why fewer female artists were being aired was a structural bias, including the fact that Danish Radio was not playing music by female bands. This led to a misconception in the music industry that female artists were less popular. To correct this, a strategy was implemented to ensure gender parity on the air.

The youth market radio is an area that the radio industry tries hard to engage with, to varying degrees of success. It was encouraging to hear of the popularity of NRK hit podcast *Friminutt* (*Recess*), a mixture of comedy and chat from Norwegians Herman Flesvig and Mikkel Niva. Denmark's DR P3 also has a hit on its hands. *På Bagsædet* (*On the Backseat*) covers real-life issues and is hosted by irreverent presenters Kamal Hassan and Hav Nabaz (Fig. 4).

Floods and Pestilence

Radio In Times of Crisis: the Power of Local Radio was, perhaps, the most enthralling session that I attended. Our editor's German 'home' station, Radio Wuppertal, was a lifesaver for many during the worst floods for 300 years, in July 2021.

Editor-in-Chief, Georg Rose, told the torrid tale of how the station managed to stay on the air for eight hours, broadcasting vital messages and information. [Another Georg, from the editor's birthplace! -Ed.]



CHRISSEY BRAND

The emergency services, a city-wide siren and police drones all urged the local population to listen to Radio Wuppertal to learn of the flood's impact, where to flee to, and what other actions to take.

Although many people were listening to the station online, the stream failed once the water got into the basement of the radio studio. The robustness of FM saved the day, however, and the FM broadcast was streamed further afield by radio presenters, through their phones. After eight hours there, was a complete transmission failure. Other radio stations were already off-air due to the floods but the Radio Wuppertal broadcast proved, once more, that radio can save your life.

Georg Rose gave some key learning points that need to be considered by all radio stations when preparing for similar crises: Local radio stations need electricity back up along the lines of the big public service broadcasters, independent from the public power grid. In Wuppertal, 40% of the population have a migration background and do not fully understand German, yet there are no broadcasts in Arabic or Turkish; can texts, audio files or other forms of communication be made available for people who may not understand the radio output or who are deaf? The cost of transmission and emergency power is expensive and needs public investment. One small battery-powered backup lasts for three hours, which is not long enough in a crisis.

A major public information and marketing campaign is required, to make people realise that radio works even when there is no power or internet. Every household needs a battery-operated radio. In parallel with this, a new warning mechanism is needed. This

would send a warning text message to all phones in a target area and be backed up with a siren warning system in place, notifying the population to listen to on the local radio station, immediately.

As a result of the July floods, Radio Wuppertal's profile increased locally and internationally and was given the prestigious German radio award, *Deutscher Radiopreis*, for this coverage. More importantly, the broadcast helped people, as well as being another reminder of the impact of climate change, and the power of local, on-air, radio.

Alessandro Gilioli is editor-in-chief of the news radio station Radio Popolare in Milan. He spoke of the solidarity, friendship and importance of a community that was engendered by the station's coverage when the area was one of the first to be affected by Covid-19. Listeners were all encouraged to sing the anti-Nazi song, *Bella Ciao*, from their balconies and rooftops and on the radio. This campaign went viral, and I am sure readers saw it on television and social media back in April 2020. The support given by radio in keeping listeners company and often talking about topics other than Covid-19 were much appreciated. Radio Popolare continued to make use of its influence throughout 2020 and 2021 by encouraging vaccination campaigns. The next struggle for the station is to try and address the economic and social disparities caused by the pandemic.

Attending a conference like this always imbues me with a healthy dose of inspiration, and I hope to attend future *Radiodays* events (Fig. 5). The next *Radiodays Europe* conference is in Malmö, Sweden, from 15th to 17th May 2022.

Radio News

COMMUNITY MEDIA ASSOCIATION LAUNCHES SMALL-SCALE DAB SURVEY:

The Community Media Association (CMA) has launched a *Community Radio small-scale DAB Survey* to better understand the challenges and potential barriers for community radio stations to get onto small-scale DAB multiplexes. The CMA says, based on the licence applications submitted to Ofcom, it could cost around £55,000 to establish a trouble-free multiplex using two or more transmitter sites. The survey is to help better understand how the costs of establishing and running a multiplex apply to community radio stations and to assess the technical capacity of the sector. CMA Chair, Dom Chambers, said: "The Community Media Association is delighted with the progress being made with the rollout of small-scale DAB which represents huge opportunities for community radio on the new digital platform. We are looking forward to the announcement of invitations to apply for Round 3 shortly and the results from the CMA's latest survey will help to support DCMS and Ofcom in licensing new multiplexes and broadcast services. The growth of community radio in the UK has been phenomenal over the last decade and has way exceeded the expectations of those early years. At the CMA we are working hard with DCMS and Ofcom to maximise the opportunities for community broadcasting on DAB so that this vital contributor to the UK's fantastic broadcast industry continues with this level of growth, impact, and success." [...]. (SOURCE: CMA | RadioToday | Industry Press)

<https://tinyurl.com/yehbx52r>

<https://tinyurl.com/5n8ac4dx>

DWARF STAR DISCOVERY: Astronomers have discovered the fastest-spinning White Dwarf Star ever observed. The star completes a full rotation once every 25 seconds, researchers said. One rotation of the earth takes a day, while the Sun rotates on its axis once every 27 days. Astronomers established the spin period of the star for the first time, confirming it as an extremely rare example of a magnetic propeller system. This is when the White Dwarf is pulling material from a nearby companion star and flinging it into space at around 3,000 km per second. Scientists report that it is only the second magnetic propeller White Dwarf to have been identified in more than 70 years. This was done using a combination of powerful and sensitive instruments that allowed scientists to catch a glimpse of the speeding star.

(SOURCES: *Monthly Notices of the Royal Astronomical Society: Letters* The 'i' Newspaper, 23rd November 2021: 5)

<https://doi.org/10.1093/mnrasl/slab116>

Keith Rawlings

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Hello and welcome to my first column of 2022. We are going to kick off the New Year with a series covering the technology of aerials on a rudimentary basis. This will be an ongoing topic throughout 2022, and it will also include descriptions of different aerial types ranging from the well-known to some of the more unusual types.

There will be some formulae – which on a technical subject such as this is unavoidable – but I will keep this to a minimum. Transmission lines will also be covered, as well as wave propagation because a basic grasp of this area will be needed to understand how and why particular aerials do what they do, or not do, as the case may be. At the same time, I will still bring you news, reviews and other topics as they arise.

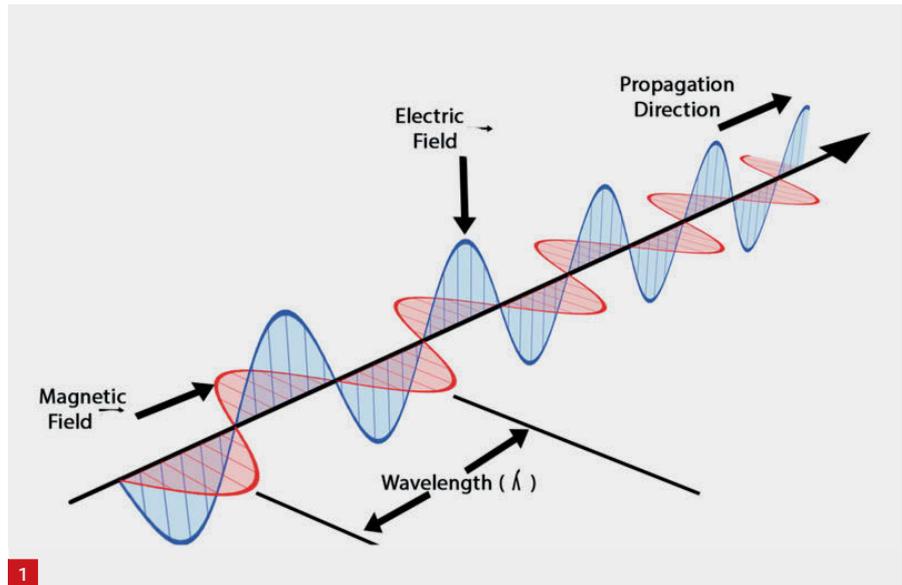
General Introduction

In wireless communication systems, radio frequency (RF) signals are generated by a transmitter and subsequently picked up by a receiver. In between, these signals travel ('propagate') through free space. The transmitted signal will eventually arrive at the receiver.

Exactly *how* the signals end up there depends on several factors, such as the frequencies involved, the location of the transmitters and receivers, any obstacles, the terrain, and the atmosphere. On HF, the sunspot cycle will also have to be considered.

If we then add to this the type of 'service' desired for reception we have another group of factors to consider. There are amateur radio, broadcast band and 'utility' signals, on the HF bands. Moreover, we have citizens band (CB), Satellite signals, scientific use, airband (HF, VHF, UHF) and mobile phone signals, to mention just a few; the list goes on, but most of these signals will have very different basic requirements for communication.

However, all of them have one thing in common. A wireless communication system needs the means to launch and receive signals; in many cases covered by this magazine, this is still through an aerial. After reading the above I am sure you will not be surprised to learn that there are hundreds of different designs of aerial to do the various jobs required efficiently and with stability.



Aerials 101: A New Series for Beginners

Keith Rawlings begins the new year by outlining the content of his new series on basic aerial technology in wireless communications systems and by looking at some key types of aerials and their main properties.

How Electromagnetic Waves Behave

Radio (wireless communication) relies on the radiation of electromagnetic waves to and from an aerial. Radiation from an aerial is considered as a succession of concentric spheres of electric force, which move outwards from the aerial at a constant speed. Imagine dropping a stone in a flat, calm, pond with the ripples in the water representing radio waves.

Electromagnetic waves which propagate in space are what we call *radio signals*. The wave propagates when an electrical current oscillates in the transmitting aerial.

Electromagnetic waves possess both electrical (E) and magnetic (H) fields, so the waves launched into space have alternating E-field and H-field components.

These fields are called *transverse waves*, which means they travel in the same direction and are *orthogonal*; this means that E and H fields are at right angles (at 90°) to each other and are inseparable (Fig. 1).

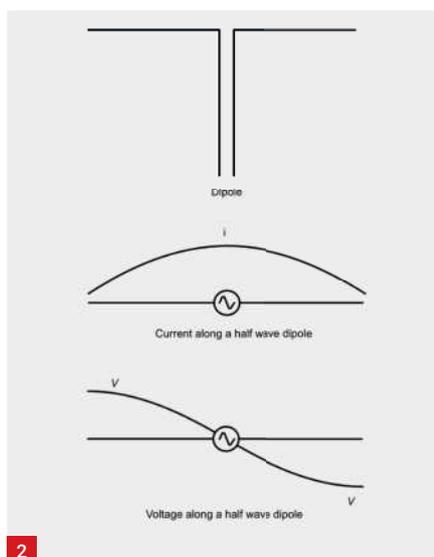
When the EM wave reaches the receive aerial, it sets up a copy of the intercepted

currents, and these currents are then fed to the receiver. This electromagnetic field travels away from the aerial (or arrives at it) at the accepted speed of light at 300×10^6 m/s or 186,000 miles/s (velocity of propagation = the speed of light). Hence, to find the wavelength λ in metres, we can use the generally accepted formula $\lambda = 300/f$ MHz or $\lambda = 300,000/k$ kHz. Therefore, a wavelength of 300m equals a frequency of 1MHz, and the 10 amateur band, for instance, has a wavelength of 10m, corresponding to a frequency of 30MHz. Incidentally, free space has been found to have an impedance of 377Ω.

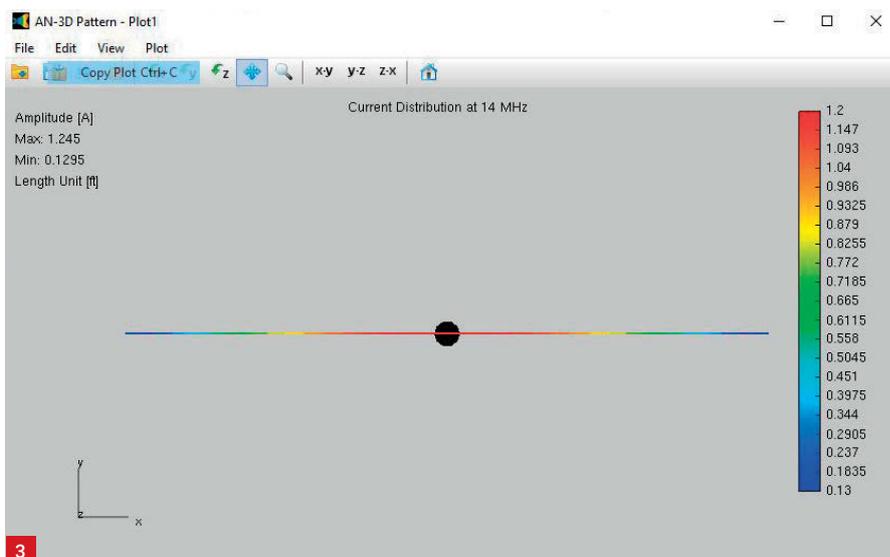
The Inverse Square Law.

As radio waves travel away from the aerial, they become weaker by a relationship called the *Inverse Square Law*. The meaning of this is that the strength of the signal is inversely proportional to the square of the distance the wave has travelled ($1=r^2$). If you double the distance, you get four times less power.

This means that radio signals will get



2



3

Fig. 1: Electromagnetic Waves. Fig. 2: A diagram of $\lambda/2$ dipole elements (top), with current and voltage plots below. Fig. 3: An AN-SOF simulation of currents along a 20m dipole element. Fig. 4a: An AN-SOF simulation of a horizontal 20m dipole in free space. Fig. 4b: An AN-SOF simulation of a vertical dipole in free space. Fig. 5: An AN-SOF simulation of a 20m dipole $\lambda/2$ above ground. Fig. 6: An AN-SOF simulation of the same 20m dipole but at 4λ above ground.

weaker very rapidly as the distance from the transmitter increases.

The Dipole

The best place to start with a series about aerials is with a half-wave ($\lambda/2$) dipole (once known by the term 'Hertz' and also called a 'Doublet'). The reason for this is that a dipole is a basis for many designs: It can be used as an aerial in its own right and in designs that use a combination of dipole elements.

Not only that but it is also used as a *reference* for the comparison of other aerial designs and is one of the easiest designs to construct, put up and get working.

A $\lambda/2$ dipole is formed by making a conductor, which is electrically a half-wave-length long at the desired frequency and placing a feeder in the middle of this conductor. If we take the amateur 14MHz (20m) band as an example this would be some 33 ft long.

The formula for working this length into a near-real-world dimension is $468/f$ were in this case $f=14.150\text{MHz}$. I say 'near-real-world', as there will be other factors that can affect this length. These can be nearby objects, such as trees, buildings, masts and poles, insulators coating on the wire, and so on.

The dipole is a conductor that has free space at the ends. There can be no current flow-off of the ends of this conductor. Consequently, the current has nowhere to go. Therefore, when power is applied to the dipole centre, the current at the end is zero and at a $\lambda/4$ (quarter-wave) back from this place (the centre) current will be at a maximum. Also, with no current flowing off of the end, the voltage will have reached a maximum, with a minimum being found at the centre. The aerial power will thus be the currents, multiplied by the voltages found at the centre. This is simply a consequence of *Ohm's Law*, as found in any other circuit.

Inductance and Capacitance

An aerial is a form of *tuned circuit*, consisting of *inductance* and *capacitance*. As a result, it has a *resonant frequency*. When resonant, this is the frequency where the capacitive and inductive reluctances cancel each other out, presenting a pure resistance.

The image in Fig. 2 depicts a diagram of a dipole and the relationship between current and voltage along the element. Fig. 3 demonstrates this current as a model, on the element of a 14MHz dipole. The black dot represents the feed point and the colour along the dipole stands for the current intensity along the wire. The current is highest in the middle, where it is depicted as *red* and lowest at the ends where it is shown in *blue*.

