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- 60MHz - 260MHz
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3 element Beam

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### Icom AH-8000

Professional Discone Antenna

Suitable for both Transmit and Receive

- Rx: 100-3,300MHz
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• Supplied c/w 15m cable + N connector & Mounting hardware

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FLAGSHIP RADIO with Bluetooth

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- Local, medium, DX selector
- ATS: Auto search and storage
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- USB sound card function
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- Batteries: Uses 2 x 18650 batteries, charging one as a spare, whilst running on the other

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### Tecsun PL-990x Top Of the range Portable radio

- Covers: LW, MW, FM, SW (1.711-29.999)MHz
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£259.95



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- Latest Firmware!

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### BCT-15X

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- Band scope
- CTCSS/DCS decoding
- Alpha-numeric tagging feature
- GPS enabled

Supplied with:  
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• Telescopic Antenna  
• Mounting Bracket and Hardware

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- Weather Resistant IPX4

Standard Version (licence required to activate DMR, NXDN)

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Activated Version (DMR, NXDN already activated)

£649.95

#### BEARCAT



### SDS-200E Digital Scanning Receiver

- 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!

£779.99

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### UBDC-3600XLT Digital Scanner with 'Close Call' and Analogue AM/FM

- Receives: 25-1300MHz
- SD card slot

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UBDC-3600XLT - NXDN Same specs as above but with NXDN activated NXDN digital protocol is used by Kenwood & Icom

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#### ALBRECHT



### AE255M Wideband Base Scanner

- Covers 25-960MHz (w/gaps)
- Step sizes: 5/6,25/8.33/10/12.5/20kHz
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#### ALBRECHT



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- Hyper search -300/sec
- CTCSS & DCS
- Supplied c/w: Mini USB lead, 2 x AA 2,300 mAh NiMH Batteries

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### TRX-2E Base version of TR-X1E

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### Whistler TRX-1E and Whistler TRX-2E

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- Record & save to Windows
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- Spectrum Sweeper



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## RadioUser

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# Welcome

## Aeronautical Comms & Underwater Tracking

Georg Wiessala  
wiessala@hotmail.com



**H**ello and welcome to the March edition of *RadioUser*. First of all, many congratulations to Julie Breckon, the winner of our December 2021 competition. Julie, I do hope you like the bhi in-line unit.

There is an aeronautical flavour to this issue: For take-off, we offer a brief review of the very latest in airband listening books; it gives me great pleasure to say that both the *ATC Handbook 2022* and *UKAFG 2022* have been authored by long-standing contributors to *RadioUser*. If you are into airband, take a look.

For some quality in-flight entertainment, we invited Nils Schiffhauer back on board. He casts a meticulous eye over the Automatic Link Establishment (ALE) mode, as used by the US Air Force, and he shows you how to achieve high-flying reception success. And as we come in to land, David Smith is waiting for us on the runway to take us to RAF Odiham and to speculate on the future of air traffic management.

The main pull for many of you this month will, I feel, be our annual review of the latest frequency guides, DXing publications and radio surveys. We already started this in last month's issue; David Harris looks at the remaining books in the pages that follow.

We also share the latest RAJAR figures, and I am trialling a new little feature called *Magazine Panorama*. Let me know if you wish to see more of this nature here in the future.

In our regular features this month, we turn to the use of podcasting and video in the work of radio stations and look at the future of funding for public broadcasters, such as the BBC and ABC.

Moreover, I hope that you will benefit

from our coverage of the best radio on HF, online and on digital, including our listening hints and tips for Europe-wide and global short wave stations and podcasts.

Speaking about world band listening, do not miss our competition this month – enter now, to be in with a chance to win a fabulous Sangean ATS-909X2 receiver with airband coverage.

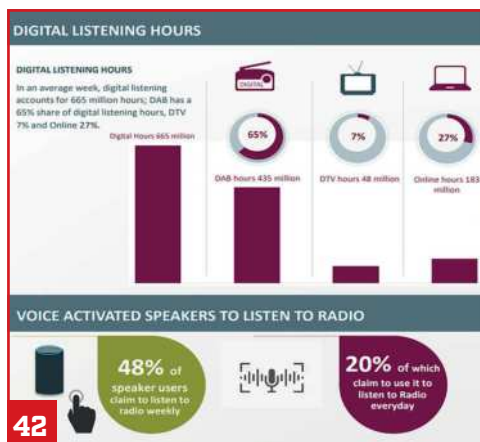
If you are more technically-minded, you may enjoy Keith Rawlings' discussion of isotropic radiators and dipoles in his beginner's series. I have tried to complement this by offering the concluding part of my brief ELF/ VLF aerials article. See what you think and let us know of any projects you have cooking at the moment.

In our historical strand this time, we continue to look at the development of the BBC, decade-by-decade, and we take a look at a book about radio officers in the Merchant Navy. Last, but certainly not least, check out Robert Connolly's survey of the fascinating technology used to track-and-trace submarines.

That's it for this month. I think I shall sit down to re-watch *Das Boot* now.

Enjoy this issue and stay in touch.

**Georg Wiessala**  
Editor, *Radio User Magazine*  
[www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



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Nils Schiffhauer offers an in-depth guide to the US Air Force High-Frequency Global Communications System (HFGCS), illustrating how to receive these and other ALE signals.

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Here is our rapidly-expanding seasonal guide to radio rallies, lectures, hobby meetings and online events as we move into the Spring of 2022. Always check with the organisers before you go!

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Tim Kirby offers a line-by-line history of Slow Scan Television in space exploration and discusses, among other things, the more recent medical and amateur use of some SSTV technology.

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# RadioUser

December 2021 £4.99

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## TECSUN H-501X

We test this highly anticipated receiver to see how practical it is on your travels

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# What's New

Have you got something new to tell our readers about? If so, then drop a line to [wiessala@hotmail.com](mailto:wiessala@hotmail.com)



## JNCRadio VNA 3G at ML & S

The JNCRadio VNA 3G is a portable Vector Network Analyzer with frequency coverage from 50kHz to 3GHz. It is featured with a 4.3-inch IPS screen and a metal case. In this model, the sweep speed is running at 400 pts/s (4 times faster than the original). The key technical details are described as follows:

- CE, FCC and RoHS compliance
- Frequency range: 50k – 3GHz; Dynamic range: 70dB for S21, 50dB for S11
- Sweep speed: 400 pts/s; sweep points: up to 501
- 4.3-inch IPS LCD, ultra-wide viewing angle;
- All aluminium alloy case: 130mmx75mmx22mm, small and portable;
- SMA RF connectors, easy to connect DUTs
- Built-in 3.7V 5000 mAh lithium battery, standby time up to 5 hours
- Full touching screen design, with 3 side buttons at the same time
- TDR function; Built-in simple RF signal generator: up to 4.4GHz, the output is power-adjustable
- Support touchstone file save and export; files are named with RTC time
- More than 10 calibrations save/recall slots
- Optimized UI design, make measurements convenient and efficient
- Screen brightness adjustable; firmware upgrade via virtual U disk with USB Type-C cable
- Equipped with a high-quality SMA calibration kit and RG405 cable
- 5V/1A USB power output port; charging via USB Type-C, maximum charging current reaches 2A
- Compatible with NanoVNA-saver PC software.

(Source: ML&S)

<https://tinyurl.com/4ksdkf38>

## Latest News and Products from Butel

Here is a selection of recent product news and updates from Dutch makers Butel: "(1) **ARC30 YouTube Videos**: We are in the process of creating YouTube videos for our popular ARC30 software for the Icom IC-R30. These videos will include basic instructions on how to install the software, set up the Icom IC-R30 for use with the ARC30 software, and general tips and tricks for using ARC30. You can subscribe to our YouTube channel using the link at the end of this section. In respect of the ARC125 find-and-replace bug, there is a known issue in the latest release of ARC125. The Find-and-Replace option is not working in Bank 1. This will be fixed in the next release of ARC125. On software updates, here are some new releases: ARC536 basic and pro: small bugs were fixed for importing NXDN data from radioreference. In the pro version, the logger was further improved. Also, we fixed an issue when the scanner was using drive D: in mass-storage-mode. (2) **ARC500 basic and pro**: To comply with the Whistler firmware, a new option was added to reset the so-called RSSI values to avoid problems with the S-meter in Whistler scanner models WS1040 and WS1065. (3) **ARC125 for Uniden (U)BC125**: added a 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 | **ARC30 for Icom R30**: A new preview option was added to inspect the contents of the CSV files. The bank browser now shows how many channels are in use per bank. The ARC30 radioreference.com import option was upgraded. Butel is now shipping software on USB drives to their global dealers Avera and ScannerMaster."

<https://tinyurl.com/5x7vkw4>

**MORE HELP AVAILABLE FROM SDRPLAY:** SDRplay got in touch with us to say how much they appreciate the patience of customers awaiting new stocks of RSPs. Due to a worldwide shortage of components, there have been significant problems with availability. This has caused production delays at both the UK-based manufacturing subcontractors used by SDRplay in Hartlepool and Peterborough. In some cases, SDRplay has even tweaked the physical radio design to be able to accommodate alternative components with better availability. It's a frustrating time for the resellers as well as they run out of stocks. Meanwhile, software development at SDRplay is continuing apace. SDRuno Version 1.42 is progressing well and this upgrade will provide many requested additions to the Memory Panel and Scanning functions, as well as custom controls for creating your own (user-defined) band framing. Full details can be found at this URL:

<https://www.sdrplay.com/sdruno-roadmap>

Work continues on the ongoing software project to migrate SDRuno to other computer platforms and day to day support for the ever-expanding SDRplay user community continues to be a priority. There is now a revamped HELP page on the SDRplay website which should allow people to find help more easily.

[www.sdrplay.com](http://www.sdrplay.com)

For more information about SDRplay's world-famous UK-made SDR receivers, go to the SDRplay YouTube channel:

<https://www.youtube.com/c/sdrplayrsp>

The RSP family of SDR receivers range in price from around £110 to £260 and are (normally) available directly from SDRplay Ltd., or Martin Lynch & Sons, Moonraker, Nevada, Radioworld, SDR-Kits and Waters & Stanton. A full list for our international readers can be found on:

<https://www.sdrplay.com/distributors>

For the latest news and product reviews, visit [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





**RadioUser  
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## Heil Sound Pro Set 6 Now at Moonraker

The Pro Set is designed to meet the exacting standards of world-class Contest and DX operators. The is a lightweight, versatile headset designed for comfort, durability, and performance. The earpieces are full-sized, with heavily-stuffed cushions for operator comfort during long operating stints. The ear pad covers are removable, for washing, and replacement pads are also available. The Pro Set features Heil Sound's exclusive phase reversal technology, which allows the user to "move" the incoming signal by engaging the phase-reversal switch; this creates a unique spatial widening sound that can, in some situations, significantly improve copy in a tough DX pile-up. The speakers in the Pro Set Series are 200Ω nominal devices, with a -3 dB point at 8000Hz. This combination reduces hiss found in receiver audio stages.

These speakers exhibit medium sensitivity but are easily driven by most rigs by turning the AF Gain control up to about 2 o'clock. The Pro Set 6 (PS 6) utilizes the HC-6 dynamic element also designed for amateur radio use. The -3dB points are fixed at 100 Hz and 12 kHz with a sensitivity of -57 dB at 600 Ω output impedance (centred at 1 kHz.) The Pro Set 6 requires an additional adapter cable. The microphone's specifications are stated as follows (Heil website):

- Generating Element: PS6
- Frequency Response: 100Hz – 12kHz
- Polar Pattern: Cardioid
- Impedance: 600 ohms
- Output Level: -57 dB at 1 kHz
- Weight: 10.6oz

(SOURCE: Moonraker | Heil Sound).  
<https://tinyurl.com/mr46ws9b>

## ENDBH/GNDBH/NANDBH Handbooks & CDs

The 2022 editions of **Michael Oexner's** popular NDB handbooks and CDs covering Europe and North America are ready now and have, once again, been updated extensively to reflect the latest changes and monitoring results. The new **GNDBH** contains the details of more than 17,100 NDBs worldwide.

This is the perfect listening companion for radio listeners who use the extensive and ever-growing network of WebSDRs. The updated **ENDBH** shows the data of more than 8,300 NDBs, and the new **NANDBH** features more than 5,900 NDBs.

(Source: SWLing Post Michael (*ENDBH, GNDBH & NANDBH* editor))

<https://ndbchangeblog.blogspot.com>

British Railways Amateur Radio Society

### RAILS and RADIO

January 2022



GOPYX - Railways on the Air 2021

In this issue:

Editorial – President's Piece – Chairman's Chat  
Secretary's Scribbles – Special Event Station GB1FRT – Rallies  
AGM 2021 Informal Report – Treasurer's Report  
Membership Secretary's Topics – ROTA 2021: GB1SLR and GBMHM  
KWVX Calling – ROTA 2021: GBOLMR  
My Favourite Heritage Railway  
Accounts – Society notes, subs, contacts

Subs for 2022 are now due - see inside back cover

## New Magazine from BRARS

BRARS (the British Railways Amateur Radio Society) is delighted to announce the arrival of its new look *Rails and Radio* magazine. The magazine now has more pages, more articles, more columns and more photos than its recent predecessors and will be published regularly every quarter.

The new look came about due to the retirement of the long-standing editor. A new editor was needed and so Ian Brothwell G4EAN and Richard Waterman G4KRW jointly took on the role of editor. They had to start with a clean sheet and decided to make *Rails and Radio* more of a magazine and less of a newsletter. The January 2022 issue of *Rails and Radio* is their first new-look issue. It indeed has a colourful look and lots of photos and articles. More significantly, it has more pages than the total of all the issues published in 2021. The April 2022 issue is well in hand and will soon be posted to every BRARS member. Membership of BRARS is open to anyone interested in any aspect of amateur radio (whether licensed or listening) and in any aspect of railways (by which we mean any rail transport so, yes, we include trams, miniature railways, model railways and suchlike).

(SOURCE: Ian Brothwell G4EAN)

*BRARS secretary and joint editor*

*British Amateur Radio Teledata Group*

*British Railways Amateur Radio Society*

*Radio Amateur Old Timers' Association.*

[www.BRARS.info](http://www.BRARS.info)

[membership@brars.info](mailto:membership@brars.info)

Enter our competitions at [www.radioenthusiast.co.uk/competitions](http://www.radioenthusiast.co.uk/competitions)

Visit our Book Store at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)

# RADIO ENTHUSIAST BOOKSHOP

## The Magic Bands

Building on Don's earlier books the *6 Metre Handbook* and *Six and Four*, *The Magic Bands* adds lots of material on data modes operation, which has grown enormously in popularity in recent years with the advent of FT8. There is detail of the many new radios that have appeared in recent years with 6m and, increasingly, 4m capabilities. Readers will find two new antenna designs from Justin Johnson, G0KSC, of InnovAntennas especially produced for this book. There is detail of software too, not just for data modes but for remote operation, tracking of achievements and much else. There is even material highlighting the achievements of several of the leading operators on the 6m band.

The 6m band is now almost universally available across the amateur radio world, while in recent years 4m access has been granted to many more countries, often on a permanent basis. So why miss out on the 'Magic bands'? *The Magic Bands* is recommended for anyone who wants to try these bands out and is a comprehensive guide for those who are already hooked on these fascinating pieces of spectrum.



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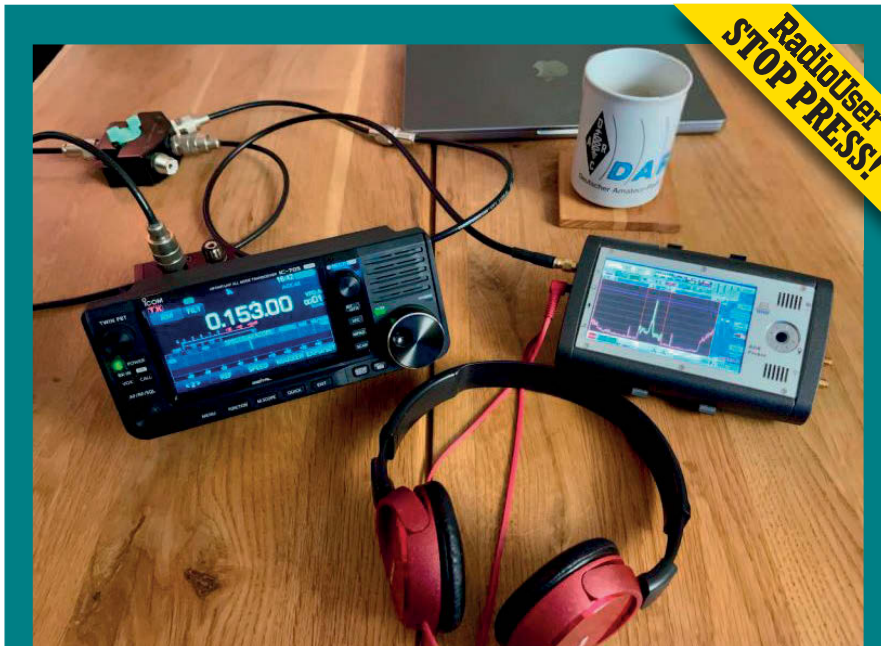
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## Review: Reuter Pocket and Icom IC-705 for SWLs

Uli (DK5ZU) offers a comparative review of the Reuter Pocket and the Icom IC-705, from the point of view of a short wave listener. Uli's Reuter was a **Reuter Pocket RDR 51** (Version B2). This was a standalone SDR Receiver (0-30MHz | 50-71MHz), and, in his 'B2' version it also had FM (Stereo/RDS) and Digital Audio Broadcasting. He concludes, amongst other things, that, "To compare both rigs, one has to be careful not compare apples to oranges. But just from the SWL point of view, and if someone is just on SWL, I would prefer the Reuter Pocket. It is the 'Swiss

*Army Knife' for the radio listener. You can use it from 2 kHz way up to FM and it is quiet with high selectivity. It has every feature you will need as an SWL, I guess. That said, the IC-705 cannot replace it as an SWL rig (for me). On the other hand side, the 705 is versatile and full of great features and caught up to the modern technologies, which I missed at HAM radio rigs a lot."* (SOURCES: SWLing Post Reuter Elektronik | Uli DK5ZU).  
<https://tinyurl.com/286uyfpy>  
<https://www.reuter-elektronik.com/html/>

## SteppIR Communication Systems at ML&S

Since 2001, **SteppIR Communication Systems** has manufactured thousands of mechanically adjusted, remotely tuned, frequency optimised HF/VHF Yagi, Vertical & Dipole antenna systems for commercial, amateur radio, military, emergency communications & consumer markets. In December 2021, SteppIR appointed ML&S Martin Lynch & Sons to retail & distribute their range of antenna products. John Mertel – WA7IR, SteppIR President & CEO commented: "Martin Lynch & Sons represents a significant step forward for SteppIR Communication Systems. Never before have we had such a well-known, highly respected ham radio reseller as a partner, to assist in

*the overseas sales, service and maintenance of SteppIR products. It takes a serious commitment to offer the kind of customer service we expect at SteppIR, and we believe ML&S is up to the task and more. We look forward to working with the ML&S team to help build new and lasting relationships with our valued customers in the UK and beyond." The 3-element Yagi is the original SteppIR antenna and uses their proven technology giving continuous frequency coverage (no gaps at all!) from 6.8 to 54 Mhz. There have been many improvements over the years like the addition of a 40/30m rotatable dipole and the (now-standard) electronic controller, the SDA100. With a 16 foot boom, the antenna models that are programmed into the controller deliver solid gain and exceptional front-to-rear ratios."*

(Sources: SteppIR | ML&S)

[www.HamRadio.co.uk/SteppIR](http://www.HamRadio.co.uk/SteppIR)  
<https://www.hamradio.co.uk>

## A New Tuneable Indoor Ferrite Aerial

The **Reuter Elektronik RFA1 (A/B)** allows continuous one-button tuning over a relatively large frequency range, thanks to its microprocessor design without the need to manually switch between ranges or to change antenna modules. An illuminated LC display is installed for display purposes. The reception voltage of the built-in ferrite rod is amplified with a low-noise amplifier (SFET/OpAmp cascode) and output to a standard 50Ω BNC connection. A quality multiplier circuit allows the bandwidth and output level to be varied. The antenna is designed for indoor use in very noisy surroundings.

It can either be supplied with power autonomously from an installable battery, a DC hollow pin socket or via the HF cable. Using the power supply via the cable allows for remote control of the tuning and quality setting from a control unit or suitable receivers. The housing is made of robust ABS with an anodized and printed aluminium front panel.

The coil of the ferrite rod and the electronics are shielded internally. The main reception range with high reception levels includes the LW, MW and lower SW range. The antenna voltage decreases steadily in the higher SW range. To improve reception in this range, an auxiliary antenna (rod, short wire) can be connected, which acts as a tuneable, selective 'electrical' antenna.

The RFA1 operates with 55g of ferrite material. When compared with other ferrite antennas, the use of material and the achievable frequency range must be considered. Especially when used in a low-noise environment, the internal noise of the RFA1 can be higher than the external noise, and other designs may deliver better results. The aerial is also available as an outdoor version (RFA1B).

<https://reuter-elektronik.com/>  
 [This aerial will be reviewed next month -Ed.]

## Etón Satellit

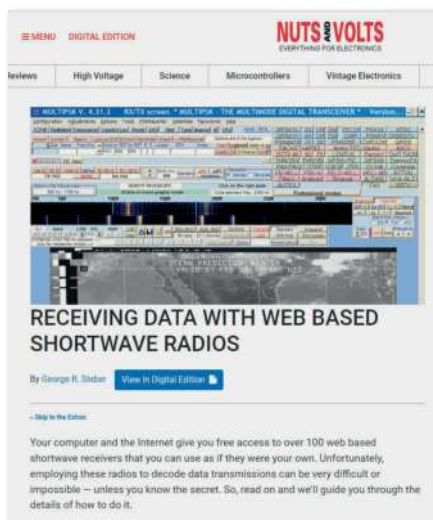
From Troy Riedel, via the *SWLing Post* and *Etón*, comes news that *Etón* has now placed a splash-page image of the new *Elite Satellit* (above) on their home page. There is no further information yet and the splash page simply links to their current production shortwave models. It does, however, show that *Etón* is committed to producing the *Elite Satellit* this year. (Source: Eton | SWLing Post | Troy Riedel).

<https://tinyurl.com/2p8u5vam>  
<https://etoncorp.com>

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# Magazine Panorama

An occasional overview of some of the contents covered in selected radio and hobby newsletters



**Asian DX Review**  
(Indian DX Club International – February 2022)  
Texas Radio SW, Tonga Volcano, Indian Radio, and more.  
<http://www.idxci.in>

**Benelux DX Club Bulletin**  
<http://www.bdxc.nl>

**C. Crane Catalogue 2022**  
<https://tinyurl.com/5f9z7ds>

**DX Fanzine (Italy)**  
<http://www.dxfanzine.com>

**Medium Wave Circle**  
e-Medium Wave News: British Broadcasting Before the BBC, DX Detectives, WRTH, Ofcom Proposal.  
<http://www.mwcircle.com>

**Nuts & Volts Magazine**  
Receiving Data with Web-Based Short Wave Radios (via SWLing Post).  
<https://tinyurl.com/2p8r6hwa>  
<https://tinyurl.com/3bddyz33>

**British DX Club 'Communication'**  
(ISSN 0958-2142) (Vol. 567, February 2022)  
Short Wave Scene in Utah, TECSUN Radios, Collectors' Corner.  
<http://www.bdxc.org.uk>

**ENIGMA2000 Newsletter**  
(Issue 128, January 2022)  
[www.enigma2000.org](http://www.enigma2000.org)

**Radioworld**  
(2nd February 2022)  
Audio-Streaming, Emergency-Alert System.  
<https://tinyurl.com/2tscbhkt>

**Radioworld**  
(19th January 2022)  
Reviews: C. Crane CC SkyWave SSB, Sangean ATS-909X2.  
<https://tinyurl.com/59an438m>

**Monitor (ISWL)**  
(Vol. 70 Number 12, December 2021)  
Realistic DX100, QSL Cards, Logs and more.

**New Zealand DX Times**  
(January 2022)  
<http://www.radiodx.com>

**Radioworld e-Book**  
Spectacular Radio Studios  
<https://tinyurl.com/4t5h74ju>

(SOURCES: Radio Kurier | SWLing Post | Online For a and Facebook-Groups).



Georg Wiessala

wiessala@hotmail.com

The editor takes a look at two new publications by RadioUser writers and columnists: *The UK Airband Frequency Guide 2022*, by Rick King, and the *Air Traffic Control Handbook*, by David Smith.

### UKAFG: UK Airband Frequency Guide 2022

UKAFG 2022 begins with very useful listings of UK Civil and Military Air Traffic Control (ATC), European ATC, and Common Airband Frequencies before launching into the Civil and Military Airports A-Z, which is accompanied by some very convenient maps, showing, for example, area maps, refuelling areas, transmitter sites and flight corridors.

The subsequent *Airports by Region* sections is your one-stop quick guide, depending on where you live, and should, naturally, be read in conjunction with the listings in the rest of the book.

The *Frequency/channel Search* section is at the heart of this publication and ranges from 118.0250 (p. 54) to 399.975MHz (p. 89) – easy to use and access.

At 154 pages in length, the 2022 edition of UKAFG is a full 30 pages longer than last year's handbook.

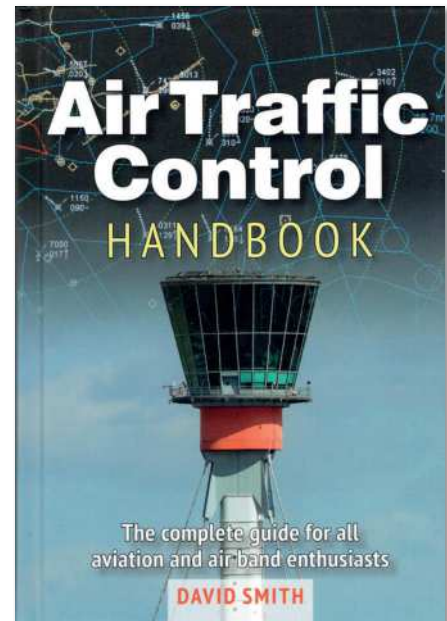
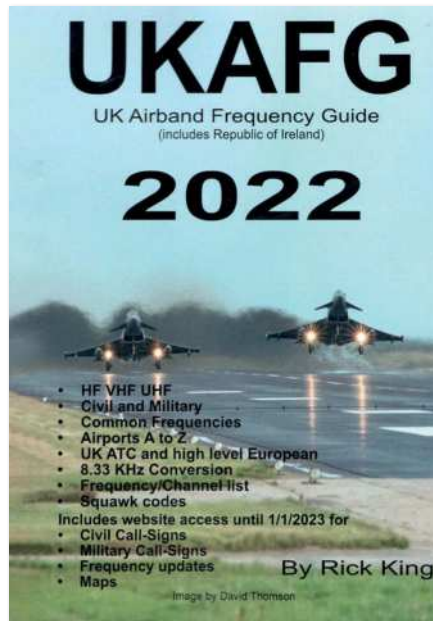
This is owing to the very welcome re-introduction to this guide of HF content, which now takes two forms: *HF by Group* (for instance, *Calling & Distress*, *HFGS ALE*, *MWARA*, *North Atlantic NAT-A*; from p. 90) and *HF Frequency Search* (from p. 105), both of which add detailed and reliable frequency information for the MilCom and general enthusiast.

The guide is rounded off by some ancillary tables, for instance on *Channel-to-Frequency Conversion* (8.33kHz), *Squawk Codes* and – above all – *Abbreviations*; these alone would be of great value to followers of David Smith's *RadioUser Airband News* column (see also below).

The relevant 'Q' Codes are here, and more besides.

I have followed these publications since their 2020 publication and have never been disappointed. This helpful guide – and its online offers, services and additions – are well worth your while, and your pennies. The 2022 version, for example, includes website access (until 1 January 2023) for information on civil and military callsigns, frequency updates and maps.

All in all, for the airband monitor, here is a quick, reliable and thorough guide that you



## A Jargon-Free Airband Bonanza

will want to have in your shack, and which is also extremely handy to take on any visits you might plan to airports and airfields, airshows, museums and aviation weekends away or radio rallies.

### Air Traffic Control Handbook

This is the most recent (11<sup>th</sup>) edition of a publication, which was published for the first time in 1986, under the name of *Air Band Radio Handbook*. The author, and *RadioUser* regular, David Smith, has subdivided the book into two principal sections, covering, respectively, the fundamentals of Air Traffic Control (ATC) and the radio- and communications-related aspects of this topic.

The reader may either approach the book reading it in sequential order from cover to cover or consult selected chapters, with the help of the table of contents or the many comprehensive indices and lists. For radio enthusiasts and airband monitors, one of the many advantages of this book lies in the de-mystification of the prevalent airband communications business jargon and phraseology. This is achieved deliberately and unambiguously throughout the volume, which, in turn, makes you get so much more out of airband listening.

In **Part One** of the text, the interested

UKAFG – UK Airband Frequency Guide 2022 (Includes Republic of Ireland)

By Rick King

£16.95

[www.ukafg.co.uk](http://www.ukafg.co.uk)

*Air Traffic Control Handbook*

By David Smith

Manchester: Crécy Publishing Ltd.

ISBN 9781910809990

£18.95

[www.crecy.co.uk](http://www.crecy.co.uk)

reader can learn about the technicalities of ATC, ranging from Visual and Instrument Flight Rules (VFR / IFR), types of airspace, navigational aids and ATC equipment systems, to matters of area, aerodrome and approach control, to a detailed focus on London Airports and the intricacies of Oceanic Control. Other chapters in this first part of the book are, for example, about flight information and ground services. It is in these chapters, in particular, that the explanations of the words and phrases in common use are useful and pave the way to the radio contents offered in Part two of the volume.

The section on *Weather and Air Traffic Control*, such as VOLMET, SIGMET, METAR & Co, will be of enhanced interest to many

Fig. 1: Pages from UKAFG 2022. Fig. 2: A map page from the Air Traffic Control Handbook.

airband enthusiasts, since so many of us monitor aviation weather forecasts regularly, myself included.

As in all other areas of the book the information presented here is richly illustrated with clear and detailed maps and photographs, and right up-to-date, as you would expect from this author.

Part One continues by covering, in much detail, *Airfield Visual Aids, Ops and Procedures*, such as for noise abatement and low visibility, and *Emergencies and Unusual Circumstances*, including the 121.5 and 243.0MHz distress frequencies, and, in the next chapter, *Unlawful Interference (Hijacking) and other Exceptional Events*.