The *scale of the current* can be read from the colour bar to the right of the diagram, and we can see that red represents a high level and blue a low level. This model simulates a 100W transmitter input signal, and we can see that the predicted maximum

current is 1.2 Amps. It should be around 1.4 amps but is roughly about right as the model has not been optimised, this can be confirmed by the formula:

Where I = current,
 P = Power and R = Resistance.

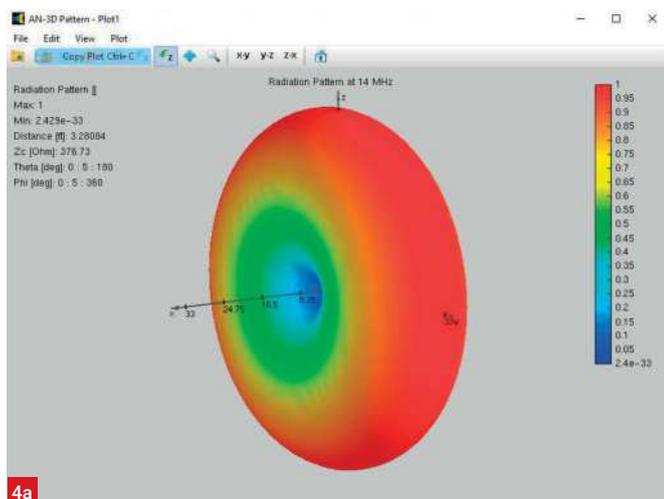
The Meaning of Reciprocity

Now might be a good time to mention *reciprocity*: This term means that the transmit and receive properties of an aerial are identical – they work the same on receiving as they do on transmitting. Both *gain* and *directivity* will be the same for both modes. If you look at the radiation patterns in the figures (see below), the angles depicted demonstrate not only the direction of signals going out but also the direction the aerial favours for signals coming in. Clearly, if you know the pattern for signals going out then you also know the directions for those coming in. There are exceptions to this rule. Active aerials come to mind, as they are not suitable for transmitting. However, in general, aerials can be assumed to be reciprocal devices.

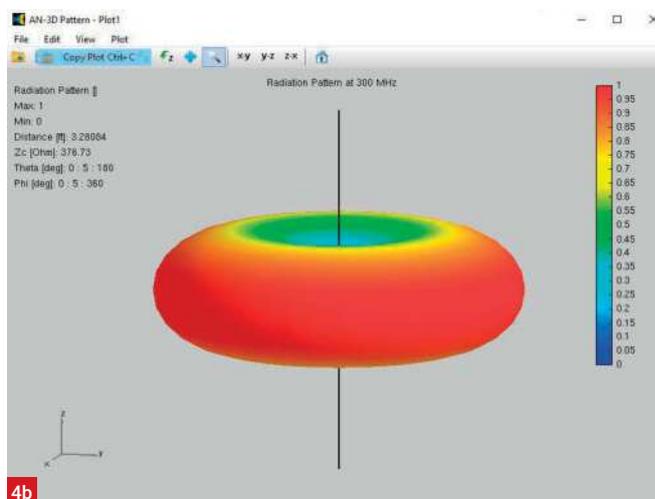
The Significance of Polar Plots

The radiation pattern (described as *polar patterns* or *polar plots*) is a reference to the directional properties of the strength of the radio wave. Propagating from the aerial of a dipole, this is that of a 'doughnut'. This can be seen horizontally-polarised in Fig. 4a, and vertically-polarised in Fig. 4b.

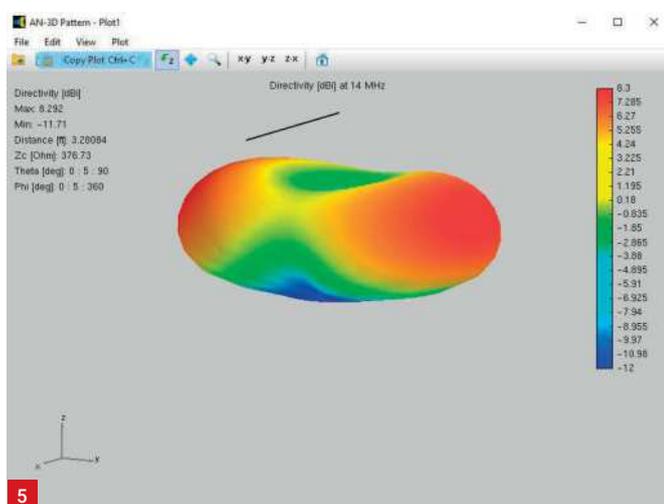
However, this is the 'classical' pattern and is only the case when the aerial is located in 'free space', where there is no ground reflection to affect the pattern. The image in Fig. 5 demonstrates the (more likely) pattern



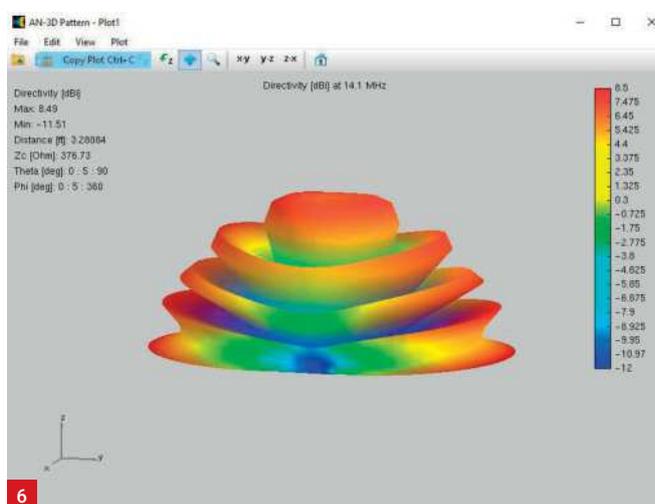
4a



4b



5



6

of a 14MHz horizontal dipole at $\lambda/2$ (33ft) above a realistic ground. It can be seen that ground greatly affects the radiation pattern. This pattern is also affected by what ground type is below the aerial. Built-up areas are generally quite poor, while seawater on the other hand is excellent in this respect.

Aerial height greatly affects radiation patterns. This can be seen in Fig. 6 where the same dipole is mounted at 4λ above a realistic ground.

I will cover the subject of ground reflections more in next month's column.

A dipole is a resonant aerial and effectively a single-frequency aerial, although it will present a match on its third harmonic ($3\lambda/4$). This aspect is commonly exploited on the 7MHz amateur band where a dipole cut for this band will also work on the 21MHz band, albeit with an altered radiation pattern. The dipole nominally has a feed point impedance of 73Ω . In the real world, this will vary with the height of the dipole above ground.

I could not finish this without mentioning

Maxwell's Equations. This is not the place for an in-depth discussion; therefore, as a summary, I will quote Saunders [1]: "The existence of propagating electromagnetic waves can be predicted as a direct consequence of Maxwell's equations [Maxwell 1865]. These equations specify the relationships between the variation of the Vector Electric field \mathbf{E} and the Vector Magnetic field \mathbf{H} in time and space and within a medium. The \mathbf{E} field strength is measured in volts per metre and is generated by either a time-varying magnetic field or by a free charge. The \mathbf{H} field is measured in amperes per meter and is generated by either a time-varying electric field or by a current.

"Maxwell's equations can be summarised as follows:

An electric field is produced by a time-varying magnetic field.

A magnetic field is produced by a time-varying electric field or by a current.

Electric field lines may either start and end on charges or are continuous.

Magnetic field lines are continuous"

New Practical Antenna Models book from ON5AU

Readers may remember that I have covered Marcel ON5AU's books *Advanced Antenna Modelling* and *Practical Antenna Models Volume 1* in previous columns.

These books have been written to explain in more detail the workings and use of the EZNEC and AutoEZ software suites in the context of aerial modelling.

I am pleased to report that there is a new volume out: *Practical Antennas Volume 2*.

Volume 1 mainly covered modelling the dipole and its derivatives, whereas *Volume 2* now concentrates on the variations of vertical designs, including a section on the ever-popular J-Pole type.

I have not yet had the time to thoroughly read through my volume. However, it has the same layout as the previous books in this series, and it looks to be very informative.

I will report back in a future column; in the meantime, here is a link to Marcel's website: <http://www.on5au.be/index.html>

By David Harris

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On 29 September 2021, BBC Radio 3 commemorated 75 years of broadcasting. Strictly speaking, September 1946 was when the BBC *Third Programme* first came on the air. In September 1967, there was a major reorganisation of BBC Radio to accommodate the launch of pop music station Radio 1. The '*Third Programme*' was then rebranded as '*Radio 3*', as of 30th September 1967.

Looking back, it seems to have been a brave move to launch a new radio station in 1946. The Second World War had only ended a year previously, the economy had been devastated, rationing was still in place, and many cities were covered in bomb sites – an age of austerity.

Classical music has been a major component of BBC radio programming since the launch of BBC radio in 1923. BBC radio broadcasts began in November 1922, with the first orchestral concert programme transmitted on 23rd December 1922 (see the *TV and Radio* column, elsewhere in this issue).

Thanks to a wonderful online resource, we can now view every copy of the *Radio Times* from Issue One (of 28th September 1923) onwards.

<https://genome.ch.bbc.co.uk>

Programming and Radios

Throughout the 1920s and 1930s, much of the programming content consisted of classical concerts and records. The creation of the *Third Programme* in 1946 can be seen as a logical reorganisation of services, which put most of the spoken word programmes onto the '*Home Service*' (now 'Radio 4') and gave light entertainment to the '*Light Programme*' (now 'Radio 2'). The '*National Programme*' and the '*North Regional Service*' were both replaced by the '*Home Service*' on 1st September 1939.

From 1946 until 1964, the *Third Programme* broadcast, in the main, between 1800 and around 2350. There were some daytime programmes aimed at schools and some sports coverage on Saturdays.

Along with classical concerts, there were plays and talks on poetry, natural history, politics and other worthy subjects. One of the aims of the *Third Programme* was to be able to "*devote time to the full and frequent performance of great works*



Celebrating 75 Years of BBC Radio 3

David Harris draws on the Radio Times Archive, his previous publications in BDXC Communication and other resources to paint a vivid picture of BBC Radio 3 following the station's 75th Anniversary in 2021.

in their entirety" (Sir William Haley, the then Director-General of the BBC, in 1946).

Radios in the 1940s and 1950s were frequently substantial pieces of furniture, housed in wooden cabinets with a large

loudspeaker and a valve amplifier. The sound quality on AM must have been good but the reception of this new station was difficult in some parts of the UK during the hours of darkness.

For the latest news and product reviews, visit www.radioenthusiast.co.uk

Fig. 1: BBC Radio 3 Ident (2021).

Fig. 2: The Third Programme: Handel's Opera Xerxes in preparation with translator, conductor and opera coach (1948).

Fig. 3: George Barnes: The First Head of the BBC Third Programme (1946).

The *Third Programme* was initially broadcast on 583kHz, which was also used by stations in Tunisia and Latvia. The 1473kHz frequency was also in use by some low-power transmitters. In March 1950, the Third Programme moved to 647kHz with relay stations moving to 1546kHz. As Europe slowly rebuilt itself after the Second World War, new MW stations came on the air; their numbers doubled between 1950 and 1955.

FM Broadcasting

The next big development with the *Third Programme* was the start of FM ('VHF') mono broadcasting on 2 May 1955. The first experiments in FM broadcasting started in January 1947, but only a small number of BBC engineers were able to listen to the transmissions. The BBC started FM transmissions, initially from Wrotham, Kent (to serve London and the South East).

There is an article about VHF broadcasting in the *Radio Times* (page 3 of Issue 1641; April 24 -30 1955) by Douglas Walters. He talks about the interference caused to AM broadcasts by refrigerators, vacuum sweepers, hairdryers and neon signs.

Although electrical interference is much worse today it has always been a problem for the radio listener. The article points out that, to receive VHF broadcasts, one will need a new radio and an external aerial.

The *Third Programme* started FM broadcasting on 91.3MHz. The *Home Service* and *Light Programme* also began FM broadcasts in May 1955. The Wrotham frequencies have remained unchanged since 1955. It is interesting to note that the key selling point of FM was the lack of interference, rather than audio quality.

The *Radio Times* (No. 1642 1 -7 May 1955) featured another piece on VHF with coverage maps for the new service. The article boldly claims that 13 million people in the South-East would be able to receive the new service.

I wonder how many people had VHF radios in 1955? The VHF service was to be slowly rolled out in 10 areas by the end of 1956, including the Midlands, East Anglia, and South Wales.



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The aim was to have some 83% of the population covered by the end of 1956.

Interestingly, the article also reassures listeners that it will be some time before MW will be switched off. In fact, Radio 3 did not vacate Medium Wave until 1992.

Local Radio

The early days of FM must have been rather like the beginning of DAB broadcasting. Radios were very expensive and many people will not have seen it as worthwhile, as there were no new stations on this new band.

It would not be until 1967 with the launch of BBC local radio that there would be any other stations on VHF in the UK. The real beneficiaries of FM were hi-fi enthusiasts, who could now build or buy a tuner to connect to an amplifier and speakers, which would go along with their record deck.

The mid-1950s also saw the launch of the LP record, which meant that one could now hear longer pieces of music (up to 20 minutes a side), as opposed to the three-minute duration of a 78 rpm record.

The FM tuner was an essential part of any hi-fi system up until recent years. In our time, music-streaming and the failure of DAB to take off, along with threats of an FM switch-off seems to have left only a few manufacturers still making



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FM/DAB tuners.

The next move for the *Third Programme* was stereo broadcasting, with tests commencing from Wrotham in 1958 and regular broadcasts from 1962. BBC Stereo transmissions in 1962 were still 'experimental', not a full, regular, service. Stereo was very slow to roll out, and it was not until 1973 that Radio 1, 2 and 4 became stereo broadcasters. BBC local radio had to wait until the 1980s. From December 1964, the *Third Programme* became a full-time station, broadcasting from 0800 until approximately 2330.

Developments from 1967-2021

From 1946 to 1967, Radio 3 was known as the *Third Programme* (see above). The rebranding did not initially bring about any major changes, but, in 1969, the BBC report, *Broadcasting in the Seventies* laid down the content and target audience for each radio channel. This resulted in much of Radio 3's spoken word programmes migrating to Radio 4. Previously, Radio 3 could be seen as a 'cultural' radio station. As it moved into the 1970s it became more of a 'classical music' station.

One constant of Radio 3 is the way it has retained certain mainstay programmes. The most notable is *Choral Evensong*, which was first broadcast by the BBC in 1926. It moved over to Radio 3 in 1970. I believe that this weekly performance is broadcast on DAB at an enhanced bit rate. *Composer of the Week* began on BBC Home Service in 1943 and is part of the Radio 3 schedule from Monday to Friday. *Jazz Record Requests* has been on Radio 3 since 1964 when jazz trumpeter and raconteur Humphrey Lyttleton presented the show.

Radio 3 is also seen as the 'home' of the *Proms*, an eight-week season of classical concerts performed every year from July to September at the Royal Albert Hall, London. The *Proms* were first broadcast by the BBC in 1927. This was from the Queen's Hall on 13th August 1927, which was demolished by bombs during the Second World War (1939-1945). The *Proms* then transferred to the Royal Albert Hall.

If one looks back over copies of the *Radio Times* from any year from the 1970s onwards, then much of the content of Radio 3 has not really changed that much. The bulk of the music is drawn from the established canon of classical music with some emphasis on more contemporary composers. Although it was possible to listen to classical music from other European stations, Radio 3 had no competition until the launch of the commercial station *Classic FM* in

The station can be seen as a 'flagship' institution for Britain; a statement of its cultural values and a confirmation of the importance that is attached to the Arts

September 1992.