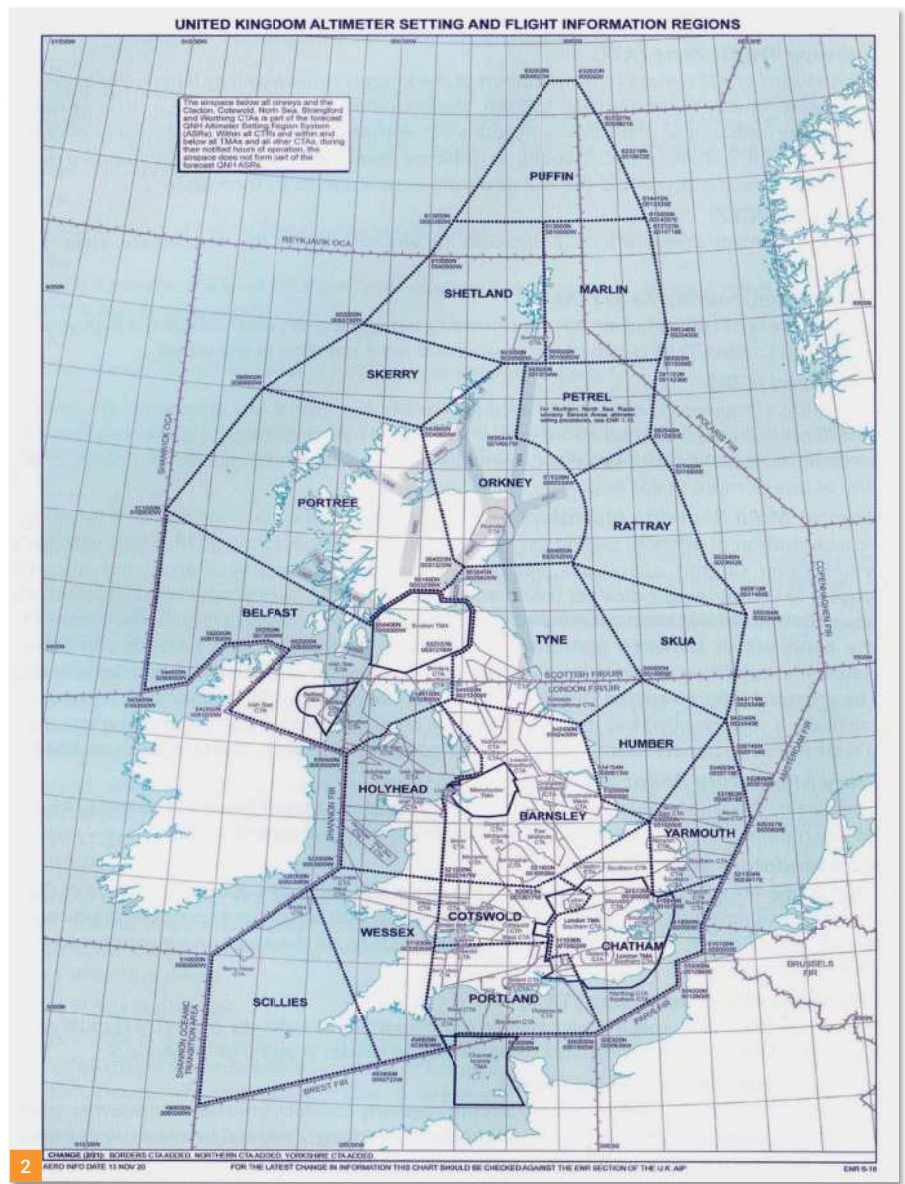
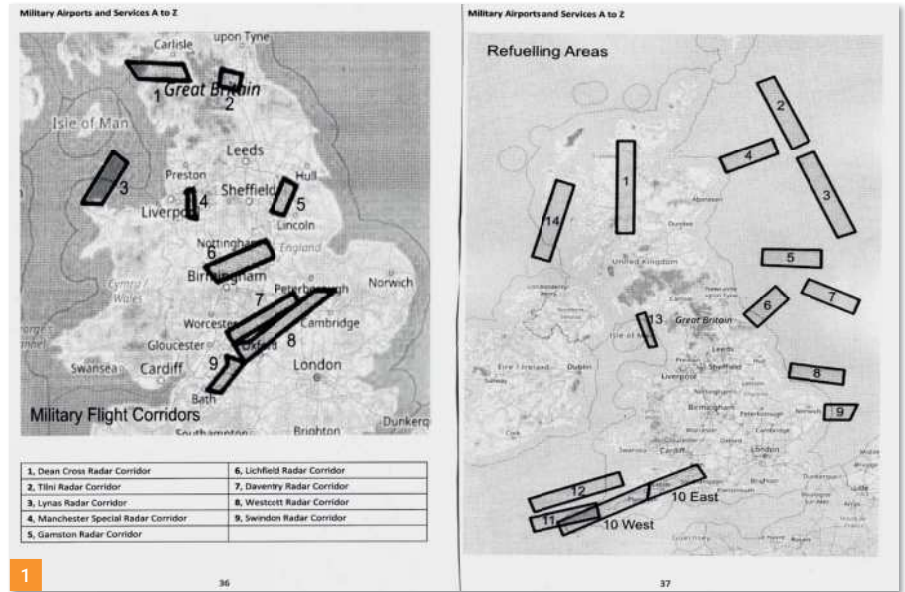
The first half of the book is then rounded off by a look at *UK Military ATC*, once again including maps, a new chapter on *Drones and ATC*, and some hints and tips on a *Career in ATC*, drawn, no doubt, from the author's long experience in this field.

**Section Two** of the book then goes on to cover the radio-related aspects of aircraft monitoring – starting with some legal reminders (*airband listening is illegal for the unlicensed*) and again some jargon-busting, relating to such terms as you will often read in the *Airband News* column in *RadioUser*, like 'QNH', 'QFE', 'Squawk', and a few others. The chapter on *Airband Scanners* is introductory, and all the radios introduced here are physical radios, not Software-Defined Receivers (SDR).

*Virtual Radar* is covered well, including its online variations, and the chapter on *Charts and Official Documents* is one that you may choose to scan-read first in this book. The same goes for the dedicated sections on *ATC Terminology, Phraseology and Aviation Jargon*, which many of you may choose to read in conjunction with the wealth of lists and glossaries distributed throughout this comprehensive volume.

If you are a military airband monitoring enthusiast, you may wish to turn to Chapter 24, and the HF Monitoring scene is briefly covered in the subsequent chapter, followed by the Appendices.

These are not to be skimmed, by the way; I found the listings of *Beacons and Reporting Points, Area Control Channel (Frequency) Allocations and VHF / UHF Airband Channels* (both as an A-Z and in numerical order) indispensable. Other appendices unlock *ICAO Aircraft Type and Company Designators, Aircraft Radio R/ Callsigns, UK SSR Code Assignment Plan,*





"Since reading about the *Air Traffic Control Handbook* in *Radio User*, I could not wait for this to become available. Over the years, I have had the 2015 and 2010 editions, as well as more books by David Smith: For example, the (1986) *Air Band Radio Handbook*, which showed the Signal 8.535 Scanner. I once parted with this, and I am now regretting this. What is more, the 1995 edition showed the Sony PR080 handheld scanner. All these books over the years have had truly wonderful info of informative detail. I promptly ordered this new 2021 edition as soon as *Radio User* arrived at my home QTH; this was something to really look forward to because, in my view, the author puts more than one hundred per cent into anything he writes. The quality and nice hardback feel are well worth the £18.95 from Crécy Publishing.

The book is printed in Bulgaria. The 25 chapters are very well documented, and the title benefits from the added bonus of some appendixes. For instance on Airband Channels, Callsigns and several other aspects. The entry for London City Airport includes the information about a Remote Tower Controller – certainly a very new option, as David has outlined in his *RadioUser* columns recently. There are some extremely good colour plates. I much prefer these to just ordinary black-and-white ones. Overall, this is a truly wonderful book. It must have taken David Smith many hours to check the details, so I say a very big thank you to him.

As a footnote, I have been very interested in anything relating to Aviation for many years, and I used to enjoy monitoring *Concorde* when she left Heathrow. I plotted this plane across the Atlantic with various receivers and recorders. Presently, I use various makes of receivers and handhelds, my favourite being the Uniden Bearcat 75XLT. I have owned various *Signal Communications* models over the years and still manage not to part with my Signal R537 handheld with Crystals."

Anne Reed

hamreed@blueyonder.co.uk

[See also Anne Reed's article on 'WaveHawks, Nomads & Airmasters: Some Scanning Memories', in *RadioUser*, June 2021: 27-29 – Ed.]

**Table 1: *Air Traffic Control Handbook 2021 – A User Review* by Anne Reed.**

and present a *General Index* for the whole of the book.

If you are getting the impression by now that there is a huge wealth of information here, easily available at the fingertips of the airband enthusiast, then this is exactly the kind of message I wanted to convey. There is not a lot on matters ATC and Airband monitoring that you will lack knowledge of when you have finished reading this text, which, in addition to this, also manages to be extremely readable, excellent value for money, and readily accessible to the non-specialist.

A great reference and permanent shack companion.

Table 1 contains a summary of a review of this book, sent to me by our friend, and occasional *RadioUser* contributor, Anne Reed. Thank you, Anne!

## Radio News

### RADIOCENTRE'S TUNING IN NORTH EVENT RETURNS TO MANCHESTER:

*Radiocentre* has announced its first *Tuning In* event for 2022 will take place in Manchester on the morning of 29th March 2022. *Tuning In North* will be the industry body's first in-person event outside London since the start of the pandemic and you can book a free place via the website, below.

Taking place at the *Everyman Manchester*, *Tuning In North* will be a chance for radio stations, brands and agencies from areas across the north of England to come together face-to-face and hear about the world of radio and audio in 2022 and beyond.

The event will provide attendees with new *Radiocentre* insight into what big data tells us about radio advertising effectiveness, discussion of the important role radio plays in powering the northern economy and the latest on how technology is driving the sector forwards.

A full list of speakers will be announced in the coming weeks. *Radiocentre* previously visited Manchester in September 2019, where nearly 300 delegates heard from speakers including Take That's Howard Donald, Mayor of Greater Manchester Andy Burnham, Hits Radio breakfast Show host Fleur East as well as case studies from media agencies and presentations from radio stations. *Radiocentre* CEO Ian Moss said: "I have been getting out and about to hear directly from those working in radio and advertising throughout the country and am delighted we are heading to Manchester for our first formal event of 2022. We look forward to reconnecting with our friends in the North and sharing all the latest developments in the world of radio and audio."

(SOURCES: Radiocentre | RadioToday)

<https://tinyurl.com/52jfjwtn>

**RAJAR Q4 2021:** Over a billion hours of radio were consumed in the UK over the last three months of 2021 according to the latest RAJAR results. The data shows 89% of the population – 49.5 million adults – listened to live radio on average for 20.3 hours per week. Commercial radio increased its share of listening time to 48%, up from 47.1% in Q3 2021, while BBC share fell back to 49.9% from 50.9%. The total commercial radio audience is now 36.77m, just shy of its biggest ever audience of 36.8m in the last quarter.

Total digital listening now represents

64.4% of all radio listening. This is mainly accounted for by DAB at 42.5%, (down from 43% last quarter) but also online (including smart speakers) is now 16.9% (down from 18.1% last quarter) of all listening time. The remaining 5.1% is listening on digital TV (up from 4.7% last quarter). Listening via AM/FM has increased slightly from 34.2% to 35.6%. Another interesting stat is that 51% of people with a smart speaker claim to listen to the radio weekly, with 21% saying they listen to the radio on it every day. BBC Sounds had a total of 162m plays to on-demand radio and podcast content, and 5.2m plays of music mixes.

On third-party platforms, there were 257m downloads of BBC podcasts and on-demand radio programmes across the world. The new data shows that 40 million adults, or 72% of the population aged 15+, now tune into digital radio every week, with strong growth seen across several digital stations compared to Q3 2021 including Capital DANCE, which grew by 106% to reach 592,000 listeners; Smooth Radio Chill, which grew by 19% to reach 449,000 listeners; Absolute Classic Rock, which grew by 10% to reach 980,000 listeners; talkRADIO, which grew by 20% to reach 542,000 listeners; Absolute Radio 70s, which grew by 36% to reach 421,000 listeners; and Magic Chilled, which grew by 11% to reach 263,000 listeners.

These stations join a host of established digital-only stations which continue to perform strongly, including the most popular digital-only station BBC 6 Music with 2.604 million listeners, and KISSTORY, the most popular commercial digital-only station, with 2.301 million listeners.

BBC Radio 4 Extra is the third most popular with 1.889 million listeners, followed by Virgin Radio with 1.620 million listeners. Other stations in the top 10 digital-only stations include Absolute 80s (1.605 million listeners); Planet Rock (1.396 million listeners); Heart 80s (1.326 million listeners); BBC Radio 5 live sports extra (1.218 million) and Absolute Radio 90s (1.026 million).

Digital listening in the car now accounts for 50.6% of all in-car listening, with DAB in car accounting for 45.8% of listening and online/apps listening in-car accounting for 4.8% of all in-car listening.

(SOURCES: RAJAR | Digital Radio Today | Mediatel News | Radio Today [...]).

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

<https://tinyurl.com/2p84d2nh>

<https://tinyurl.com/2p8u2vnd>

<https://tinyurl.com/48pptw6>

David Harris  
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David Harris closely inspects this year's crop of the principal listening guides for the international radio enthusiast and SWL: *The Radio Listener's Guide*, *Worldwide Listening Guide* and *World Radio TV Handbook*.

### The Radio Listener's Guide

One of the hardest things about choosing a new FM/DAB radio is finding impartial reviews of products. One can Google the brand name and model number of any radio, but virtually all online 'reviews' are posted by retailers who simply reprint the manufacturers' original publicity.

Fortunately, since 1989, Clive Woodyear has been publishing the annual *Radio Listener's Guide*, which has listings and reviews of over 100 clock radios, portable FM/DAB radios and desktop radios, along with some smart speakers. The 2022 edition lists radios from £20 up to £2,500. Each radio is given a star rating from 1 to 5. The domestic radio market in the UK is dominated by Roberts and Pure, but RLG also offers ratings for some lesser-known brands, such as VQ, Goodman and Tivoli.

This publication contains in-depth reviews of more than 20 radios and speakers, which have been launched in the last year. I would have no hesitation in recommending RLG if it was just a consumer guide to radios.

However, it is much more than that.

The first section, which comprises news about radio in the UK, will certainly be of much interest to *RadioUser* readers. There is a decent summary of the *DCMS Digital Radio and Audio Review* (published in October 2021) which was generally ignored by the mainstream media.

This review put on hold any plans to switch off FM in the UK until at least 2030. The news section also has updates from media regulator OFCOM and listener research organisation RAJAR. Furthermore, the RLG also provides information about the gradual switch-off of AM stations and the relentless takeover of commercial stations by media giant Bauer.

The RLG serves as an excellent introduction to new technology, as it contains some helpful articles on Smart radios, Internet radio, music streaming, radio Apps, podcasts, and *Spotify*.

For those of us who just like to switch on a radio and tune around, the RLG provides many pages of coverage maps showing lo-

# Trip Advisors for Radio: The 2022 RadioUser Review of Listening Guides



*Radio Listener's Guide (RLG) 2021*  
Clive Woodyear (ed.)  
162 pp. (£7 + £2.50 postage)  
ISBN 9781871611335  
[www.radioguide.co.uk](http://www.radioguide.co.uk)

cations of AM, FM and DAB transmitters.

There are also some comprehensive listings by both frequency and station name for every BBC, Commercial and Community radio station in the UK. This is supplemented by a four-page section devoted to radio in the Republic of Ireland. Last year, Ireland became one of an increasing number of countries to switch off DAB. The country has decided to stick (very sensibly in my mind) with its comprehensive FM network.

Moreover, some people now listen to the radio via their television. Therefore, the RLG shares full listings of radio stations you can access through Freeview, Freesat

and Sky. RLG also furnishes information on many media organisations and links to radio manufacturers' websites.

If your main interest is listening to UK radio, then the RLG is the most comprehensive publication on the market; at only £9.50, including postage, it is something of a bargain.

Well done Clive in producing the 33rd edition of this great little book.

### The Worldwide Listening Guide

The *Worldwide Listening Guide* was first published in 1996. In recent years, it has become a bi-annual feature. The book is divided into several sections: *Radio Platforms*, *The Big 6 Broadcasters*, and *Consolidated Programme Listings*.

The book is illustrated with many pictures and descriptions of old Grundig world band radios. John kicks off by describing the current radio scene in North America where listeners can choose between AM/FM, AM/FM(HD) (which is mainly found on car radios), Short Wave, and SiriusXM satellite radio (again mainly used in car radios). He also acknowledges the increasing importance of internet-based live-streaming services and podcasts. In the USA, AM radio is in decline. However, it still manages to support 4,533 stations.

FM is the preferred broadcasting format, and, in many areas, this band is becoming increasingly crowded. In the US, the frequencies used in Europe for DAB are not available, and car drivers have enthusiastically embraced the multi-channel offerings of Sirius which has 34 million users (see Tim Kirby's excellent article on SiriusXM in *RadioUser*, January 2022: 60-62).

If you are a keen Medium Wave DXer based in UK/Europe then this book provides a wealth of information about the AM band plan in North America. The WLG has

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a full-page listing of over 150 stations that operate with 50kw both day and night, plus a directory of the North American 'X' band (1610-1700kHz stations).

John also points the reader to the numerous online resources dedicated to 'Ultralight DXing' and 'Graveyard DXing'. 'Ultralight' is DXing using a small portable radio, whilst 'Graveyard' is listening for low-power stations that broadcast on 1230, 1240, 1340, 1400, 1450, and 1490kHz.

There is an interesting article on radio formats in the USA here. It shows that *Country* is the most popular (2,200 stations), followed by *Religion* (2,045), *News/Talk* (2,002), *Contemporary Christian* (1,289) and *Variety* (1,257). There are 1288 Spanish stations; a reflection of the big Hispanic community in the USA.

The Short Wave section lists the 13 countries with English broadcasts that target North America. This is down from 58 in 2000, although many US DXers will be able to hear stations targeting other areas.

The author also writes about the 10 privately run shortwave stations in the USA, which transmit mainly religious programming.

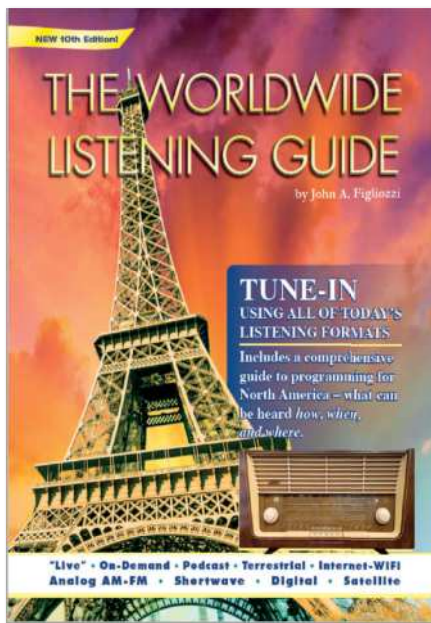
In the section on the 'Big 6', the author turns his attention to the national broadcasters: BBC, ABC (Australia), CBC (Canada), RTÉ (Ireland), RNZ (New Zealand), and the USA's National Public Radio (NPR).

John, like many American writers, has great respect for public broadcasting and one can sense his regret that US commercial radio, "tends to dampen creativity and experimentation in favour of what's been found to be tried and tested" – Imagine how we in the UK would feel if the only radio stations we had were the ones owned by Global, Bauer and the Murdoch group.

The final 100 pages of the book are taken up with the *Consolidated Programme Listing*, which is a carefully curated hour by hour-by-hour pick of the best of global broadcasting, drawn mainly from the Big 6 broadcasters. Most of these programmes need to be accessed online. John writes with great enthusiasm about radio. In my opinion, this book would be a useful addition to any radio enthusiast's library.

### World Radio TV Handbook (WRTH) 2022

Like many *RadioUser* readers, I was saddened to learn that WRTH 2022 will be the last (76<sup>th</sup>) edition of this fine publication. I bought my first copy in 1968 and remem-



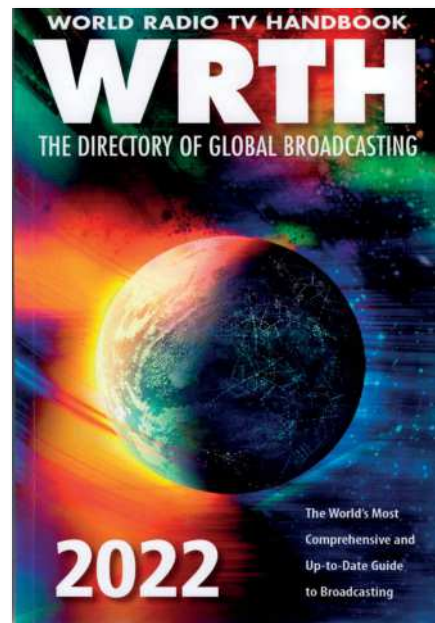
*The Worldwide Listening Guide (10th edition)*  
John A Figliozi.  
Master Publishing, USA. 2021.  
168 pp. Spiral bound pbk. (c. £23.27)  
ISBN 9780945053002  
<https://tinyurl.com/2p8evd75>

ber coming home from school, switching on my Vega VEF-10 world band radio and browsing through WRTH, wishing that I could visit some of the countries and hear their radio stations.

It fuelled my desire to travel, and, in 1971, I joined the Merchant Navy. My copy of WRTH and my world band radio (now upgraded to a Grundig Satellit 210) accompanied me to South Africa, India, Canada, and many other places. I got into DXing in the late 1980s and started buying WRTH again. Since 2016, I have reviewed this wonderful publication every year for *RadioUser*.

I do hope that another publisher will take on at least some of its content. Many other annual radio directories are online or available as subscription-only publications. I believe that WRTH relied heavily on volunteer contributors and was selling mainly to radio enthusiasts, rather than to the global radio industry. Whilst there is plenty of radio related information on the internet, there is no single website or publication which offers such comprehensive information about radio and TV stations in every country of the world.

The *World-Radio Handbook for Listeners* (as it was first called) began in Denmark in 1946 as a result of a collaboration between



*World Radio TV Handbook 2022 (76th ed.)*  
WRTH Publications Ltd. 2021.  
672 pp.  
Pbk. £40.  
ISBN: 9781999830045  
[www.wrth.com](http://www.wrth.com)

journalist Jens Frost, and publisher Lund Johanssen. Originally aimed at the Danish market, the reputation of the book grew, and it soon had a global readership. As more television stations began to broadcast, TV listings were added to the *World Radio Handbook* and its title was changed to *World Radio TV Handbook*; soon to be known to everyone as 'WRTH'.

When Lund Johanssen retired in 1964, Jens Frost became Editor of the title and WRTH was bought by the *Billboard Corporation*, who published the music industry magazine *Billboard*. WRTH also produced, from 1963, several editions of, *How To Listen to the World*, but sales did not justify a continuation of this title, and the articles were later absorbed into WRTH.

During the 1970s, WRTH continued to increase in size, as many new radio and TV stations came on the air. In 1978 Jens Frost persuaded Larry Magne to write a regular article in WRTH reviewing and testing the latest short wave receivers. This was always the first page of WRTH that I turned to when I received a new edition.

There is nowhere on the internet where unbiased independent reviews of short wave radios can be found.

If you are contemplating spending hundreds, or even thousands, of pounds on

a radio, you will need such guidance. I do hope that one of the short wave websites or possibly an organisation like EDXC can take on this role and produce an up-to-date guide, perhaps something like Trip Advisor for Radios?

WRTH moved offices to the Netherlands when Jens Frost retired, and in 1994 *Billboard* became part of the VNU Group. In 1998, the current owner/publisher Nicholas Hardyman took over WRTH, and the title has been published in Oxford ever since.

I do urge you to buy WRTH 2022, as it is bound to sell out and become very collectable. Although radio stations do come and go, much of the information in the new edition should be of use for many years to come.

If you are a member of BDXC then their monthly magazine, *Communication*, will also offer updates about short wave stations around the world and European MW stations.

Moreover, the *Radio Listener's Guide (RLG)* and *Global Radio Guide (RadioUser, February 2022: 14)* will continue to be amongst some of the key publications on British and International radio stations and broadcast transmissions (Review: *RadioUser, February 2022: 14*).

What is more, WRTH 2022 offers some very interesting articles on *HF Transmitters, Radio in Lesotho, Over 75 Years with My Radio by Ullmar Qvick, Technical Monitoring at VOA, and the History of KTWR* on Guam.

There are also some concise equipment reviews of the Icom IC-705, Sangean ATS-909x2, Tecsun H-501, and Tecsun PL-330.

As usual, WRTH has around 400 pages of information about almost every domestic radio station in the world, from Afghanistan to Zimbabwe. Short wave radio broadcasting refuses to die, and WRTH provides us with over 50 pages about international broadcasters. Add to this frequency listings for Short Wave and Medium Wave (by Continent), plus a section on terrestrial TV broadcasters, time signals, maps and DX Clubs.

Since 1946, this has been the only comprehensive source of information on global broadcasting.

It will be sorely missed.

### Further Resources

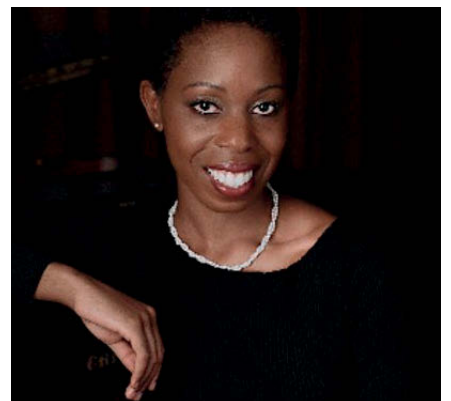
Pennington, A. (2022): 'World Radio TV Handbook 1947-2022' *BDXC Communication*, No. 566; January 2022: 16-19 (ISSN 0958-2142).

## Radio News

**BBC MAKES SOME RADIO PROGRAMMES EXCLUSIVE TO SOUNDS FOR 28 DAYS:** The BBC is making a small number of its on-demand radio programmes available exclusively inside the *BBC Sounds* app. The programmes from Radio 4 or 5 Live will be exclusive to *BBC Sounds* for 28 days before being made available on other audio platforms through the RSS feed. Some podcasts have been operating like this for a while now, but this is the first time the BBC is forcing listeners to use its own app to listen to certain programmes after they have aired. Over the following weeks, listeners will start hearing about new episodes of *In Our Time, Desert Island Discs, Inside Science, Friday Night Comedy, Money Box, and 5 Live: All About Sport* being on Radio 4 or 5 Live and *BBC Sounds* first. The archive won't be affected by these plans. Mary Hough, Head of Content Discovery for *BBC Sounds*, says it gives licence fee payers even more value so people can discover more content: "The world of audio listening is constantly changing, and the global tech giants are more routinely publishing content exclusively on their platforms. We want to make sure people can easily find new things from the BBC and can't rely on other platforms, who have their own exclusive content and a global catalogue to promote, to do this for us. We're doing this as a trial to see what the impact is on listening on *BBC Sounds* and we hope listeners do use this as an opportunity to try out *Sounds* and discover and enjoy more brilliant BBC audio. We know people have established ways of listening to on-demand audio but we also know many people already use multiple apps and platforms to listen to their favourite content. *BBC Sounds* is improving all the time and now has lots of features which we know are popular with listeners such as allowing people to continue listening between different devices, to pause and rewind live radio, and improved ways of recommending something new to try." Yesterday, the BBC released figures for app usage saying *BBC Sounds* has recorded its most popular quarter yet with a total of 364 million 'plays' of all content across radio, podcasts and music mixes. (SOURCES: BBC | RadioToday).

<https://tinyurl.com/ysnb5z29>

**DIVERSE COMPOSERS:** More music by composers from varied ethnic backgrounds is to be featured on BBC Radio 3. New research on the *Diverse Composers* scheme run by the station and the Arts and Humanities Research Council (AHRC) unearthed neglected orchestral and string quartet repertoire by Joseph Bologne Chevalier de Saint-Georges, Margaret Bonds, and Ali Osman. Now, the station is all about expanding the classical canon through new



commissions and unearthing those from the past that might forever be lost without a platform for audiences to discover them. Launched in Autumn 2020 with a call out for expressions of interest from academic researchers, the scheme aims to expand the breadth and diversity of what is accepted as belonging to the classical music canon, recognising and celebrating Black, Asian and ethnically diverse composers across the centuries. The seven researchers who were awarded funding in Spring 2021 are currently unearthing pieces of music that have been rarely performed, and at times are not commercially available as recordings. The upcoming Afternoon Concert presents the first results of the BBC Radio 3 and AHRC collaboration, with a further concert scheduled to be broadcast in Autumn 2022. Alan Davey, BBC Radio 3 Controller, says: "BBC Radio 3 is all about expanding the classical canon through new commissions and unearthing those from the past that might forever be lost without a platform for audiences to discover them. "We're grateful to the Arts and Humanities Research Council for supporting us and enabling us to take steps to ensure that unfairly forgotten figures are welcomed again into the Western classical canon for future generations." The programmes will be introduced by Tom McKinney and Linton Stephens. (SOURCES: AHRC | BBC Radio 3 | RadioToday). <https://tinyurl.com/4zap9hrj> <https://ahrc.ukri.org>



David Smith

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**A** cutting-edge Air Traffic Management System is now operational at RAF Shawbury, following a £1.5 bn contract, set to transform air traffic management for the UK military. Shawbury is the first RAF station to benefit from the technology, which is designed to ensure safe and resilient military flying operations.

The contract aims to integrate and support innovative equipment with the existing infrastructure. Variations will be implemented at more than 60 Ministry of Defence (MOD) sites in the UK and overseas by 2024, including Cyprus, Gibraltar and the Falklands.

The equipment provides controllers with improved situational awareness to enhance flight safety, digital upgrades, including touch screen communications, clearer radar pictures, and improved flight information. All of this will be available on upgraded controller consoles. The contract was awarded to *Aquila Air Traffic Management Services Ltd* – a joint venture between Thales and NATS – in 2014.

The programme, known as *Marshall*, provides improved reliability, quality of service and cost savings. The system includes a £400 million investment in advanced surveillance radars and a wide range of sophisticated equipment, such as tower systems, new surveillance and navigation aids, plus radios. As the first unit to transition to full operational service, Shawbury ATC are delighted with the new system, having worked hard over the past year to render it operational.

### Proposed Airspace Change to Enable Drone Operations from RAF Fairford

In order to support NATO's *Agile Combat Employment* concept, the USAF is making significant infrastructure investments on air bases in the UK and other allied nations.

<https://tinyurl.com/5ean26hf>

There is an emerging requirement for military aircraft, including Remotely Piloted Aircraft Systems (RPAS), to operate regularly from RAF Fairford. Following CAP 722 – *Unmanned Aircraft System Operations in UK Airspace-Guidance and Policy, Beyond-Visual-Line-of-Sight (BVLOS)* operations require either a CAA-approved *Detect and Avoid (DAA)* capability, or they must remain within a block of airspace that is separated from other users. The aim is to establish



## On Air Marshall, Fello'fly and Wake Energy Retrieval

**David Smith** features some significant changes in RAF Air Traffic Management, and he reports on future drone operations from RAF Fairford, fuel-saving by formation flying, and comms at RAF Odiham ATC.

suitable, segregated, airspace to facilitate RPAS transition between RAF Fairford and medium- or high-altitude transit.

At this early stage, it is assumed that airspace changes will be required within the vicinity of Fairford, but it is not known whether these will be restricted to the vicinity or whether changes will be required at greater distances from the base. The proposal will affect airspace users in a large area of the busy airspace around Fairford, with little detail known at this stage about the proposed RPAS operating altitudes.

For this reason, the MOD has elected to select its aviation stakeholders from an area within a radius of approximately 30 miles from Fairford and to use the *National Air Traffic Management Advisory Committee (NATMAC)* as a practical means of broader engagement.

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

### Airbus A350s Save Fuel By Flying In Formation

Airbus has demonstrated how flying across the Atlantic in formation can

save a considerable amount of fuel. On 9 November 2021, two Airbus A350 test aircraft crossed the Atlantic in formation, flying from Toulouse to Montreal. Throughout the flight, the two aircraft saved over six tons of CO<sub>2</sub> emissions – the equivalent of over 5% fuel savings for this flight.

Airbus has developed flight control systems that position the 'follower' aircraft in the wake updraft of the 'leader' aircraft, allowing the one behind to reduce engine thrust and thereby reduce fuel consumption. It is the same concept as used by large migrating birds flying together in a distinct V-shaped formation.

The next step is to gain approval from authorities so that this new operational concept can be certified and enable airlines to reduce fuel burn. Airbus says that it has received a strong level of support for this project from airlines, ATC, and regulators. The aim is to get what Airbus call 'Fello'fly' deployment for passenger aircraft around the middle of this decade.

<https://tinyurl.com/2p9ej5bm>

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In the context of current operations, aircraft are directed by ATC to enter transatlantic airspace at a specific time and altitude, via a designated oceanic clearance point. Pilots then use the flight management computer to direct the aircraft to arrive at the designated point at the specified time and altitude.

In the case of two *Fello'fly* aircraft, ATC will direct them to arrive at the same point but on two different flight levels separated by 1,000 feet. Under the rules of today's airspace and procedures, this is the closest aircraft can fly together.

Once both *Fello'fly* aircraft have reached the clearance point, they will collaborate to manoeuvre into the rendezvous position, which is when the 'follower-aircraft' is 1.5 nautical miles behind the 'leader-aircraft' and separated by 1,000 feet. From here, pilots will use flight assistance functions to move the aircraft safely to a position in the updraft where it is saving fuel through wake-energy retrieval.

When both aircraft need to separate to head to their destinations, one aircraft will reposition itself into the spare flight level and inform ATC, which will again start identifying them as individual aircraft within the ATC system. This is certainly an amazing concept, but is it practical in the real world?

Presumably, it works if the same type of aircraft are crossing the ocean since different aircraft types have different cruising speeds. However – unless the two aircraft belong to the same airline – how would any cost savings be split, given that one aircraft is essentially saving the other one fuel? Another major problem would appear to be the effect on passenger comfort both from ingested fumes from the lead aircraft and the turbulence created by its wake.

Whether so-called 'wake energy retrieval' will ever be adopted in this way remains to be seen.

This month's aviation photograph is of a British-based *Harvard* in wartime training colours, seen at an air show near the 'beer-town' of Plzen (Plzeň, Pilsen) in the Czech Republic.

[A wealth of information on many of the topics covered in this column, now and in future, can be found in the 2022 edition of David Smith's **Air Traffic Control Handbook** (Crécy Publishing Ltd.; ISBN 9781910809990). This book is reviewed elsewhere in this issue - Ed.]

<https://tinyurl.com/mr2jj3vu>

## RAF ATC Profiles 11 Odiham

ICAOxw Code: EGVO IATA Code: ODH

Frequencies	(MHz)
Odiham Approach/Radar	275.450; 131.300
Odiham Director	313.375
Odiham Talkdown	245.625; 123.300*
Odiham Tower	267.400; 119.225
Odiham Ground	339.825

\* NATO Common Frequency. Available on request only.

### ATIS

Odiham Information	370.750
Nav aids	ILS/DME CAT I; Runway 27 TACAN ODH
	109.600
Runways	09 (1839 x 45m)
	27 (1839 x 45m).

### Notes (A-Z)

#### Circuits

All fixed-wing visual circuits to the south of the runway are to be flown at 1,500ft QNH (QNH refers to the Current Atmospheric Pressure at Sea Level: Smith, 2021: 131). There is no deadside.