Classic FM was an immediate success and continues to be popular. RAJAR figures for March 2020 show *Classic FM* with a 10% reach, as opposed to only 4% for Radio 3.

Presenters and Listeners

In an effort to popularise Radio 3, Paul Gambaccini (b. 1949) presented a programme called *The Morning Collection* from 1995 to 1996. Paul began as a Radio 1 presenter in 1974 and moved to *Classic FM* in 1992. His tenure at Radio 3 led to accusations of the station 'dumbing-down', and he returned to *Classic FM* after just a year. The issue of relatively low listening figures has been a factor for Radio 3 for its whole existence.

The station can be seen as a 'flagship' institution for Britain; a statement of its cultural values and a confirmation of the importance that is attached to the Arts. I think this was the rationale for starting Radio 3/ the *Third Programme* in 1946: Britain defeated the totalitarian Axis powers in World War Two and wanted its broadcasts to act as an example of cultural freedom to other democracies.

Many other European countries also have cultural/classical music stations. For example, France has *France Musique*; Ireland transmits *Lyric FM* and Belgium broadcasts *Klara* and *Musiq 3*. Spain offers *RNE 2* and the Dutch enjoy the wonderful station *NPO 4*.

Present and Future

The future of the BBC is currently under consideration, as its Charter comes up for renewal in 2027. *Classic FM* is a commercial success, but it is difficult to see how Radio 3 could attract much advertising or sponsorship. Some might say that the BBC should focus on what people want to watch and listen to rather than subsidise what is sometimes seen as an 'elitist' radio station.

The launch of *Scala Radio* in 2019 does not appear to have dented Radio 3's listening figures. This Bauer-owned, commercial, DAB station only managed a 1% reach in the March 2020 RAJAR figures. Both *Classic FM* and Radio 3 have very many loyal listeners.

My own criticism of Radio 3 is that its focus is almost exclusively on classical music. As a jazz fan, I do think that a couple of hours a day of programming could be given over to jazz. This genre encompasses a huge range of styles and

Further Reading

- Carpenter Humphrey (1966) *The Envy of the World: Fifty Years of the Third Programme and Radio Three*
- Higgins, C. (2015) *This New Noise: The Extraordinary Birth and Troubled Life of the BBC* (Guardian Faber Publishing)
- Mills, T. (2020) *The BBC: Myth of a Public Service* (Verso)
- Radio 3 Timeline: <https://tinyurl.com/2p8rzm36>
- *Radio Times* (1923 – onwards) <https://genome.ch.bbc.co.uk>
- Hendy, D. (forthcoming, 27th January 2022) *The BBC: A People's History* (Profile Books)
- Potter, S. (forthcoming, 14th April 2022) *This is the BBC: Entertaining the Nation, Speaking for Britain, 1922-2022* (Oxford: OUP).

has been around for over 100 years.

The amount of jazz played by Radio 3 has, sadly, diminished over the years, with *Jazz Record Requests* the only programme to have lasted.

In France, national station *France Musique* manages to play quite a bit of jazz, as well as classical music. On the south coast of England, I hear this station frequently, particularly during the summer months on 95.6MHz from Caen in Normandy.

www.francemusique.fr

What is more, there are some Radio 3 programmes, such as *Night Tracks*, *Late Junction* and *Music Planet*, which could be seen as 'eclectic' or 'avant-garde'. These programmes may be aimed at younger listeners as that does seem to be a BBC priority. Radio 3 has also dabbled in world music with Andy Kershaw presenting a specialist programme from 2001-2007. He still occasionally presents for Radio 3.

Radio 3 does play quite a bit of 'new' Classical music and features live performances.

I very much hope that, in 2046, we will be celebrating the 100th Anniversary of BBC Radio 3.

[David Harris has drawn on several other pieces, which he wrote for *Communication*, the newsletter of the **British DX Club (BDXC)**; for example, *Classical Music Radio* (August 2019), and *FM and DAB Tuners* (February 2020).

<http://bdxc.org.uk>

Many thanks to **Keith Hamer** and **Garry Smith**, for providing additional information and supplying images – Ed.]

Kevin Ryan
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There was not too much of note in this year's WorldDAB summit. The group's objectives over the coming three years appear roughly the same as before. They are, primarily, to ensure that any developments for car radios keep DAB broadcasts as the primary source of audio, and not IP (i.e. the internet).

The other objectives are marketing, retaining the countries currently using DAB, and gaining new markets.

The 'receivers' section of the summit covered marketing initiatives in Germany, the Netherlands, Belgium and the UK. This dedicated digital radio store in Germany has some interesting models: <https://www.dabplus.store>

A presentation on the green credentials of DAB+ boldly claimed that a DAB+ radio, at 50% volume, uses 40% less energy than an FM radio. Overall, DAB+ broadcasting is claimed to use 90% less power than FM with the same coverage.

UK Update

There was a short report on the UK's *Digital Radio and Audio Review*. I am taking a first look at this very substantial report later in this column, with more detail next month. The headline news was that a switchover to all-digital is seen as too risky now and will only happen when it benefits the listeners. There is a worry that FM listeners might abandon radio completely if it was badly managed. A review is planned for 2026.

The presenters also believe that a development plan is required to move forward but did not provide many details about this. Ford Ennals of *digitalradio.co.uk* (Fig. 1) delivered a presentation on training retail staff to better explain the various features of digital radio that are harder to understand than smart speakers. The marketing plan is entitled *Radio's Digital Revolution*. John Lewis is probably the UK's biggest electrical retailer in this context, but the website below took some finding.

<https://tinyurl.com/4fe5xpwa>

DAB Radio Sales

The sale of all types of new radios is declining sharply, including those of

Digital listening surges to

65.8%

of all radio listening

RAJAR Q3 2021

digitalradioUK

1

The Future of DAB and a Radio that Knows Your Emotions

Kevin Ryan reports on the 2021 WorldDAB Summit, evaluates the latest Digital Radio and Audio Review, has news on a software update for PURE digital radios and looks at a face-scanning 'emotional radio'.

DAB radios; the latter were down by some 18% (another presentation stated 11%) in 2020. Although the sales volume of SmartRadios is quite small, this type of radio may turn out to be the one that grows in importance over the coming decade.

Many younger people are interested in 'smart' radios, but devices must have Bluetooth (not a problem because many radios now include it) and, ideally, voice control. It would be a new development if the radio were to have the functions of a smart speaker included within it. The *Frontier Smart* radio portal used by so many internet radios works with *Alexa*, but you cannot control the radio through it and get *Alexa* to switch audio sources. For further details, you can check the support information on this website.

<https://www.frontier-nuvola.net>

The trends in digital radio across Europe outlined in a report prepared by *GfK Marketing* offered some information on new devices called 'smart displays'. These consist of a smart speaker with

a touch screen attached. The one news story I had not heard about concerned a 'smart' digital radio with artificial intelligence (AI). I am not sure whether this was just a catch-all for smart speakers, or whether it related to a new type of radio that chooses what it 'thinks' you want to listen to. In this latter context, a company called Uniform Communications makes a radio which links to *Spotify*.

It can scan faces to determine the person's mood, and then chooses appropriate music.

<https://tinyurl.com/2p8y8h3x>

<https://tinyurl.com/uwn6j7kh>

Last but not least, an interesting graph presented by GfK estimated that 1,390 digital radio models have Bluetooth, 276 interact with a smart app and 17 have AI.

Thoughts from Switzerland

Switzerland's Ofcom presenter described FM as a "phase-out technology"; it is expensive and prevents innovation because there is no available spectrum. Swiss FM networks will be shut down by

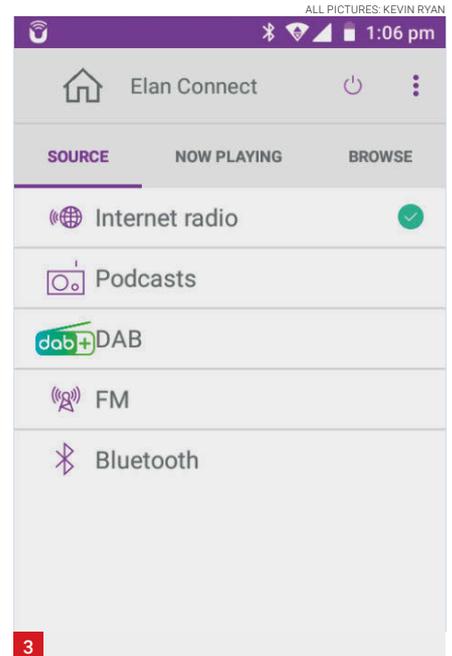
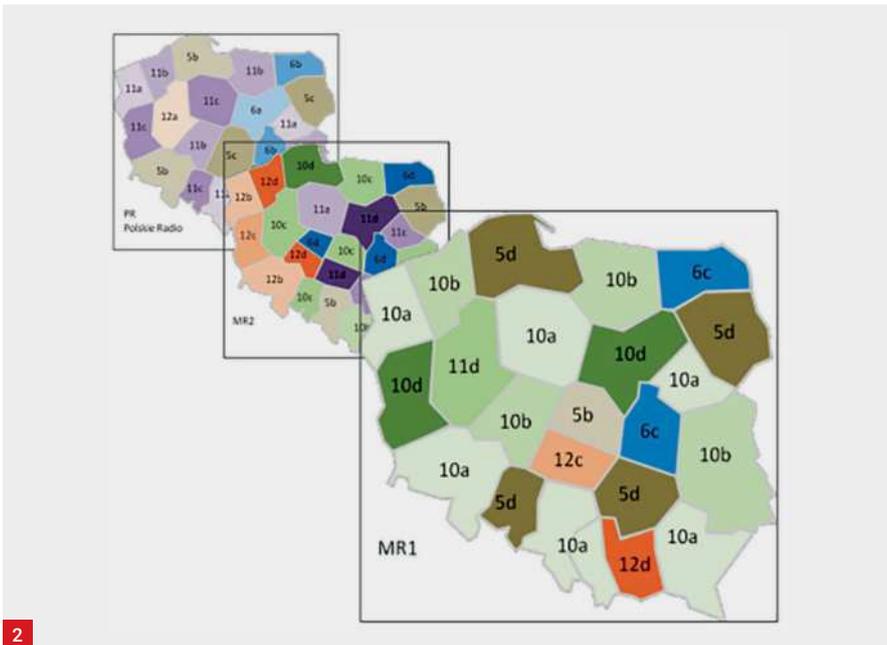


Fig. 1: Digital listening in the UK has surged to nearly 66% according to the latest RAJAR figures.
Fig. 2: There are more listening choices for Poland, and plans for five national multiplexes.
Fig. 3: The first update for the *Pure Elan Connect+* radio is giving more prominence to Podcasts.
Fig. 4: The *Pure Elan Connect+* offers a simple web interface with some technical information and access to the radio's presets.
Fig. 5: A long-time user of DRM in Germany has made a welcome return to short wave.
Fig. 6: Hidden in the DRM transmission for TDF France, is a data file with an animated weather forecast for the *MiniTransat* race.



the end of 2024. The earlier shutdown in August 2022 was abandoned because too many cars did not have a DAB+ tuner. <https://dabplus.ch/aktuelles>

DAB in Poland

A major expansion of DAB coverage is planned for Poland and two new multiplexes are at the planning stage. (Fig. 2). They should be ready by summer 2022. This will take coverage by population to 80%, up from 56% in 2019. Figures on coverage by area were not available, but from the maps shows, it looked to be around 55%.

The Digital Radio and Audio Review

The UK Government has now published the above report. It is full of data but pushes the digital switchover date into the future as expected. I learnt that there are 574 stations available on DAB across the UK and

333 analogue (FM-AM-MW) stations. There are also over 300 (analogue) community radio stations, which collectively reach over 1 million listeners every week.

Smart speakers, which emerged only five years ago, are owned or accessed by a third of all adults, and account for 6% of all audio consumption. A total of 64% of audio consumed on a smart speaker consists of live radio.

Listening Habits and Smart Devices

The review considered how listening might change in the future, by starting with how we listen to radio *now* and adjusting that for demographic changes. The study estimated that live radio listening would decline from its current share of 72% of all audio listening to around 66% by 2035. However, this calculation assumes that the radio scene stays the same, and it does not take account of likely changes in

listening habits as new digital platforms (for instance, a radio service designed for 5G) and the number of services grow.

The review team assessed scenarios ranging from one where the different age groups continue to use their preferred device to listen to the radio, through to a major change, in which the take-up of smart online devices shoots up rapidly both in the home and in-car, and consumers switch to online services at a much faster pace.

The broadcasters' main worry about smart speakers is, of course, that their channels will get lost in a 'sea' of other broadcasters, and that listeners lose their 'connection' to them.

I found out that Tesla cars do not have a radio tuner. That is not surprising but how many others will follow suit? The car market is seen as being vital to the continuing growth of DAB, and WorldDAB will do everything it can to stop the likes of Google and Amazon from 'taking over'.

The Digital Radio Journey

The review goes right back to the beginning of digital radio calling it a 'digital journey'. It has now lasted for more than 25 years, with the mid-1990s launch of DAB digital radio and the growth of internet radio and online audio. Progress to develop digital radio in the early 2000s was initially slow, despite the BBC launching digital radio services in 2002. The original plans to develop a second national commercial DAB network came to nothing, but we now have the SDL National multiplex. The cost of receivers, and the fact that the UK was one of the early adopters, at first rendered vehicle manufacturers cautious about installing digital radios.

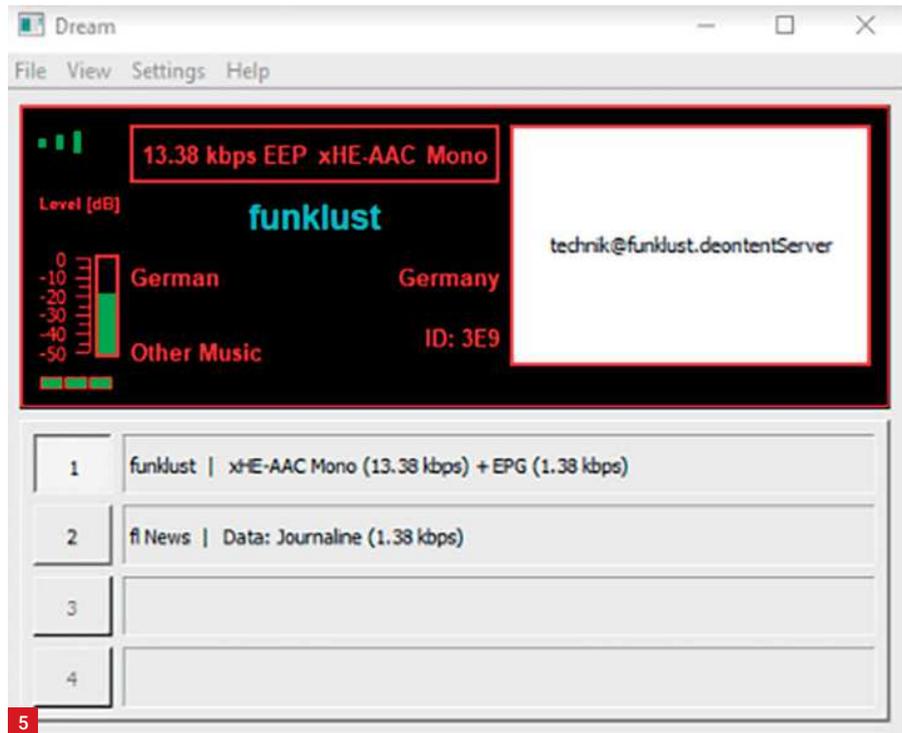
A Digital Radio Action Plan

The government's 2010 *Digital Radio Action Plan* aimed to encourage the industry to work together and to expand DAB coverage. Money from the government, alongside investments by both the BBC and commercial radio, led to a major expansion of DAB network coverage over the next decade. Since then, the UK has seen the launch of the SDL national multiplex, the extension of the Digital One to Northern Ireland and the launch of more local multiplexes. More recently, we witnessed the success of small-scale DAB. Moreover, all new passenger cars now have DAB and DAB+ installed as standard; this was practically non-existent in 2010.

In 2018, digital listening passed the '50%-of-all-radio-listening' threshold envisaged by the *Digital Radio Action Plan*. A decision was consequently made to set up a broad-based digital radio and audio review to help decide a future for digital and analogue broadcasting, in the light of the wider changes in listener habits. Interestingly the *Terms of Reference* did not include a future switchover-timetable. Instead, the review looked at how and when listeners would be moving from analogue to digital.

The Future of Radio

The UK is very well served by a wide range of radio and audio services with a growing choice of national, local and community services. The future health of radio depends on the BBC and commercial broadcasters being able to attract and retain audiences. However, audiences want more diversity in content, especially from new local independent services and a wide range of community radio stations.



This could make it difficult for the big broadcasters to expand their audiences. Although forecasts produced for this review suggest that radio will decline as a share of total audio consumed by 2035, it is clear that radio will still be a vital medium accounting for over half of all audio consumption well into the mid-2030s; FM will continue to be part of the mix until then.

One of the review's principal conclusions is that live radio (DAB+) will still account for over 50% of UK audio listening in the mid-2030s, with only around 10% from analogue that is expected to be just FM by then. IP or internet will be just under 40% and digital TV a low 3%. The review does not see any future for AM radio, which now accounts for just 3% of all radio listening.

The UK radio industry should begin preparing the ground for a switch-off of AM services at some point in the next few years, but it has not set an actual date as yet. It appears that the BBC, Bauer and Wireless will now need to create a plan.

To ensure that radio remains available to all audiences across FM, DAB and IP and is available as a free-to-air medium, the report suggests that government and Ofcom need to do certain things: FM spectrum will be needed for BBC, commercial and community radio services, at least until 2030. There should be no mandated switchover before that time, and the DAB spectrum will be needed for national (BBC and commercial), local and small-scale services beyond 2030.

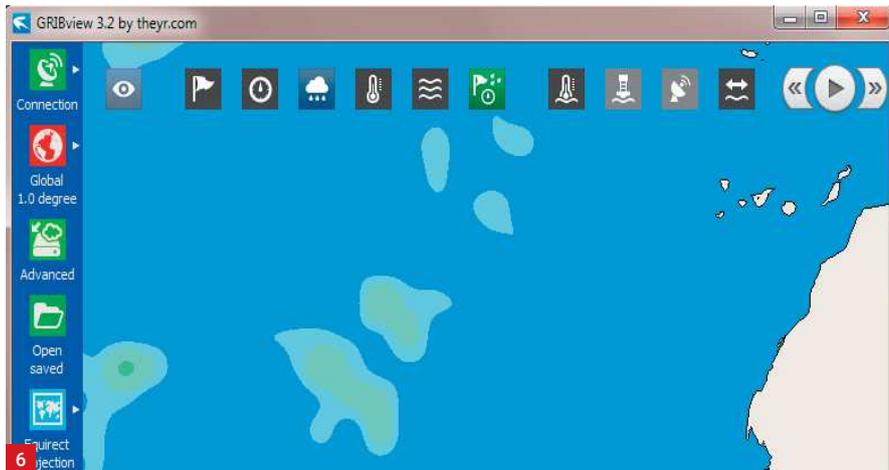
Consequently, the BBC and the commercial broadcasters need to maintain FM services to reasonable standards of resilience until at least the early 2030s.

SmartRadio Update

This is probably a coincidence, but on the 30th of September, Pure has issued a software update for its *Elan Connect+* models. It promised to give access to a plethora of new podcast options. The date coincided with *International Podcast Day* and was to be delivered automatically to devices. I could not wait so I got the radio to update there and then. The e-mail from Pure Support had a link to explain the purpose and features contained in the update but it turned out to be broken. Fortunately, the link to the YouTube video did work.

<https://tinyurl.com/54dcr7rt>

Podcasts now feature as a separate entry (Fig. 3) on the top-level menu as an *audio source*. Podcasts related to a station can still be found under *Internet Radio*. Podcasts now have the same options and categorization as radio stations. I do not have space to go into detail about how this works, but there is a complete review of the Pure Connect+ radio in my February 2021 column (*RadioUser*, February 2021: 57-59). The top-level menu in Podcasts is *Popular*, *Genre* and then a list (presumably) of popular podcasts. *Popular* expands to *UK*, *COVID-19*, *Search*, *Location* and *Discover*.



I wanted to find the latest edition of *The Unexplained* by Howard Hughes (talkRADIO) and found what I wanted by using *Search*. I tried finding the same podcast via the *Internet Radio* option, but at the time the only associated podcast for talkRADIO was the *Mike Graham Show*. Overall, this is a useful update.

Adding Streams and Combined Lists

I acquired a bit of knowledge recently that Frontier Silicon-based radios have a web interface (Fig. 4). You need to know the IP address for your radio, and this should be in the *network settings* on the radio. My *John Lewis Octave* only offers a status screen, but the *Pure Connect+ SmartRadio* lists the presets stored in the radio where you can add your own streams. This feature is also available to users who have an account on the Frontier Silicon portal, and whose radio provides an access code. The *Report* option generates a zip archive of mainly binary files for technical analysis; the files I could view were just meaningless characters.

What is more, some DAB/FM radios will soon have a combined station list, with duplicates removed, instead of separate ones for DAB and FM. Once the listener chooses a station, the radio will decide which transmitter and mode to use for the strongest available signal. I believe that digital radios will become even 'smarter' when the combined list includes internet stations as well.

Noteworthy DRM News

KTWR increased its DRM transmission for the B21 season, now broadcasting in Tamil and English to India from 0957 to 1056 UTC on 15200 kHz. The Saturday broadcast to East Asia runs from 1100 to 1230 UTC on 9910 kHz in English and Japanese. I

logged the broadcast from *Funklust* (Fig. 5) on 15785kHz at 1030 UTC using a remote receiver in Finland that yielded the best signal. The broadcast was in mono using *xHE-AAC* but also carried an Electronic Programme Guide and *Journaline*.

Meanwhile, TDF in France broadcast weather data to the boats taking part in the *MiniTransat Race* from France to the Caribbean. I logged this on the 17800kHz frequency at 1720 UTC via a remote receiver in the Caribbean. The broadcast carried data labelled as an image file (.png), but this was actually weather data stored in a binary file (.grp) (Fig. 6). By renaming the file, I could run a forecast for pressure, rain and temperature using the popular, and fairly widespread, *GRIBview* desktop app.

https://www.theyr.com/leisure_marine.asp

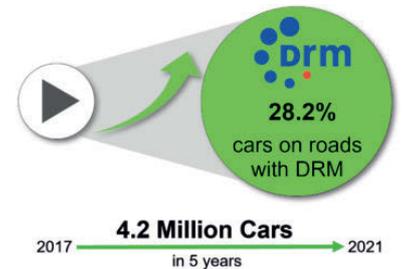
Some Late DAB Information

MuxCo Cumbria has now launched the Morecambe Bay multiplex on the 1st of December, probably using four transmitters. The plan is for nine stereo radio stations, including Heart (DAB), Smooth (DAB), Capital (DAB), BBC Radio Cumbria (DAB), Bay Radio (DAB), Cando FM (DAB+), Bay Trust Radio (DAB+), Fun Kids Junior (DAB+), and Chris Country (DAB+).

Bauer Digital Radio Cumbria, covering North and West Cumbria, will also be launching soon. Using five transmitters, the new multiplex will carry 13 services. This will include some national ones currently on national Sound Digital, and which are not available in the area.

The stations lined up for this are: Greatest Hits Radio, Country Hits Radio, Planet Rock, Scala Radio, Absolute Radio 80s, Absolute Radio 90s, Absolute Classic Rock, Magic Chilled, Magic Soul, Mellow Magic, and Jazz FM.

Radio News



DRM IN INDIA UPDATE: The public broadcaster All India Radio (AIR) embraced radio digitisation after 2010, delivering the largest radio digital roll-out in the world. With just 39 powerful DRM transmitters (mainly medium- and shortwave) installed and operational, AIR can already cover a large part of the subcontinent and provide an estimated 900 million people with digital DRM signals. Offering more traditional programming, AIR is truly the only platform reaching all the corners of India and almost 100 per cent of its population with news, Bollywood music, and more.

The organisation realized that the DRM all-band standard is the only option for bringing the large AIR AM infrastructure into the 21st century. DRM means additional digital radio services with reduced energy costs (40 to 80 per cent for AM and up to 90 per cent for FM). It was recognized that the additional services can generate new revenue streams without compromising the existing content offer. The creation by AIR of a more varied program content offer could maintain the interest of the listeners wooed by the nimbler news-free but music- and gossip-rich private FM stations prevalent in the big- and medium-size metros and cities (no more than about 60 per cent of the total Indian listenership).

(SOURCE: RADIOWORLD)

<https://tinyurl.com/29rmw4de>

DEATH OF RECEIVA: The impact of *Qualcomm* shutting down its *Reciva* internet radio aggregation platform earlier this year continues to reverberate through the internet radio manufacturing industry. The loss of this platform means *Reciva*-enabled internet radios can no longer connect to audio streams on the web – rendering them effectively useless. *Grace Digital's* page for users affected by the *Reciva* shutdown. *Sangean Electronics* is one of the manufacturers left stranded by the *Reciva* shutdown [More at the URLs, below – Ed.].

(SOURCE: RADIOWORLD | SWLing Post)

<https://tinyurl.com/f9f248m7>

<https://tinyurl.com/2j6szspx>

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Regular readers will remember that last year, we featured a series of articles commemorating the 85th Anniversary of BBC Television, culminating in the November issue to coincide with the official start on November 2nd, 1936 (*RadioUser*, September 2021: 37-39; October 2021: 38-40; December 2021: 48-50).

Well, this year marks the BBC's Centenary, and we have set ourselves the task of attempting to cover as many aspects as possible of engineering or programme-making for every year between 1922 and 2022.

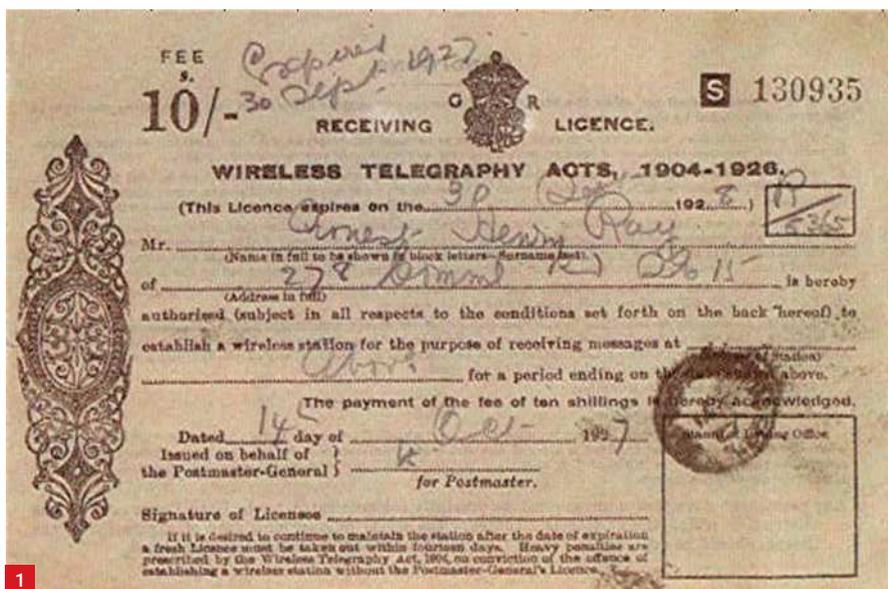
BBC 100 Years: 1922-1929

The BBC was originally a limited company, formed on October 18th, 1922. A 10-shilling broadcast receiving licence (a mere 50p in today's money) was introduced on November 1st (Fig. 1).

Daily broadcasts from the London station, known as 2LO, began on the evening of November 14th, 1922. Before then, broadcasting in Britain was strictly the preserve of industrial concerns in their research departments and a few experimenting amateurs. To provide a regular service for a growing audience of listeners, the Postmaster-General granted a licence to radio manufacturers to form *The British Broadcasting Company, Limited*, of which John Charles Walsham Reith was Managing Director.

Six major companies provided the main investment and guaranteed to finance a service for two years. The six investors were, to give them their full titles, *The Marconi Company, The Western Electric Company, The Radio Communications Company, The Metropolitan Vickers Company, The General Electric Company, and The British Thompson-Houston Company*. A number of smaller investors, radio manufacturers and retailers were also represented. The BBC's income was derived from the proceeds of half the 10-shilling licence fee plus royalties paid on the sale of receivers.

On the following day, after the successful launch of the 2LO station in London, programmes were broadcast regularly from Birmingham (5IT) and Manchester (2ZY). Stations in Newcastle, Cardiff, Glasgow, Aberdeen, and Bournemouth were opened within the following year. Details about the expansion of the MW transmitter net-



The BBC Centenary in 2022: A Prelude

Keith Hamer and Garry Smith begin covering the BBC's 2022 Centenary, showcase classic vintage wireless adverts, unearth lesser-known aspects of the life of John Logie Baird.

work were given in our May 2020 column (*RadioUser*, May 2020: 22-23).

A Tireless Work Ethic

The early 'wireless-pioneers' worked tirelessly for many hours each day, often without any breaks and in conditions of severe discomfort. Nevertheless, within a few months, four hours of programmes were transmitted daily, without fail, to some tens of thousands of listeners. In December 1922, the news bulletins were read in London and broadcast simultaneously, utilizing connecting landlines, from all stations. Orchestras were assembled at each station, as far as studio space permitted.

Several relay stations were opened in 1924. In 1925, the Daventry (5XX) transmitter reached out to more distant parts of Britain, carrying an alternative programme, including weather forecasts and gale warnings. Experimental transmissions of 'still' pictures using the *Fultograph* process were inaugurated from the Daventry transmitter on October 30th, 1928. The transmissions

continued for one year. [see also *Tony Smith: 'The British Broadcasting Company in 1925'* *RadioUser*, December 2021: 24-28 – Ed.].

From Company to Corporation

When the original BBC became the British Broadcasting Corporation, constituted under a *Royal Charter* on January 1st, 1927, the organisation had gained the appreciation of more than two million families. As broadcasting grew in scope and popularity, annual events and favourite personalities emerged. Running commentaries on the *Boat Race* were an early Outside Broadcast engineering triumph, the launch-craft *Magician* being fitted with a short wave transmitter in the stem. *Children's Hour* was broadcast at five o'clock each day and the 'aunts' and 'uncles' took to the airwaves to amaze children of all ages. The first Wireless Orchestra concert was given in June 1923, by Percy Pitt. Winston Churchill's first broadcast was an appeal for *Wireless For The Blind*.

In April 1924, talks were broadcast to schools during the afternoon. Programmes



2



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Fig. 1: The 10-shilling broadcast receiving licence was introduced on November 1st, 1922. Fig. 2: The first BBC transmitter was installed at Marconi House, London; it was the first of a number of 1kW transmitters. Fig. 3: Studio 1 at the Savoy Hill 2LO station in 1923.

for families at home normally began later in the day. One authority of interest who gave a talk to schools in the spring of 1924 was Sir Oliver Lodge (1851-1940; *RadioUser*, March 2021: 30-31; April 2021: 28-31; May 2021: 49-51, and July 2021: 41-43).