#### Disused Runway

Use restricted to ground and hover manoeuvres by Odiham Helicopters and light aircraft only.

#### Helicopter Operations

North of Runway - Northern Grass Helilands

Helilands 090/270 560 x 45m

Helilands 050/230 445 x 45m

Helilands have three Departure Points (DPs)/ Landing Points (LPs) aligned parallel with the runways and defined by surface markers.

Approaches should be made to the nearest LP for the Heliland in use, provided that this does not involve overflying other aircraft. The upwind marker is the helicopter departure point. Helicopter circuits variable north and south. No deadside.

#### Military Aerodrome Traffic Zone (MATZ)

A circle 5nm (nautical miles) radius up to 3,000ft above aerodrome level with final approach stub aligned on Runway 09.

#### Military Instrument Departures

Compton 09 and 27, HAZEL 09 and 27.

#### Operational Hours

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

#### Precision Approach Radar (PAR)

The PAR will not be used on Runway 27 outside 12nm and 15nm on Runway 09.

#### Transponders

To enable correct operation of Chinook Traffic Avoidance Systems, and in compliance with local agreements, all visual circuit traffic at Odiham should squawk 3647, Mode C suppressed when within the MATZ and not above altitude 1,500ft AMSL (Above Mean Sea Level). Aircraft without the ability to suppress Mode C should squawk Mode A only.

#### VFR Departures

Aircraft are to climb ahead to 1,000ft QNH, then turn the shortest way on to desired outbound Sector heading, continuing the climb to 1,300ft; QFE, Helilanes (Via Hook and British Rail East/M3 East) and VFR East departures should be flown not above 1,300ft QNH or as directed by ATC. Helilane departures (via British Rail East/M3 East) are to inform ATC whether a VFR or Special VFR transit is required before departure.

#### Warnings

Glider operations on weekends and public holidays, operating within the confines of the Aerodrome Traffic Zone to the base of controlled airspace. Outside ATC operational hours, contact Kestrel Base on 119-225. If there is no answer, contact Farnborough Radar on 125.250MHz. Traffic carrying out instrument approaches to Runway 27 will pass approximately 2.5nm south of Farnborough Aerodrome at 2,500ft QNH. Radar services will be limited due to the proximity of Farnborough and possible unknown departing traffic. Known areas of non-transponding high traffic density exist to the west and south-west of Odiham, 2 - 15nm. Standard separation may not be achieved between aircraft climbing out of and positioning inbound to Odiham and other aircraft, due to the proximity of adjacent airfield instrument and visual circuits. The Runway 09/27 Operational Readiness Platforms are out of bounds to all aircraft due to the poor condition of the surface and unfirm manhole covers.

Enter our competitions at [www.radioenthusiast.co.uk/competitions](http://www.radioenthusiast.co.uk/competitions)



**Chrissy Brand**

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**L**istener interaction and audience participation have always been the mainstay of any broadcaster. Public and commercial radio are accountable to boards of directors and regulatory bodies. Potential advertisers need to know the demographic that a station targets. Just as importantly, listeners need to interact and inform programme producers and station decision-makers as to what they think of programme content, technical quality and the overall 'listenability' of a radio station's output. This model can generally be applied the world over.

I started 2022 by musing on two different styles taken by two well-respected international broadcasters: one a giant, the BBC, the other a small operation that punches above its weight, Radio Emma Toc World Service.

**Emma Toc Live!**

Radio Emma Toc World Service first came into being as a Restricted Services Licence (RSL) station in Essex, named *Chelmsford Calling*, over 20 years ago. It went on to become an innovative short wave broadcaster with a loyal, international, audience. It remains under the auspices of Jim Salmon, a keen radio enthusiast.

The latest innovation comes in the shape of a live video stream from Jim's home studio, aired over *Mixcloud Live*. The inaugural live transmission, on 28th December 2021, went swimmingly, with plenty of live interactions in the form of messages from viewers in North America, Asia and Europe.

Radio Emma Toc programmes always pack a lot of variety and content into each broadcast. The short wave incarnation offered trance music, vintage comedy, and an affectionate glimpse of radio's early days. Shout outs and answers to listener questions have formed another part of the programme, and it all works out very well.

The video stream version fully utilised the opportunities of the medium. The first show included video clips and features, such as a tour of the WRMI transmitter facilities in Okeechobee, Florida.

Jim is a natural broadcaster. He is at



# Audiences, Espionage and Intrigue

**Chrissy Brand** looks at a radio station that has turned to video and another one that only airs podcasts. She also enjoys a glorious drama series set on a short wave transmission site.

ease behind the microphone, and, with the addition of video, he looks calm and in control in front of the camera. He is one of that band of people who make broadcasting and video calls appear easy. The reality is that it is far from straightforward to talk coherently, maintaining an interested and interesting tone of voice, to be able to adlib and segue, all while sounding natural, as if talking to a friend.

Check out the Radio Emma Toc website for details of the latest broadcasts, and to watch past transmissions.

[www.emmatoc.org](http://www.emmatoc.org)

[emmatoc1922@gmail.com](mailto:emmatoc1922@gmail.com)

**Take Your Seat**

The format for recording programmes, whether in-person or watching online, is similar around the world. I say that, having experienced recordings in Europe and the USA (Figs. 1 and 2). I joined the audience in person for a Český rozhlas morning programme in 2019 (*RadioUser*, February 2020: 28-32) and *Hear to Slay*, "the black feminist podcast of your dreams", in Los Angeles (*RadioUser*, January 2020: 54-56).

[www.heartoslay.com](http://www.heartoslay.com)

It is understandable that, for practical reasons, it is often mostly local audiences who are attending recordings. But this

Fig. 1: A recording of a Czech radio programme in front of a live audience. Fig. 2: Waiting for the *Hear to Slay* podcast in downtown LA. Fig. 3: *Podcast Radio*: an expanding UK radio station showcasing global podcasts. Fig. 4: The *Hobbycast* is one of many podcasts to be found on *Podcast Radio*. Fig. 5: A photo of the (now-abandoned) RARET site in Portugal.

can make them a little too exclusive. The pandemic has forced broadcasters to open up recordings of television and radio shows to wider audiences that can be located anywhere, provided you have a reasonable internet connection.

I joined the virtual audience for a special edition of the BBC World Service's *Arts Hour*, broadcast on New Year's Day. It is rare for the programme to be recorded in front of a live audience but, considering the programme content was stand-up comedy, it helped create an appropriate atmosphere. Comedians from Kenya, India, Mexico, Japan and other countries entertained a global audience, thanks to the good use of both internet and broadcast technology.

The hour-long programme was presided over by regular host Nikki Bedi, along with South African comedian Tumi Morake. I am sure I was not alone in feeling privileged to be able to hear a cross-section of humorous styles and witticisms from a handful of comedians around the world. You can hear the programme online.

[www.bbc.co.uk/programmes/p016tmg0](http://www.bbc.co.uk/programmes/p016tmg0)

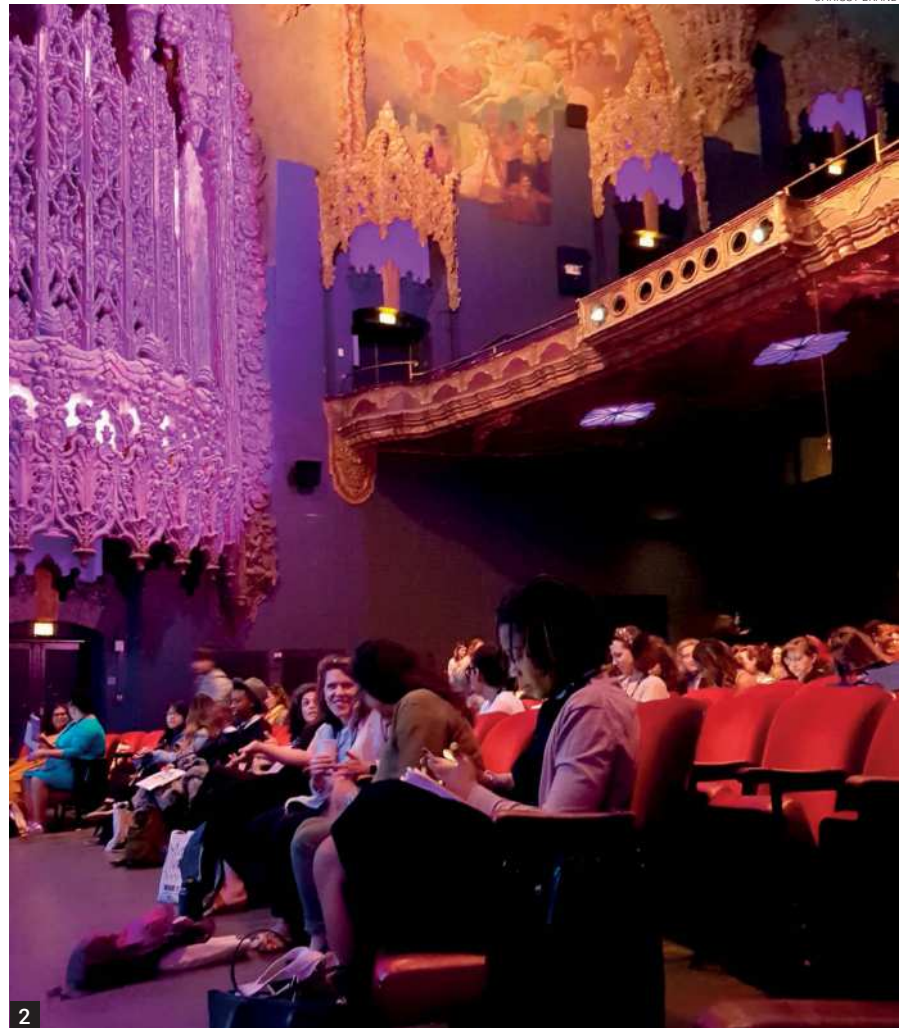
In January, I achieved a decades-old ambition, when I joined the audience for a recording of the legendary BBC Radio 4 programme, *Just a Minute*.

The late Nicholas Parsons was always going to be a tough act to follow as host but, in Sue Perkins, the BBC has chosen well. She has an engaging level of self-deprecation and humour, as well as being strict enough to keep the often wayward panellists under control.

[www.bbc.co.uk/programmes/b006s5dp](http://www.bbc.co.uk/programmes/b006s5dp)

*Google Chrome* is the required internet browser to log onto the BBC's *Audience Recording System*, while the broadcast is watched using *Zoom*. Audiences are asked to wear headphones, and ideally sit in a quiet space. This is to ensure that the only sounds picked up on your microphone are laughter and applause, and not the sounds of children squabbling or washing machines whirring.

Local radio also makes use of studio audiences in certain programmes. I have been listening to *Anything But Coldplay*, on BBC Three Counties. It is an hour-long light-hearted music quiz, where contestants are



CHRISSE BRAND



PODCAST RADIO

allowed to play a song of their choosing when they win a round of questions. The programme made an appearance for an end of year special but is made very intermittently. Keep an eye on *BBC Sounds*.

[www.bbc.co.uk/programmes/p0b8tgsr](http://www.bbc.co.uk/programmes/p0b8tgsr)

Meanwhile, another BBC comedy stalwart launched his own podcast in

December. *Now, Where Were We?* saw Barry Cryer collaborating with his son, Bob Cryer. It was recorded in a London pub, with well-known guests. Sadly, Barry Cryer passed away on 25th January 2022. In the programme, he related stories from his 60 years in the entertainment business. <https://tinyurl.com/3ak8p9jf>

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Date	Time (UTC)	Station	Programme	Podcast	URL/Stream/Frequency
Daily	1430 to 1500	Voice of Mongolia	Mongolia news, music and tourism	<a href="http://www.vom.mn/en">www.vom.mn/en</a>	12015kHz and <a href="http://www.vom.mn/en">www.vom.mn/en</a>
Monday to Friday	1600 to 1800	WAMU and NPR	1A, a deep and unflinching look at the USA	<a href="https://wamu.org/show/1a">https://wamu.org/show/1a</a>	<a href="https://the1a.org">https://the1a.org</a> FM, SiriusXM, smart speaker, NPR app
Monday	2100 to 0000	Delite	Jazzy Noises Fusion Beat, Tee Harris, connoisseur of Jazz-funk, Fusion	<a href="http://www.deliteradio.com">www.deliteradio.com</a>	DAB (Glasgow, London, Manchester and Portsmouth) and <a href="http://www.deliteradio.com">www.deliteradio.com</a>
Friday	2230 to 2355	BBC Foyle & BBC Ulster	Folk Club with Lynette Fay	BBC Sounds App	DAB, FM <a href="http://www.bbc.co.uk/sounds/brand/b075tgm4">www.bbc.co.uk/sounds/brand/b075tgm4</a>
Saturday	Unspecified upload time	Radio Free Europe / Radio			
Liberty	Majlis Talking Central Asia, in English	Apple & Google podcast apps	<a href="http://www.rferl.org/majlis-talking-asia-podcast">www.rferl.org/majlis-talking-asia-podcast</a>		
Saturday	1400 to 1700	Radio Guyana International			
	Saturday Jump Up Show, chat and local music	<a href="http://www.mixcloud.com/radio-guyana">www.mixcloud.com/radio-guyana</a>	FM locally, station app <a href="http://www.radioguyanafm.com">www.radioguyanafm.com</a>		
Sunday	2100 to 2300	BBC Scotland	Jazz Nights with Seonaid Aitken. Concerts, artist profiles and jazz from across the sub-genres	BBC Sounds App	DAB, FM, <a href="http://www.bbc.co.uk/sounds/brand/b08m8z10">www.bbc.co.uk/sounds/brand/b08m8z10</a>
Sunday	1600 to 1900	Absolute Radio Country	The Front Porch with Baylen Leonard, roots and Americana	Absolute Radio app	DAB, Smart Speaker and <a href="https://tinyurl.com/2p88k3wz">https://tinyurl.com/2p88k3wz</a>

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

## A Podcast Radio Station

Podcast Radio (Fig. 3) is a UK radio station that plays podcasts to the world, 24 hours a day. It can be heard on the radio in Birmingham, Glasgow, Manchester and London, as well as being on all the usual podcast apps, smart speakers and streams. For example, *Deezer*, *Alexa* and *Tuneln*.

The prime objective of Podcast Radio is to showcase, "fantastic podcasts to the world. From the weirdest to the most wonderful, the biggest and the best, to the exciting and unheard gems awaiting your discovery. The network combines live presenters, news updates, charts, and acts as a constant source of podcast inspiration 24 hours a day. There are over two million podcasts on the planet – more than 50 million episodes to sort through. If that all sounds a bit daunting - let us do the hard work! Sit back, relax, and enjoy the ride with us."

The station curates and airs programmes in a programme schedule, just like a regular radio station. The difference is that it is relaying a constant, wide range of podcasts. For instance, on weekdays, I have heard *Art of Darkness* at 0100 and 1500, followed by *Armchair Adventures* at 0400 and 1800, and *The Hobbycast* at 0600 and 2000 (Fig. 4).

Other intriguing-sounding podcasts on the network are weekend offerings *ESC Insight* and *Private Lives*. 'ESC' stands for Eurovision Song Contest and this podcast brings backstage news, interviews and songs. It is presented by Ewan Spence, a BAFTA-nominated broadcaster and podcaster.

East London Radio's *Private Lives* programme hears former BBC and Disney media broadcaster, Paul Robinson, open his, "little black book of big contacts and [have] some warm conversations with some incredible musical guests."

A mix of musicians who first made their mark in the distant past has featured so far, such as Osibisa, Toyah, Jethro Tull and Heather Small of M People. Each episode runs for 58 minutes and usually features an interview with two guests.

Why is there a radio station with the sole objective of playing other people's podcasts, with little radio programme content of its own? It does seem to be a workable and financially viable model, for now. Station director, Paul Chantler, tweeted in January that Podcast Radio has big plans to expand to the USA and Australia this year.

In addition, radio critic Gillian Reynolds stated in her *Sunday Times* column last year that, "Podcast Radio has found its place on the dial because of its investors' belief that, with millions of podcasts to choose from, people will trust radio to discern ones worth hearing."

[www.thepodcastradio.co.uk](http://www.thepodcastradio.co.uk)  
<https://shows.acast.com/the-hobbycast>  
<https://tinyurl.com/bdvr9z5z>

## Glorious Glória

The Portuguese village of Glória do Ribatejo may be familiar to some readers. From 1951 to 1996, it was the location for a USA broadcast centre, RARET (*Sociedade Anónima de Rádio Retransmissão*). In late 2021, Netflix released a ten-part drama



series, titled *Glória*, based on this. It is, perhaps, an unlikely marriage between a slice of Cold War broadcasting history and one of the world's leading broadcast platforms of the 2020s, Netflix. It is a co-production with Portuguese independent production company, SPI, and RTP (Rádio e Televisão de Portugal).

*Glória* has received much critical acclaim, as well as educating the world about the era of Portugal's *Estado Novo* corporatist regime. The series should appeal to all generations. Set in 1968, the clothes, cars and technology all provide a dose of 'nostalgia' for older viewers and an eye-opener into another world for the younger generation. *Glória* is well-paced and beautifully produced.

Radio Free Europe engineers, a short wave transmitter station, cocktail parties for the powerful and rural families working the land are all there in abundance. Throw in some spies, beautiful people, glamour, sex and intrigue, and the result is an enthralling series.

DIIGO MONTEIRO ON UNSPLASH



[www.netflix.com/gb/title/81073977](https://www.netflix.com/gb/title/81073977)  
[www.sp-i.pt/en/spi/about-spi](https://www.sp-i.pt/en/spi/about-spi)  
[www.rtp.pt](https://www.rtp.pt)

The series screenwriter, Pedro Lopes commented how, “This project brought an original story, not only to non-Portuguese people, who began to understand the role that Portugal played as a platform in this period of the Cold War; and also for the Portuguese, because RARET, despite being a complex of 200 hectares where 500 people worked, remains a well-kept secret throughout all these years.”

You can find footage of what the facilities look like at the abandoned RARET site today (Fig. 5) on YouTube. Meanwhile, Nelson Ribeiro of the Connecting the Wireless World Project, at the University of Bristol, neatly summarised the background to how RARET evolved: “Portugal was then ruled by an authoritarian regime led by Oliveira Salazar, known as the ‘Estado Novo’ (‘New State’). Being an anti-communist regime, it opened its doors for the installation of a major retransmission centre of Radio Free Europe in its territory, and this became the station’s major broadcasting site and the only one located outside Germany.”

This placed Portugal, “at the centre of American anti-communist broadcasting to the countries behind the Iron Curtain. As early as 1953, Raret was already operating through four different transmitters, a number that would increase to twelve in the early 1960s and that would also lead to an

expansion of the staff working in Portugal, namely engineers and translators – It seems that during the early years a group of Radio Free Europe broadcasters were held in reserve in Portugal in the event that the feed of programmes received from Munich was interrupted for technical reasons.”

It is these Radio Free Europe broadcasters and engineers that are at the heart of the series. I cannot recommend it highly enough.

### Further Reading on RARET

*Glória: RFE’s Portuguese Launchpad Over the Iron Curtain, Radio Free Europe/Radio Liberty*, by Ken Brown, September 2021.

<https://tinyurl.com/2p9hx3d6>

‘RARET, the Portuguese-American Cold War Propaganda Transmitter’, by Pedro, August 2021, in *Ride Reports*.

<https://tinyurl.com/5b6men8m>

‘Abandoned Radio Station from The Cold War Period: RARET, Helderhugo’ YouTube channel, 2018.

<https://tinyurl.com/2p8k6cbn>

Ground-breaking Portuguese Netflix series: *The Portugal News*, 10 November 2021.

<https://tinyurl.com/2s3dzkpk>

‘Short wave Broadcasting to Eastern Europe: Anti-Communist Transmissions from a Country under Authoritarian Rule’, by Nelson Ribeiro, *Connecting the Wireless World Project*, University of Bristol, 2017.

<https://tinyurl.com/2p8aaf26>

## Radio News

**ARENA RADIO:** Arena Radio is the brainchild of national radio presenter Tony Dibbin and is backed by fellow director Paul Chantler. “This started as a lockdown project for me,” says Tony, who currently presents on the *Greatest Hits Network*, *Absolute Radio 70s* and builder’s station *Fix Radio*; “I love listening to concert performances and then I realised just how much live music had been recorded so I simply thought why not create a radio station that sounds like one big, continuous concert – and I have. There’s something about a live concert that is so exhilarating, and Arena Radio aims to capture the flavour of that.”

Paul, who has been in the radio industry for nearly 40 years and is also a director and shareholder of *Fix Radio* and *Podcast Radio*, says: “Dibbzy’s idea is a fantastic way to showcase the familiarity of big artists and well-known songs in a different live concert environment. It’s a great listen.” Since Arena Radio started online broadcasting at the end of the year, it has attracted a growing fanbase. It is now live on *UK Radioplayer*, as well as via its website, app and smart speakers via a partnership with *Aiir*.

Arena Radio plans to expand through DAB digital broadcasting and it has already started airing on DAB in Cambridge with more areas to come in the next few weeks. The station says talks are taking place with concert promoters and venues about sponsorship.

(SOURCE: Arena Radio | Radio Today).

<https://tinyurl.com/2b8ndss4>

**ASIAN NETWORK:** Twelve new presenters are joining the BBC Asian Network as part of its second nationwide presenter search. Following the launch of the initiative in 2021, BBC Asian Network has once again led the search for the best up-and-coming presenter and radio talent across the UK.

The 12 successful applicants for 2022 will have the opportunity to host a full month of Sunday night shows (9-11 pm), sharing their unique voices and music taste with a nationwide audience.

For several of the presenters, hosting on BBC Asian Network will be their first-ever role in radio. This includes influencer, model and full-time financial consultant Tanvi Shah, who will take on the first slot in March, before handing over to Luton-born rapper Versay, who has previously been supported by ‘taste-makers’, such as *1Xtra’s Target* [...].

For the full story, go to the URL, below: (SOURCES: Asian Network | Radio Today).

<https://tinyurl.com/48pptw6>

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Scott Caldwell

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**H**ello and welcome to *The Long, Medium, and the Short*. This month has been dominated by several station closures. RAI Italy (Fig. 1) has announced that it intends to terminate its Medium Wave service by the end of 2022, while Czech Radio has terminated its Long Wave transmissions on 270kHz. The broadcasts of the latter station are now on DAB+ digital, which currently serves 95% of the Czech Republic.

A number of North American stations have also followed suit (Table 1) However, despite the demise of European Medium Wave broadcasting, the USA shows that the band still offers a significant market share.

Stateside, in terms of income. *Radio Online* recently compiled a revenue league table for 2020 (Table 2).

[Some of the longer tables accompanying this article, for instance, those relating to CRI, can be found on the Radio Enthusiast website: [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk) – Ed.]

## General Medium Wave and North American DX

Reception conditions have remained quite poor here in Warrington (North-West England). The vast majority of signals have suffered from prolonged periods of fading, making definitive identifications difficult. To address this frustrating issue, it was necessary to record overnight and playback at the top of the hour, just before the news report when most stations provide a definite identification. An example to illustrate this point is WFED Washington which is identified as Federal News Radio (Fig. 2, Tables 3 and 4).

Many US stations operate on a network system, in which they are affiliated with news providers, ABC, CBS, Fox News, and so on. Therefore, some identifications are partial, making it quite difficult on frequencies that have multiple East Coast stations broadcasting on. Mike Usher (Hayes, Middlesex UK) reports that VOWR is indeed back on the air, as reported in November 2021.

## Short Wave DX Logs

Our Short-Wave correspondent, Lionel Clyne (Faversham) reports that he has received Radio Tamazuj with a very strong SINPO rating of 44444. He reports that the broadcast consisted of a mixture of news and regional music in Arabic and Juba. Radio Tamazuj serves the South-Sudanese community at home and in exile. The station welcomes comment and reception reports via



# Station Closures, American DX, and Chinese Presence

Scott Caldwell surveys the HF bands, looks at North American DX catches at this time of year, has more background details on CRI and comments on recent news concerning the World Radio TV Handbook.

[contact@radiotamazuj](mailto:contact@radiotamazuj)

Other notable short wave logs are shown in Table 5 this month.

China Radio International's (CRI) English service has been rebranded *China Global Television Network (CGTN)*. For CRI/ CGTN SW frequencies, see the additional information placed on the *Radio Enthusiast* website.

You can also consult the listings in *WRTH 2022*, the *Klingenfuss SW Guide 2022* (Figs. 5 and 6) and similar publications. Regardless of the nature of the broadcasts, in terms of freedom of speech, they represent a remarkable economic and operational commitment to short wave broadcasting.

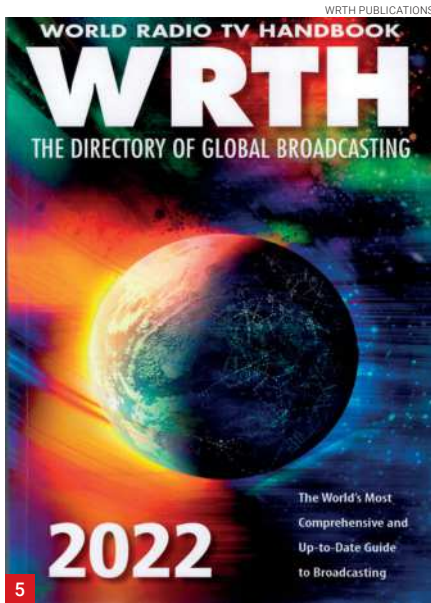
## The Final WRTH

The publishers of the *WRTH* have sadly announced that the 2022 edition will be the last one. Its editor, Nicholas Hardyman, wrote: "Having produced this book for the past 24 years, we are very sorry to announce that *WRTH 2022* will be the final edition of *World Radio TV Handbook* produced and published by *WRTH Publications*. We realize that this news will be disappointing for many people. We wish to thank you all for your loyal support over the years. Good DX and Happy Listening." It remains to be seen if a new publisher can be found for this iconic and valuable publication.

The *Global Radio Guide* is an online publication that may offer an alternative to *WRTH*

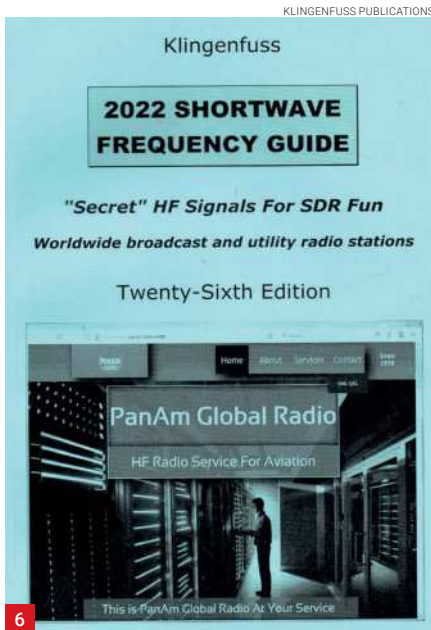


Fig. 1: No MW-Amore anymore: RAI Radio Italy has left Medium Wave. Fig. 2: WFED Federal News Radio. Fig. 3: The Tecsun PL-990x World Band Receiver. Fig. 4: The SDRplay RSPdx Software-Defined Receiver enables users to record the bands overnight and catch up the next day.



Station	Location	Revenue (Million)	Ownership
WTOP	Washington DC	\$62	Hubbard
KIIS-FM	Los Angeles LA	\$38.9	iHeartMedia
WLTW-FM	New York NY	\$30.8	iHeartMedia
WSB-AM	Atlanta GA	\$30	Cox Media Group
WBBM-AM	Chicago IL	\$29.7	Audacy
WBZ-FM	Boston MA	\$29.6	Beasley
KBIG-FM	Los Angeles LA	\$29.35	iHeartMedia
WHTZ-FM	New York NY	\$29.3	iHeartMedia
WINS-AM	New York NY	\$28.1	Audacy
WFAN	New York NY	\$28	Audacy

Table 1: USA Station Revenue 2020 (Sources: Medium Wave Circle/ Radio Online).



Frequency (kHz)	Station	Location	Closure Date
870	WFLO	Farmville VA	31st December 2021
1280	KDKD	Clinton MO	31st December 2021
1480	WGVU	Grand Rapids MI	7th January 2022
1600	KOGT	Orange TX	31st December 2021

Table 2: North American Medium Wave Station Closure Dates.

for some. It is now in its 17<sup>th</sup> edition and was previously titled *The International Shortwave Guide*. The publication is an e-book, and it retails on the Amazon platform and is included as part of the Kindle Unlimited membership. The Guide contains a comprehensive 24-hour station and frequency schedule for all the broadcast bands, making it, in my opinion, an invaluable addition to any radio shack.

### Conclusion

Until next time, 73s and good DX. Many thanks to Lionel Clyne and Mike Usher for their reception reports and logs. If readers have any news, listening tips, or reception reports/ logs, please do let me know.

[For further reading, please see **Figs. 5 and 6** and the reviews elsewhere in this issue - Ed.]

Frequency (kHz)	Station	Location	Date	Time	Power (KW)	SINPO	DXer
570	CFCB	Corner Brook NL	06/12	03:59	10/1	32222	A
580	CFRA	Ottawa	04/01	05:49	10	22332	C2
590	VOCM	St Johns NL	06/12	03:26	20	33222	A
590	VOCM	St Johns NL	04/01	06:01	20	33333	C2
660	WFAN	New York, NY	08/12	04:55	50	22222	A
680	CFTR (Pres)	Toronto ON	08/12	04:04	50	22222	A
700	WLW	Cincinnati OH	08/12	02:47	50	32222	A
710	WOR	New York NY	08/12	05:00	50	22222	A
730	CKAC	Montreal	08/12	04:00	50	33222	A
740	CFZM	Toronto	08/12	04:00	50	33333	A
740	CHCM	Marystown	16/12	01:39	?	32222	A
770	WABC	New York NY	08/12	03:39	50	22222	A
780	WBBM	Chicago IL	08/12	02:05	42	33222	A
800	VOWR	St Johns NL	04/01	06:01	2.5	33333	C2
830	WCRN	Worcester MA	08/12	03:10	50	33222	A
880	WCBS	New York NY	08/12	02:37	50	32222	A
950	CKNB	New Brunswick NB	08/12	02:17	10/1	22222	A
1010	WINS	New York NY	27/11	04:00	50	32222	A
1010	CFRB	Toronto ON	17/12	02:05	50	32222	A
1130	WBBR	New York NY	27/11	05:13	50	33333	A
1500	WFED	Washington WA	27/11	04:21	50	33222	A
1600	KVRI	Blaine, WA	10/01	05:56	10	12222	C3
1620	R. Rebelde	Cuba	04/01	06:18	5	23232	C2

Table 3: North American MW DX Logs (Scott Caldwell).

Enter our competitions at [www.radioenthusiast.co.uk/competitions](http://www.radioenthusiast.co.uk/competitions)



Frequency (kHz)	Station	Location	Date	Time	Power (KW)	SINPO	DXer
549	Radio Koper	Beli Kriz	03/01	16:05	15	44344	C2
657	RAI Radio Pisa	Pisa	12/01	15:39	100	44444	C2
891	Radio Caroline Flashback	?	10/01	12:02	?	23432	C4
963	RTT Chaîne Intl	Tunis	26/12	18:01	100	33333	C2
1314	Antena Satelor	Timișoara / Constanta	03/01	15:43	25/ 50	44344	C2
1548	Forth 2	Edinburgh	27/12	14:31	2.2	22322	C2
1575	RAI 1	Genoa	27/12	14:37	30	23222	C2
1584	Tay 2	Dundee	27/12	09:47	0.21	23443	C2

**Table 4: General Medium Wave DX Logs.**

Frequency (kHz)	Station	Location	Language	Date	Time	Power (KW)	SINPO	DXer
7390	R. New Zealand Intl	Rangitaiki	English	27/12	14:46	50	44434	C
7550	Voice of the Martyrs	Tashkent	Korean	07/01	21:33	N/A	43333	B
7600	Afghanistan International TV	Yerevan – Gavar	Pashto	03/01	17:23	N/A	53222	B
15150	Radio Tamazuj	Talata – Volonodry	Arabic - Juba	08/01	15:32	N/A	44444	B

**Table 5: Short Wave DX Logs.**

**Contributors and Equipment Used** **A** Scott Caldwell – Warrington, Cheshire UK: SDRplay RSP DX, Sony ICF2001d, Tecsun PL-990x, Wellbrook Loop (Figs 3 & 4).

**B** Lionel Clyne – Faversham, Kent UK: Lowe HF-150, PR 150 Pre-Selector, AP150, 19 m Wire, home-built Multi-Loop. **C** Mike Usher – Hayes, Middlesex UK: Elad FDM S2, Wellbrook 1530LNP Outdoors at ground level. **C2** Mike Usher- Hayes, Middlesex UK: Elad FDM S2, Antennas Wellbrook 5030 and Wellbrook FLX1530LN. **C3** Mike Usher – Hayes, Middlesex UK: Elad FDM S2, Flag Antenna 290°. **C4** Mike Usher – Hayes, Middlesex UK: Elad FDM S2, Flag Antenna 70°.