New Horizons

In this informal, almost 'casual' way, new horizons were opened, and *School Broadcasting* began. This soon became a part of the national system of education. The first BBC transmitter was installed at Marconi House, London. It was the first of several 1kW transmitters each located near the centre of the town it served (Fig. 2).

However, soon, more spacious accommodation was required. As engineering advances had made it possible to separate transmitters from studios the head office and London studios moved to Savoy Hill in 1923 (Fig. 3).

When Parliament decided that the British Broadcasting Company, Limited, should be dissolved and have a *Royal Charter* for ten years from 1926, the new British Broadcasting Corporation acquired a unique coat of arms and flew their own flag. It directed its activities without too much interference from the government and controlled its own finances. The Charter called on the BBC to develop broadcasting "to the best advantage and in the national interest".

High Standards

A high standard of musical performances was set, both symphonic and operatic. The first *BBC Promenade Concert* was broadcast

from the Queen's Hall in London on August 13th, 1929, with Sir Henry J. Wood conducting his Symphony Orchestra. Tickets for the 'promenade' area cost just 2 shillings (10p.) The more affluent music lovers paid 7 shillings and sixpence (37½p.) to be in the 'Grand Circle'.

Furthermore, plays specially written for broadcasting were encouraged. Many talented people distinguished in the Arts and Sciences were invited to the microphone. Then, on August 20th, 1929, the first BBC transmission of 30-line experimental television using Baird's studio went out.

The next major development in radio came in 1929 with the opening of Brookman's Park, the first of the high-power, twin-wave 'regional' stations. These each contained two separate 50kW transmitters, one for regional output, the other for the National Programme. These transmitters were of much-improved design, housed in glass-fronted cabinets. Increasing interference from European stations and electrical equipment made it necessary to augment the service in some parts of the country. Regional 'twin-wave' broadcasts (as opposed to 'single-wave') began during the following year.

Early Radio Equipment: A 1928 Marconi Receiver

This month's wander through vintage copies of moth-eaten newspapers and magazines has hit upon a great *Marconiphone Receiver* (Fig. 4). This is the full description of the equipment originally featured in a Marconi Company advertisement, dated 1928:

"You get more from Marconiphone. To own

a Marconiphone is to gain an entirely new conception of wireless entertainment - a finer standard of natural reproduction; of range; of simplicity. The untiring research and resources of the immense Marconi organisation are behind every Marconiphone Receiver.

MARCONIPHONE WIRELESS EQUIPMENT Marconi Valves, Marconiphone Receiving Sets, Loud Speakers, Transformers, Power Units and Components, is sold by all Radio Dealers. Write for Marconiphone General Radio Catalogue No. 453z.

The Marconiphone Company Limited, 210-212, Tottenham Court Road London, W.1"

Early Television Pioneers: John Logie Baird - Part 1

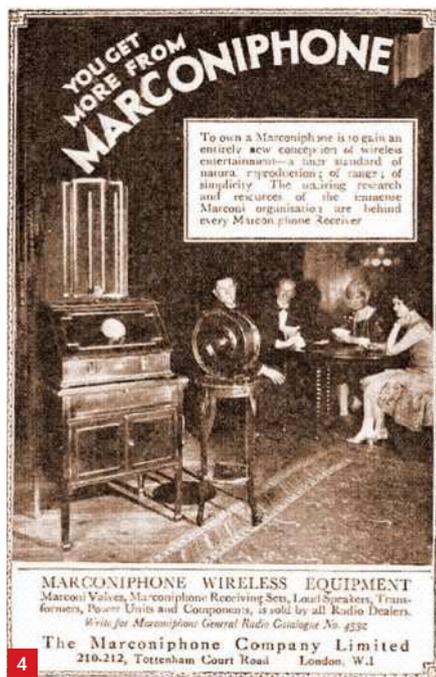
Our ongoing series, detailing the careers of early television pioneers, began with Paul Nipkow in September 2020 (*RadioUser*, September 2020: 57-58; see also: *RadioUser*, November 2020: 25-27; January 2021: 60-61, and March 2021: 30-31).

The main components that Nipkow used for his ubiquitous scanning discs are shown in Fig. 5.

This month, we are turning the spotlight once again onto the inventor, John Logie Baird (see also: *RadioUser*, September 2019: 30-31; July 2020: 27-28; May 2021: 49-51).

A Biographical Sketch

Baird was born on August 13th, 1888, at The Lodge, 121 West Argyle Street in Helensburgh, Dunbartonshire. He was the youngest of four children of Reverend John Baird, the Church of Scotland's minister for the local St Bride's Church in Helensburgh,



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and his wife, Jessie Morrison Inglis (née, Albu). Despite suffering from ill health for most of his life, he still showed early signs of ingenuity. He was educated at Larchfield Academy (now part of Lomond School) in Helensburgh, followed by the Glasgow and West of Scotland Technical College, and finally the University of Glasgow.

His studies on an electrical engineering course at the college soon demonstrated that he had a keen interest in science and technology. He designed a remote-control system for a camera, and a basic telephone exchange network to connect his bedroom to those of his friends across the street.

At the beginning of 1915, he volunteered for service in the British Army but was classified as 'medically-unfit' for active duty (Fig. 6). Unable to go to the Front, he served as the superintendent engineer with the Clyde Valley Electrical Power Company, which was engaged in munitions work. After a brief spell as a salesman and an unsuccessful business venture in Trinidad, Baird eventually returned home to Britain in 1920.

The Red Door, Deadly Discs and Arcades

In 1923, he moved to Hastings to convalesce from a serious bout of ill health. In August 2021, the intrepid authors from Derby visited this famous address where Baird first displayed television images. Walking up the steep steps to the red front door to ask if we could photograph the commemorative blue plaque, installed on the wall by *The Institute Of Physics*, we wondered what the present



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Fig. 4: An example of a Marconiphone receiver manufactured in 1928. Fig. 5: Paul Nipkow's famous disc scanning system. Fig. 6: John Logie Baird in 1917. Fig. 7: The Queen's Arcade in Hastings, where Baird rented a workshop.

owners would look like, and did they have a room set aside to display some of Baird's early equipment? Alas, nobody was at home so we left, still wondering what may have been just the other side of that red door.

Undaunted by his ill health, Baird rented a workshop and established his laboratory in the Queen's Arcade in the town and set about experimenting with the transmission and reception of television signals.

He used a variety of materials: Some of the items included a used tea chest, an old hatbox, several lenses from bicycle lights, a pair of scissors, darning needles, sealing wax, and glue.

Whilst in Hastings, the authors visited the Queen's Arcade (Fig. 7). Furthermore, Baird designed new and improved Nipkow discs and used larger lenses, culminating in a disc over eight feet in diameter with eight-inch lenses – something that could soon turn into a deadly weapon, when in motion.

RTÉ DAB Switched Off

Raidió Teilifís Éireann (RTÉ) have switched off their DAB transmissions. The RTÉ national multiplex, the only one in Éire, carried RTÉ Radio 1, RTÉ 2FM, RTÉ lyric fm, RTÉ Raidió na Gaeltachta, RTÉ Choice, RTÉ Gold, RTÉ 2XM, RTÉ Junior, RTÉ Chill, and RTÉ Pulse. However, its digital radio services, RTÉ Gold, RTÉ 2XM, RTÉ Radio 1 Extra, RTÉ Pulse, and RTÉjr Radio, will remain available on other platforms.

The closures are part of major cuts across the organisation, including 200 jobs being lost and the closure of its stu-



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dio facilities in Limerick, home of RTÉ lyric fm.

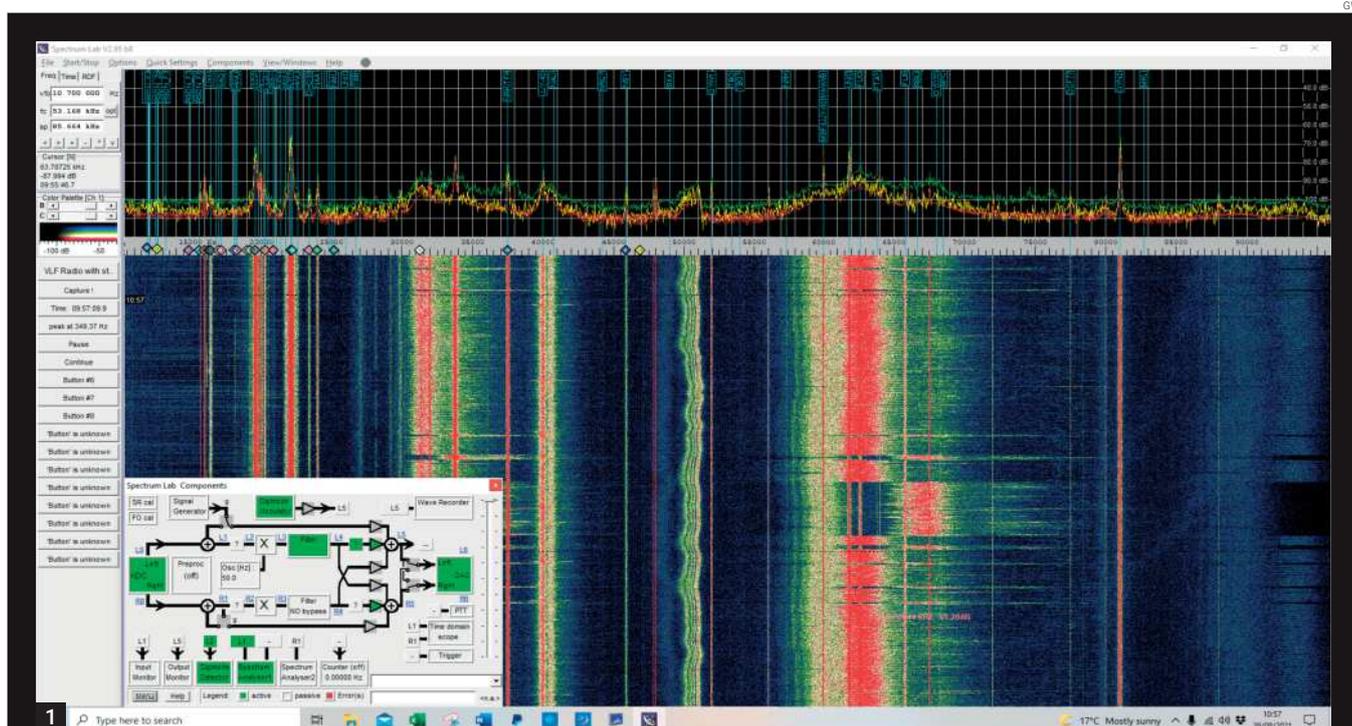
RTÉ explained their decision as follows: "The move to cease DAB transmission was driven by three main factors - the fact that DAB was the least utilised platform in Ireland; that RTÉ is the only Irish broadcaster on the DAB system, and cost avoidance."

DX-TV & FM News

The latest DX news, plus details of changes to broadcast television and radio services, is available online in the *Articles* section of the *Radio Enthusiast* website: www.radioenthusiast.co.uk

Stay Tuned!

Please send archive photographs, information, news or suggestions for future topics via the E-mail addresses shown at the top of this column. Please be advised that we cannot undertake to answer E-mails relating to technical issues or give advice on suitable equipment.



Georg Wiessala
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If you are a regular reader, you will, no doubt, have noticed my interest in the Extremely Low Frequency (ELF, 3-30Hz) and Very Low Frequency (30Hz-30kHz) bands, sometimes referred to as the 'Basement-Bands' of radio (Table 1). Radio signals at these extremities (Fig. 1) are fascinating, not just as physical phenomena in themselves, but primarily because they offer so much information about how our world – and the wider universe – are working.

It may be useful to remind ourselves of the basic separation of signals in these very low regions: First, here is what you may call 'radio-before-radio-was-invented'. These are the *sounds* from the natural environment, space and the Earth's magnetosphere and ionosphere. Many of them have their origins in lightning strikes (*RadioUser*, January 2013: 8).

They sub-divide into geophysical and weather-related noises. But all are natural *sounds*, not man-made *signals* – and they never cease to amaze me.

The Earth's own *Schuman Resonance* in the Earth-Ionosphere Wave Guide is a Standing Wave at a frequency of 7.8Hz (with harmonics on 14.3, 20.8, 27.3, and 33.8 Hz). It is a prime example of these sounds.

Aerials for the ELF and VLF Bands (Part I)

The editor revisits the Very Low Frequency (VLF) part of the spectrum, evaluating the kinds of receivers, aerials and accessories you might find useful if you venture into this fascinating part of the radio hobby.

Both Oliver Lodge (1851-1940) and Nikola Tesla (1856-1943) are known to have studied these emissions and related phenomena; the latter specifically at his laboratories at *Colorado Springs* and *Wardenclyffe*.

<https://tinyurl.com/389zd23h>

In our days, US researcher Stephen P. McGreevy has made a decades-long, much-noticed, study of the *Whistlers*, *Sferics*, *Tweeks*, *Dawn Chorus*, *Hiss*, *Echo-Trains* (ca 1-30kHz) and many other related sounds, recording them meticulously.

Here in Europe, Renato Romero's book on *Radio Nature* and the companion

website, *Radio Waves Below 22kHz*, are, in my view, the top go-to resources if you wish to learn more about this fascinating field (Fig. 2).

<http://www.auroralchorus.com>

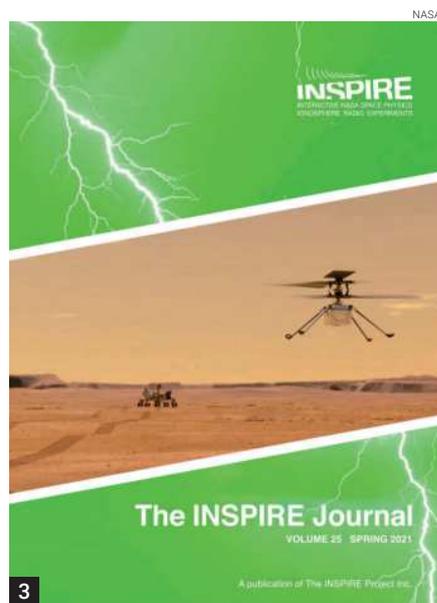
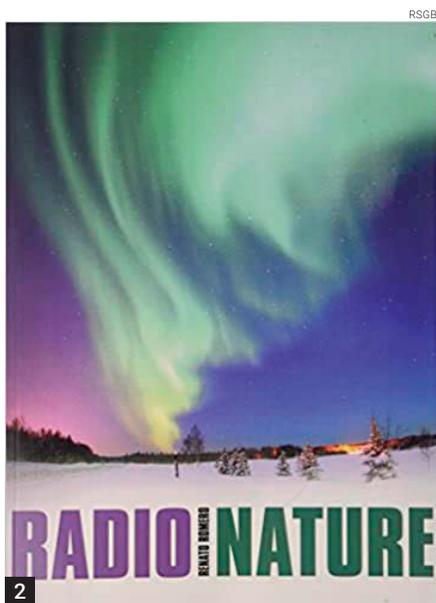
<http://www.vlf.it>

<https://tinyurl.com/3dj92sbt>

The Many Uses of VLF Monitoring

Next to Nature Radio, the VLF band reveals radio transmissions of *human* origin, which you may find between, approximately 15 and 80kHz. There used to be a multitude of signals here, from transmissions to the submarines of the

Fig. 1: Submarines to SFTS stations: signals and noise in the VLF Band in the UK (August 2021).
 Fig. 2: *Nature Radio*, by Renato Romero (RSGB).
 Fig. 3: The 2021 Issue of the *NASA INSPIRE Journal*.
 Fig. 4: The SAQ Grimeton Transmission on Alexanderson Day (4th July 2021).
 Fig. 5: Some of the ELF and VLF receivers I have used in the past – outdoors only!
 Fig. 6: The UKRAA VLF Receiver (<https://ukraa.com>).
 Fig. 7: The former Rugby Aerial Tuning Inductor Coil from GBZ, now at the London Science Museum.
 Fig. 8: The BAZ VLF S1-N (*Spherics*) Power Ferrite Module.
 Fig. 9: The BAZ Power Ferrite Module for MSF60 |HBG 75 | DCF 77.5 (N.B.: 'HGB' is now defunct).
 Fig. 10: The ADDX-AT-2BNC aerial by the late Charly Hardt.
 Fig. 11: At professional level: The *Aaronia MDF* and *MagnoTRACKER* series of ELF/ VLF aeri-als.



world's navies to Frequency Standard and Time Signal (FSTS) transmissions (MSF, DCF77, WWVB, Russian *Beta Chain*, 25kHz).