# PRACTICAL WIRELESS



**Practical Wireless** is a monthly magazine aimed at the licensed radio amateur and caters for the amateur radio hobby.

Written by expert authors and contributors, **Practical Wireless** reflects developments in the technology, participants, activities and licensing framework of the hobby, while also covering the practical and constructional side of amateur radio and appeals to all ages.

Find out more about Practical Wireless at: [bit.ly/pawi-sub22](http://bit.ly/pawi-sub22)

## Radio News

**THE DARC WEB?:** On 15<sup>th</sup> January 2022, the homepage of the German DARC (*Deutscher Amateur Radio Club e. V.*\* [German Amateur Radio Club, the equivalent of the RSGB]) became the target of a cyber-attack. The attack exploited a security vulnerability in a plugin in a *WordPress* installation. Two days later, the attack spread to the main DARC pages.

It was detected on 17<sup>th</sup> January 2022, promptly stopped and repelled. At 10 pm on the same day, the homepage from Friday's backup could be put back online [\*'e. V.' stands for 'eingetragener Verein', a 'registered association' - Ed.].

(SOURCE: *ICQ Amateur / Ham Radio Podcast* | DARC | German Hobby Press)

<https://tinyurl.com/yckhsw8d>

### AMATEUR RADIO LIGHTHOUSE

**SOCIETY:** The Amateur Radio Lighthouse Society (ARLHS) is devoted to maritime communications, amateur radio, lighthouses, and lightships. Its members travel to lighthouses around the world where they operate amateur radio equipment at or near the light. Collecting lighthouse QSLs is popular for some amateur radio operators. ARLHS is a membership organization with over 1665 members worldwide. The ARLHS was founded by Jim Weidner, K2JXW, in 2000. Key points include:

- To promote awareness of ham radio and light beacons in maintaining safety at sea;
- To preserve the heritage and history of lighthouses and lightships;
- To aid in preserving those lights in danger of destruction or decay;
- To recognize the keepers of the lights as maritime heroes;
- To foster camaraderie within the ham fraternity;
- To provide fellowship amongst nations and members of the ARLS.

(SOURCE: *RadioAmateur.EU* | ARLHS | via Bob Houlston)

<https://arlhs.com>

### CORRECTIONS & CLARIFICATIONS:

*RadioUser*, November 2021, p. 62, RH-Column; Line 7. This should read: "Please note that I have not produced [...]."

*RadioUser*, February 2022, p. 40, Middle-Column, beneath the website <https://www.raynet-uk.net> The third organisation listed (bullet-point three) should read 'Local Authority Emergency Planning Officers'. Thanks to **David Harris** for spotting this.

# European Private Shortwave Stations

## February 1st 2022

Only **legal** stations are included. Most stations use low power, but a few use several kW. Note that UTC is used here - not CET! Abbreviations used: D = Germany, DNK = Denmark, FIN = Finland, NL = Netherlands, NOR = Norway F.pl.: future plan, Int'l = International, Irr. = irregular, LT = Local time, 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	Shortwaveservice	Kall-Krekel	Daily 1500-2100
3995	D	HCJB	Weenermoor	24/7
5895	NOR	The Sea / Radio Northern Star	Bergen	Silent, but renewal of license granted
5920	D	HCJB	Weenermoor	Daily 0700-1705
5930	DNK	World Music Radio	Bramming	24/7
5940	NL	Radio Piepzender	Zwolle	
5955	NL	Sunlite	Westdorpe	24/7. F.pl.: Daily 0400-1700
5970	DNK	Radio208	Hvidovre	24/7
5980	DNK	Radio OZ-Viola	Hillerød	We 2200-2300
5980	FIN	Scandinavian Weekend Radio	Virrat	1st Sa LT of the month (22-08 & 14-17)
5990	NL	Lomp Radio	Klazienaveen	F.pl.
6005	D	Shortwaveservice	Kall-Krekel	Daily 0900-1700
6005	NL	Radio Delta International	Elburg	F.pl. - from March 27th 2022 - evenings
6020	NL	Radio Delta International	Elburg	Su 0600-1500
6055	DNK	Radio OZ-Viola	Hillerød	Sa-Su 1200-1400
6070	D	Radio Channel 292	Rohrbach Waal	24/7
6085	D	Shortwaveservice	Kall-Krekel	Daily 0800-1800 (Radio MiAmigo Int'l)
6115	D	Radio SE-TA 2	Gera	Irr. (0900-1200 UTC)
6125	NL	Radio Europe	Alphen a/d Rijn	Irr. (1400-2300 UTC)
6140	NL	Radio Onda, Belgium	Borculo, NL	Irr. (mostly 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.
7340	NL	Radio Delta International	Elburg	F.pl.
7365	D	HCJB	Weenermoor	0900-1500
7425	NL	Radio Piepzender	Zwolle	Irr. (1800-0800 UTC)
7445	NL	Radio Piepzender	Zwolle	Irr. (0800-1800 UTC)
7575	NL	Rockpower	Nijmegen	Daily
9530	NL	Radio Onda, Belgium	Borculo, NL	Irr. (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)
15700	D	World Music Radio	Randers	F.pl. - from March 27th 2022
15785	D	Funklust	Erlangen	DRM-modulation
25800	DNK	World Music Radio	Mårslet, Aarhus	24/7

This list is published by Hartvig Media ApS. each first day of the month - based on details supplied by the 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@wmr.dk](mailto:shn@wmr.dk).

Enter our competitions at [www.radioenthusiast.co.uk/competitions](http://www.radioenthusiast.co.uk/competitions)



Keith Rawlings

Keith.g4miu@gmail.com

**Y**ou will often see references made to something called an 'isotropic radiator', so let us have a look at what is it and why it is used. An 'isotropic' radiator, in simple terms, is a purely 'theoretical' radiator, which is used as a reference for measurements. It can best be imagined as a point located in outer space with absolutely nothing else around or connected to it.

The useful property of this theoretical, or 'point-source', aerial is that it radiates equally well in all directions, not favouring one direction over another, consequently, it has no *directivity* whatsoever. This *spherical* source is uniform in all directions, and its geometry is easily determined mathematically. Therefore, signal intensities at all points can be calculated from simple geometric calculations.

Physical aerial systems all exhibit some degree of directivity. By this, I mean that they have the property of radiating *more signals in some directions than in others*. A radiation pattern from a real aerial never has the same intensity in *all* directions; in fact, it may not radiate at all in some of them.

The isotropic radiator is useful as a reference value when a comparison with *actual* aerial systems is required. The image in Fig. 1 shows such as a comparison of the radiation pattern of a *directional* antenna with that of an *isotropic* one. You will often see Gain figures quoted in 'dBi', meaning gain *relative to an isotropic radiator*. A dipole is considered as having a gain of +2.14dB with reference to an isotropic radiator.

Therefore, if you have used a dipole – and you chose to replace it with an aerial that has a quoted gain of, for example, 6dBi – you will, in fact, only be achieving an extra +3.86 dB. The figures do not look quite as good, although you still would have doubled the signal.

### Dipole Variations

A dipole fed by coaxial cable is essentially a resonant, single-band device; therefore, a mismatch will develop as we tune away from resonance. This effect is more noticeable on the lower frequencies and is becoming less pronounced as we go higher in frequency. I have already covered (*RadioUser*, February 2022: 28-

# Isotropic Antennas and Dipole Variants

Keith Rawlings explains isotropic radiators, elaborates on variations of dipole aerials, such as the folded dipole and T2FD/TWFD variants and brings us up-to-date with a range of aerial modelling software.

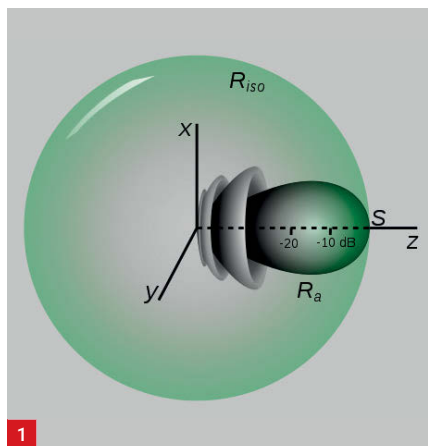


Fig. 1: Schematic of a comparison of radiation patterns of a *directional* and an *isotropic* antenna.

Fig. 2: A folded dipole. Fig. 3: Three ways to implement a folded dipole (A to C).

Fig. 4: A diagram of a T2FD/TWFD dipole variation. Fig. 5 (Top): predicted efficiency in per cent (T) and dBi gain (B) of a 47ft T2FD.

Fig. 6: Scilab Plot of an optimised Yagi.

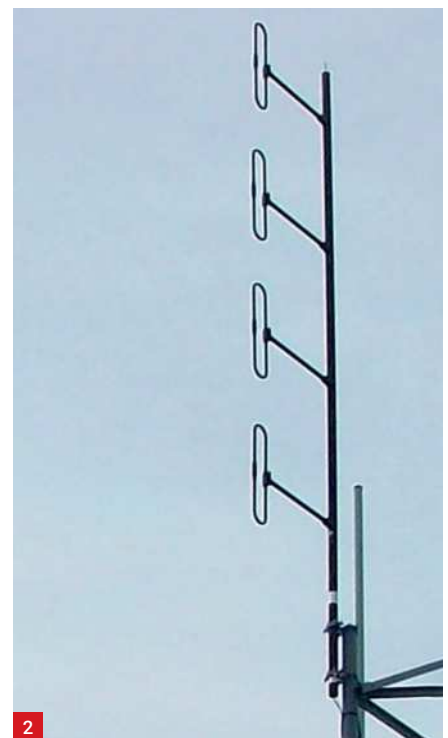
Fig. 7: An-SOF near-field simulation using Scilab.

30) how *parallel dipoles*, or a *fan of dipoles* could be used to 'broad-band' a dipole system by using multiple elements cut for bands of interest. I am sure you will not be surprised to learn that there many variations that can be made to the humble dipole to extend its bandwidth.

### The Folded Dipole

One such type is a 'Folded Dipole' which is a dipole in the form of a 'squashed' loop. They are very common, often seen on directional TV aerials and V/UHF commercial radio installations use them, either singularly or combined, for a variety of reasons (Fig. 2). The formula for calculating a folded dipole is the same for a standard one:

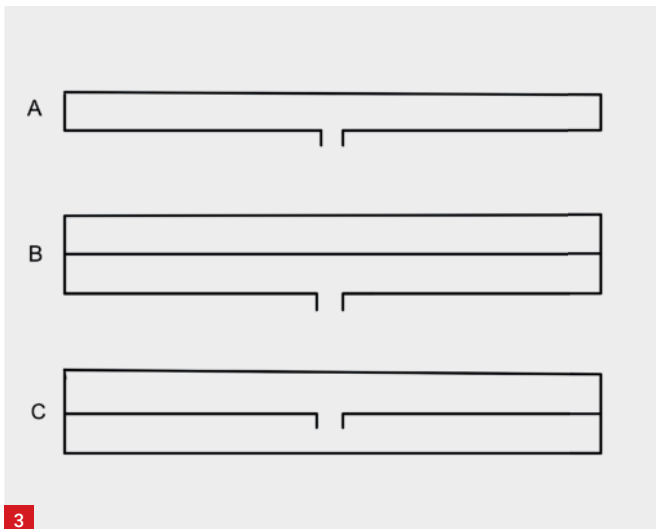
$468/f$ , where 'f' is in MHz, and the result is in feet.



150/f, for the result in metres.

The usual caveat applies: the calculations are just a guide, as several factors will affect the length of the element, such as wire diameter, local objects, and so on. Therefore, some experimentation will very likely be required. Fig. 3 illustrates three ways in which a folded dipole may be implemented. At A, you can see a dipole element consisting of a single 'loop' of wire. Designs B and C, although more complex to make, further increase the dipole's bandwidth (and input impedance).

We are not talking about huge increases in bandwidth here, and on the amateur bands of 40m and above, a simple dipole should enable efficient operation over the whole of a band, with a Voltage Standing Wave Ratio (VSWR) of 2:1 or lower, a figure



3

easily coped with by any decent Aerial Matching Unit (AMU).

For a simple dipole on the 160 and 80m amateur bands, you could, on average, expect a 2:1 VSWR bandwidth of around 150 kHz and 300 kHz respectively. A folded dipole could well give full coverage of each of these two bands. However the feed impedance of a folded dipole, as long as all conductors are of the same dimension, is in the region of 280-300Ω for the two-wire folded dipole, and around double that figure for the mid fed example 'C' in Fig 3.

Consequently, an impedance-matching transformer will be needed to match 50Ω receiver inputs. The above bandwidth restrictions mainly concern transmitting on the amateur bands. Readers who are also SWLs will find that they will be able to squeeze quite a bit more out of a basic dipole as a receiving aerial, especially if the dipole is used with an AMU before signals start to fall off. Reception is a bit more forgiving of losses. However, the folded dipole is still effectively a single band aerial, albeit with a wider bandwidth over a basic dipole.

### The T2FD/TWFD Variation

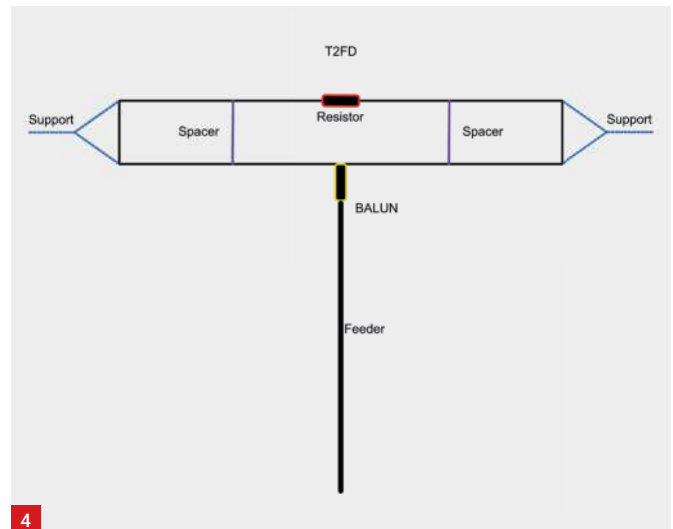
As some better weather is now (hopefully) approaching, readers with limited space, who may not have, or do not wish to use, an AMU and are looking for a change of aerial may wish to look at a useful but distinct variation of a folded dipole: This is the Broadband Non-resonant Terminated Tilted Folded Dipole (T2FD or TTFD). It has a frequency ratio of about 5:1 and is entirely practical for an SWL to implement on HF. The design originates from the United States Navy during WWII. It was

introduced to radio amateurs in 1949 by Captain Gil Countryman W3HH who was one of its original developers.

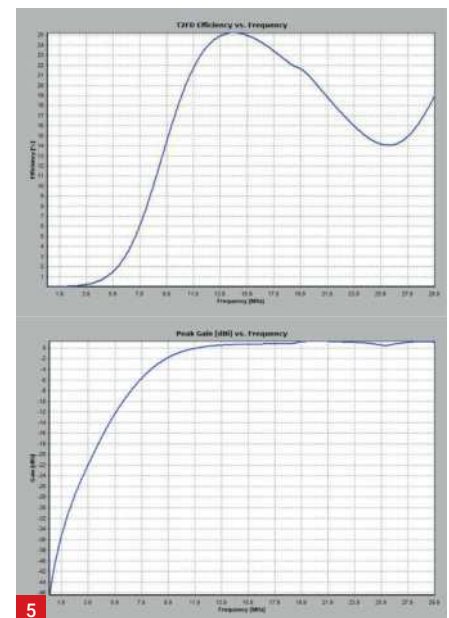
The basic design can be seen in Fig. 4, which is represented here in horizontal form as a TWFD or Terminated Wideband Folded Dipole. When constructed correctly, this design is capable of returning a VSWR of 2:1 or less over much of the HF bands. In addition to this, it has shorter element lengths than a standard dipole. When used in a 'tilted' manner – that is sloping at 30° – it requires just one support. As a variety of the *closed-loop* aerial-type, it has also been found, in some cases, to reject noise.

While this sounds fine, there are some drawbacks to the design. The input requires a BALUN at the feed point, for 50Ω operation (*RadioUser*, February 2022: 28-30). Alternatively, an open-wire feeder can be run to the shack, which is then terminated in a suitable matching circuit or balanced AMU. The inclusion of a resistor dampens the frequency response and increases the bandwidth but incurs losses as the resistor absorbs power. Hence, efficiency is lower than a standard dipole. Signals on the T2FD are likely to be lower than those of a dipole cut for a given frequency. The image in Fig. 5 illustrates this by modelling the predicted efficiency of a 47ft T2FD, shown as a percentage (at the top). Below this is a gain plot. You can see here that both gain and efficiency drop dramatically below 12MHz.

It is claimed that the T2FD variant is omnidirectional. Modelling demonstrates a high angle of radiation below 12MHz and multiple lobes on the higher frequencies. Some further modelling of a 110ft version lowers the figures presented above by about 4MHz. As an SWL, I built one for



4



5

reception years ago, after first seeing it in my copy of the 1972 edition of *Amateur Radio Techniques*, published then by the RSGB. This was 47ft long, and I think I used a 430Ω resistor. At the time I had no means to check the matching but I found it worked well as a receiving aerial.

An accepted formula for calculating the T2FD is as follows: Take the lowest frequency of operation (f) and use  $100/f$  (or  $\lambda/3$ ) for the overall length; for the wire spacing use  $3/f$  ( $\lambda/100$ ). The calculated length is in metres. Thus, for 7MHz,  $100/7=14.2$ m long;  $3/7=430$ mm for spacing (figures rounded up). I have seen values for the non-inductive terminating resistor quoted as 300,400,650,500 or 850Ω. This should be rated to at least 33% of the input power to the aerial when transmitting (e.g. 33W or more for 100W



of input).

For purposes of reception, a rating of a few Watts should be fine.

A design that uses a 330Ω resistor and 4:1 Balun can be found here:

<https://tinyurl.com/yuk4afnt>

Some further information and resources on this subject can be found at these websites:

<https://tinyurl.com/3pyc4yxx>

<https://tinyurl.com/yckykvff>

<https://wiki.acervolima.com/t2fd>

<https://tinyurl.com/bdza8ex9>

<http://www.johncon.com/john/T2fd>

<https://tinyurl.com/4h3ahe84>

## Antenna Modelling Updates.

The end of 2021 was an interesting time for aerial modellers. I appreciate that by the time this edition comes to print what follows will be a little dated. However, I feel it is still worth mentioning: As promised, EZNEC has been a free release since the 1st January 2022 in the form of *Pro/2 V6*. Roy Lewallen will now be releasing, mid-January 2022, a (final?) update of EZNEC, in the form of *Pro/2+ V7.0*. This not only has some improvements over V6; it will also be able to run both the external *NEC-4* and *NEC-5* calculating engines. These are available, at cost, from the *Lawrence Livermore National Laboratory* in the USA.

<https://www.ez nec.com/index.shtml>

There is an 'optimiser' for EZNEC called *AutoEZ*. It costs US\$79, which includes a free, limited, demo.

<https://www.ac6la.com/autoez.html>

Moreover, the popular free modelling program *MMANA-Gal Basic* was updated to V3.5.3.50 on the last day of 2021. There have been improvements, notably an increase to 10,000 segments and 600 wires. A total of 100 sources are supported, and the *Advanced 3D Far Fields* window from the *Pro* version has been added.

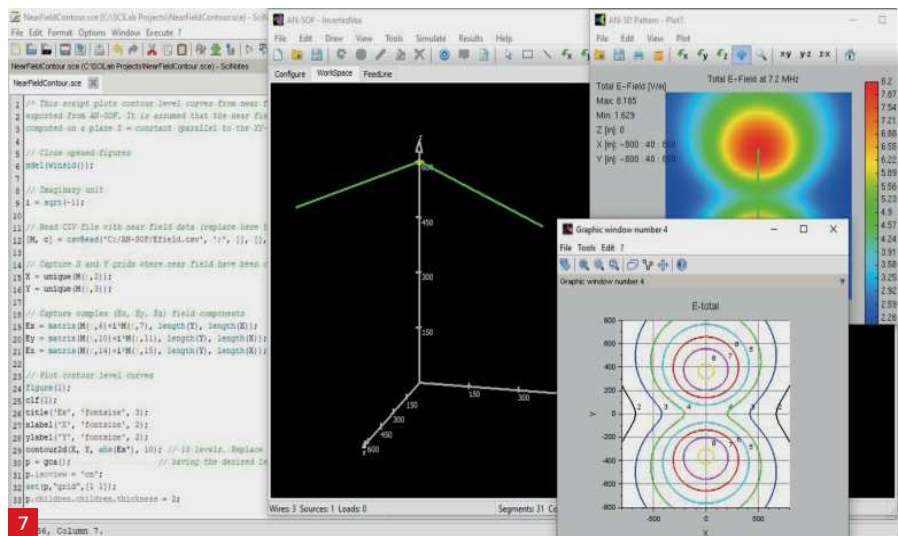
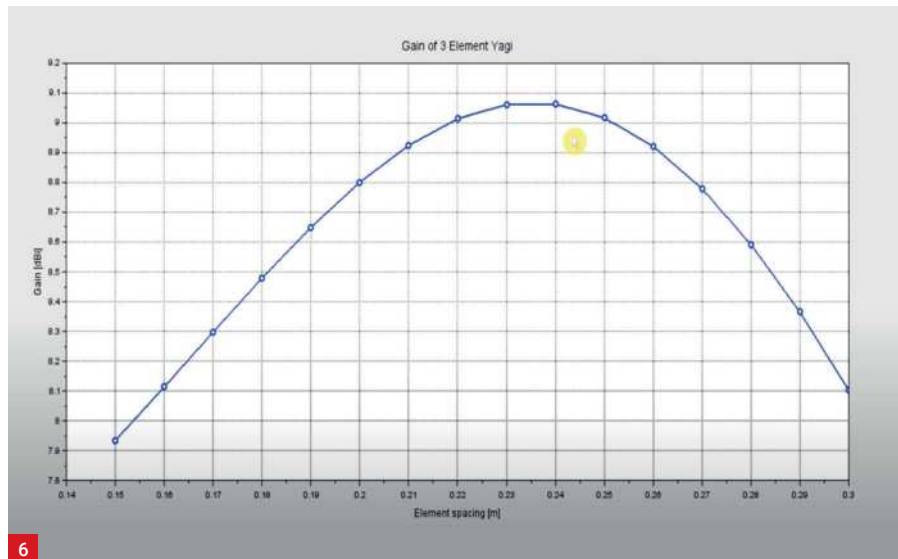
<http://gal-ana.de/basicmm/en>

<https://tinyurl.com/5f7cbcm5>

It seems that nearly every month I can report on some updates of the *AN-SOF Antenna Simulator*. In some further recent improvements, for example, users can now enter data for *linear wires, sources and loads* in *tabular* format, in a similar way to that found in other packages (such as *EZNEC, MMANA-Gal, 4NEC2*).

I have found that this makes it easier to keep an eye on the dimensions of a design as you are building it.

Users may now also zoom in and out of



a design using the mouse wheel, or touch-pad on a laptop, as well as by clicking on the zoom magnifying glass and then moving the mouse. The model may still be dragged and moved while holding the left mouse button.

Lastly, you can now see a 'recently opened' list in the *File* menu. The next upgrade, which should be available soon, will allow scripts to be written in *Scilab*, which will enable the running of multiple simulations in *AN-SOF*.

*Scilab* is a free, open-source, platform for running numerical tasks. Writing scripts such as these will allow the user to analyse and optimise their designs using any of *AN-SOF's* output parameters like *Gain, VSWR, Impedance*, and so on.

To demonstrate this advanced feature *AN-SOF* have released a short YouTube video demonstrating how descriptions of a 3-element Yagi with differing element

spacings have been processed by *Scilab*, and in what way the calculations have been plotted on a chart displaying 'gain' versus 'element spacing' (Fig. 6).

In addition to this, a working model of a 7MHz Inverted-V has also been released for use within *AN-SOF*. Here, *Scilab* is used to simulate Near Field voltages (in V/m) below the aerial (Fig. 7).

*AN-SOF* is paid-for software. I prefer using it for this column; as well as being powerful software with advanced features it enables me to generate clear plots and graphics very easily. This makes my life easier when compiling the column and enables me to give these graphics in a format that makes life easier for our editor too! Always a good thing!

See you next month.

<https://youtu.be/MMdCTzoE7QM>

<https://www.antennasimulator.com>

<https://tinyurl.com/4pvv9bfp>

WORTH  
£214.95

# Win this Sangean ATS-909X2 Synthesised Receiver



Thanks to our friends at ML&S, Martin Lynch and Sons Ltd., we have one of these fabulous world band radios with airband coverage to give away as a prize. The Sangean ATS-909X2 is a Third-Generation FM (RDS & Stereo) / Air / MW / LW / SW PLL synthesised receiver with three alarm timers, airband mode and smart battery function. We reviewed this great little radio in our January 2022 issue (RadioUser, January 2022: 28-29).

To be in with a chance of winning this fabulous prize worth £214.95, all you need to do is visit our website at [bit.ly/win-sangean-ats909xs](http://bit.ly/win-sangean-ats909xs) and answer the following multiple-choice question...

How many configurable alarm timers does the Sangean ATS-909X2 feature?  
a. 2   b. 5   c. 3

Entry is only via our website. Entries close at midnight on **31st March 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 **April 15th 2022**. Warners Group Publications Plc standard competition terms apply, to view visit [warners.gr/comptems](http://warners.gr/comptems). For information on how your personal data is processed, secured and your rights, our Privacy Policy can be viewed here – [warners.gr/privacy](http://warners.gr/privacy) or available in hard copy upon request. The winner will also be announced in the **May 2022** issue of RadioUser.

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Buy the TRX-1E for just **£419.95**



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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
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**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

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### 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!

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#### 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.

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### 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**



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### 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.

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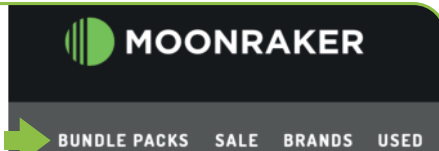
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**Chrissy Brand**

chrissyLB@hotmail.co.uk

**T**he BBC is celebrating its 100<sup>th</sup> Anniversary in 2022, as most readers will already know. My *RadioUser* colleagues Keith Hamer, Garry Smith and David Harris will be covering this landmark event elsewhere in this magazine, and throughout the year. Moreover, a spate of new book and article publications will mark the event, as will, quite rightly, many programmes and podcasts, both by the Corporation and about it, produced from within and without.

One book that hit the shelves in January runs to 650 pages, and I am sure will be reviewed in *RadioUser*. In *The BBC: A People's History*, professor and historian David Hendy, "traces the BBC from its maverick beginnings through war, the creation of television, changing public taste, austerity and massive cultural change." [N.B.: This publications will be reviewed in the April 2022 issue of *RadioUser* – Ed.]

Like many public broadcasters around the world, BBC funding comes from service users paying a licence fee. In January, however, the Secretary of State for Digital, Culture, Media and Sport, Nadine Dorries, announced a freeze in the licence fee (which is currently £159) until 2025 and the scrapping of the licence fee altogether at the end of 2027. The latter announcement was later rolled back on, but it is unclear as to the form of any future funding models.

This is not a new debate, as the licence fee has been a – sometimes controversial – topic, pretty much ever since the British Broadcasting Company Ltd., as it was then known, first took to the airwaves in 1922.

[see, for example, the article by Tony Smith, *RadioUser*, December 2021: 24-28 – Ed.]

### Licence to Thrill

A radio licence fee was introduced through the *Wireless Telegraphy Act* of 1923, where radio users had to pay the equivalent of 50p per annum. With the rise in popularity, availability, and affordability (often through rental schemes with high street electrical stores, such as *Radio Rentals*) of television after World War Two, a revised, combined radio and television licence was introduced. This cost £2 a year in 1946, and a debate ebbed and flowed for decades, especially once BBC was no longer the UK's sole



# Aunties Here and Down Under: How Public Radio Stays Relevant

In the first of a new two-part mini-series, **Chrissy Brand** examines the BBC funding model and notes significant broadcasting anniversaries at both the Beeb and the ABC in Australia.

broadcaster. The stage of that licence debate culminated with the radio licence being scrapped in 1971.

We now live in a very different world, with a media landscape that could barely have been imagined 50 years ago. The BBC licence fee generates approximately £3.75 billion (year ending March 31st, 2021) and, for that, nobody can deny a huge and varied range of services are provided.

However, there could be an argument put forward that the Beeb overstretchers itself. Should it concentrate on documentaries and features, and drop the light entertainment and light, pop music that can be found elsewhere? Could much of BBC

One's quiz and reality TV programming be sold to ITV or other stations? Is much of the BBC Radio Two musical output replicated already on the Absolute and Gold stations, Boom Radio and Caroline?

As you can see, this is a controversial subject area.

Depending on how you count them, there are at least six television channels, 21 national radio channels (when you include the Radio One derivations (*CBeebies*, *BBC Scotland*, *Wales*, *Cymru*, *Ulster*, *Foyle*, and *nan Gàidheal*), two apps to stream all output, dozens of regional and local radio stations, plus podcast content that is not aired on radio.

CHRISSY BRAND



2

CHRISSY BRAND

**Fig. 1:** Music radio of many genres, and from diverse artists, emerges from BBC Broadcasting House on a regular basis.

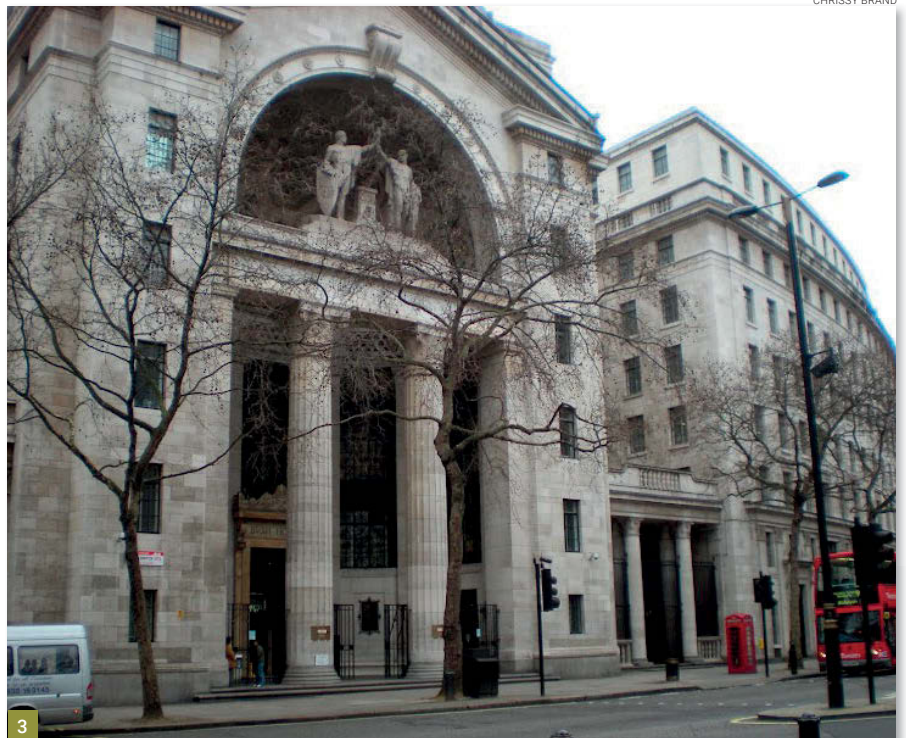
**Fig. 2:** *La Lune* on a BBC *Introducing* stage. This is a part of the BBC that might well be under threat if licence fees should end.

**Fig. 3:** Bush House in London was home to the BBC External Service from 1940 until 2012.

**Fig. 4:** 'Radio Australia', spelled out in Morse code on a QSL card.

I would conclude that the BBC gives good value for money; perhaps a large part of the problem is that whilst it has content on all the necessary platforms (including social media), its core audiences are mostly older generations. Many younger people, and some other demographics, only access services or programmes of the BBC, such as the *BBC Introducing* programmes and concerts, championing new acts (Figs. 1 and 2).

However, BBC radio has remained extremely relevant for a century now, serving hundreds of millions around the



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world. In 2022, this may be in the form of a BBC Radio 1Xtra listener accessing a clip on *Snapchat* or *Tik Tok*; wider afield, it could be concerned citizens monitoring the BBC Ukrainian and Russian services for the latest over Russia and the West's fighting over Ukraine.

### Possible Solutions

Radio 'futurologist', James Cridland, wrote an interesting blog post in January 2022 about how the BBC could be funded in the future. He effectively advocated using the model that is employed in Sweden for Sveriges Radio. In essence, this would be a 1% tax, reduced for those on a low income, and capped at €128 per person.

<https://tinyurl.com/bdhufja5>

In Italy and Germany, the licence fee for public broadcasters has, occasionally, decreased in recent years. In Italy, the payment for the state broadcaster is made as an integral part of each households' electricity bill.

This intriguing and highly workable solution, along with many others, can be found in the publication, *Funding Public Media, an insight into contemporary funding models*. Written by Mervyn Warner. This is an authoritative tome, published by the Public Media Alliance. This organisation is, "the largest global association of public media organisations. Its members are those that communicate daily and free of charge through TV, radio and online with the 2.5 billion citizens living in the 54 countries that our members serve. The Alliance provides a global context for public service broadcasters as they transition into the digital era. It works to identify, research and champion common themes in PSM and provide forums for debate and networking."

<https://tinyurl.com/2p8r26az>

Speaking on BBC Radio 4, veteran broadcaster David Dimbleby suggested that perhaps the way forward could be for a BBC fundraising fee to be included in council tax bills. This would be a fairer method, he opined. People in lower-rated and lower-valued properties, such as flats or terraced housing would, therefore, pay less than those living in detached houses or mansions.

<https://tinyurl.com/5n8wnm7r>

My solution would be to introduce a subscription service that comprised options of several different packages. Other broadcasters, like Sky, have long done this. To use me as an example, I would willingly pay a monthly fee, in the same way I do for *Netflix* and *Apple Music*. I would choose



the option of paying for some BBC radio stations, including The World Service, Radio Four, Radio Six and some local radio stations. My preferred option for television would be on a pay-as-you-go basis, to stream certain programmes or series.

However, this idea could fall at the first hurdle though, as FM radio is free, and I would not want to see certain stations requiring a log-in (although *BBC i-Player* currently requires that). Perhaps this model could only work once everything radio is by streaming-only, and FM and DAB are no longer in use?

Another funding option is, of course, advertising. *YouTube* is free to watch but you can pay for a premium service without any advertisements. Many decades ago, I held the opinion that BBC Radio One and Two might carry advertising, in the same way the BBC World television channel does.

However, this year I have heard a very valid argument against the Beeb going down the advertising route. The main one is that it would decrease revenue for commercial radio and television, as there are not enough organisations able to pay



for the amount of advertising required which would sustain both commercial sectors and the BBC.

I think advertising on the high-status BBC might attract new companies to the advertising world, but I am no expert.

The BBC licence fee was the first and was a workable model for many years, leading the world, just as much of its programme ethos and content did.

In 2019, Sally-Ann Wilson, CEO, Public Media Alliance, succinctly summarised the financial situation for all state broadcasters, "To survive and thrive, public media needs secure and stable funding. In an increasingly crowded digital media space, public media needs to change to maintain political and public funding support. It is perhaps time to engage in a critical debate about what is essential and realistic in terms of funding for public media."

## World Services

In December, BBC World Service will mark its 90th anniversary (in the December 2022 issue I will write more about that). In earlier incarnations, it was known as the *Empire Service*, *General Overseas Service* and *External Services*. This is the part of the BBC, which first gained the corporation's global reputation as a trustworthy source, mainly through its reporting during World War Two and throughout the following four decades.

The BBC World Service was previously funded through a Parliamentary grant-in-aid, which was ended in 2014/15 when it had to compete with an already fully-stretched pot of licence fee income. However, it has survived and even introduced additional services.

The Australian Broadcasting Corporation (ABC) equivalent to the BBC World Service was Radio Australia. For years, it aired in many languages to most parts of the globe, on short wave. (Fig. 4). Today, its international aspirations are restricted to

broadcasts in the Pacific region. While it is understandable that ABC should concentrate on targeting its nearest neighbours, broadcasts that were aimed wider afield would be appreciated.

There is a wondrous amount of high-quality content available from the ABC website. Many streamed programmes provide valuable insight. I can feel like you are sitting amongst locals, soaking up Australian culture, features and Aboriginal issues. In addition to this, it is pleasant to get involved with news stories that take over whole countries but rarely ever break national borders.

Yet, I always feel that a country with an impoverished international public radio service, unable to give a voice to its diverse populations and introduce the world to sights and sounds, is missing a trick.

In my view, this is more the fault of the governments than public broadcasters; it causes most countries to operate in a rather lacklustre manner, through this approach to international relations.

## An Australian Auntie

The ABC is affectionately known as 'Auntie' – mostly by listeners of more mature years – just as the BBC is. There appears to be no one clear reason for why this moniker applies. Some surmise it goes back to the early days of radio, when children's presenters were known as uncle or auntie, and seen as cheerful, extended family members.

Others refer to the BBC and ABC's once stern overtones, implying that "Auntie knows best". Other reasons have been discussed online, for instance, at *The Guardian's Notes and Queries* column, back in 2011.

<https://tinyurl.com/yc58tpv6>

The ABC is celebrating its 90th anniversary in 2022, and there have already been several programmes celebrating the station's history. Last August, in a

50-minute programme. *The History of Auntie* was discussed on the *Nightlife* programme. Philip Clark spoke to former producer and presenter on Triple J, Lawrie Zion, Professor Bridget Griffen-Foley from Macquarie University, and veteran sports broadcaster, Charlie King.

<https://tinyurl.com/575xj72j>

ABC's current annual report is well worth reading. It offers insights into how the public service organisation runs today, and there is a look back to previous milestones and achievements. The ABC was allocated \$1,065.3 million in the October 2020 Federal Budget and also received \$53.3 million of income from other sources, including ABC Commercial during the year.

The *ABC Listen* app is not available in the UK but streaming from the website works well. Programmes of note to have a listen to include, *Science with Dr Karl*, *Ladies We Need to Talk*, and *Stuff the British Stole*.

A programme that has been running for almost 80 years, since 1945, is *The Country Hour*, which has, "covered the issues, events and stories of rural Australia - To mark the show's 75th anniversary, ABC Rural reflected on its history and looked to the future, with more than 40 audio stories and digital articles, outside broadcasts, a live cross to News Breakfast, a front-page collection on the ABC's homepage and on ABC iView, and a special episode of *Landline*."

ABC Radio has clearly moved with the times and offers listeners a relevant and real slice of society. In a recent poll for the organisation, 56% of Australians believed the quality of programming on ABC Radio was "good", while 55% of the population believed that commercial radio offered "good-quality programming".

Among the various radio services offered are *ABC News*, a national, 24-hour radio news network. National radio networks consist of RN, ABC Classic and Triple J.

Local radio stations are available from all eight capital cities, and there is also diverse regional local radio.

Digital stations include Radio4, Double J, ABC Classic, ABC Jazz, ABC Country, ABC Sport, Triple J Unearthed, and ABC Kids. Spend some time checking them out online, where they all play their part in the claim that, "The ABC is part of the national infrastructure that keeps Australia safe, aware, informed, stable, and united through times of change."

<https://tinyurl.com/v6b9wuea>

<https://tinyurl.com/mr3ke83t>

<https://www.abc.net.au/radio/listen/>

<https://tinyurl.com/yjn5u7yc>



Georg Wiessala

wiessala@hotmail.com

I am, arguably, 'straying' a little from the 'pure-VLF' path here: However, you may wish to receive and decode the signals from Standard Frequency and Time Signal (SFTS) stations, navigational (aeronautical and maritime) beacons, or the fascinating weather information that is still available in the VLF, LW or MW bands.

In the VLF band, the past and present activities and transmissions from Russian time stations around 25kHz have been widely analysed, for example by my colleague Nils Schiffhauer, here in *RadioUser* and elsewhere.

In this context, you may find some of the models by *Grahn* or *BAZ* useful (cf. Part One: *RadioUser*, January 2022: 51-55).

<https://tinyurl.com/b4xu8dfa>

Both companies make special, high-quality, magnetic aerials to receive, for example, the weather forecasts from the German Weather Service (Deutscher Wetterdienst, DWD) from Hamburg on 147,3kHz, and global NAVTEX transmissions on 490 and 518kHz.

Meanwhile, traders such as *Mörer Schiffselektronik* and *NASA Marine* produce self-contained receivers for the reception of the DWD on 147.3kHz, like the *NASA Target 147* and *NASA Clipper 147*, the *Mörer 'Weather Info Boxes'* ('*Wetterinfobox*', *WIB*) models *WIB1* and *WIB3S*, or the (slightly older) *NAVCODE/ NaviCharT 'Weather-Mouse'* ('*Wettermaus*').

Most of those receivers have their (magnetic bar) aerials already built-in, but you can still get some smaller external aerials for LW and MW. These are the small *Mörer* desktop indoor magnetic aerial (*WIBIAM*, EAN No.: 4250327406610, Fig. 12) or the (outdoor) *Nasa N147S* compact vertical aerial stick from *NASA Marine*.

Check out these URLs, for some more details on receivers and aerials:

<https://tinyurl.com/yc32w3tx>

<https://tinyurl.com/2p9ycxfj>

<https://tinyurl.com/4yhrf4dt>

<https://tinyurl.com/8kveysdr>

<https://tinyurl.com/5n82a5ss>

You may also wish to look at the resources on the *Radio Enthusiast* website, where I have uploaded plenty of more information about suitable receivers, aerials and resources about these frequency bands.

I have used several simple telescopic aerials for the reception of 'Nature Radio',

## Feeling the Geomagnetic Pulse: Aerials for the ELF and VLF Bands (Part II)

The editor continues his investigation of aerials suitable for the Extremely Low Frequency and Very Low Frequency (ELF and VLF) bands, looking at aerials for 'natural radio', weather information and diverse utility signals.



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and the simple RH795 type has proved to be particularly suitable with a range of ELF receivers (Fig. 13). Just remember to go outdoors at all times!

If you are a 'home-brewer', take a look at this article by Hans Michlmayr, on '*Magnetic Antennae [sic] for ULF*'. In the sources attached to his essay, you will find a good range of ideas for the construction of induction coils, 'loop-stick' aerials, variometers and antenna tuners to catch those elusive geomagnetic pulsations.

<http://www.vlf.it/inductor/inductor.htm>

Table 2 contains a selection of some frequencies within the scope of this article. Happy hunting!

### Going VLF with the Reuter RLA3B

There is one more tale to tell here: Several months ago, I acquired an RLA3A indoor crossed loop magnetic aerial (Figs. 14 & 16), manufactured by *Reuter Elektronik*, a small company offering high-quality HF

receivers and aerials. All RLA models are broadband, non-tuned, receiving antennas for the LW to SW range, based on the magnetic-loop principle.

<https://tinyurl.com/ffhks3kj>

It was sold, second-hand, and at a very good price, so I treated myself. We have reviewed another, more recent, Reuter product (RLA4E) in *RadioUser* recently (*RadioUser*, May 2020: 18-20).

The RLA3 does not have the same display front as the RLA4E, and the latter is a slightly improved version. The loops of the RLA are made of specific multilayered circuit board material with a good protective coating. They are small (14.17 in [36 cm]) but can achieve surprisingly good receiving levels in conjunction with low-noise amplifiers.

<https://tinyurl.com/advares9>

For a while, I used this antenna for short wave and medium wave broadcast Dxing and Utility signals reception up here in the Northwest of the UK, with very good results. If you do not have space for a large outdoor aerial, or if you are in a caravan, on holiday or otherwise mobile, the Reuter does a surprisingly decent job. The best feature, in my view, is the optional *RSW3B Control Unit* (Fig. 14, bottom). It provides power and permits you to have directional control over the unit, rotating it (electronically, as it were) in 45° steps, through 0-180°.

The RLA3's receiving specs indicate coverage of 50kHz-54MHz 'solid' (with 'reduced-level coverage' from 20kHz-71MHz). I was wondering how my little German friend would perform at the very low end of the spectrum, in the VLF sector. Connection to the PC was with my sound card offering a 192kHz sampling rate.

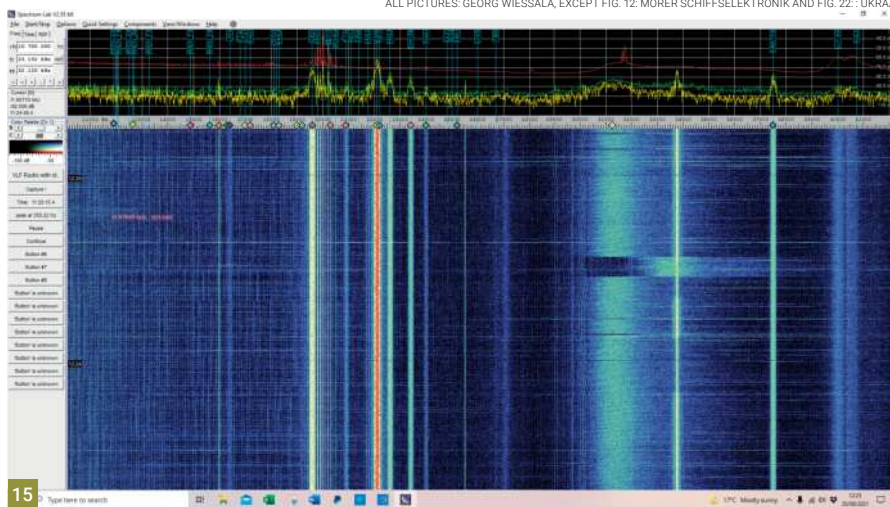
Mine was from Maplin, bought some years ago, but many VLF observers swear



13



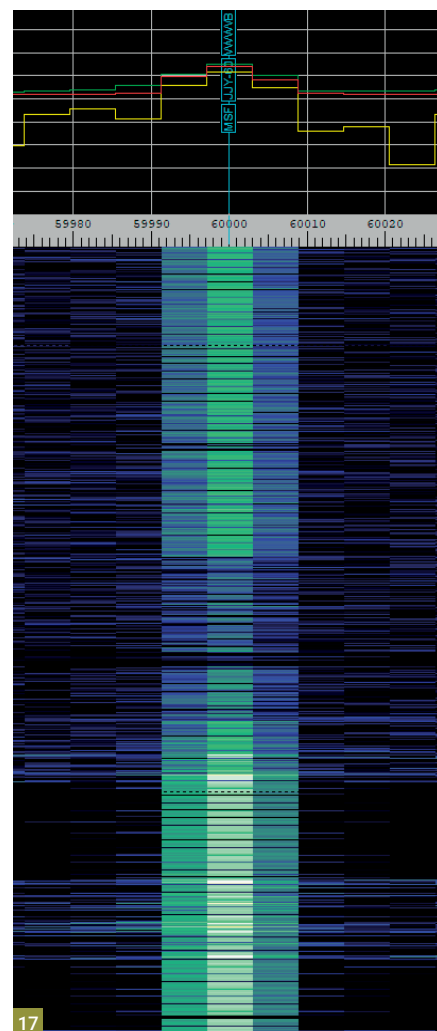
14



15



16



17

by something a little more 'serious', such as the Behringer U-PHORIA UMC202HD 24 Bit/192 kHz USB Audio Interface.

The results were respectable, given that I am not exactly in an electrically 'quiet' situation at home, not even here in a small village in the Ribbles Valley.

The screenshot in Fig. 15 shows some signals in the 10-80kHz range, with VLF transmissions to the world's navies on the left and nearby HMS Inskip (a UK Royal Navy landship) blasting in here at 81kHz. I 'rotated' the antenna with the control unit, finding that some signals grew weaker or dropped out altogether, and some new ones would disappear.

The image in Fig. 17 reveals some detail of the MSF 60kHz time signal station in our neighbouring county of Cumbria. I switched the RLA3 aerial through all four cardinal directions (Figs. 15 and 16) while receiving this, and you may discern the small variations in signal strength throughout (screenshot enlarged).

The image in Fig. 18 is a screen grab of (most of the) VLF range I can receive here. About halfway through the waterfall scroll, I switched in a Bonito G11000 galvanic antenna isolator (Fig. 19), with the rather modest results shown in the upper half of the screen. Fig. 20 displays the best overall

**Fig. 12: The Mörer Schiffselektronik WIBIAM desktop indoor magnetic aerial (EAN: 4250327406610). Fig. 13: A simple RH795-type telescopic aerial suitable for the reception of signals on ELF and VLF. Fig. 14: All-rounder: My RLA3A indoor crossed loop magnetic aerial. Fig. 15: VLF signals received indoors with the Reuter RLA3. Fig. 16: The Reuter RLA3 Control Unit 'revolves' the aerial electrically, not mechanically like a traditional 'rotator'. Fig. 17: Reception of the MSF 60kHz time signal station from Cumbria (UK), turned through all four cardinal points (enlarged, Spectrum Lab).**

result I could get with the Reuter RLA3 on the day of observation. You can spot some weak signals and some interference here and there. By comparison, the image in Fig. 21 displays a part of the same range, antenna direction and settings but this time with my custom-made VLF antenna, my BAZ Ferrite Bar LFM/S1-N (15-70kHz by //C : 20pF-1.6nF; Fig. 5 in Part One).

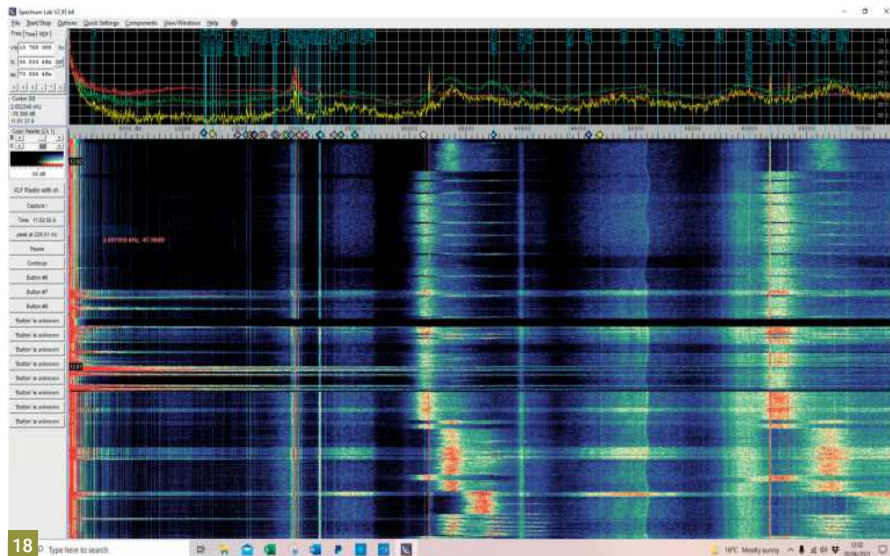
You will see a difference in resolution and signal strengths, in most cases. However, this is only to be expected and does not distract from the reliable performance of the Reuter RLA3.

<https://tinyurl.com/2s9vee2u>

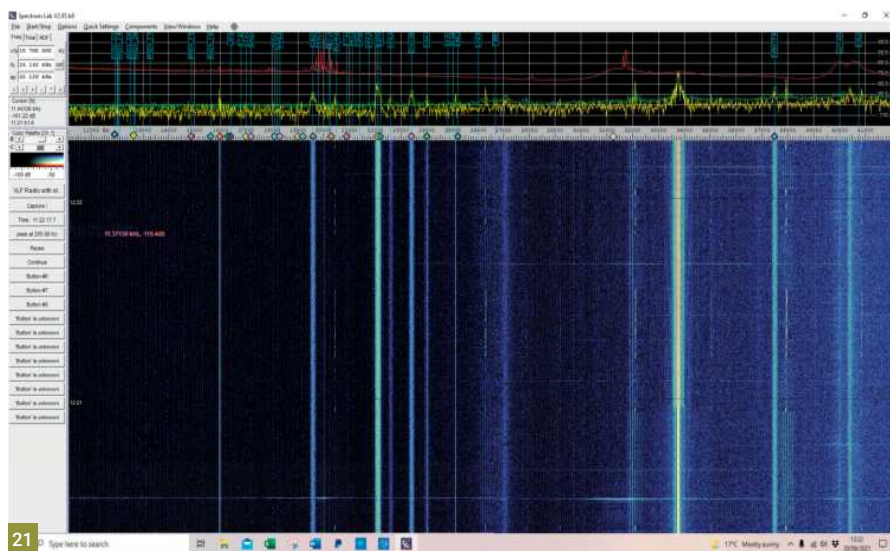
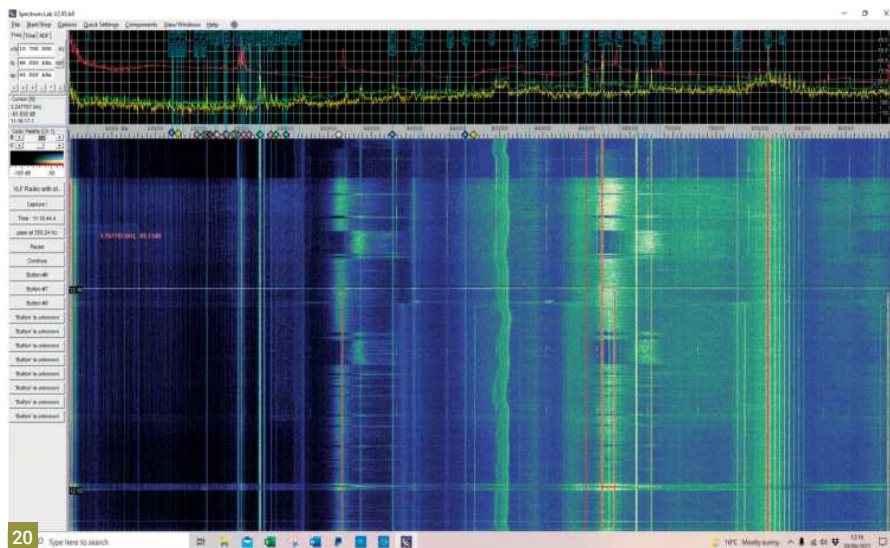
While the BAZ ferrite bar – and some of the other aerials mentioned above

– remain my main 'go-to' aerial for directional VLF reception from home, I was impressed with the Reuter RLA3, especially when away from the house and the attendant higher noise levels. For VLF enthusiasts, this is certainly a good performer. It is highly portable and





**Fig. 18:** The VLF range I receive here; about halfway through the waterfall, I switched in a *Bonito GI1000* galvanic antenna isolator (<https://www.bonito.net/hamradio/en/galvanic-antenna-isolator-gi1000>).  
**Fig. 19:** The Bonito GI1000 can (sometimes) make a difference (See also Fig. 18, top-half).



**Fig. 20:** The day's best results on the *Reuter RLA3*.  
**Fig. 21:** Clearer reception of the same range with the *BAZ Ferrite Bar LFM/S1-N* (see also Fig. 8 in Part One).  
**Fig. 22:** The assembled UKRAA Loop and Aerial Tuning Unit (ATU) attached to it.

lends itself to some experimentation with directionality if you are using the powered control unit.

It is recommended to always use any active aerial with a portable, rechargeable, battery; mine was a *TalentCell* Lithium-ion battery (model YB1203000-USB).

The image in Fig. 22 is a photograph of the VLF Loop distributed by the United Kingdom Radio Astronomy Association (UKRAA, see above). I use this as a stand-by aerial, and for the (indirect) monitoring of solar flares.

[www.talentcell.com](http://www.talentcell.com)  
<https://tinyurl.com/7r5myzha>

[Part One of this article was published in *RadioUser*, January 2022: 51-55 – Ed.]

**Further Reading and Resources**  
 (From 1<sup>st</sup> February 2022)  
[www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)

David Harris  
mydogisfinn@gmail.com

David Harris enjoys a new book containing the fascinating reminiscences of a former Radio Officer in the Merchant Navy and taking readers back to a now-lost world of transport, shipping and communications.

If you were a young man in the early 1970s, and you wanted to work with radio and see the world, a career as a Radio Officer in the Merchant Navy enabled you to fulfil your ambitions. One such young person was Austen Guest who, as a teenager, listened to short wave radio and read *Practical Wireless* magazine. He left school in 1973 and started a two-year radio course at Bristol Technical College, which would lead to him gaining the full *Marine Radiocommunications General Certificate (MRGC)*. This permitted a person to work as a Radio Officer on a British Merchant ship.

However, such a career was not an easy option. Someone choosing to become a Navigating or Engineering Officer in the Merchant Navy would be employed as a cadet for three or four years, with all college fees and accommodation paid for. There was no such provision for radio students who needed to be able to pay their own way through college. The course was very thorough with numerous exams to be passed in Morse sending and receiving, fault finding, circuit diagrams, operating equipment, and related topics. Only one-third of Austen's fellow students completed the course.

To clarify the subtitle of the book: Up until the late 1970s, most dry cargoes were carried in general cargo ships, which could carry around 10,000 tons of cargo. All of this would be loaded individually in crates, sacks, boxes, pallets, barrels, and so on. It could take at least a week to load a ship and then another week to unload once it reached its destination.

Today, virtually all dry cargo is containerised with some big ships being able to carry up to 24,000 containers. That is roughly over 24 times the amount of cargo that a traditional ship could carry then. A large container ship can be unloaded in a few days. Containerisation began in the USA in the mid-1950s but it was not until the late 1960s that the first purpose-built container ship was launched. Container services initially began between the USA, Japan and Western Europe but

# Ocean Currents, Radio Waves, and a Way of Life

*Tales from the Waves. My Voyages on Some of Britain's Last Traditional Cargo Ships*  
by Austin Guest.

New Generation Publishing. 2021.  
225 pp. Pbk. £8.99.

ISBN 9781803699837

[www.newgeneration-publishing.com](http://www.newgeneration-publishing.com)

spread very quickly throughout the 1970s.

Conventional ships had not changed much since the beginning of steam-powered cargo ships in the 1870s.

What Austen chronicles so accurately in his book is the ending of a way of life that had existed for about 100 years. It also spelt the end for many long-established British shipping companies, who were either taken over or just closed down as their fleets of inefficient, uneconomic, ships became redundant.

Most Radio Officers in the British Merchant Navy were employed by Marconi, who also supplied the ship's radio, radar and DF equipment. Austen worked for P&O, which directly employed many R/Os. In 1975, they were one of the largest shipping companies in the UK, with 72 general cargo ships.

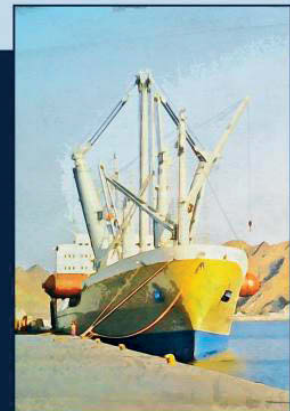
The bulk of the book is taken up with very detailed accounts of life at sea and trips ashore on the nine conventional cargo ships on which he served from 1975 until 1983. His voyages took the author to New Zealand, India, the Persian Gulf, East Africa, the USA, many Mediterranean ports, and finally to the Falklands in the aftermath of the Falklands war.

He describes the day-to-day life at sea, with radio watchkeeping, sending telegrams and maintenance punctuated by film shows and sessions in the bar. One of the main attractions of being a Radio Officer was that, once the ship arrived in port, there were few duties for him to perform.

This enabled him to do a lot of sightseeing.

## Tales from the Waves

*My voyages on some of Britain's last traditional cargo ships*



AUSTIN GUEST

Guest also accurately captures the boredom of life at sea and the tensions that could exist, especially if the captain was a difficult person. The Radio Officer worked alone and reported directly to the captain, who, in some cases, had a poor opinion of the role of the R/O. After eight years, Austen became disillusioned and left the sea, eventually working as an IT manager in the shipping industry. P&O were down to 11 ships in 1983 and eventually became part of the Danish-owned *Maersk* group.

This book will appeal to anyone who served in the Merchant Navy or ever wondered what it would be like to work as a Radio Officer. It is also a valuable account of the dying days of the British Merchant Navy, which is now down to just 328 cargo ships as opposed to 4,300 in 1967 when it was the largest in the world.

The role of the R/O finally ended in 1999 when GMDSS came into force, and the watch-keeping on the 50kHz distress frequency ended.

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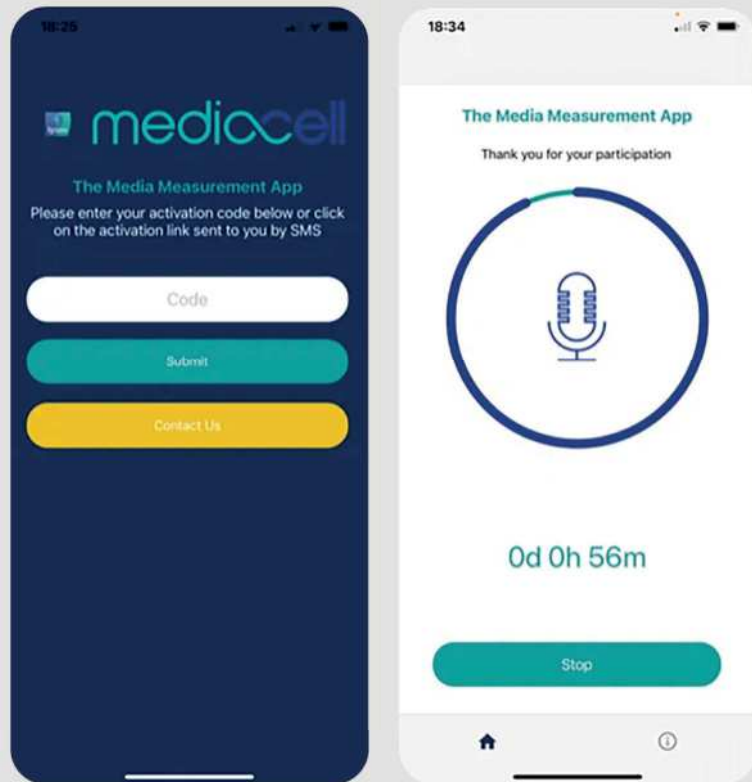
**M**ore people are now listening to the radio using digital options like DAB, Freeview and smart speakers. However, with the quarterly data from RAJAR (Radio Joint Audience Research), it is sometimes difficult to make sense of headline-grabbing news. RAJAR suspended its usual surveys in March 2020 after COVID restrictions banned their method of using face-to-face interviews. The most recent survey published at the end of October 2021 uses a new method: It includes panellists, as well as (for the first time) *MediaCell* technology. This technology captures listening habits both manually, from diaries, and automatically, from mobile devices.

*MediaCell* is owned by the marketing research company *Ipsos MORI* and runs as a background application on a smartphone. It identifies listening to radio stations by Audio Content Recognition (ACR) techniques. *MediaCell* is currently only available on iPhone devices (Fig. 1) and can only be downloaded by invitation from RAJAR. ACR is a technology that can identify a piece of audio or video content by analysing small parts of the audio contained within the content. ACR can even identify which show is being played on a TV by its soundtrack. There is more about this process on the RAJAR website, and a handy summary of the latest listening trends is on their website (Fig. 2).

<https://tinyurl.com/ycyfjw72>  
<https://tinyurl.com/yc5dbx94>

### The Top-25 Digital-Only Stations

My Top-25 list of stations that broadcast *only on digital* reflects some significant overall developments (Table 1). Smooth Extra and Heart Extra are gone, replaced by Absolute Classic Rock because it no longer uses AM. Times Radio is the highest-placed recently launched digital station. Most stations show growth – which may be down to listeners discovering the wealth of choice on DAB. BBC Radio 5 Live Sports Extra recovered listeners due to some big sporting events. The talkRADIO station is a non-mover, even though some presenters claim that, “it



1

# RAJAR Figures and Global Digital Developments

**Kevin Ryan** analyses the most recent RAJAR figures, shares his list of the top-25 digital-only stations and reports on the latest in small-scale DAB developments and technologies.

*is the fastest growing radio station on the planet\**. It is clear that the second commercial multiplex (SDL) was important to the creation of new digital stations and, by using local multiplexes' stations, can get national coverage to rival that of the Digital 1 multiplex.

### GB News Radio

I picked up the launch of GB News Radio by chance on the 4<sup>th</sup> of January at 6 am. The station appeared on the D1 National multiplex in DAB+ in mid-December.

The radio service is a simulcast of the TV service without the TV adverts. It is also available on the new Channel Islands multiplex. Its website has a 'How to Listen' page detailing the available options. Listening on the web launches a custom version of *RadioPlayer* (Fig. 3), and you must download the *RadioPlayer* app to access the station on a mobile phone. On my Android mobile phone, I had to use the search function to find GB News and then add it to my favourites. <https://www.gbnews.uk/radio>

ALL PICTURES: KEVIN RYAN

Fig. 1: Two screenshots from RAJAR's new, 'automatic', method of tracking online listening via a smartphone. However, this will only capture a small segment of overall digital listening.  
 Fig. 2: For a quick and accurate update on our listening habits, use this handy guide, rather than the detailed charts that accompany it.