The latter group includes a range of global *hyperbolic* navigation signals (*Decca*, *LORAN-A*, *LORAN-C*, and so on). Most of these are now of historical interest only (e.g. the former [Russian] *ALPHA* [RSDN-20, ca 11-16kHz] and [US] *OMEGA*, ca. 10-14kHz chains; Klawitter, G. 1991: 28).

<https://www.loran-history.info/default.htm>
<http://www.vlf.it/alphatron/alpha.htm>

The WWVB time signals on 60kHz have also occasionally been monitored to study wider ionospheric changes.

Moreover, some experimental radio amateurs operate here (below 9kHz, 137 and 472kHz), as do scientists and even artists (*The INSPIRE Journal*, Spring 2021: 28; Fig. 3).

The band is also widely used by cave-and mountain rescuers, water-resource explorers, medics and many other users besides – Lots to explore then.

You might just get a piece of software like the audio spectrum analyser *Spectrum Lab* (by W. Büscher DL4 YHF) and explore these signals on their own merits, they are certainly very interesting for the radio hobbyist or citizen-scientist to view, analyse and monitor.

<https://www.qsl.net/dl4yhf>

And indeed, many radio enthusiasts are quite happy to leave it at that and marvel at the colourful and revealing, ever-changing, displays of those signals. This is where signals analysis meets art (Fig. 1).

A Litmus Paper on VLF

However, it gets *really* interesting if you do go a little further and treat VLF signals like *electronic litmus paper*, i.e. as indicators of



wider phenomena, in the areas of geology, geodesy, space-weather, propagation, terrestrial earthquakes, and a wide range of geomagnetic and geophysical phenomena.

One of the most popular applications of VLF monitoring amongst radio enthusiasts includes radio/ solar astronomy, lightning-tracking, aurora-watching, and catching special-events stations. In this latter category *Grimeton SAQ* (on 17.2kHz) is a regular; it once again transmitted messages on *Alexanderson Day 2021* (4th July 2021, Fig. 4).

<https://tinyurl.com/2p9yrs3j>
<https://tinyurl.com/muzycz34>

From what I hear, many hobbyists are interested in investigating how solar flares can translate into Sudden Ionospheric Disturbances (SID) here on Earth. Consequently, some recent publications have contained detailed instructions and

descriptions of a range of VLF projects. Prominent examples of those are the *Stanford Solar Centre SuperSID Monitor*, for the case of VLF, and the *NASA INSPIRE Project* (Fig. 3).

<https://tinyurl.com/5ff4ahap>

There are very significant practical scientific applications to this activity of (indirectly) monitoring the Sun-Earth connection by tracking variations in the reception of VLF signals.

These ups and downs reflect the vagaries of space weather and demonstrate our Star's influence on all terrestrial infrastructure, satellites, communications systems, and so on.

As a result of this, many Governments around the world are now much more aware of this and are developing appropriate pre-emptive strategies. The UK's recent *Space Weather Strategy* is one example of this. The



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USA and Australia, to name but a few others, have issued similar blueprints.

<https://tinyurl.com/5xth7jvv>

Beginning with Suitable VLF Equipment

In terms of what you will need, to receive ELF and/ or VLF waves, much depends on your preferred ways of working. If you are into nature radio, then, of course, you need to be outdoors, away from any electrical interference. You may want to consider home-brewing or acquiring a portable ELF receiver / Solar Flare monitor, such as the following models (e.g. Fig. 5):

- *Elettrofficina ELF-VLF PIC-RX04 (and its successor-models)*
- *Kiwa Earth Monitor (rare now)*
- *NASA INSPIRE VLF-3*
- *North Country ELF (Earth) Receiver*
- *SE1 VLF-ELF-Spherics Receiver (by author and experimenter Wolfgang Friese).*
- *Sistel Explorer E202*
- *Stanford SuperSID Receiver*
- *UKRAA VLF Receiver*
- *WR-3 VLF Receiver (by S. P. McGreevy).*

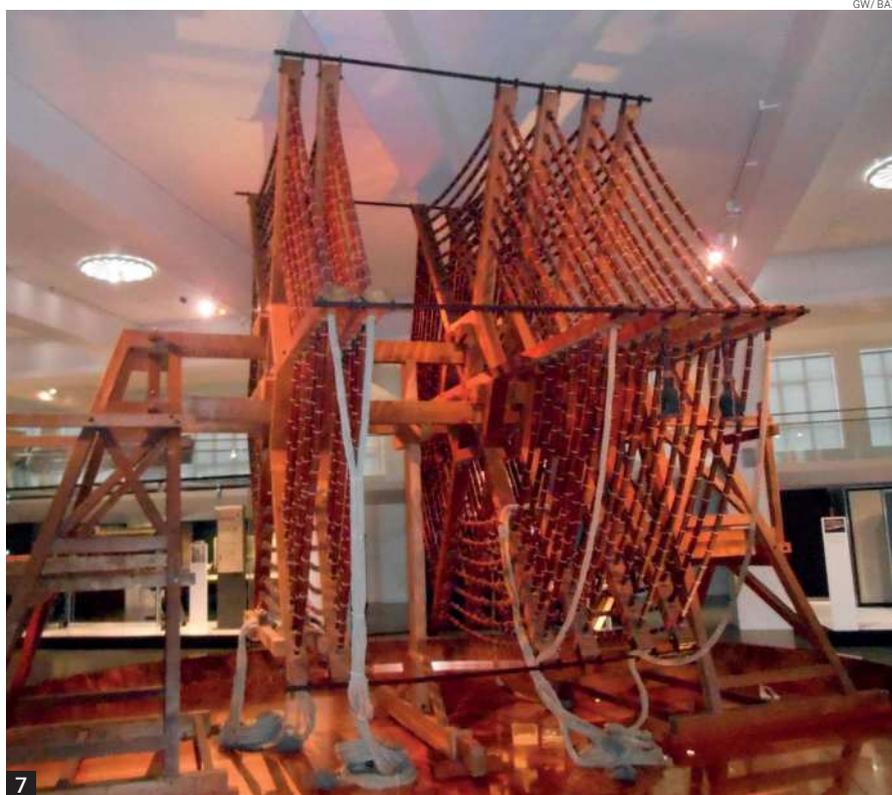
Furthermore, many hobbyists use dedicated hardware VLF receivers or level meters; amongst those, the *Siemens D2008* continues to be a popular specialist model.

However, a suitable general HF receiver will do the job well; the AOR AR7030, for instance, goes down to 0kHz, and many other HF receivers start at 30, 50 or 60Hz.

Most VLF enthusiasts use the popular *Spectrum Lab* software suite by Wolfgang Buescher DL4YHF (Fig. 1).

<https://www.qsl.net/dl4yh/spectra1.html>

Make sure you have a suitable (192kHz-sampling-rate) sound card, such as the popular *E-MU 0204 USB* or the more recent *Behringer U-PHORIA UMC202HD 24 Bit/192kHz USB Audio Interface* (for a



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0-96kHz range of signals).

Connected to the right antenna (see below), these can yield excellent results.

When monitoring solar flares using variations in VLF signals, you could use the *Stanford SuperSID*, the *NASA INSPIRE VLF-3* or, closer to home, the *UKRAA VLF Receiver* by the UK Radio Astronomy Association (Fig. 6).

<https://tinyurl.com/yckkbavf>

For many others, the greater flexibility and customisation of Software-Defined Radio (SDR) offers a good way to explore ELF and VLF signals. I used to start by using the *RF Space SDR-IQ*. These days, receivers such as

the *ELAD*, *SDRplay* and *AirSpy* models offer unmatched features like recording - which you will definitely want to make use of.

In certain areas of interest, for instance, the SAQ transmissions on 17.2kHz (Fig. 4) there are special pieces of software you can use, such as the (slightly older but still available) *SAQ Panoramic VLF Receiver (V. 0.94)* by SM6LKM.

This may require little more than a redundant laptop PC and LW aerial.

(Thanks to RadioUser correspondent Bob Houlston, for additional information - Ed.)

<https://tinyurl.com/2p9a8fe8>
<http://g4pvb.eu5.net/saq.htm>



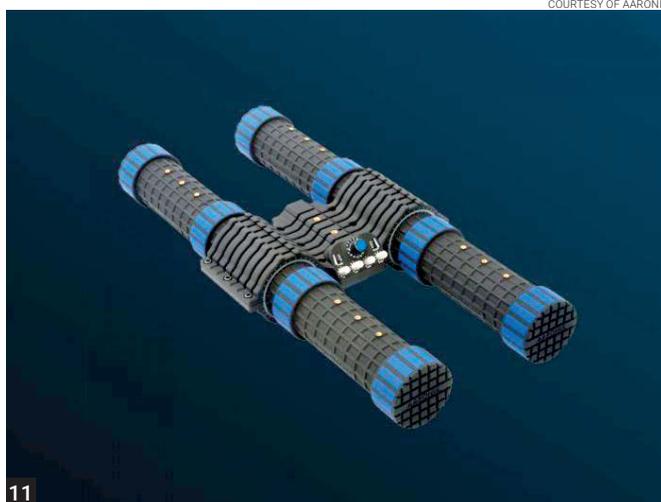
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The Propagation of VLF Waves

When choosing your aerial, remember that VLF propagation is contingent on frequency, diurnal, annual and solar patterns, transmitter power and an aerial's efficiency, amongst other things. VLF *ground wave* signals travel close to the Earth, following its curvature. They may be slowed down by the ground's dielectric constant, and they are reaching significantly further over water, for instance (e.g.: Friese, 2007: 11-13).

Ground wave predominates, and is very stable by day, whilst, after dark, LF signals travel strongly by both ground and skywave. *Skywave* VLF travels, worldwide, in the Earth-ionosphere Waveguide (80-800km).

This sub-ionospheric propagation undergoes refraction, reflection or attenuation. Signals typically have skip distances between 1,000 and 2,000km.

When both kinds of waves arrive at the receiver at the same time, you will experience both constructive and destructive interference and fading, as happens in other frequency bands.

The important thing to remember here is that VLF signals display predominantly *vertical* polarisation.

Furthermore, by contrast to, say, short wave radio signals, VLF propagation can be *augmented* by enhanced atmospheric ionisation, such as during solar storms or meteor scatter.

However, astronomical events, such as solar eclipses, have been shown to have a dampening effect on signals levels <https://tinyurl.com/2p8e275w>

Therefore, a VLF receiver setup can be made to work as a monitor of Sudden Ionospheric Disturbances (SID) or similar phenomena precisely *because* VLF signals get *stronger* as a result of solar flares.

They can circle the globe and penetrate water, to some degree (and vertically). But the key information content of any man-made radiated VLF signal here will be sparse, bandwidth is less than 200Hz, transmitter aerials are very large and radiation efficiency is low (For details and the maths, cf. Evren Ekmekçi, 2004).

For nature radio, your aerial must be able to receive the omnidirectional atmospheric impulse radiation at around 10kHz from lightning strikes, auroras, sprites, jets and elves – which is why a simple telescopic antenna is often more than sufficient here (see below).

You can find many useful resources on the prediction of VLF propagation conditions, both online and in print format.

Most of those predictions are based on a phenomenon called the Equatorial Ring Current and on related geomagnetic activity, especially the measurement of the disturbance storm time index (DST Index). <https://tinyurl.com/5xyx2ew7>
<http://wdc.kugi.kyoto-u.ac.jp/dstdir>
<https://tinyurl.com/4psu44u7>

Some Suitable Aerials for VLF

If you want to take a look at a truly huge VLF aerial (actually an aerial tuning inductor coil), you can visit the Science Museum in London. Find the (permanent) *Information Age* exhibit, to come face-

0-3kHz	Extremely Low Frequency (ELF)
3-30kHz	Very Low Frequency (VLF)
30-300kHz	Low Frequency (LF)
300-3000kHz	Medium Frequency (MF)

Note: 'LF' includes the long wave (LW) broadcast band, and 'MF' includes the medium wave broadcast band.

Table 1: Frequency Bands from ELF to MF (see also: *RadioUser*, July 2018: 49).

7.8kHz	Schumann Resonance
17.2kHz	SAQ Grimeton (Special Occasions Only)
60kHz	MSF Standard Frequency and Time Signal Station NPL, UK
77.5kHz 137kHz (Europe)	DCF77, PTA Germany
147.3	German Weather Service (DWD) DDH47
198kHz 472kHz (Europe)	BBC 4 (Long Wave)

Table 2: A (Small) Selection of Frequencies.

to-face with the 'Rugby-Monster'. This contraption was once part of the famous 'GBR' transmitter (16kHz; Fig. 7; Hancock, M. [2017] *The History of Rugby Radio Station*, pp. 110/111). Only very few of us have room for something as large as this! <https://tinyurl.com/2p99tc6b>

On a smaller scale, you might just connect a long wire to your soundcard or radio, but this is prone to noise and interference from the environment. Therefore, many radio amateurs are coupling tuning loops to ferrites as secondary radiators. Others are recommending drums of a simple wire, connected serially, as a VLF antenna. If you do this, you ought to ensure you have as many turns of the wire as possible, at least 400. Since VLF waves are vertically polarised you must also be certain that the axis of your drum is always parallel to the ground.

In terms of aerials capturing the magnetic component of an electromagnetic wave, there are quite a few excellent models to choose from, if (like me) you are not a home-brewer.

Ferrite bar aerials, as you may recall, represent a special variety of loop aerial. The ferrites stand out by means of their compact and varying sizes and their permeability, i.e. their ability to take in and focus magnetic field lines.

In my humble view, amongst the top ranges to try out are those by two German companies, BAZ and Grahn. From the range of their products, those especially suitable

for ELF to MF are listed below.

Both firms also make customised and high-performance aerials (*Hochleistungsantennen*), which will often be a great solution, depending on what signals you are interested in. These are 1,050 mm long, have up to 55 ferrite bars inside, are in widespread use in electronics laboratories.

Some have been tested comprehensively for radio magazines and books (e.g.: Friese, 2007: 37ff.).

For hobby or even semi-professional ('prosumer') use, take a look at the following BAZ and Grahn aerials ranges:

- BAZ VLF S1-N (Spherics) Power Ferrite Module (15-70kHz by // C: 20pF – 1.8 nF) (Fig. 8).
- BAZ Power Ferrite Module for SFTS stations MSF60 |HBG 75 | DCF 77.5 (Fig. 9).
- BAZ LFM/ZZ1-N (For Standard Frequency and Time Signals [SFTS] Stations).
- BAZ LFM/5-50 (5-50kHz) ferrite module.
- BAZ LFM 50/300 (50-300kHz [...]).