### Channel Islands Mux Full

The addition of GB News Radio means that this multiplex now has 29 stations. The operator says that it is full, and they are opening a waiting list. However, there might be space for one more station. In theory, if all the stations operated at a lower bitrate, more capacity would be available; but it is more complex than that. I have read references to a report by Arqiva that their recommended maximum is 27 stations, but I cannot yet find the actual report to see how they work that out. The *ETSI DAB Rules for Implementation* have more information: <https://tinyurl.com/2p8bpxaz>

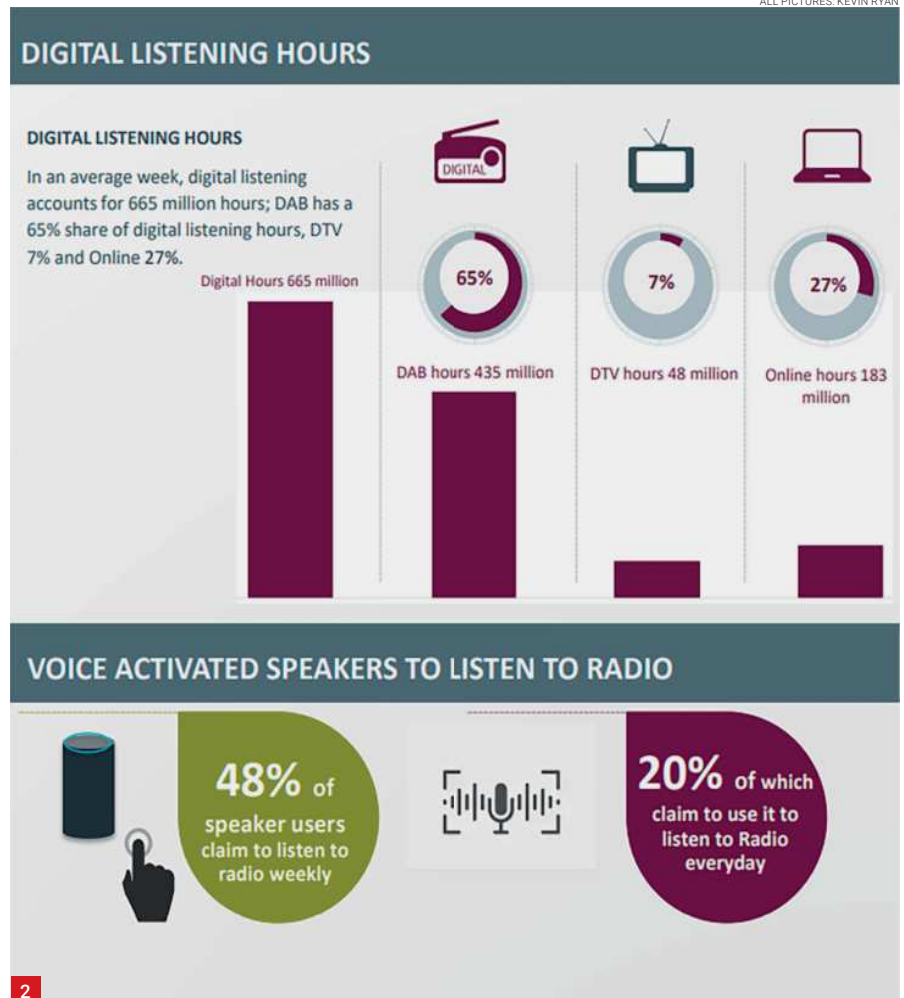
One part of the DAB data stream is called the *Fast Information Channel (FIC)*. This offers a fixed capacity, divided into 80% for *Multiplex Configuration Information (MCI)* and 20% for *Service Information (SI)*. The MCI describes the current multiplex in terms of services and sub-channels. The SI provides date, time, language and programme type, and the FIC is transmitted every 96 ms.

### Rules of Thumb

Tests show that, with up to 20 DAB+ audio services - each carrying a slideshow feature within the audio data stream - the FIC reaches the signalling repetition limit of 96 ms. However, UK DAB stations rarely carry slideshows, and a multiplex will be able to carry a greater number of audio services. Arqiva seems to recommend 27 DAB+ services, close to the number on the Channel Island multiplex. More services can be added to a multiplex. If there were 60 services on the multiplex then it could take nearly 300 ms before the receiver responded to any changes to the multiplex. At a third of a second, it looks like there is nothing to worry about before we might start to notice that our DAB receivers behaving oddly.

### Small-Scale DAB Muxes

*MUX one* launched the first permanent small scale DAB multiplex in Tynemouth and South Shields at the end of November, just nine months after the award of their licence. Its website (Fig. 4) shows its plans to bid for the Round 3 licences for Durham and Middlesbrough, and Redcar. This was



a technical launch, and 14 stations went a couple of weeks later all using DAB+ stereo.

<https://www.muxone.uk>

In a similar vein, Ofcom has awarded the small-scale DAB multiplex for Glasgow to *Nation Broadcasting*. *Nation* ran the trial multiplex for three years. It decided to sell the licence to *Like DAB*, a division of the *Like Media Group*. *Like DAB* already has the licence for the Isles of Scilly. I expect that in a couple of years we will see more buyouts and the formation of larger operators who may well attract the attention of Bauer and Global.

<https://likemedia.group/dab>

### KTWR Christmas Broadcasts and WRTH 2022

KTWR in Agana, Guam, has a tradition of putting on additional broadcasts around Christmas using DRM directed to India and the Far East. This year, they added a broadcast in English on 11860/11890kHz. On Christmas Day, there was one of their dual-language tests between 1100

and 1230 UTC on the regular 9910kHz frequency.

I managed to start listening to the middle half hour, a single language transmission in Japanese; at 1200, there was a dual-channel service in Japanese and Korean. There were three of the four possible DRM channels in use including the multimedia service with selected pictures from TWR. The reconfiguration of the multiplex at 1200 seemed OK, but by 1209 it had reverted to Japanese. A couple of minutes later, the dual-language configuration came back but collapsed again in a short time (Figs. 5a & 5b).

I eagerly await the delivery of a new WRTH in early December each year – at a discount on the cover price that is a reward for being a member of the British DX Club (BDXC). <http://bdxc.org.uk>

Unfortunately, this may be the last edition, unless someone else takes over. Missing this year was the annual review of digital radio technology. It is a real shame that this may be the last edition because digital radio is now getting more space in each country's listing. The book's heritage is analogue, and



information on national digital radio has been rather 'squeezed in'. There are plenty of references to DAB transmissions, but there is not a great depth of information. The entry for France was in the best format for me, with a tabular listing of cities and DAB multiplexes. Information on HD Radio broadcasts in North America was good for the USA and Mexico but I could not find any entries for Canada.

For details of UK DAB, the *Radio Listeners Guide* is, in my view, the best hardcopy reference available.

[The RLG is reviewed by David Harris, elsewhere in this issue - Ed].

<https://tinyurl.com/usc5k6z6>

Most of the DRM information in the WRTH can be found on the *International Broadcasts* pages. The WRTH 2022 also refers to a test of DRM+ on 86.5 MHz in Copenhagen. Domestic DRM broadcasts are listed too.

The North Korea test frequency is listed (but marked as inactive, and China's DRM broadcasts of China National Radio include just one of the various CRI broadcasts to Australia.

## The USA and India

Low powered (1500W daytime/100W nighttime) WSRO in the town of Ashland, Massachusetts, changed to all-digital mode last December. This station joins WWFD in Frederick, Maryland, and WMGG in Tampa, Florida, in what many station owners see as a brave move away from the old AM system. Others think it is vital that AM stations provide the same data and services as FM that is only possible using the all-digital AM mode.

In terms of the USA, I started following a story about HD Radio evaluating the technology in India in late 2019. The January 2022 issue of *Radioworld* has now reported this has happened but in a much-reduced way. India selected DRM for its AM transmitters, both on the medium and short wave bands. The WRTH 2022 lists 42 medium wave transmitters. It is widely assumed that India would also choose DRM for the FM band. Xperi, the current owners of the technology, think they have a chance of winning this contest with the DRM Consortium. However, the pandemic impacted the year-long evaluation resulting in short test transmissions in New Delhi and Jaipur using the all-digital MP3 mode with four audio services (for example, *Artist Experience* and *Emergency Alerts*). The tests showed that the selection of commercially-available radios would work.

Place	Station	Q1-20	Q3-21	+/-	Mux
1 (1)	BBC 6 Music	2.556	2.687	+	BBC
2 (2)	KISStory	2.066	2.255	+	D1
3 (3)	BBC R4 Extra	1.983	2.036	+	BBC
4 (11)	BBC 5 Live Sports Extra	0.601	1.697	+	BBC
5 (5)	Absolute R 80's	1.459	1.690	+	SDL
6 (4)	Virgin Radio	1.496	1.631	+	SDL
7 (6)	Heart 80s	1.249	1.493	+	D1
8 (7)	Planet Rock	1.209	1.332	+	SDL
9 (9)	Absolute Radio 90's	0.837	0.950	+	SDL
10 (-)	Absolute Classic Rock	0.813	0.895	+	Local
11 (8)	BBC R1 X	0.986	0.880	-	BBC
12 (-)	Times Radio	0.000	0.637	+	SDL
13 (17)	Heart 90s	0.456	0.555	+	D1
14 (15)	talkSPORT 2	0.489	0.499	+	SDL/Local
15 (12)	Mellow Magic	0.590	0.481	-	SDL/Local
16 (18)	Kerrang!	0.438	0.473	+	Local/Freeview
17 (13)	Jazz FM	0.566	0.469	-	SDL/Local
18 (-)	Heart Dance	0.380	0.464	+	D1
19 (19)	talkRADIO	0.424	0.450	+	SDL/Local
20 (-)	Virgin Chilled	0.124	0.447	+	SDL
21 (14)	Kiss Fresh	0.519	0.416	-	Freeview
22 (-)	Scala Radio	0.310	0.399	+	SDL
23 (-)	Virgin Anthems	0.150	0.388	+	SDL
24 (-)	Smooth Radio Chill	0.312	0.377	+	D1
25 (20)	Magic Soul	0.393	0.355	-	Local

Table 1: The top-25 Digital-only Stations (RAJAR, October 2021).

The test receiver in the car was a Kenwood KDC-BT758, whilst home receivers included the Sangean HDR-15, HDR-18, and several models from makers Sparc.

<https://www.hdradio.com/india>

<https://sparcradio.com>

<https://tinyurl.com/4bedya6r>

## DRM in Denmark

Denmark granted a licence for a DRM test broadcast in the FM band in Copenhagen that could run for two years until the end of August 2023. The broadcasts started on the 13<sup>th</sup> of October on 86.5MHz. In case you are wondering, the frequency is really outside the normal European FM band because it is too crowded in that region. This is a collaborative project, led by *Open Channel* in Copenhagen. As far as I can tell, *Open Channel* is a subsidiary of *U-Media* a consultancy that involves itself in testing

emerging digital broadcasting technology.

DRM receiver maker Gospell supports the project; chip-maker *NXP* and other non-DRM Consortium members like *Bauer Media* are supplying content, and *Kathrein* the antenna. Bandwidth is 200kHz, which offers room for two DRM signals. Each has a capacity of 186.4 kbps (16QAM) – enough for three audio channels and multimedia services. The only Gospell DRM receiver which tunes the range of 65 to 108MHz, is the GR-22 portable; the better-known GR-216 may be based on the same chipset, requiring just a 'software-tweak'.

## The UK, Belgium and Poland

The Government is giving Ofcom the power to renew two national commercial radio multiplex licences - Digital One Ltd Multiplex and Sound Digital Ltd Multiplex, due to expire in 2023 and 2028 respectively

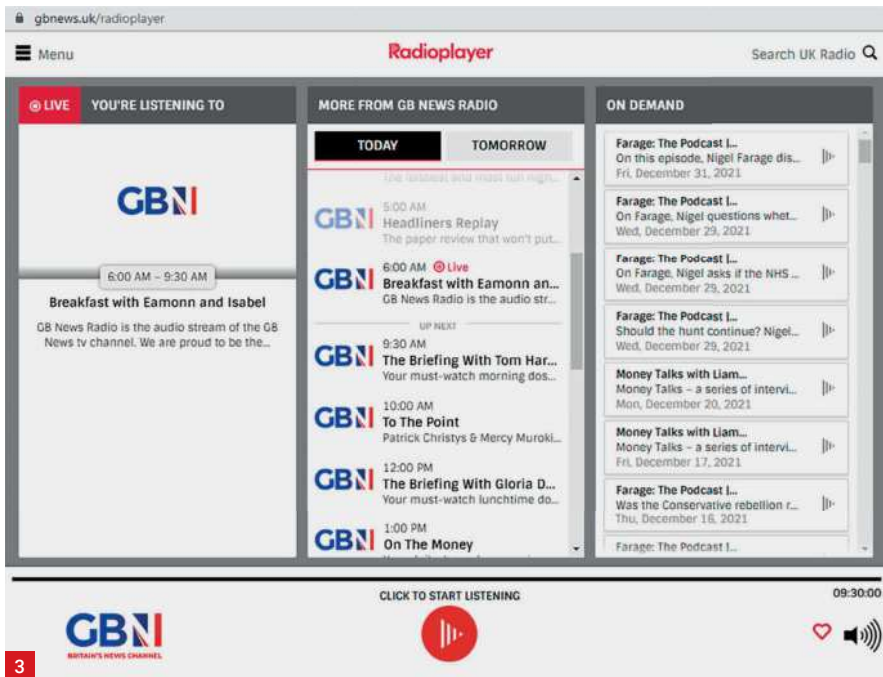


Fig. 3: GBNews uses *RadioPlayer*, rather than their own app, for online listening to their TV simulcast on radio. Fig. 4: Just a few of the stations on the Mux One small-scale DAB multiplex in the North East. Figs. 5a and 5b: The final part of the *KTWR Christmas Day Broadcast* 'flipped' between single and dual-channel configuration.



– until December 2035. The 2035 date fits with the *Digital Radio and Audio Review*. <https://tinyurl.com/ycx539d3>

The public broadcaster in French-speaking Belgium (Wallonia) wants to switch off its digital terrestrial TV broadcasts by the end of the decade. FM radio would also close, imitating Norway and Switzerland. The plan is probably achievable because this French-speaking area of Belgium has no commercial TV operators. The situation is different in Flanders, the Flemish-speaking region.

The Polish National Broadcasting Council (KRRiT) issued more details on plans to advertise a new national multiplex, aimed mainly at commercial broadcasters. There

are places for 12 stations, six for major broadcasters that cover large parts of the country on FM, three for specialized commercial broadcasters and three slots for the national broadcaster Polskie Radio that already operates its own national multiplex.

It is hoped that the national broadcaster will create more specialized services like *Radio Literatura* a dedicated arts and cultural channel that broadcasts occasionally on existing channels. Commercial broadcasters are reported to be critical of the audio quality of DAB+, saying it is expensive and no better than FM, and that moving online may be a better long-term option.

Regular broadcasts in selected locations should also start soon. The Office of

Electronic Communications announced at the end of July that the operator of five local DAB + multiplexes will be DABCOM, and the other two covered by the competition announced in April will go to *PSN Infrastruktura*.

DABCOM is a company engaged in creating small-scale DAB multiplexes will be the operator of MUXRL in Poznań (5C channel), Tarnów (9C), Warsaw (10B), Katowice (12C) and Częstochowa (12D). *PFN Infrastruktura* won the competition in Toruń (6C) and Rzeszów (9B). It looks like Poland is currently developing national and small-scale DAB multiplexes, skipping the local multiplexes layer we have in the UK.

<https://tinyurl.com/34dz7h72>

## Radio News

**ASTRONOMY CLUB EXPLORES CONNECTION BETWEEN SPACE AND AMATEUR RADIO:** The *Peterborough Astronomical Association (PAA)* meets, via Zoom, on Fridays, beginning at 6 pm, and community members are invited to tune in. The format includes novice astronomy classes, a main presentation, and a question-and-answer period. This month, the novice astronomy classes start anew with Lesson 1 (*An Introduction to Astronomy*). Find out how we fit in the universe. This session

looks at our position in space and the Universe, our 'cosmic address', as it were. It will also explore the myriad of objects visible in the night sky as well as a sampling of more exotic phenomena such as Black Holes, Dark Energy, and Dark Matter. The novice astronomy class begins at 6 pm and runs for approximately 45 minutes before the main meeting. These classes focus on the practical aspects of learning about astronomy, introducing astronomy-related subjects at a very basic level, in a logical sequence. Participants in these classes are welcome to stay for the meeting that follows,

but there is no obligation to do so. The main presentation, beginning after a short meeting at 7 pm, is on *Amateur Radio and Amateur Astronomy*. Because many amateur astronomers are also amateur radio operators - including PAA president Mark Coady - operator VE3LJQ (Mark) will show how the two hobbies are intertwined. *The Sky This Month*, a regular meeting feature, will be posted on the club website for all to access. (SOURCES: ICQ Amateur/ Ham Radio Podcast PAA | Club Website). <http://www.peterboroughastronomy.com> <https://tinyurl.com/4ss5dcdj>

Enter our competitions at [www.radioenthusiast.co.uk/competitions](http://www.radioenthusiast.co.uk/competitions)



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**F**ollowing the Declaration of War on September 3<sup>rd</sup>, 1939, BBC units were scattered throughout the UK in 1940 for security reasons. It was very important that no guidance due to radio signals should be given to enemy aircraft. The transmission system was consequently re-organised overnight, in a remarkable technical feat.

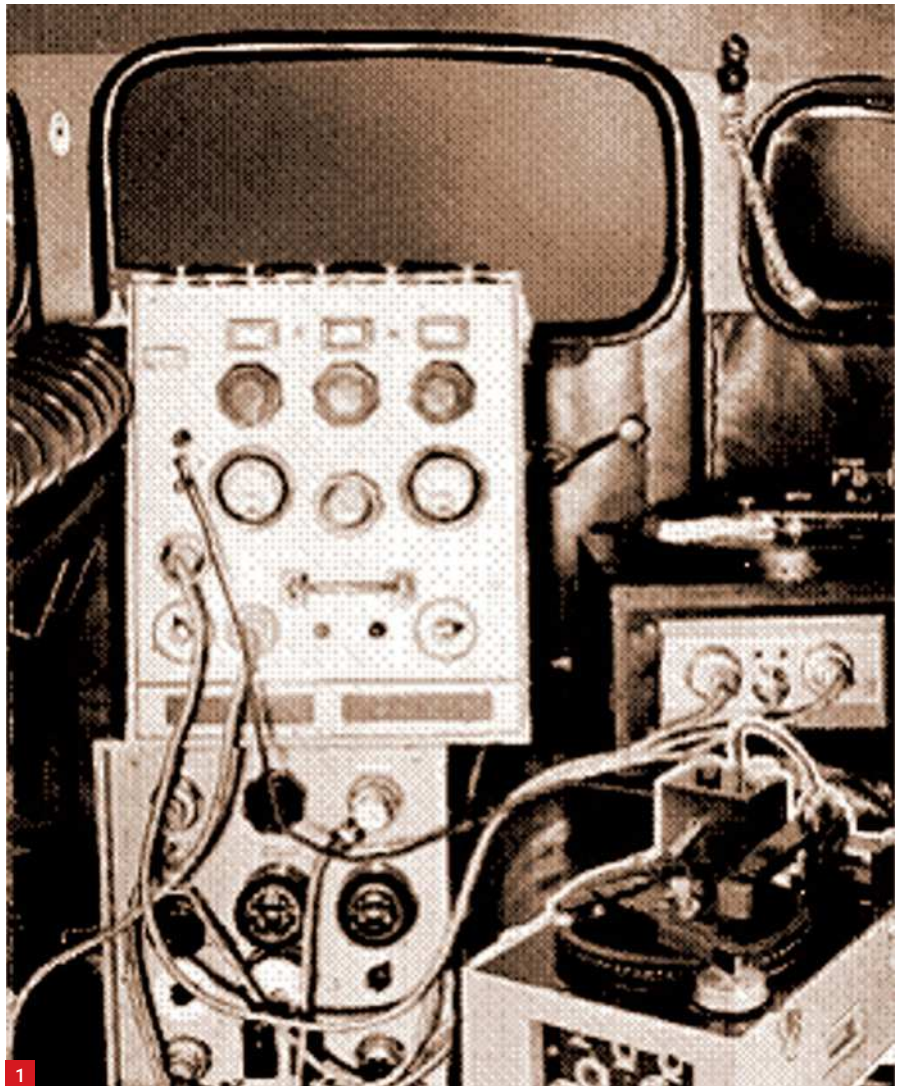
When the USA eventually became involved in the war, American troops, together with those from the British Empire, began pouring into the UK. On January 7<sup>th</sup>, 1940, the BBC introduced the *Forces Programme*. Uplifting, morale-boosting programmes were relayed to the Armed Forces around the world. Broadcasts often featured variety shows from the underground theatre in Piccadilly Circus.

A whole raft of new foreign-language stations opened in 1940. The first service was targeted at Bulgaria on February 7<sup>th</sup>. This was quickly followed by programmes directed towards Sweden, Finland, Denmark, Norway, The Netherlands, Hindustan, Malta, Burma, Belgium (in both the Flemish and French languages), Albania, Luxembourg (as part of the *Belgium Service*), Iceland, and Persia.

Winston Churchill made his first broadcast as Prime Minister on May 19<sup>th</sup>. His famous "This was their finest hour" speech was delivered on June 18<sup>th</sup>. On the same day, French President De Gaulle delivered his first broadcast to France from the comparative safety of his new location in London.

As part of the war effort, the BBC introduced a programme called *Music While You Work*. This was first broadcast on June 23<sup>rd</sup>, 1940. In the same year, on July 7<sup>th</sup>, *Radio Newsreel* was broadcast for the first time via the *European Service*. The reality of war came home to the BBC on October 15<sup>th</sup>, 1940, when a German bomb made a direct hit on Broadcasting House in London during the 9 o'clock *News* bulletin resulting in seven deaths.

After a pause, the newsreader calmly continued reading the news as if nothing had happened, even though the explosion was loud enough for all to hear. One month later, on November 19<sup>th</sup>, the Birmingham transmitter was destroyed by enemy bombs. On December 8<sup>th</sup>, Broadcasting House was attacked again by a land-mine, resulting in serious damage.



## BBC 100 Years: 1940-1949

**Keith Hamer** and **Garry Smith** continue exploring 100 years of the BBC, trace the story of John Logie Baird, and provide the link to their current online column, DX-TV & FM News.

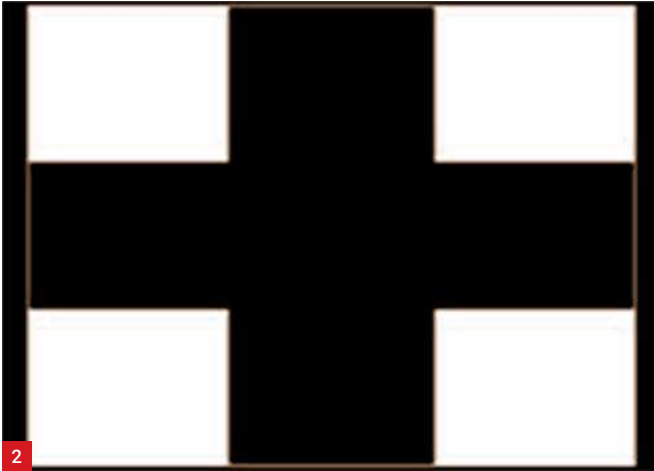
### **Bombs, Bartók and Morse Code**

The German bombing raids were relentless. The BBC premises in Swansea were destroyed on February 21<sup>st</sup>, 1941. For security reasons, the BBC European Service was transferred to Bush House in London on March 17<sup>th</sup>.

On May 10<sup>th</sup>, 1941, Queen's Hall in London,

the historic home of *The Proms*, was demolished by bombs. The music continued, however, from the Albert Hall with the undaunted veteran conductor, Sir Henry Wood, still in charge on the rostrum, baton at the ready. On the same day, The BBC studios at Maida Vale and other buildings were destroyed. Further programmes such

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Fig. 1: BBC engineers designed portable 'Midget' tape recorders, which were resilient to enemy bombardments. Fig. 2: The first electronically-generated television test signal, known as the 'Art Bars', was transmitted from Alexandra Palace on February 1st, 1946. Fig. 3: After the war, television resumed on June 7th, 1946, where it left off on September 1st, 1939 – with a *Mickey Mouse* cartoon. Fig. 4: *Mr Pastry* (alias Richard Hearne) made his first appearance on Children's Television on August 19th, 1946. Fig. 5: *Muffin The Mule* made his debut on October 20th, 1946. Fig. 6: The first edition of *Television Newsreel* was broadcast on January 5th, 1948. Fig. 7: Baird's first successful 30-line experiment on October 2nd, 1925: He transmitted the head of a ventriloquist's dummy.

as *Workers' Playtime* (May 31<sup>st</sup>, 1941) and *Works Wonders* were introduced to help people overcome stress and monotony. The BBC Symphony Orchestra visited service camps and was greeted with tremendous enthusiasm by its uniformed audiences.

From emergency headquarters in Bedford, the broadcasts maintained a reputation as being a first-class example of European culture. Modern and original works, including Bartók's Violin Concerto No. 1 (Sz. 36, BB 48a, 1907/8) were performed for the first time.

In June 1941, members of the BBC Belgian section devised a way to establish a sign of recognition amongst their clandestine audience. They called it the 'V-Campaign', possibly naming it after one of the instigators, Victor Laveleye. The symbol spread throughout the occupied countries. It was suggested that listeners should wear a 'V' emblem. Within a week, the RAF were greeted with the sign. It was chalked on walls and roads, tapped out in Morse Code, flashed in lights, not only in Belgium but all over the Continent. Later, the 'V' sign was replaced by the 'Tortoise' symbol which heralded a 'Go Slow'

campaign in occupied Europe. This was designed to keep production down in the mines and factories where workers were forced to labour for Germany. The emblem was a great success despite arrests, tortures, concentration camps, and firing squads.

In 1942, the first edition of *Desert Island Discs* took to the airwaves on January 29<sup>th</sup>. The programme is still going strong some 80 years later in 2022! In the same year, on March 22<sup>nd</sup>, the first daily news bulletin in Morse Code was transmitted for the Resistance in English and certain European languages.

### New Services & Midget Recorders

Several additional radio services were introduced in 1943 as part of the war effort. The BBC began its *Austrian Service* on March 29<sup>th</sup>. This was previously included in the *German Service* (it was re-incorporated into the *German Language Service* on September 14<sup>th</sup>, 1957). The *Luxembourg Service* began on May 29<sup>th</sup> (it was discontinued on March 30<sup>th</sup>, 1952). The *Overseas Forces Programme* became the *General Overseas Service* on June 13<sup>th</sup>, and the *Empire Service* was re-named the *Overseas Service*. The *Pacific Service* was also introduced. On July 4<sup>th</sup>, 1943, *English by Radio* lessons started in the European Service and the *Japanese Service* also began. Broadcasts for the clandestine European Press began on July 11<sup>th</sup>.

On February 27<sup>th</sup>, 1944, the *General Forces Programme* was introduced, replacing the *Forces Programme*. This was discontinued on December 31<sup>st</sup>, 1946. Another station for military personnel called the *Allied Expeditionary Forces Programme* began on June 7<sup>th</sup>. On June 30<sup>th</sup>, 1944, BBC Bush House was badly damaged by a flying bomb.

A programme called *War Report* was transmitted for the first time in the *BBC Home Service* after the nine o'clock news bulletin.



3

This was on D-Day, June 6th, 1944. The final programme was broadcast eleven months later at the moment of the final victory in the West. By that time, the programme's daily audience had reached a total of approximately fifteen million listeners. The production team went through military training. They were equipped with mobile transmitters for direct speech links. These, as conditions became stabilised, were increased in power, advancing in the wake of the armies. There were mobile recording trucks and vans, such as had been used on other war fronts. In addition, BBC engineers had designed portable 'Midget' recorders, weighing only 40 pounds, whose machinery stood up remarkably well under enemy fire (Fig. 1).

Before the war, the national broadcasting system produced programmes mainly for an English-speaking audience at home and in the Empire. During the war, the BBC developed into a huge, complex, multi-lingual organisation. At the height of the conflict, the BBC transmitted the equivalent of six days' broadcasting every day, carrying programmes in 48 languages and using more than 80 wavelengths for the purpose. One of the BBC's main responsibilities regarding the over-run countries of Europe was that of putting the leaders of the Resistance, who were based in London, in touch with their embattled comrades.

### The BBC Light Programme Begins

At last, the war was over. Victory in Europe Day (VE-Day) was celebrated on May 8<sup>th</sup>, 1945, by millions of people around the world. Special lights were installed at Broadcasting House to celebrate a victory in which British broadcasting had played a vital role in the war effort. On that historic day, King George VI and Winston Churchill broadcast to the nation, and the world at large. On July 29<sup>th</sup>, the *BBC Light Programme* was



introduced, and the six regional variants of the Home Service resumed. August 1<sup>st</sup> saw the first edition of one of radio's most popular programmes, *Family Favourites*. The first edition of *Today In Parliament* was broadcast on October 9<sup>th</sup>. It is one of the longest-running programmes, mainly because the BBC is forced by successive governments to broadcast it by law. *Forces Educational Broadcasts* began on September 3<sup>rd</sup>, 1945, as a supplement to the Forces' educational schemes, and were transmitted to occupying garrison troops overseas as well as to recruits at home.

## First Electronic Test Signal

February 1<sup>st</sup>, 1946, saw the first transmission of the BBC *Art Bars* (Artificial Bars) from Alexandra Palace. This was the first electronically-generated Test Signal and was radiated on weekdays between 11.30 am and 12.30 pm and from 4.00 pm until 5.30 pm with a tone and an 'Interval Signal'. The Art Bars continued to be used on an ad-hoc basis until 1963 (Fig. 2). March 4<sup>th</sup> saw the launch of another radio favourite, *Housewives' Choice*.

Meanwhile, the broadcast receiving licence fee was increased from 10 shillings (50p) to £1 for radio on June 1<sup>st</sup>. A £2 combined licence for television and radio was introduced. On June 7<sup>th</sup>, 1946, the 405-line BBC Television Service resumed with the same programme which had been so unceremoniously interrupted at the outbreak of war – a *Mickey Mouse* cartoon (Fig. 3).

Inside the two studios at Alexandra Palace, producers, both veterans from before the war and newcomers, soon increased their knowledge of the new techniques required for television. Outside the studios, cameras were becoming increasingly more advanced, thanks to technologies devised for the military during the war.

The first television programmes for children called, appropriately enough, *For The Children*, began on July 7<sup>th</sup>. *Mr Pastry* (alias Richard Hearne) made his first appearance on August 19<sup>th</sup>. In Fig. 4, he is seen discussing a knotty script problem with his producer. Moreover, the first religious service was televised on September 15<sup>th</sup>.

The great adventure in sound broadcasting after the war was the *BBC Third Programme*, which was tied to no timetable and drew upon various resources including music, opera, drama, and poetry from all parts of the world.

This then ultra-new and experimental radio station was launched on September 29<sup>th</sup>, 1946.



4



5

*Woman's Hour* took to the radio airwaves on October 7<sup>th</sup>, together with *Dick Barton, Special Agent*. Meanwhile, *Muffin The Mule* clattered onto our television screens for the first time on October 20<sup>th</sup> (Fig. 5), assisted by Annette Mills. One of the authors had a small metal Muffin marionette. Alas, the small mule rattled off into the sunset during the Seventies, never to be seen again except, perhaps, at the local council rubbish dump!

Furthermore, the first edition of radio's *Down Your Way* was broadcast on December 29<sup>th</sup>.

## BBC Weather Forecasts Resume

In 1947, the government renewed the BBC's Royal Charter, but only for five years rather than the traditional ten.

Despite the end of the war, not everything

was rosy in the country. Due to a fuel crisis, the BBC Home Service and the BBC Light Programme closed down early each evening from February 9<sup>th</sup>.

The fuel situation worsened and on February 10<sup>th</sup>, the Television Service and the Third Programme had to be suspended. The Third Programme resumed broadcasting on February 26<sup>th</sup>. The Television Service didn't resume until March 11<sup>th</sup>.

Politicians were, as ever, anxious to hear their own voices and garner people's votes: The first radio *Party Political Broadcast* was aired by Prime Minister Attlee on March 18<sup>th</sup>.

By 1947, weather forecasts had returned to the airwaves and the BBC Symphony Orchestra resumed wearing evening dress, rather than military-style attire, for its increasing number of public performances.



6



7

In June 1947, they made a European tour which, by all accounts, was a huge success. Variety performers also discarded military-style clothes and began wearing civilian dress.

On November 9<sup>th</sup>, the Remembrance Service from the Cenotaph was televised for the first time using tele-recording techniques. Later that month, on the 20<sup>th</sup>, the wedding of Princess Elizabeth and the Duke of Edinburgh was broadcast via BBC Radio and Television.

### Children's Television and the Sutton Coldfield Transmitter

January 1948 was quite a busy month for the BBC. *Children's Television* commenced regularly on January 4<sup>th</sup>, to be followed the next day by the first edition of *Television*

The definitive history of the BBC was written by social historian Asa Briggs (1921 -2016). Between 1961 and 1995 he completed the five-volume, *The History of Broadcasting in the United Kingdom* (OUP) which covers the period from the early 20<sup>th</sup> Century to 1974. The complete set is still available for £292 (Hardback) and individual volumes are priced between £59 and £165. Briggs also wrote a one-volume condensed history, *The BBC: A Short Story of the First Fifty Years*. This was published in 1985 and covered 1922- 1972.

- *The Envy of the World: Fifty Years of the Third Programme and Radio Three* by Humphrey Carpenter. 1996. Out of print.
- *The Remarkable Tale of Radio 1 (1967 – 1995)* by Robert Sellers. Omnibus. 2021. £20
- *The BBC: The Myth of Public Service*. Tom Mills. Verso. 2016. £9.99
- *The War against the BBC* by Patrick Barwise and Peter York. Penguin. 2020. £10.99.
- *Pinkoes and Traitors*. Jean Seaton. Profile. 2017. £12.99
- *The Political Structure of UK Broadcasting 1949 -1999*. David Elstein. Meson Press, Germany. 2015. £10.70
- *Behind the Wireless: A History of Early Women at the BBC*. Kate Murphy. Palgrave Macmillan. 2016. £23
- *This New Noise* by Charlotte Higgins. Guardian Faber £12.99. 2015.

The last 7 books listed above have all been reviewed in *Radio User*. None of these books are general histories of the BBC.

The books by Tom Mills, Barwise and York and Jean Seaton are about the perceived political bias of the BBC. The books by Kate Murphy and Charlotte Higgins focus on women at the BBC. **Books about the BBC that are scheduled to be published in 2022** include:

- The Radio Front* by Ron Bateman
- This is the BBC* by Simon Potter
- The BBC a People's History* by David Hendy

**Table 1: Recommended books on the BBC.**

*Newsreel* featuring opening graphics depicting the transmitter at Alexandra Palace (Fig. 6). Also on the 5<sup>th</sup>, the first entry was made in *Mrs. Dale's Diary*. This was one of the longest-running radio drama programmes where *Mrs. Dale* was constantly worrying about her GP husband, Jim.

The first television Outside Broadcast (OB) from No. 10 Downing Street on the occasion of the Commonwealth Conference was broadcast on October 11<sup>th</sup>, 1948.

Listeners were treated to the first edition of *Billy Cotton's Band Show* on March 6<sup>th</sup>, 1949. This became a very popular light entertainment show, later transferred to television. The first golf match (apart from the demonstration given as the first Outside Broadcast at Alexandra Palace in

the Thirties) was televised on March 29<sup>th</sup>, and the initial TV weather forecast was broadcast on July 29<sup>th</sup>. A full account of BBC weather forecasts was featured in our articles dated November and December 2018 (*RadioUser*, November 2018: 20-21; December 2018: 20-22).

On October 30<sup>th</sup>, the *BBC Hebrew Service* (discontinued on October 27<sup>th</sup>, 1968) and the *BBC Indonesian Service* began. But the most significant broadcasting milestone in 1949 was on Saturday, December 17<sup>th</sup> when the Sutton Coldfield television station was brought into service. This brought television programmes to millions of viewers living in the Midlands. Details about the Sutton Coldfield opening are in *RadioUser*, January 2020: 48-49.

### Television Pioneers: John Logie Baird - Part 3

Baird's first successful 30-line television experiment took place on October 2<sup>nd</sup>, 1925, when he transmitted the head of a ventriloquist's dummy at his laboratory. The somewhat indistinct image shown in Fig. 7 is from a recording that Baird made on a wax disc. Inspired by his success, he asked a young man who worked in the office below to take part in another test.

Despite the exceedingly hot lights necessary to produce an effective image, 20-year-old William Edward Taynton volunteered to be scanned and was paid two shillings and sixpence (12½ p. in today's money) for his valiant effort. He became the first person to be televised with a full tonal range.

According to contemporary reports, looking for publicity, Baird visited the *Daily Express* newspaper to promote his invention. The news editor was terrified, and he was quoted by one of his staff as saying: "Go down to reception and get rid of a lunatic who's down there. He says he's got a machine for seeing by wireless! Watch him - he may have a razor on him." On January 26<sup>th</sup>, 1926, Baird gave the world's first demonstration of *true* television before an audience of fifty less-than-enthusiastic physicists at the Royal Institution, London.

Although the pictures measured only 3.5 x 2 inches, the outstanding achievement was considered to be the world's first demonstration of television – the possibility of *seeing at a distance* which had first been proposed in 1878, but had, hitherto, eluded every inventor who had dreamed of such a miraculous invention.

[Table 1 is courtesy of **David Harris** who provided additional information – Ed.].



Nils Schiffhauer, DK8OK  
dk8ok@gmx.net

It is worth noting that *Black Cat Systems* – home of a range of decoding software for radio enthusiasts, such as *Black Cat HF Weather Fax* – has recently developed a new multi-channel decoder. This enables users to read (up to) 24 channels of messages, transmitted in MIL-STD-188-141 (Automatic Link Establishment, ALE) mode.

<http://www.blackcatsystems.com>

ALE was introduced as far back as 1988, with the express aim of *revitalising HF usage* (Fig. 1). Its main purpose was to 'demystify' the secret of reliable HF communications, despite the ever-changing propagation and interference conditions. The mode was developed to supply an easy, push-to-talk, mode on HF without being a propagation expert. To that end, each transceiver of an ALE network contains a set of different channels, for example, for day and night operation and to avoid interference.

Usually, these channels have been pre-programmed by experts, using dedicated software. The receiver scans all the channels, whilst the transmitter radiates a 'sounding' (testing) message, on channel after channel, approximately every 30 minutes. A good receiver will then store the data, such as Bit Error Rate (BER) and Signal-to-Noise Ratio (SNR). If it wants to call up the other station in voice or data, this routinely takes place on the best frequency.

The ALE protocol has many more intricate features, meticulously laid down in a hefty 370-page (15.96MB) description of the US Department of Defense.

<https://tinyurl.com/ny3vsa45>

## Receivers and Networks

A typical mobile ALE transceiver, like the military-use Tadiran HF-6000, features 100 tables of 10 channels each in its basic version, ensuring a time of 2.5 to 4.5 seconds for link establishment.

<https://tinyurl.com/2p9xk2bn>

Moreover, Rockwell-Collins has promised an "*HF ALE Global Gateway*" with a 'first-attempt-success-rate' increase from 15% to 30%; with manual linking, this can rise to more than 90% for ALE signals.

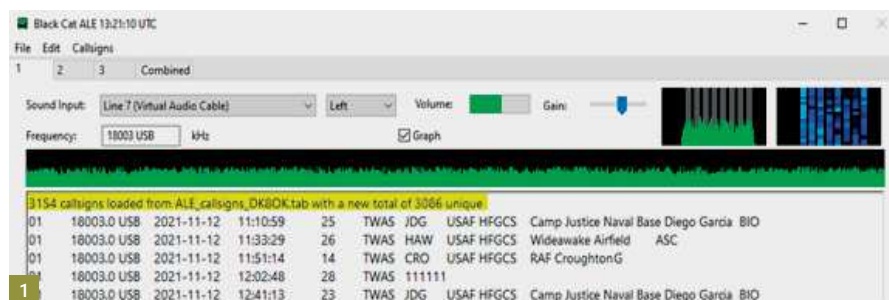
<https://tinyurl.com/mmxukjcb>

This performance is further enhanced by the choice of a very robust mode.

Let us take the High-Frequency Global Communications System (HFGCS) of the

# Monitoring and DXing ALE with A Unique Decoder

Nils Schiffhauer introduces the High-Frequency Global Communications System (HFGCS) of the US Air Force as an example of the Automatic Link Establishment (ALE) standard and decodes signals with new software.



US Air Force as an example for worldwide coverage with HF.

This network consists of at least 13 ground stations, strategically scattered all over the globe (Fig. 2).

There are ten common HF channels, ranging from 3137kHz (not active at this time) to 23337kHz, to cover HF propagation each minute throughout a full sunspot cycle. Every half an hour, each of these stations transmits a sounding of 10 seconds in length, for example, "*THIS WAS PLA*" for Lajes (Azores) on one channel. It then switches to the next channel, and so on. By doing so, each of the ten channels will be activated for ten seconds each by all transmitters, with the schedule avoiding any collision.

An AWACS reconnaissance aircraft flying, for instance, across the South China Sea will continuously scan through all those ten channels, listening for under a second on each one. This ensures that it covers all ten channels during a sounding of ten seconds length – nothing is missed. If it catches a signal, it stops, decodes the sounding, and saves the results – such as the location of the transmitter and reception details. In this way, it is building up a table of locations/channels within

reach; in this case, most likely from Guam/GUA, Yokota/JTY or Diego Garcia/JDG. The trick is both to provide channels/locations with 24/7 propagation and to check actual propagation for each channel/location, automatically and regularly.

## ALE: A Robust Technique

An ALE signal consists of up to eight tones, each 8ms long, resulting in a symbol rate of 125. These are transmitted, one by one, at a constant phase. Each tone represents three bits (1,750Hz stands for '110'), resulting in a bit rate of (3 x 125 =) 375 bit/s. The lowest tone is at 750Hz; the highest one is at 2,500Hz, with a 250Hz distance from tone to tone (Figs. 3 to 7).

This method incorporates some smartly-distributed redundancy technology and forward error correction (GOLAY-FEC) to efficiently combat noise and interference pulses. Reception is in SSB (mostly USB) where a filter of 3kHz bandwidth should be used. If your software offers a tailored passband, I recommend a range from about 575Hz to 2,775kHz to minimize interference, maximize SNR and avoid distortion. The signal is tuned to a centre frequency of 1,625Hz, resulting in a frequency readout to a full kHz or to 500Hz,

**Fig. 1:** Figure 1: *BCS-ALE*: The basic version with three decoders in parallel – this will resolve even some of the more ‘cryptic’ callsigns.  
**Fig. 2:** Scattered all over the world: The US Air Force (USAF) HF stations using ALE.  
**Fig. 3:** An ALE Signal as seen by the *Signals Analyser* software, showing the spectrogram.  
**Fig. 4:** A few tones of 8 ms in length, plus the in-phase switching from one tone to the next one.  
**Fig. 5:** The eight tones. A consolidated view of their appearance in this part of the recording. The frequency steps are seen in the background.



and sounding – with my apologies – a bit like peeing into a pond.

### Mesmerizing Monitoring

What makes ALE monitoring so attractive for DXers? First, the transmitters are dispersed all over the world; networks are popping up, often during delicate situations, and fade. Within three years, I have logged some 9,181 different combinations of call/frequency used by ALE stations. Take a look at Fig. 8 for a distribution of stations vs. frequencies, and at Fig. 9 for the geographical origin of most of the identified stations.

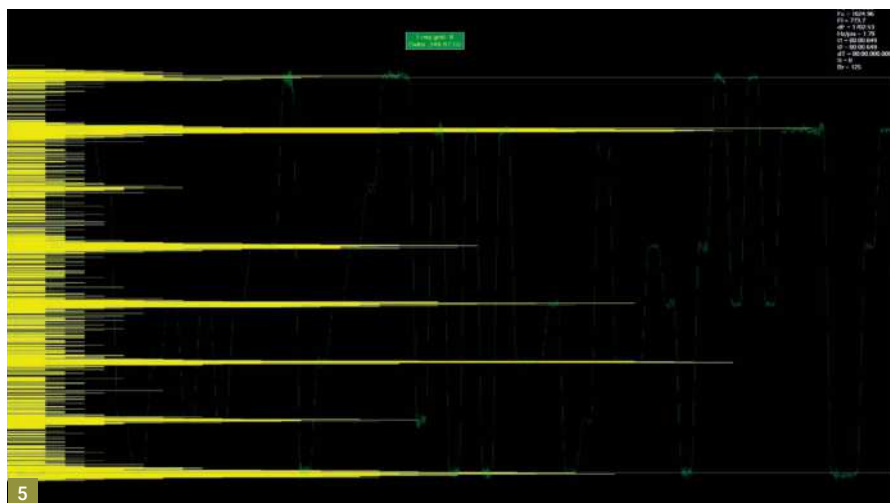
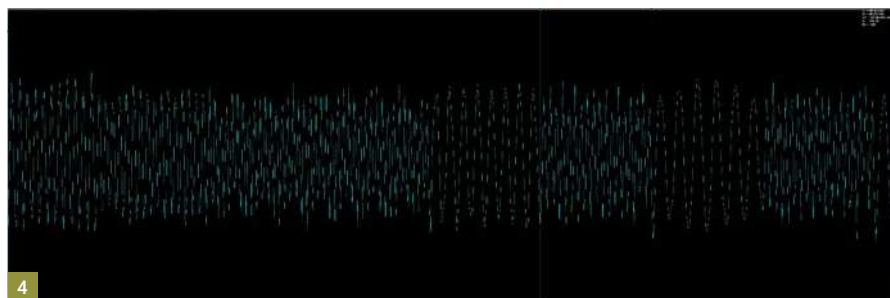
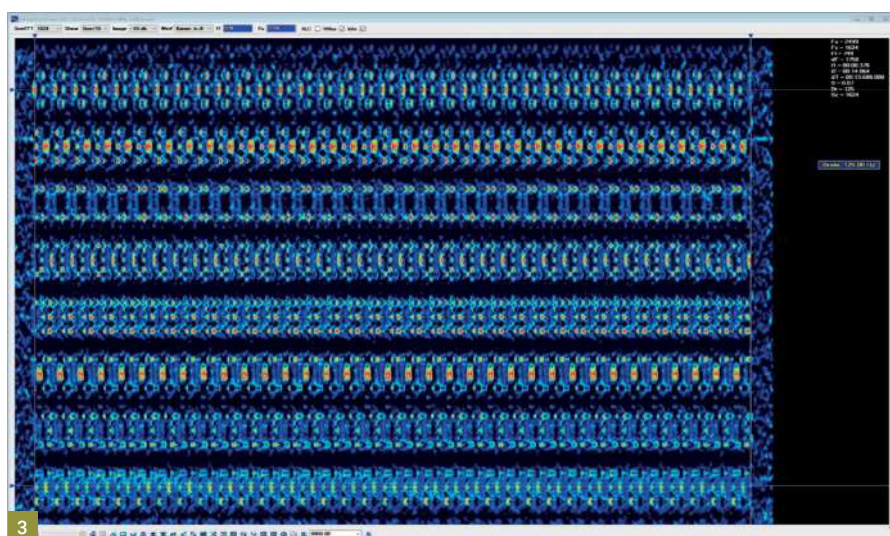
Second, most of them are not encrypted. Even better is the fact that many stations tell you who they are: For example, TIPPUSULTAN is the callsign of just this destroyer of the Pakistan Navy, CHONKAPKA is the Kazakh border post in Cho’n-Kapka in the north-west of this country, and KRAKOW originates from the Polish Ministry of the Interior in Krakow.

Moreover, often the callsign gives at least a hint: CDG01D is heard from the French Aircraft Carrier *Charles de Gaulle* (‘CDG’ as for Paris Airport Charles de Gaulle). Only a few stations have an ITU-conforming callsign, like FUM (French Navy Tahiti), NOJ (US Coast Guard in Kodiak/Alaska) or KWU47 (The US Consulate in Kyiv/Ukraine, on extra-territorial ground).

### Cryptic Callsigns

In many cases, you will need to puzzle things out a bit until you know that FCOFEM1 originates from FEMA (Region 0, Bothel/WA in the USA); and SANRIV stands for the MHFCS system in Australia (Riverina); what is more, 69PMSANMIGUEL has its source in San Miguel/Peru; it belongs to the *Centro Regulator De Urgencias y Emergencias Nacional*.

However, even seemingly cryptic





numbers have their hidden meaning, like those in the AFAD network of the Turkish Disaster and Emergency Management system, where digits 2 and 3 of the callsign refer to the province. In the case of the callsign 329013, for instance, '29' stands for Gümüşhane Province. The UN's MINUSMA jeeps take their car plate number as their callsign (for instance: [UN] 700220).

In other cases, some direction finding with the KiwiSDR network may be necessary. Or you might consult the guys at the UDXF (the *Utility DX Forum*).

Without these additional resources, it is difficult to identify 2415 as the Gendarmerie Royale du Maroc, 3217 as SONATRACH Algeria (a petroleum company), and 4PEF01 as Comando Militar da Amazônia in Brazil.

<http://kiwisdr.com/public>  
<http://www.udxf.nl>

### The Evolution of ALE Monitoring

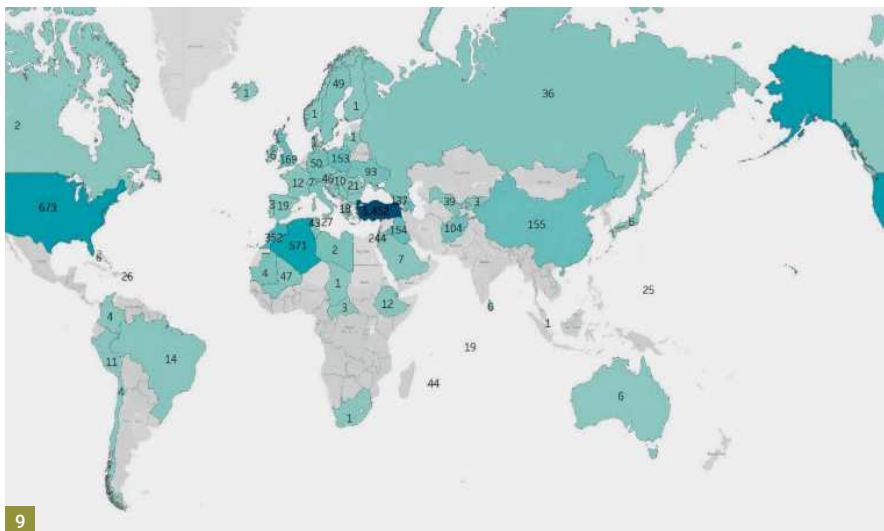
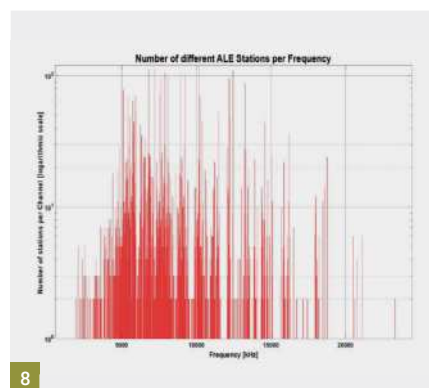
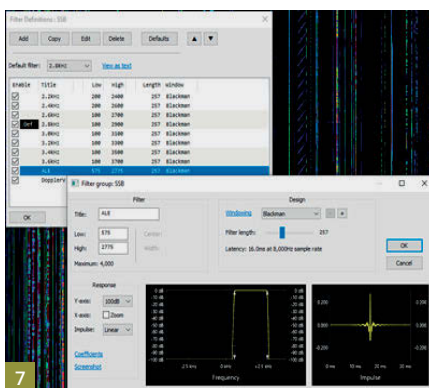
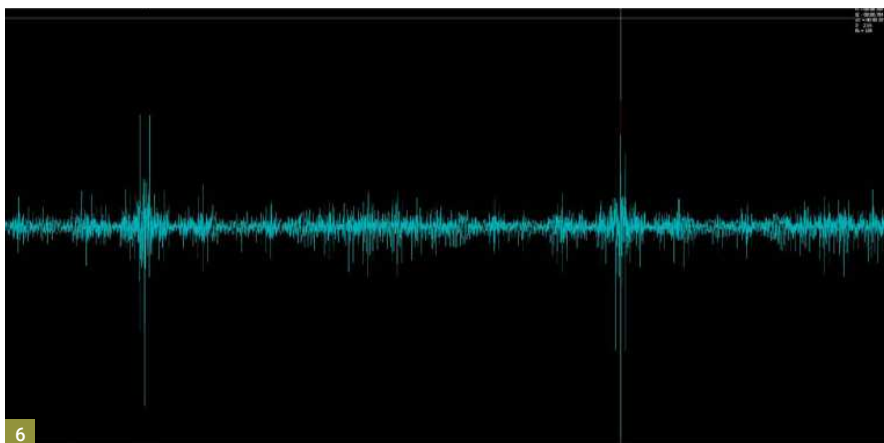
From the advent of the first ALE decoders, hobbyists have developed strategies for monitoring. The first one is consistent with tuning the receiver to one channel and letting it stay there for hours, hoping that the frequency would not drift too much. Another technique mimics the professionals, by using a 'scanning-table', which contains all the channels of a network. In this method, success depends on the performance of the squelch and AGC actions.

More recently, Software-Defined Receivers (SDR) have rendered possible some very advanced ALE Monitoring. This is achieved by manually analysing the spectrogram of a recorded HF file and decoding up to 24 channels in parallel; either 'live', as they happen, or from an HF file.

And only the true professionals have now reached the very neatest way: Here, the I/Q stream of an SDR is directly analysed, and Artificial Intelligence (AI) recognizes signals, classifying and – in many cases – decoding them.

In terms of ALE, this works reliably with good to fair signals but still fails with faint and distorted signals, where manual analysis still is the tool of choice. Future developments in AI will further improve this method, which may also trickle down from the price tags of more than £20,000.

Smart software authors are now hot on their heels, and I am currently enthusiastically testing a very early pre-release version of such a decoder.



It should be on the market before the Summer of 2022 and will match an SWL's budget.

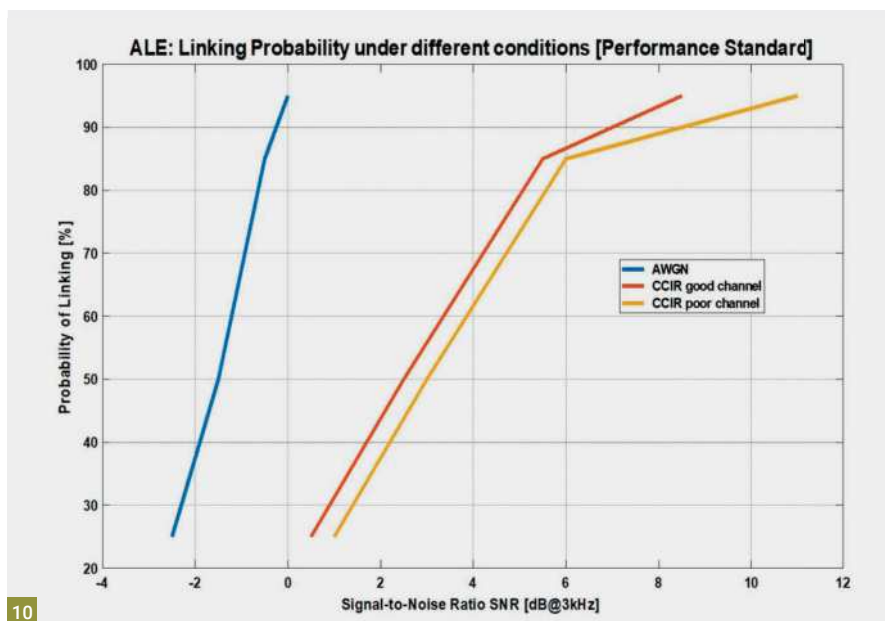
### BCS-ALE Decoder by Chris Smolinski

With the new multi-channel ALE decoder (BCS-ALE, in short) from Black Cat Systems, Chris Smolinski, W3HFU, offers another great piece of smart software, driving forward ALE monitoring.

<https://tinyurl.com/yz49rjct>

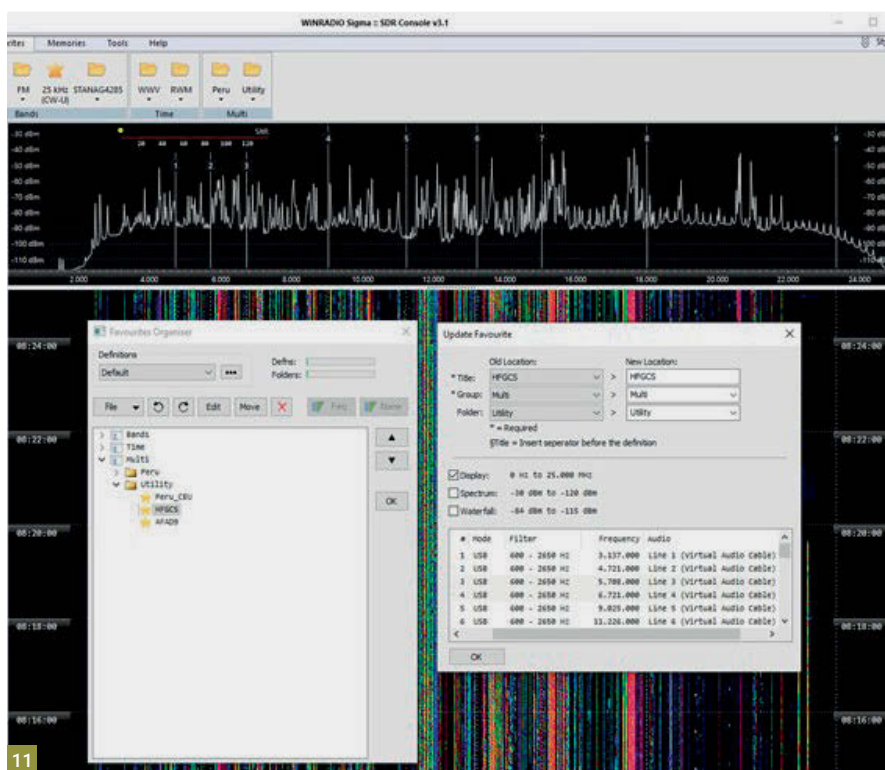
With this software tool to hand, hobbyists may monitor up to 24 such channels in parallel for activity. In this kind of context, an SDR is a must. Demanding DXers will most likely opt for a wideband SDR, providing good sensitivity and a high dynamic range. Only then will they have the chance to place their demodulators within the HF range wherever they want. A 25-30MHz wideband SDR with 16bit resolution is a perfect choice.

Bear in mind that the frequency stability



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Fig. 6: The auto-correlation tool measures the triple-word (basic-redundant) period as 392ms. Fig. 7: *SDRC* allows for the tailoring of each filter. This one has been optimized for ALE reception. Fig. 8: Distribution of 9,180 combinations of station and frequency. Note the 'networking-pattern' with more than one station per frequency on 10,175kHz, the main channel of the *Turkish Disaster and Emergency Management Presidency*. (<https://en.afad.gov.tr/about-us>) Fig. 9: More than 5,000 callsigns have been identified here, by country of origin. You can see the activity of each of these countries by the unique combinations of callsign and frequency. Fig. 10: System performance of ALE under several conditions, displayed schematically (see text). Fig. 11: Using the *Favourites* menu of *SDRC* can save the channels for a net. These are 10 channels for the *HFGCS-Net* of the US Air Force, with the lowest channel not ticked. Each audio output has been routed to a different Virtual Audio Card VAC.



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on your receiver must be both assured and accurate. Usable SDRs now start at around 200GBP (for the RX888) and range right up to the ELAD FDM-S3, the professional-grade Winradio *Sigma*, and the new Winradio WR-G69DDCe *Artemis*. <https://tinyurl.com/ftv925d> <https://tinyurl.com/3dn87nu7> <https://tinyurl.com/4j9btp69> [on the *Artemis*, see our *News and Products* section this month, as well as next month's full review – *Ed.*].

### Testing Decoders: Sensitivity v. Linking Probability

There are always some secrets about the performance of decoders, and only a test will separate the wheat from the chaff, as it were. For our purposes, 'best' means: "Which decoder will produce proper results under adverse propagation conditions?" The professionals, however, will prefer the term 'reliable results for further automatic processing'. A professional decoder will prefer reliability; a hobby DXer should push

sensitivity to the limit; a 'perfect' decoder will bring both and let to make your choices by offering some options.

Remember, the ALE mode is designed to establish links under demanding conditions. The image in Fig. 10 shows the 'linking probability' (i.e. a 'correct decode') on an Additive White Gaussian Noise Channel (AWGN, see below) as the theoretical limit. It also displays the performance on CCIR-channels, showing both 'good' and 'poor' ones. Of course, many hobbyists will ask for a decoder to be as sensitive as possible, to get even the most elusive DX, whereas the professionals will have an eye on a high linking probability.

Another quick look at Fig. 10 shows that DXers are happy with SNRs even under -2dB (AWGN). Testing *BCS-ALE*, I have achieved correct decoding down to an exceptional -15dB@3kHz in an AWGN channel!

AWGN is a 'flat' noise, never occurring under multipath HF propagation. It is easy – by modifying the CCIR channels for this mode – to make sure that one tone of the 8-FSK signal is not constantly 'notched out'. For practical reasons, I undertook my AWGN tests with the (free) *HF Path Simulator* software. <https://tinyurl.com/3v9f3m5k>

I had to leave the multipath tests to many instances of carefully-selected on-the-air ALE reception, combined into one audio test file, which all decoders had to crack; and here, *BCS-ALE* turned out to be the winner.



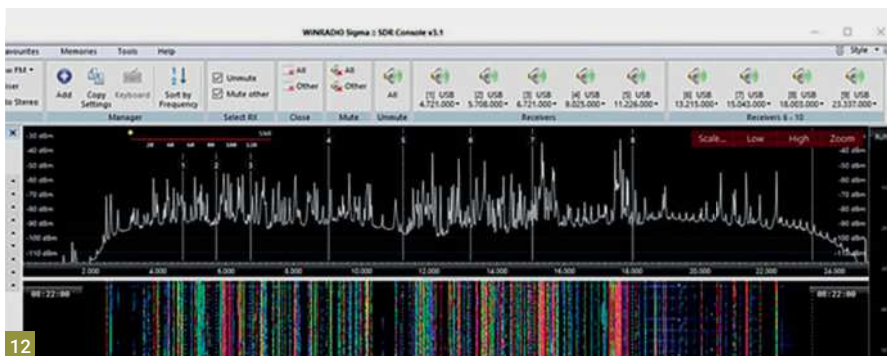
Fig. 12: The 'favourites' channels. Do not forget to activate all channels; otherwise, there will be no audio output at the VACs.

Fig. 13: The information moves from your reference database into the decoder's look-up files (folder "ale\_callsigns") and back again.

Fig. 14: BCS-ALE decodes messages from an audio file in 'fast motion', retaining time, frequency and date of the original audio files.

Fig. 15: Dissemination of the 100-Hertz decimal for ALE frequencies – 85% end in a full kHz value.

Fig. 16: How are the kHz values from 0 to 9kHz distributed? Clearly, 'zero' (0) is the winner here.



### A New Approach: Multi-channel Decoding with BCS-ALE

ALE transmissions are mostly organized in 'nets' of different stations, frequencies, or channels. If you have (nearly) all the channels of a net to hand, BCS-ALE will enable you to decode up to 24 channels in parallel. To do this, you must drive your SDR with the (free) SDR software (Fig. 11).

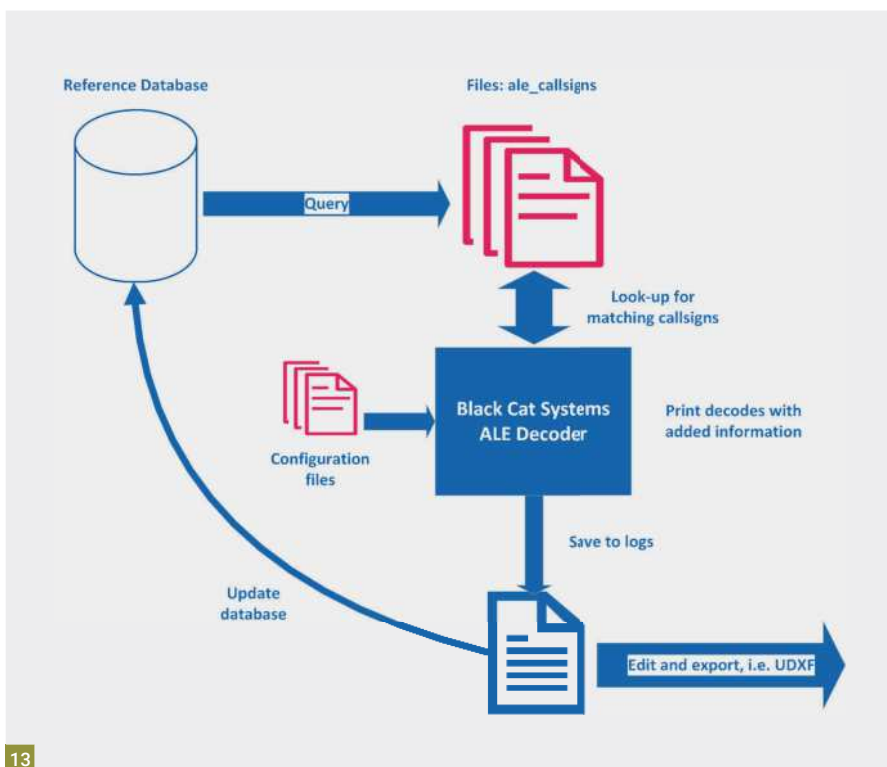
<https://www.sdr-radio.com>

This provides for a maximum of 24 channels with demodulated output from up to 24 frequencies, placed within the bandwidths of your SDR.