<https://tinyurl.com/2vmjx9wa>

- Grahn VLF-2 Ferrite Bar ('Alexanderson'; 10-300kHz; €189)
 - Grahn LW-1 (30-150kHz) and Grahn LW-3 (75-400kHz)
 - Grahn 'Nautic' (100-600kHz)
 - Grahn MW2-3 (switchable: 400-1800 and 850-4000kHz)
 - Grahn Base Unit GS-5 (For all Grahn Loops and Ferrite Bar aerials; €249-349) [...].
- <https://tinyurl.com/rptemdcx>
- Of good value in this field – but very hard to find these days – was the ADDX-AT-2BNC once manufactured by my fellow 'Remscheid', the late Charlie H. Hardt. It came with a custom-made amplifier module and could be switched to either 50-120kHz or 90-300kHz (Fig. 10).

In addition to these, many radio hobbyists I know swear by earth rods used as antennas, as is evident in the numerous contemporary Facebook Groups on this topic.

- And, at the very top-end are to be found the Aaronia MDF and MagnoTRACKER series (Fig. 11).

<https://tinyurl.com/2p8ph4h9>

- In the USA, *LF Engineering*, I am told, is a popular choice for these aerials and in terms of their further customisation.

<https://www.lfengineering.com>

[A substantial list of reading materials and resources for all matters VLF is available upon request from the editor and will be placed on the Radio Enthusiast website – Ed.]

www.radioenthusiast.co.uk

Radio News

DAB RADIO MULTIPLEXES: New DAB digital radio multiplexes in Cumbria and Morecambe Bay are launching on December 1st, 2021. The Bauer-owned *North and West Cumbria* multiplex said it was to carry CFM, Greatest Hits Radio, Planet Rock, Scala Radio, Absolute Radio 80s, Absolute Radio 90s, Absolute Classic Rock, Absolute Radio Country, Magic Chilled, Magic Soul, Mellow Magic, Jazz FM and BBC Radio Cumbria when it won the uncontested licence in 2019. Meanwhile, the *MuxCo/Nation Broadcasting Morecambe Bay* multiplex will cover Morecambe Bay and South Cumbria with transmitters in Lancaster, Kendal, Ulverston and Windermere [...]. Hospital radio service Bay Trust Radio has also confirmed it will be on the multiplex. The full line-ups for both multiplexes have not been announced as yet but RU will keep updating you on this. (SOURCE: RadioToday)

<https://tinyurl.com/bdha7vpc>

COMMUNITY RADIO STATIONS WANTED TO AIR NEW AUDIO DRAMA:

A new drama series called *The Waves* is being made available free of charge to all community radio stations. *Holy Mountain* created the audio in association with *Tamasha Theatre Company* with money from the *Audio Content Fund*. Each instalment tells a story based in a different part of the UK, but, taken together, the episodes create a national picture of contemporary British life. There are five stories, each written by promising young writers of dual or multiple heritage from across the country. These are modern, fresh and contemporary stories. Not historical drama – and yet the stories arise from an informed reading of British history. *The Waves* has scale and ambition as well as local relevance. The series is created by Boz Temple-Morris (founder of *Holy Mountain* and twice winner of the *APA Award* for best drama Producer) and Fin Kennedy (award-winning playwright and former Artistic Director of *Tamasha*). Fin and Boz have formed and mentored teams of locally-based artists, telling stories recorded in Bristol, Manchester, Cardiff, Edinburgh and Leamington Spa. Some 15 radio stations are already signed up to broadcast *The Waves*, with more being added. For more details, see the e-mail address, below:

(SOURCES: RadioToday | Industry Press | Audio Content Fund)

<https://tinyurl.com/4nwwf53n>
boz@holymountain.co.uk



Robert Connolly
gi7ivx@btinternet.com

Maritime Communications on MF and HF

Winter: The time of the long and dark nights, interspersed with short periods of daylight. While it may not be a good time to head to the coast and listen to marine VHF channels, unless you are fortunate enough to live in a coastal region, it is a time when you can improve your skills at receiving MF/HF maritime communications.

The maritime MF and HF bands may not be as active as the equivalent aircraft bands, but there are signals to be received if you know what frequencies to listen to, and at what times. Also, remember that unlike the aircraft HF bands when you can hear aircraft over long distances (due to the altitude they are flying at) ships are on the surface; as a result, their signals will be heard over a much shorter range. Consequently, the majority of stations you will receive on the MF/HF bands will be coastal stations.

Another thing for the newcomer to remember is that you will receive *more distant* stations during *darkness*, dependent on propagation conditions, compared with during daylight when you will normally receive stations closer to home, in our case the British Isles and near Europe via ground wave propagation.

Robert Connolly looks at how to receive maritime voice and data communications on MF and HF, at NAVTEX DXing, Digital Selective Calling, Radioteletype and Radiofacsimile, and SAR ops and cruise ships.

Having said that it is possible to receive HF transmissions from across the Atlantic during daylight hours if propagation conditions are good.

Moreover, MF/HF radio signals travel much further across water than overland; somewhere in the region of one mile across land equals 10 miles across water. I quite often receive the 1115 and 1530 UTC HF voice transmissions from US Coast Guard Portsmouth USA on 8764 and 13089kHz, and they are clearly readable.

I also sometimes receive the 1933 UTC voice transmission from Hong Kong on 8812kHz and the 1500 UTC and 1800 UTC transmissions from Bangkok on 8764 and 6765.1kHz.

Bangkok is an interesting station, as it frequently plays musical intervals.

Transmissions and Resources

Data transmissions, for example, HF NAVTEX, seem, at times, to be receivable at even greater distances. I have, on a number of occasions, received the 1000 UTC HF NAVTEX transmission from Buenos Aires, Argentina, on 8416.5, 12579 and 16806.5kHz, again with an excellent signal coming through.

I am receiving these signals with my NRD 525 or RSPdx SDR, with a PA0RDT MiniWhip antenna mounted at seven metres above ground level. My antenna is linked using high-quality, low-loss, mill-

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tary-grade RG58 coax cable. In this context, William Hepburn's well-known website is an exceptional resource for maritime coast stations frequencies and scheduled broadcast times:

www.dxinfocentre.com

It carries a wealth of information on broadcasting, time signals, maritime, aeronautical, and so on. Clicking on the 'HF Voice' tab under the maritime section brings up details of frequencies and broadcast times of coast stations around the world, from the 3 MHz to the 27MHz maritime band.

It also shows stations that are currently inactive, along with any planned new stations. For the MF frequencies, you will need to click on the 'MB' tab in the maritime section; this details MF frequencies and scheduled broadcast times for the various met areas around the world.

One station I received here, and which is not mentioned on William's listing was SVO Olympia Radio, Greece on 8776 kHz at 1950 UTC, with transmissions in Greek and English.

DSC and Other Modes

Another option for receiving coast stations is to listen to 2182 or 2187.5 kHz Digital Selective Calling (DSC) using a suitable DSC decoder. Coast stations will transmit an announcement of their impending Maritime Safety Information (MSI) transmission on these two frequencies a few minutes before their scheduled transmission, detailing the frequencies that will be used.

Apart from MF/HF voice transmissions, there are some different data modes to play with. These include the HF version of NAVTEX, transmitting maritime safety information (MSI) and weather data, HF radioteletype (RTTY) transmissions for up-to-date weather reports from the German Weather Service (*Deutscher Wetterdienst, DWD*), radio facsimile (WXFAX) transmissions from Northwood and the DWD, transmitting weather charts and Digital Selective Calling transmissions.

[see also: *RadioUser, October 2021: 45-52 on 'Meteoradio' - Ed.]*

Altogether, there is plenty of maritime-related activity out there but remember this all happens in a less busy and congested environment compared to its HF aircraft band cousin.

The DWD transmits weather synoptic reports and forecasts on 147.3, 4583, 7646, 10100.8, 11039, and 14467.3kHz at various times.

Radio fax weather charts are transmitted on 3855, 7880 and 13882.5kHz.

In general, more details are available on the DWD website:

<https://tinyurl.com/wk7xmtjj>

JOMOC (Joint Operational Meteorology and Oceanography Centre) at Northwood transmits radio fax weather charts on 6834 (1800 to 0800), 12390 (24h) and 18261kHz (0800 to 1800), according to the latest *US Department of Commerce National Oceanic and Atmospheric Administration Worldwide Marine Radio Facsimile Broadcast Schedules* (January 2021), the *Klingenfuss List* and other sources (First URL, below). The NOAA publication is available for free download by visiting the second URL (below):

<http://www.jomoc.net>

www.weather.gov/media/marine/rfax.pdf.

Decoding and Distress

Decoding of RTTY and Radiofax signals requires software such as *Multipsk* or *SeaTTY* (V 2.6) that uses your computer sound card to decode and display the received signals.

<https://tinyurl.com/yfxnh25k>

http://f6cte.free.fr/index_anglais.htm

In addition to these, there are also the voice, Digital Selective Calling (DSC) and Narrow Band Direct Printing (NBDP) maritime distress frequencies (Table 1), as well as the Search and Rescue (SAR) co-ordination transmissions.

The main SAR frequencies are 5680 (daylight) and 3023kHz (at night).

These are used by many countries around the world, including the UK and Ireland. Having said that, its use in the UK has diminished considerably in recent years.

It is still used occasionally when coastguard rescue helicopters are out on extended-range operations, for example, tasked to the Atlantic or the North Sea.

Quite recently, I was able to hear UK Rescue contacting the Rescue 900 helicopter, which had departed to attend to an incident in the North Sea and heading for Tingwall.

Shannon Air Radio (the HF communications end of Shanwick Radio) is based in Ballygirreen, Co. Clare.

It uses these frequencies to keep in contact with the Irish Coastguard helicopters tasked into the Atlantic off the south and west coasts of Ireland.

<https://tinyurl.com/t8awj22t>

<https://coastguardsafety.campaign.gov.uk>

<https://tinyurl.com/nhjw7dev>

Under the Right Conditions: Across the Pond

Canada and the USA use different frequencies for SAR coordination. The US coast-

guard (USCG) deploys 5696kHz as its main SAR coordination frequency, along with 8983 and 11201kHz.

The Canadian coastguard uses several SAR coordination frequencies detailed in their *COMSAR II Mission Co-ordination* publication. Here, the frequencies 5680, 3023 and 4125 kHz are designated as aeronautical and maritime on-scene frequencies.

On top of these, the following are listed for air-ground-air SAR communications: 5717, 6694, 8992, and 11187kHz. Ground search parties involved in crash guard team duties may use any of the following on-scene working frequencies while so employed: 2216, 3280, 4480, 5832, 9292, 12115, 15733, and 15204kHz.

With the right propagation conditions, some US and Canadian SAR frequencies may be heard in the UK at night. One excellent example I encountered one night was a rescue operation in the Caribbean, involving a US coastguard helicopter and a higher-level fixed-wing aircraft that was providing 'top-cover'.

I was receiving clear communications from the helicopter. It was reporting to the United States Coast Guard at Portsmouth that they had winched a casualty from a yacht and were climbing through 300 feet.

However, the USCG at Portsmouth were unable to hear the helicopter's transmission, and the top cover aircraft had to relay the message. Astonishingly, I was able to make it out, despite being thousands of miles away. I could hear both the aircraft and USCG Portsmouth. The helicopter reported that, due to the high winds, it would not be possible for it to return to the US mainland and was proceeding to one of the Caribbean islands.

Top-Cover Explained

When a rescue helicopter is deployed on a mission well offshore, there is a chance that something could go technically wrong with the helicopter, forcing it to ditch in the sea. The 'top cover' is either a second helicopter or fixed-wing aircraft that will fly above the SAR helicopter and has two main roles. One is to relay radio communications between the SAR helicopter and co-ordination land station if the helicopter is unable to maintain two-way communications due to its low level during the rescue task. The other role is in the event of the helicopter developing a technical failure and having to ditch into the ocean. If that were to happen, the 'top-cover' aircraft would drop extra survival gear and, of course, immediately report the situation to the coordinating centre, so that additional resources can be deployed.

Kings of the Sea and Casa CN235

Before the UK Coastguard (HM Coastguard) and the Irish Coast Guard (*GARDA C OSTA na h IREANN*) had their own rescue helicopters, SAR tasks into the Atlantic to the west of Ireland were carried out by RAF and RN *Seaking* helicopters. Due to the extreme range involved, the helicopters were made as light as possible, by removing non-essential equipment and carrying additional fuel in flexible tanks. Even with this, the available time on scene was limited, often to less than 15 minutes.

There was a helicopter landing pad located at Castletownbere in Bantry Bay on the south coast of Ireland. It was used by the Commissioners of Irish Lights helicopter, where they could land and take on fuel.

<https://www.irishlights.ie>

However, it was a difficult approach to the helipad, especially at night, due to some high ground being close by. In the past, many RAF or RN rescue helicopters preferred to land at Shannon or Cork airports to refuel.

Currently, SAR tasks into the Atlantic west of Ireland are carried out by Irish coastguard helicopters, rather than the RAF or RN, and will request top-cover from the Irish Air Corps using one of their two Casa CN235 maritime patrol aircraft if an aircraft and crew are available.

<https://tinyurl.com/yc4tdd2z>

If this is not available, a second rescue helicopter will be tasked for the top-cover role from one of the other Irish coastguard helicopter rescue bases. The Irish Coast Guard has four rescue helicopter bases, Shannon, Sligo, Dublin and Waterford.

Monitoring and Safety

Recently, I received an email from *Radio User* reader Doug who informed me that a key interest for him is to discreetly monitor the onboard UHF radio traffic on cruise ships (around 457MHz). However, lately, many of the channels seemed to be either encrypted or using digital modes. Doug says that he would appreciate any advice. It would seem that many cruise ship operators do use encryption and/ or digital modes. There are a couple of reasons for this:

First, on cruise ships, there are many different departments, all keeping in touch with their section heads by radio, and, on occasions, also with the bridge or other departments. Using encryption and digital modes allows these various departments to be able to communicate over the few onboard hand-held frequencies available.

The second reason is to reduce any 'eavesdropping' by crew sections on the



Voice	DSC	NBDP
2182	2187.5	2174.5
4125	4207.5	4177.5
6215	6312	6268
8291	8414.5	8376.5
12290	12577	12520
16420	16804.5	16806.5

Table 1: Some Distress and SAR Frequencies.

ship not needing to know about a problem in detail and, more importantly, to prevent passengers from becoming aware of problems on the vessel, preventing a potential panic among passengers. A crew member walking past passengers with a non-encrypted handheld where the

SAR	Coordination
2596	Used in the UK for SAR purposes
3023	International SAR operations (Night)
5680	International SAR operations (Day)
5696	US Coastguard
5717	Primary SAR Canadian Airforce
8337	US Coastguard
8364	Used by survival craft

passengers could hear the engineering officer calling the bridge giving details of an engine fire or failure would create quite a degree of anxiety among the passengers.

In more general terms, modern-day UHF onboard marine radios seem to be capable of the following modes:



- Analogue mode
- Analogue/digital mixed operation
- NXDN or dPMR mode 1/2 conventional
- dPMR or NXDN multi-site conventional over IP network
- NXDN Type-D single/multi-site trunking
- DPMR Mode 3 trunking, and
- 12.5 kHz digital mode (NXDN conventional).

Within this range, there are various digital and analogue functions with encryption, especially on larger cruise ships. I honestly do not know if it is possible to monitor these communications as a passenger with a scanner, especially when encryption is involved, perhaps a reader may be able to advise.

Regular readers may recall the tragic loss of the Dublin based Irish coastguard

rescue helicopter, *Rescue 116* in 2017 when it crashed into Blackrock Island in the west of Ireland while landing to refuel before providing top cover for the Sligo-based helicopter for a mission in the Atlantic. Sadly, all four crew members were killed with only two bodies recovered.

Now, in early November 2021, the Irish Aircraft Accident Investigation Unit (AAIU) published its final report on the incident. The report identified navigational issues as a major contributory factor. It also raised concerns about the coastguard deployment on that night. The report highlighted issues with the system used by the helicopter operator to review flight routes. According to the report, helicopter operator *CHC Ireland* did not have a “*formalised, standardised,*

controlled or periodic” system in place:

Thus, Blackrock Island was missing from the helicopter’s flight management system, and the crew were not warned that it was an obstacle on their route. The AAIU report further stated that correspondence dating back four years before the accident – and regarding obstacles including Blackrock Island – was missing from the helicopter warning systems. A further 12 contributory causes for the accident are also listed in this 350-page report:

<https://tinyurl.com/2r8ksnce>

My photographs for this month show the ill-fated Irish coastguard rescue helicopter *Rescue 116*, and the container vessel *Samskip Pioneer*, operating into Dublin port.

Until next time “*Fair winds*”.

Enter our competitions at www.radioenthusiast.co.uk/competitions

Tim Kirby

tim@livingland.wales

Broadcasting television signals from space is well known to most of us. If we do not have a satellite dish on the house ourselves, we probably know someone who does. Broadcasting *radio* signals from a satellite in space is rather less common, though. I will first look at a system that did just that, and which has come and gone. Following that, I will be describing a technology that is running now and assess in what way it has evolved to meet today's demands.

The WorldSpace Story

Back in 1990, a company called *WorldSpace* was founded by Noah Samara. It had its headquarters in Silver Spring, Maryland (USA). In 1991, Samara, working in collaboration with Thomas van der Heyden, gained approval from the Federal Communications Commission (FCC) in the USA for the world's first radio broadcast satellite.

However, the problem at the time was that there was no piece of the radio spectrum suitable or available for licencing. So, at the WARC-92 conference in 1992, Samara and van der Heyden petitioned the International Telecommunications Union (ITU) to establish a new Broadcast Satellite Services band at 1452–1492MHz.

The proposal gained a great deal of support from African and Asian countries.

<https://www.fccenvironment.co.uk>

<https://www.itu.int/en/Pages/default.aspx>

WorldSpace started broadcasting satellite radio on 1st October 1999. Just before the end of 2008, the company (now re-branded '1WorldSpace') was using two satellites and broadcast 62 channels: 38 of those channels consisted of content provided by other organisations, and the remaining 24 were branded as either *Worldspace* or *1Worldspace*. The content on offer included Music (contemporary, country, classic rock and jazz), sports, news, arts, comedy, talk shows, as well as inspirational and religious programming.

The news was made available from several organisations including the BBC, CNBC, CNN, NPR, RFI, and WRN. Although the company had, it claimed, rights to broadcast worldwide, it never broadcast to the Americas or the Caribbean.

Radio Stars in Space

Out in space, *Worldspace* operated two satellites, *AfriStar* and *AsiaStar*. Combined, the footprint of these two satellites made the *Worldspace* services available in Asia, Africa,



Graveyard Orbits and Infotainment: Two Satellite Radio Stories

This month **Tim Kirby** looks at two different Direct Broadcast Satellite Radio systems – one which has failed but is remembered by many, and one which is still going strong, adapting and branching out.

the Middle East, and some parts of Europe.

A third satellite was ordered, named initially *AmeriStar*, although it was also known as *CaribStar* and was later renamed *AfriStar2*. Although the satellite was built, it never flew.

AfriStar was launched from Kourou in French Guyana on 28th October 1998 from an *Ariane 44-L* rocket. *AsiaStar* was launched on 21st March 2000, once again from French Guyana. Each satellite weighed 2,777kg and used 5.6kW of power.

The satellites had a design life of 12 years and an orbital manoeuvre life of 15 years, allowing each of the satellites to stay within 0.1 degrees of their assigned orbital position for 15 years, after which time the satellites would need to be decommissioned.

AfriStar developed a defect in its solar panels, meaning that the satellite could not operate with a full power budget. On the ground, the *AfriStar* satellite was managed by a regional operations centre in Silver Spring, Maryland, USA (Fig. 1). *AsiaStar* was run out of an operations centre in Melbourne, Australia.

These centres looked after the performance of the two satellites, as well as performing control and monitoring operations. The ground stations used an X-band (8-12GHz) uplink system for command and control, with telemetry coming down from the satellites in the L-band (1-2GHz). There was a backup S-band (2-4GHz) uplink from Bangalore in India.

Each satellite could be controlled by two stations, separated by a significant geographical distance, such that if a natural disaster befell one area, it was very unlikely that the other ground station would be affected. The *AfriStar* ground stations were located in Bangalore, India and Port Louis, Mauritius, and the ground stations for *AsiaStar* were located in Melbourne, Australia and Port Louis, Mauritius.

As well as the control ground stations, there was also a ground station dedicated to the monitoring of the quality of the downlink services. For *AfriStar*, this station was located in Libreville, Gabon and for *AsiaStar*, in Melbourne, Australia.



Receivers Required

With the downlink of the satellites on L-Band, listeners required specialist receivers. These receivers used a small 'patch-antenna' (a panel, if you like) which measured approximately 6 x 8 cm. It folded up from its stowed position, flat on the top of the receiver, to be orientated towards the satellite.

Each receiver had a unique identifier, for licencing and subscription purposes, so that when a subscriber bought a subscription to a particular station, channel or content, this could then be unlocked on the subscriber's receiver.

Firms like Panasonic, Sanyo, JVC and Hitachi (Fig. 2) manufactured receivers, and these were widely available in the UK and Europe, Asia and Africa. In the UK, they were marketed in both the general papers and in the specialised radio industry media.

Although the primary operating model presented by *WorldSpace* was direct broadcasting via satellite, the company recognised that line-of-sight reception may be difficult in urban areas, particularly when the satellite was low on the horizon. To get over this, *WorldSpace* had a plan to install terrestrial repeaters to rebroadcast the satellite signals in Italy, Switzerland and Germany. *WorldSpace* was planning to provide mobile radio and data services in Italy and had signed an agreement with Fiat to provide radios for their cars.

This all seemed rather exciting – but the problem was money! The company became insolvent in 2009/2010. During the first quarter of 2008, the company had lost a total of over 2,600 subscribers out of a total of around 17,000 and decided to scale back its marketing around the world. By this time, and into 2009, the company was reported to be owing over US\$50 million to its creditors.

After the Demise

Following the decline of *WorldSpace*, *AfriStar* was reused for *Yazmi*, an online education company also owned by Noah Samara. In 2017, it was sold to a Hong Kong-based broadcaster, now part of CMMB Vision. After



20 years at the 21.0 degrees East location, on 6th January 2018, *AfriStar* was raised to a graveyard orbit, out of the way of currently operating satellites. *AsiaStar* was acquired in 2014 by New York Broadband LLC and used as an orbital placeholder for their planned *Silkwave-1* satellite. As far as I can determine, the *AsiaStar* satellite is still in geosynchronous orbit, having outlived expectations for its lifetime by some considerable margin.

Providing listener support could provide a challenge. In a short but interesting blog about *WorldSpace* on the Science Museum website, Charlotte Connelly relates a lovely story she was told, "I had a guy in Ethiopia write me every day that his signal was lost at roughly 10 am, 1 pm, and 4 pm daily. We couldn't figure it out... It turned out the antenna was in a courtyard, and people took their smoke break in front of the antenna – effectively cutting the signal until they finished their break."

<https://tinyurl.com/rz9f92k3>

Of course, all the subscribers who had purchased a *WorldSpace* radio were left with something of a white elephant, with no satellite service to receive. You can see some details of one receiver, the Hitachi KH-WS1 *WorldSpace* Radio Receiver online at this URL:

<https://tinyurl.com/mt28cdzn>

Fortunately, this receiver also covered FM, MW and Short Wave; perhaps, all was not lost, and it had some value after the demise of the *WorldSpace* service. From time to time, *WorldSpace* radios crop up on eBay. Interesting, perhaps for historical value, but I am not sure I would pay the £50 that I can see one vendor is asking – and they do not men-

Fig. 1: The *WorldSpace AfriStar* Control Room.

Fig. 2: The famous *Hitachi WorldSpace Radio* with its patch antenna for satellite reception.

Fig. 3: The *Space X Falcon 9* launch taking the *SXM-7* satellite to Space from Cape Canaveral.

Fig. 4: A *SiriusXM* radio.

tion that the service is no longer operational.

What a shame that – with all its ideals and innovation – the *WorldSpace* system did not become a success.

Sky-High Success: SiriusXM

Let us now look at a current system, which is – as far as I know – a great success: For our second satellite radio broadcast system, we travel to North America: Enter *SiriusXM*. The company and service were created by the merger of two satellite broadcast companies, *Sirius Satellite Radio* and *XM Satellite Radio*.

Both companies were formed in 1990, but it was not until 2007 that the merger of the two companies took place. The merger was worth US\$13 billion. The two companies had nearly 14 million subscribers between them, with around 8 million belonging to XM. Following the merger, one of the challenges faced was to sell more subscriptions to motorists. By this time, the number of cars sold annually in the USA was starting to fall, reducing the market. Of course, other online radio streaming was starting to become a competitor. Following a period of transition, including the production of new radios, assigning some channels to non-commercial broadcasters and paying fines for previous FCC violations, *Sirius* and *XM* started to merge their channels in November 2008.

Things were 'touch-and-go' for a few months after the merger, with a possible bankruptcy filing being mooted. But, Liberty Media stepped in with a loan of US\$530 million. In the fourth quarter of 2009, *SiriusXM* posted a profit for the first time. Car sales in the US were increasing and subscriber numbers were rising again. By the end of 2012, subscriber numbers had exceeded 23.9 million. Howard Stern, a US radio host, helped keep new subscriptions coming in – or so he later claimed in court – and was rewarded with an extended contract.

Hardware and Frequencies

Radios capable of receiving *SiriusXM* satellite broadcasts became available for pretty much every major car manufacturer, as well as for trucks, boats, and even aircraft. By 2017, *SiriusXM* had over 32 million subscribers, and at the end of 2019, numbers peaked at 34.9 million.

At the time of writing, the subscriber base is slightly down, standing at around 34.3 million users.

What about the technical side of things? The fascinating point for 'satellite-nerds' like me is that the original *Sirius XM* satellites, *FM-1* to *FM-3* did not operate in geostationary orbits but *elliptical* orbits.

This means that a single satellite could not be seen from the ground at all times; therefore, receivers would have to hunt for the satellite that was *above the horizon* at any particular time.

Over time, of course, the service moved to deploy satellites in *geostationary orbits*; this occurred in 2016 when the *FM-6* satellite was put into service, replacing *FM-1* to *FM-3*, which were moved to 'graveyard-orbits'.

Redundancy between *Sirius* and *XM* satellites was achieved, mirroring the services provided. In fact, before the launch of *FM-6*, the *XM-5* satellite had been able to function as either a *Sirius* or *XM* satellite. The satellites use the S-band, with the *Sirius* satellites using 2.32 to 2.3325GHz, and the *XM* satellites using 2.3325 to 2.345GHz.

In late 2016, *SiriusXM* ordered two new satellites, *SXM-7* (Fig. 3) and *SXM-8*, planned to replace *XM-3* and *XM-4*. *SXM-7* was launched in December 2020, but it failed its in-orbit testing and was not commissioned. *SXM-8* was launched in June 2021 and has successfully been commissioned, replacing the *XM-4* satellite.

Compatibility, Catching Fish and Cross-Country Flying

On the ground, *XM* and *Sirius* had historically used different protocols and



systems making their receivers (e.g. Fig. 4) mutually incompatible.

One of the conditions of the merger was that receivers needed to be available, within a year, which could receive both *XM* and *Sirius* services. A wide range of receivers quickly became available.

Current models for mobile use start at around \$60, up to the top-of-the-range model at \$300, for which it is claimed that it can receive every *SiriusXM* channel.

SiriusXM Marine provides graphical weather information, including weather radar, lightning, coastal and offshore wave heights, sea surface temperatures, barometric pressure, buoy data, and so on. As well as weather data, *SiriusXM* also offers a 'Fish-Mapping' service and claims that "*whether you're competing in a tournament, out fishing for fun, or taking clients on a charter trip, Fish-Mapping identifies specific locations in the ocean with the highest likelihood of finding the fish that you're seeking to catch. Fish-Mapping provides regularly updated, science-based data to help you locate fish faster – saving time and fuel.*"

It's interesting to see that this is priced at \$99.99/month, so is considered a premium service.

Moreover, *SiriusXM Aviation* provides satellite-based weather information for pilots and claim that it offers advantages over Automatic Dependent Surveillance-Broadcast (ADS-B) weather updates.

You can see an interesting infographic of their marketing on this website:

<https://tinyurl.com/4kaan6ntc>

It is interesting to read that it is not

all about information for the pilot. The *SiriusXM* website states the following: "*Enjoy entertainment on your next cross-country flight with 150+ channels of ad-free music, plus sports, talk, news, and more on SiriusXM.*" Of course, the current *SiriusXM* service is not solely based on satellite delivery: Streaming has been a competitive technology for the company for some time. Following acquisitions, they have embraced the technology too, meaning that, armed with a *SiriusXM* subscription, you can receive programming on smart devices, such as *Amazon Alexa*, *Sonos*, *Google Nest*, *Xbox One*, *Amazon Fire*, and an *SXM* app.

If all of this has left you wanting to have a listen to *SiriusXM* programming, then I am sorry! The services are only available in the USA, although *SiriusXM* has some agreements to broadcast into Canada. However, I am quite sure that, if you had a *SiriusXM* account, you would be able to listen online from Europe, using a Virtual Private Network (VPN). The satellite service, of course, is not available outside North America.

So, there we have it – a look at two very different direct broadcast satellite radio systems. It is interesting to contrast the different markets targeted, strategies employed and technologies put to use.

Would the *WorldSpace* system have been more successful if it had operated elsewhere – we will never know.

That is it for this month's *Signals from Space*. See you back next month with another *Push-To-Talk* column. In the meantime, may I wish you and your loved ones a Happy Festive Season, however you celebrate!

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The Battle of Britain

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THE BATTLE OF BRITAIN IN COLOUR



The Battle Looms

The Battle of Britain was one of the most iconic battles of the Second World War, embedding itself indelibly into the nation's consciousness. Earlier, the Battle of France could easily have spelled defeat before the air battles got underway in July 1940.

As for the outbreak of war in September 1939, there followed eight months of what became known as the 'Phoney War'. It was clear that large-scale fighting would ultimately follow, and a British Expeditionary Force was sent to France before the end of that year. As part of the BEF, a large Air Component was supplemented by an Advanced Air Striking Force. In total, however, air forces amounted to 12 squadrons, many of which were Hawker Hurricanes, compared to the RAF force in France comprised largely of light bombers and heavy bombers. The squadrons eventually, however, the 'Mistling' became the 'Mistling'.

On 10 May 1940, German forces launched their attack on France and the Low Countries and what followed in Belgium, the Netherlands etc, was the complete collapse of these countries under the overwhelming might of German military power. Across France, German forces rolled inexorably towards the English Channel and while the French and British tried desperately to stem the advance, the situation steadily grew more bleak. Predicted catastrophe When the fighting had broken out in France, the BEF's Air Component was in almost complete disarray, and it was not until the evacuation of Dunkirk in May 1940 that the RAF was able to re-organise itself for the Battle of Britain.

BACKGROUND TO BATTLE

Left: A Hurricane of 501 Squadron on the ground at an operations base at Bournemouth, France, May 1940. An RAF Hurricane fighter is seen in the background. Right: An RAF Hurricane fighter in flight over the English Channel, May 1940. The aircraft is seen in flight over the English Channel, May 1940. The aircraft is seen in flight over the English Channel, May 1940.



THE RAF FIGHTER PILOT



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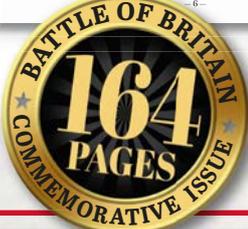
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