Frequencies, and other data from the different nets should be saved by the SDRC Favourites tool, for easy editing and recall (Fig. 12). Each channel of SDR software (up to RX1 ... RX24) must lead a different input of a virtual audio cable, (VAC1 to VAC24) such as Virtual Audio Cable (VAC), which is in widespread hobby use:

<https://vac.muzychenko.net/en>

This will feed each of the up to 24 inputs of the BCS-ALE software, as shown below:



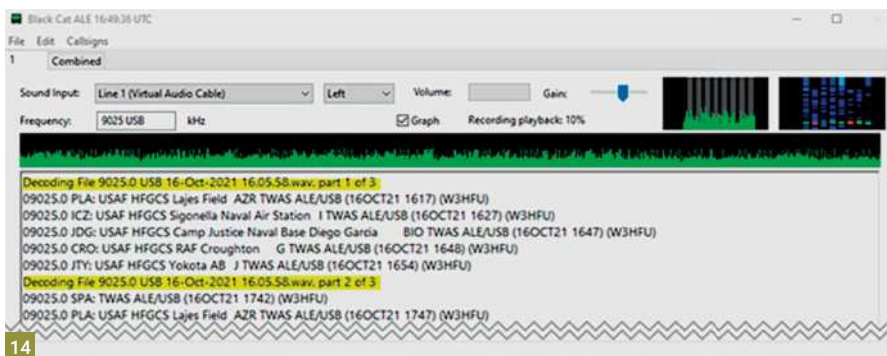
SDRC RX1 [output] -> VAC1[input] -> VAC1[output] -> 1[input]  
 SDRC RX2 [output] -> VAC2[input] -> VAC2[output] -> 2[input]  
 SDRC RX3 [output] -> VAC3[input] -> VAC3[output] -> 3[input]

... and so on ... until:

SDRC RX24 [output] -> VAC24[input] -> VAC24[output] -> 24[input].

The number of virtual sound cards you can activate at a specific bandwidth depends, of course, on the power of your PC.

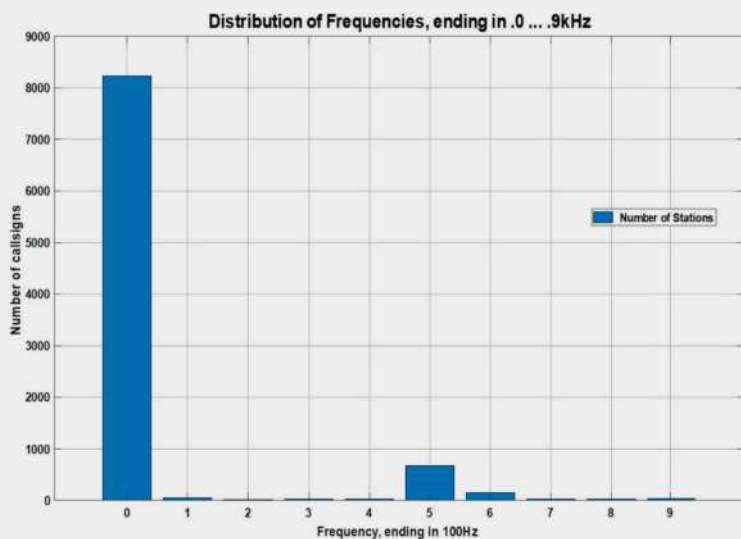
Each category (bandwidths and VACs) is eating up resources: up to 30% for SDRC, up to 16% for BCS software (assuming 9 channels running on a good Windows 10 PC with i7-8700 CPZU, 4MHz and 32GB RAM).



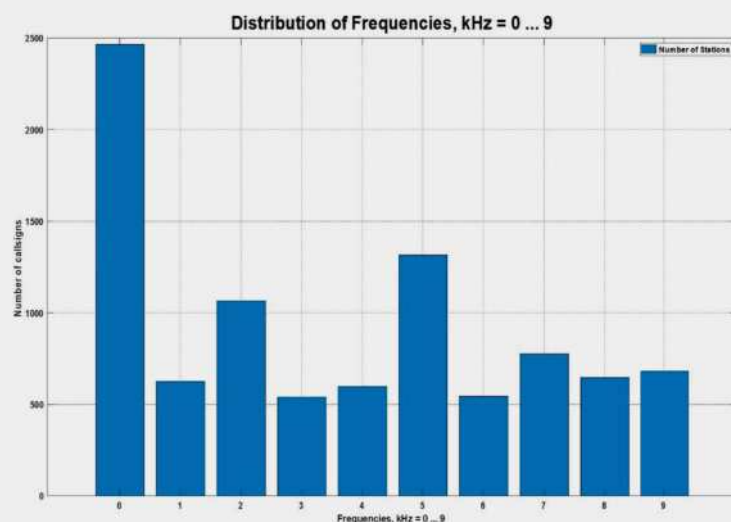
### Unique: Automatic Callsign Lookup

BCS-ALE excels as a multi-channel decoder. It offers many options to find the best balance between reliability and sensitivity. It meets each task with customisable options, although the 'default' setting will suffice in 80% of

all cases). The software also provides other unique features assisting DXers in an unprecedented way. For instance, it displays results in four formats, one of them ready to be posted to the UDXF Group. With all formats, decoded messages can be automatically enriched with additional information, which the



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software looks up in a prepared file. The usual decoded output looks like this

```
'7527.0 [Frequency in kHz] USB [mode]
2021-11-10 22:54:24 [date/time] 16 [BER]
TO TSC TIS K62'
```

Employing the software, this is then turned into a more convenient:

```
'7527.0 USB 2021-11-10 22:54:24 16'
TO TSC COTHEN Technical Service Center
Orlando FL USA
TIS K62 USGC MH-65D/E Short Range
Recovery Helicopter Dolphin #6562 USA
```

This feature, in particular, is a major achievement in DXing. The idea of the software is to look up each decoded callsign in a list of tab-separated entries, in which you had already collected some

metadata. These can be organisation, station, location, country; in fact, anything you consider important. The software looks up each callsign (as above, **TSC** and **K62**), introduces all the information in a neat way and prints it all together in the window. Even more, the software automatically fills a log file with all this data for later inspection, edition and further processing by spreadsheet or database. The 'callsigns' document and its quality (extent, reliability, consistency) thus play a pivotal role (Fig. 13). I have drawn upon a list of more than 3,000 callsigns, which I prepared earlier, as a 'First Aid Kit'. It can be downloaded from my website:

<https://tinyurl.com/4n2uj9yj>

Amongst the many other features of the software, I would like to mention at least

The following findings are based on an analysis of nearly 10,000 logs with different callsign/frequency combinations: There are no specific channels for ALE. Nevertheless, 85% of all frequencies end at a full kHz, for example, 9025.0kHz. Only 7% end in .5kHz. Very few nets leave a special 'scent-mark', like the US Department of State with .6kHz or UNHCR Ethiopia with .8kHz. **Fig. 15** shows this distribution. About 25% of all channels end in 0kHz, followed by those ending in .5kHz. The other steps are more evenly distributed, with an advantage of those ending in .2kHz (**Fig. 16**). The vast majority of logs (95.3%) were produced in USB, the remaining ones in LSB. DSB (Double-Sideband) was a rare exception. If you are in USB and you bump into a signal ending in .3 or .7kHz, which doesn't produce any results despite a good strength, try it in LSB at 3.3kHz higher.

#### Box 1: Channels and USB/LSB modes.

- Your AGC should have a fast 'attack-rate' so it does not become 'deaf' to weaker signals after a loud signal.
- Take a second, third and fourth run with your decoder – at different settings.
- Try AGC OFF but set RF GAIN carefully not to distort the signal.
- Change the frequency in steps of 10Hz (give and take) and try again. Try it at some other time if you have a recording.
- Do you operate the right sideband? Most ALE stations work on USB, but some are in LSB (see also above, **Box 1**).

#### Box 2: Improve ALE decoding with BCS-ALE.

- Do not select a passband smaller than about 575Hz - 2,775Hz enveloping the signal. Additional distortion in most cases will not weigh out this half-decibel of SNR.
- Do not 'overdrive' your receiver or your decoder. This will only add more noise and interference.

#### Box 3: Things to Avoid.

one more: BCS-ALE decodes audio files in fast motion (by more than a factor-10, Fig. 14). All in all, in my view, *BCS-ALE* is the start of a new era in ALE monitoring and is likely to become the tool of choice in this area. Finally, I am sure, Chris, the software author, will not stop here. Take a look at the information in Boxes 1-3, for some more information about my findings, and some more hints and tips on ALE decoding.

[See also Nils's earlier ALE article, in *RadioUser*, August 2018: 38-41 – Ed.]



Robert Connolly

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**D**uring the Cold War, the United States of America and its allies installed several secret acoustic devices on the seabed of the Atlantic Ocean, to listen for Russian submarines departing their bases in Russia and track them in the Atlantic as they passed through the Iceland Gap.

This **SOund SURveillance System** (SOSUS) provided a deep-water long-range detection capability, tracking submarines by their faint acoustic signals. SOSUS consists of high-gain long fixed arrays in the deep ocean basins installed across the ocean bottom at key locations covering both the Atlantic Ocean and, later, the Pacific Ocean. Additional sensors were located along the coast of North America to protect against a potential Russian attack.

These systems were monitored by a number of land-based stations, including some in the UK. Over the years, as submarines became quieter, the seabed monitoring equipment system was also improved to meet these challenges. Sometimes these arrays were referred to as 'doorbells', as they alerted the monitoring teams when the noise of a Russian submarine was received.

### Project Corsair

In the UK, *Project Corsair* was the code name given to the development of shore-based submarine detection methods. The Admiralty Research Laboratory (ARL) at Teddington, Middlesex controlled several facilities around the British Isles

These stations investigated the propagation of sound in water, leading to the development of equipment with the capability to detect ships and submarines.

The stations were located at Perranporth, Cornwall, used there for the initial investigation and development of the *Passive Sonar* technique, between 1952 to 1957. A station at Portballintrae, Co. Antrim, was set up specifically as a level of protection to shipping in the Clyde Approaches, in 1953. Moreover, Unst, Shetland, was established in 1955, to evaluate techniques for land-based detection of Soviet submarines in transit, so that they may be tracked, trailed and neutralised.

More detailed information regarding this system may be found by using the links at the end of this column.



## Cold War Doorbells and Underwater Satellites: Tracing Submarines

Robert Connolly goes well below the surface of submarine tracking technology, looks at research with acoustic buoys, reports on maritime incidents, has NAVTEX updates and previews his next NDB survey.

### Contemporary Methods

Today, much more sophisticated techniques are used to track potential enemy submarines using underwater 'satellites' and mini-robot sub trackers.

This is due to the development of much quieter engines used by submarines, making detection using the passive sound monitoring system much more difficult.

The underwater version of a satellite will be capable of operating at extreme depths in the open ocean, have a large field of view, including the ability to scan upwards, and will be mobile, quiet and unmanned to facilitate deep-sea submarine stakeouts. Once a sub is detected by the 'satellite', a small autonomous vessel will be deployed to stay on its trail in case it poses a threat.

To hunt submarines in the shallower continental shelf waters, state-of-the-art mobile sensors will 'hunt' from above, rather than from below, using non-acoustic sensing.

### Natural Sounds and SeaMonitor

While the Cold War passive sound monitoring system was primarily designed to detect Russian submarines, it also received other underwater noises that would travel long distances. This included sea life. With the end of the Cold War, the importance of the system diminished, although data was still being collected. However, the US Navy permitted civilian scientists more access to the SOSUS system for basic research.

The system has been used to study underwater volcanic eruptions and earthquakes since the early 1990s. It has also been used to study marine mammals and their vocalisations. Finally, it has been used to measure large-scale ocean temperature variability by making more precise measurements of the travel times between widely-spaced sources and SOSUS receivers.

In 2019, the Northern Ireland Loughs Agency commenced a €4.7 million

marine research programme funded by the *EU INTERREG VA* scheme, along with match-funding from the NI Department for Agriculture, Environment and Rural Affairs, and the Department of Housing, Planning and Local Government in Ireland.

This substantial investment will extend the existing network of 'smart' buoys and oceanographic models – delivered by the sister projects *COMPASS* and *MarPAMM* – so that a line of acoustic receivers runs all the way between the island of Ireland and Scotland (Fig. 1).

Called *SeaMonitor*, it is studying the seas around Ireland, Western Scotland and Northern Ireland. The project is led by the Northern Ireland Loughs Agency and supported by another eight leading marine research institutions, using innovative marine species tracking technology to better understand and protect vulnerable marine life in our oceans. *SeaMonitor* will deliver five spatial models for basking sharks, skate, salmonids, seals and cetaceans and three Management Plans for three areas and two species: Loch Sunart to Sound of Jura (skate) and the Foyle and Clyde estuaries (salmon).

The project is aiming to achieve this by extending the existing network of buoys with acoustic receivers on the East to North coasts of the Island of Ireland establishing a physical connection of acoustic receivers between the Island of Ireland and Scotland. The buoys will provide data to develop models and management plans relating to selected species. Fig. 2 shows an example of one of the acoustic buoys.

### Acoustic Buoys

These buoys would seem to be a new deployment of acoustic buoys, rather than the use of the old equipment of the SOSUS system. There were acoustic, submerged, buoys in that area, which were monitored by a Royal Navy shore station at Portballintrae, Co. Antrim during the early part of the Cold War, as part of the defences for the Clyde submarine bases as part of Project Corsair.

The Portballintrae station was also equipped with several surface radars to monitor Russian surface naval vessels approaching the Clyde. Incidentally, when that station closed in 1957, it was due to the fact the local Council would not renew the lease for the land, as they required it for their own purposes.

Table 1 shows links to websites connected with this part of my column that you may find interesting.

If you are interested in the *Project Corsair*



and the Portballintrae station, please contact me; I downloaded the information several years ago when I was carrying out some historical research on that station.

### A Collision at Sea

While on the subject of sonar acoustic arrays, it was revealed in early January 2022, that a Russian submarine that was tracked by *HMS Northumberland* in the North Atlantic collided with the acoustic sonar array towed by the Royal Navy vessel in 2020. Normally, the MOD would not comment on such incidents.

However, in this case, it was caught on camera by a Channel 5 film crew onboard the ship that was making a documentary series, *Warship: Life At Sea*, on the Type-23 frigate at the time of the incident.

The equipment was damaged, and the frigate had to return to port for repairs. It is not known if the Russian submarine suffered any damage. In recent years, there has been an increase in the number of Russian submarines entering UK waters. It is believed that some have been responsible for getting entangled in fishing trawlers' nets dragging them backwards and coming close to sinking them.

**Fig. 1: The line of acoustic receivers between the island of Ireland and Scotland. Fig. 2: An acoustic buoy. Fig. 3: The Oman Coastguard salvage and rescue vessel *Haras 1* (حرس 1).**

### Human Error or AIS Failure?

Meanwhile, In December 2021, a fatal collision occurred in the Baltic between two cargo vessels, the UK registered *Scot Carrier* and the Danish-registered construction vessel *Karin Høj*, resulting in the two crew members of the *Karin Høj* being killed when the vessel capsized.

The accident is currently under investigation by both UK and Swedish authorities. Apparently, the accident occurred in fog. However, both vessels were equipped with marine Automatic Information System (AIS) transmitters. The proper use of AIS transmissions should have prevented such a collision, as the bridge crewmembers on duty of both vessels should have seen each other's position, course and speed on their AIS display, something that is normally linked to the ship's radar.

The display can also show the projected course and provide collision alerts.



Without pre-empting the outcome of the formal investigation, it would seem to me that a proper radar watch, something that is very important in foggy conditions, was not happening on either or both vessels.

Perhaps the crew member on watch had left the bridge, leaving the ship on autopilot, for some reason but to my mind, it was certainly an accident that, in this day of technology designed to prevent such incidents, should not have happened. Checking the UK Marine Accident Investigation Branch (MAIB) website provides the current status of this and other marine accident investigations.

<https://tinyurl.com/4ejf984s>

Even though the incident happened off the coast of Sweden the UK MAIB is carrying out its investigation into the incident as one of the vessels was UK-registered.

## Navtex and NBDP Updates

According to the website below, authorities in Canada continue to permit broadcaster CHLO AM 530 Brampton to create, what William Hepburn describes as, destructive interference on the NAVTEX frequency 518kHz within the Ferndale NAVTEX area. This is caused by the use of digital HD sidebands covering 515 to 520kHz.

In some more updates for those of you who monitor NAVTEX signals, two new transmissions are planned for NAVAREA 2 – Lagos and Port Harcourt. Lagos will use slot O on 490kHz and slot S on 518kHz, while Port Harcourt will use O on 490kHz and H on 518kHz. Furthermore, in NAVAREA 2, São Vicente is out of service on both 490 (slot P) and 518kHz (slot U). Casablanca on 518kHz (slot M) is also out of service.

In NAVAREA 3, Toulon on 490 (slot S) and 518kHz (slot W) is out of service.

A new Russian station, Taganrog on 490kHz in NAVAREA 3, has been allocated slot O.

[www.dxinfocentre.com](http://www.dxinfocentre.com)

My recent checks of HF NBDP transmissions on 4209.5kHz have shown that Istanbul Turk and Irakleio transmissions are currently still receivable in the UK. On 8416.5kHz I have received UAT Moscow, along with transmissions from Isjford. Unfortunately, despite running checks on these frequencies for several days, there was no sign of any stations outside Europe.

However, as we progress into the summer, this will change. On previous occasions, I received Boston on 6314, 8416.5, 12579 and 16806.5kHz. I also some-



ROBERT CONNOLLY

times received Iqaluit and Buenos Aires on 8416.5kHz, along with the very occasional reception of Honolulu. Buenos Aires can also be heard from time to time on 12579 and 16806.5 kHz. Their transmissions are in both Spanish and English lasting well over an hour.

## Publications News

The Canadian Coast Guard has ceased the printing of its excellent annual publication *Radio Aids to Marine Navigation*. However, the document will continue to be available online, free of charge, at this URL:

<https://tinyurl.com/msx8b4un>

The annual edition of the *Radio Aids to Marine Navigation* publication is always published in January, with amendments, if any, advertised in Section 3 of the monthly edition of *Notices to Mariners*. The *Notices to Mariners* publications are available online, free of charge, at this website:

<https://www.notmar.gc.ca>

This is an interesting 300-page publication covering many aspects of Canadian Coastguard maritime communications. Interestingly, it also lists six remaining marine Non-Directional Beacons still operational in British Columbia for the Pacific coast. It has sections on NAVTEX, marine communications and traffic service centres, along with HF and VHF frequencies used. For both the general maritime radio listener and those particularly interested in

Canadian HF marine communications, this is a very useful resource document and will be of great interest.

## NDB Monitoring Review

Next month, I will bring you my in-depth review of NDB reception over the winter period. I will include not only a large selection of NDB reception logs but also a report on what happened when I compared NDB reception results after running my SDRplay RSPdx and RSP1A radios at the same time, and with the same antenna and SDR software.

Moreover, as next month sees the arrival of Easter and the re-opening of our coastal holiday resorts, I will be providing hints and tips aimed at the newcomer who plans to bring their scanner with them for a seaside holiday break.

Finally, the photo in Fig. 3 shows the Royal Oman Coastguard salvage/rescue vessel *Haras 1* (حرس 1), fitting out after construction in Messina Italy (2008). Until the next time stay safe and "Fair Winds".

<https://tinyurl.com/bdfuh8b3>  
<https://tinyurl.com/4vttyp77>  
<https://tinyurl.com/4zz6uzdh>  
<https://tinyurl.com/2p9fjpyv>  
<https://tinyurl.com/379ap8ew>  
<https://tinyurl.com/4wcp3e>  
<https://compass-oceanscience.eu>

Table 1: Further Resources for this Column.

# Rallies & Events

All information published here reflects the situation up to and including 14th February 2022. 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](mailto:wiessala@hotmail.com)

6 March

## EXETER RADIO & ELECTRONICS RALLY:

America Hall, De La Rue Way, Pinhoe, Exeter, EX4 8PW.

Pete G3ZVI

[g3zvi@yahoo.co.uk](mailto:g3zvi@yahoo.co.uk)

13 March

**HAMZILLA RADIO FEST:** Discovery Science Park, Gateway House, Ramsgate Road, Sandwich, Kent CT13 9FF. Tickets are available now from £3/Tables £12. Those who bought tickets and tables in advance will have their booking carried forward to Hamzilla 2022.

<https://hamzilla.uk>

9 April

## YEOVIL ARS: 36th QRP CONVENTION.

The Digby Hall, Sherborne, Dorset, DT9 3AA (parking charges apply on Saturdays) Open 09:30 am to 2:00 pm; Admission £3 (No dogs except guide dogs) BB | TS | Club Stalls; Supported by RSGB, RAFARS & BYLARA. No talks this year, due to Covid.

<https://tinyurl.com/fyj9vtca>

24 April

## CAMBRIDGE REPEATER GROUP RALLY:

Foxton Village Hall, Hardman Road, Foxton, Cambridge, Cambs CB22 6RN; Open at 9.30 am for the public (7.30 am for traders). Admission is £3. (BB, CBS, CR, TI, TBS).

Lawrence, M0LCM : 07941-972724

[rally2022@cambridgerepeaters.net](mailto:rally2022@cambridgerepeaters.net)

[www.cambridgerepeaters.net](http://www.cambridgerepeaters.net)

1 May

## NARSA (NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION):

Norbreck Castle Exhibition Centre, Blackpool FY2 9AA

Dave M00BW: 01270 761 608

[dwilson@btinternet.com](mailto:dwilson@btinternet.com)

[www.narsa.org.uk](http://www.narsa.org.uk)

2 May

## DARTMOOR RADIO RALLY (BANK HOLIDAY MONDAY):

The Yelverton War Memorial Hall, Meavy Lane, Yelverton, Devon, PL20 6AL. Doors open at 10 am and admission is £2.50 (BB | CR | FP | TS).

Roger: 07854 08882

[2e0rph@gmail.com](mailto:2e0rph@gmail.com)

8 May

## LOUGH ERNE AMATEUR RADIO CLUB

**ANNUAL RALLY 2022:** Arena @ Share Discovery Village; 221 Lisnaskea Road; Lisnaskea, Co. Fermanagh, BT92 0JZ; Northern Ireland. Opening at 11.30 am (9.30 am for traders). Facilities are available on-site for breakfast, tea, coffee and lunches. There may be some Châteaux available on-site. Please contact Reception directly at: [www.sharevillage.org](http://www.sharevillage.org)

Traders wishing to attend should contact Alan R Gault Chairman at:

[alan.r.gault@btinternet.com](mailto:alan.r.gault@btinternet.com)

<https://tinyurl.com/4end75em>

11 June

## ROCHDALE & DISTRICT AMATEUR RADIO

**SOCIETY SUMMER RALLY:** St Vincent de Paul's, Caldershaw Road, off Edenfield Road (A680), Norden, Rochdale OL12 7QR. Doors will be open to the public at 10.15 am; disabled visitors 15 minutes earlier.

Robert M0NVQ: 0777 811 3333

[m0nvq@outlook.com](mailto:m0nvq@outlook.com)

12 June

**JUNCTION 28 RADIO RALLY:** Alfreton and District Amateur Radio Club, South Normanton. Alfreton Leisure Centre, DE55 7BD. Tables still £10 and Admission £3. Bar, refreshments and full Café onsite. Opening at 10:15, traders will have access from 08:00.

Alan Jones M0OLT: 01332 679913

[secretary@snadarc.com](mailto:secretary@snadarc.com)

[www.snadarc.com](http://www.snadarc.com)

19 June

## EAST SUFFOLK WIRELESS REVIVAL

(IPSWICH RADIO RALLY): Kirton Recreation Ground, Back Road, Kirton IP10 0PW (just off the A14). Doors open at 9.30 am and the entry fee for visitors is £2. Trade tables are from £10. (BB | CBS | CR | FP | RSGB | SIG | TS | GB4SWR HF station).

Kevin G8MXV: 07710 046 846

[www.eswr.org.uk](http://www.eswr.org.uk)

24-26 June

## HAM RADIO FRIEDRICHSHAFEN

<https://www.hamradio-friedrichshafen.de>

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

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**Tim Kirby**

tim@livingland.wales

A few days ago, someone asked me for some tips about receiving the Slow Scan TV transmissions from the International Space Station (ISS). Although I have covered receiving voice and packet data transmissions from the Space Station before, I do not think we've ever looked in any detail at Slow Scan Television, what it is, how you might receive it and how and why it is sent from the ISS.

As I read more, I discovered that Slow Scan Television had a rich history of being used in space communications.

What is Slow Scan Television, or SSTV for short? I remember when I was first getting interested in becoming a radio amateur back in the very early 1980s, I went to a talk at the Cheltenham Amateur Radio Association about SSTV. It was being demonstrated using a new (at the time) solid-state converter device, as well as a more venerable 'long persistence' display.

However, even in the 1980s, SSTV had been around for a while; let us, therefore, go back to the beginning:

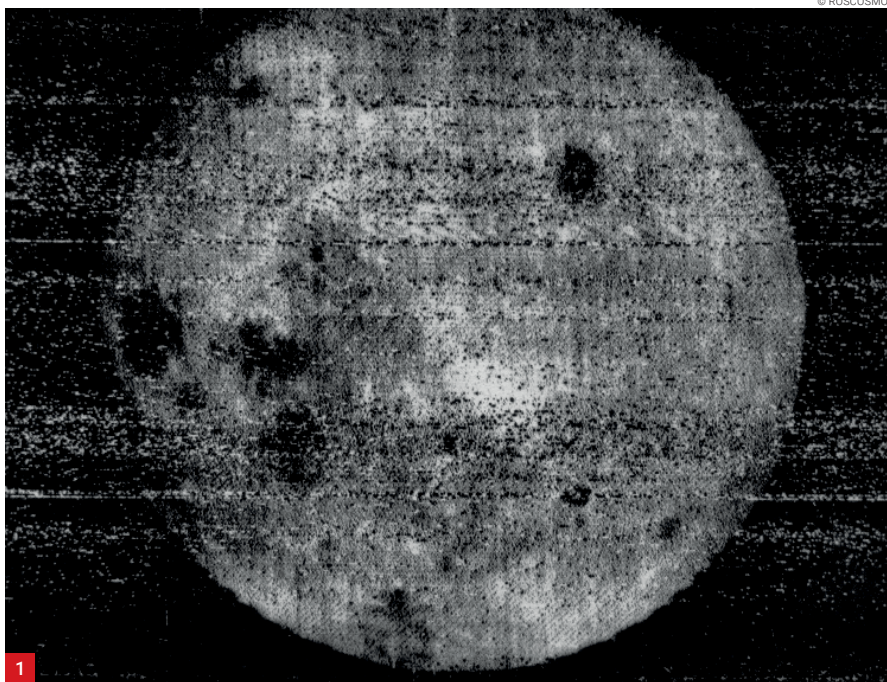
### From Luna to Apollo

The idea of SSTV was first put forward in 1957 by Copthorne Macdonald (b. 1936). He used an electrostatic monitor and a vidicon tube (similar to the long persistence display mentioned above). The 'definition' was not what we would consider 'high', these days, with 120 lines to make up the static picture; each line was made up of around 120 pixels. The first tests were made on what was then the 11-metre amateur band, which was later reallocated to the CB service by the FCC in the United States.

What I had not realised until I started looking into the history of SSTV a little more, was that SSTV had been used in Space exploration. The *Luna 3* spacecraft used SSTV to transmit images of the far side of the Moon in 1959 (Fig. 1). Whilst the overall concept of SSTV is easily understood – mapping specific tones of sound to shades of grey, or colour – there are many different methodologies used, even now!

Back in 1960, a 100 line per frame system was used, at 10 frames per second for the *Vostok* launches. A later system, with 400 lines was also used on later *Vostok* launches.

The *Apollo* Missions too used SSTV to transmit images from inside *Apollo 7*, *Apollo 8* and *Apollo 9*, as well as the *Apollo Lunar*



# Slow Scan Television from Space

This month **Tim Kirby** looks at the history of Slow Scan Television in space exploration and shows you how you can follow in the steps of the pioneers and receive pictures that are truly out of this world!

Module (Fig. 2). In a decision, which I am sure made sense at the time, but seems less than wise now, NASA took all the original tapes of these images and erased them, so that they could use the tapes on later missions! Fortunately, the *Apollo 11 Tape Search and Restoration Team* managed to find the best quality films taken from the first broadcast and then commissioned a film restoration company to enhance the film, converting it into a digital format for archiving. The *Apollo* system used 320 lines per frame at a speed of 10 frames per second.

### Early Commercial Systems

Commercial SSTV systems started to appear in the 1970s, with the Federal Communications Agency (FCC) in the USA, permitting the mode to be used on the amateur radio bands. In the UK, no such permission was required, and radio amateurs were keen to try out this new mode, which was

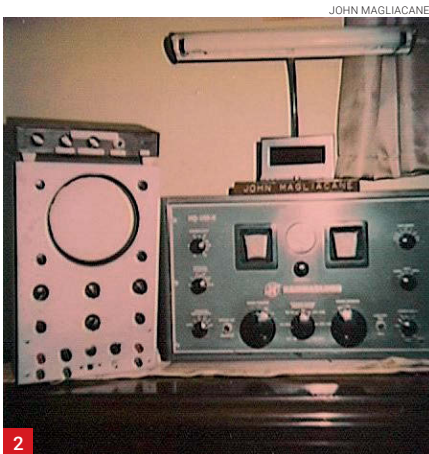
quite sophisticated at the time.

There was a scanner or camera to capture the image, a modem to convert the picture into tones for transmission, as well as converting the tones into signals, to be displayed on a cathode ray tube for the reception. The long persistence tubes allowed the picture to be displayed for about 10 seconds. Blink and you missed it!

Nevertheless, this was a breakthrough, allowing pictures to be sent over a 'normal' short wave SSB or AM radio circuit. Manufacturers such as *Robot* built commercial SSTV converters, which you could connect to the audio circuitry of your short wave transceiver. The picture was displayed on a standard video monitor. This was plugged into the back of the converter.

As I recall, these converters were expensive and I could not conceive of owning one at the time.

You can see an example of a *Robot 400*



Slow Scan TV (SSTV) converter at this URL: <https://tinyurl.com/2p8sv36h>

### Medical and Amateur Use

A good friend, Walt Davidson (callsign GB2SM) was one of the operators of the much-missed amateur radio station at the Science Museum in London in the 1970s. Walt tells a story that the SSTV equipment at the Science Museum was put to great use one day. An islander on Tristan Da Cunha in the South Atlantic had developed a heart condition; at that time, there was no one available locally to look at the patient's ECG.

Therefore, SSTV was used to transmit the image of the ECG from Tristan Da Cunha to the Science Museum, where a cardiac doctor from one of the London hospitals was on hand to look at and analyse the image of the ECG and offer advice.

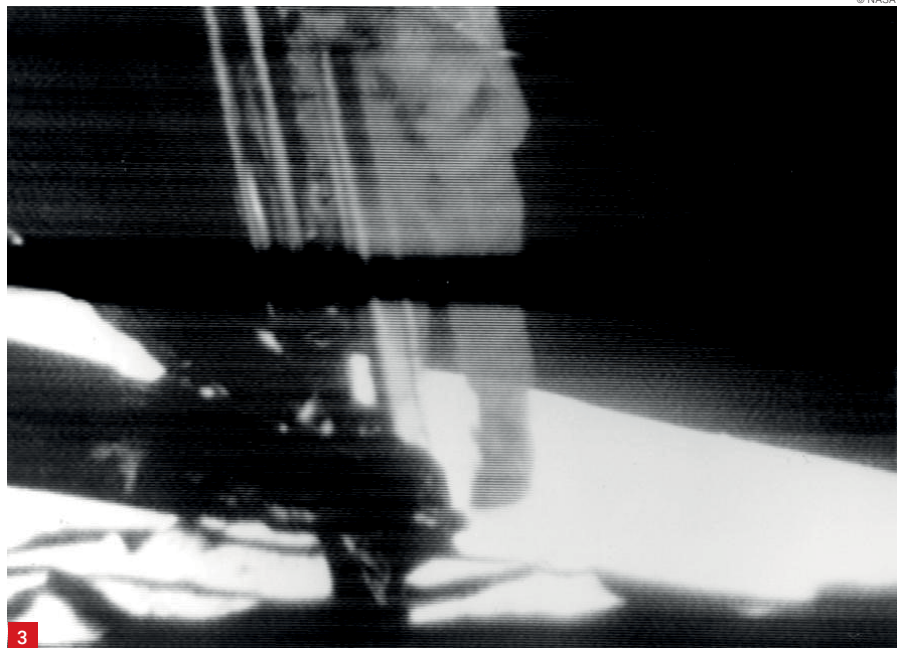
In the 1980s, SSTV was still maintaining a strong connection with Space Communications. On an interesting webpage, John Magliacane KD2BD, mentions using his homemade SSTV equipment (Fig. 3) to receive pictures from the planet Jupiter, which had recently been received by NASA from the *Voyager 2* spacecraft.

<https://www.qsl.net/kd2bd/sstv.html>

The images were then rebroadcast on the amateur bands, using SSTV by amateur radio station W6VIO, the amateur radio station at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California.

SSTV on the amateur bands continued to be quite specialised well into the 1980s. However, the new wave of microcomputers started to make an impact by the middle of that decade. If you were lucky enough to have a *Sinclair Spectrum* computer in 1987, there was a program called *G1FTU SSTV*.

This was capable of decoding and transmitting SSTV images. You still had to build an interface circuit, to connect the computer up to your radio transmitter. At the time,



as an inexperienced radio amateur, this seemed quite a hurdle. Looking back, I am not sure why I did not bodge something simple together!

### Modern Accessibility

Once PCs with soundcards were on the scene, it was not long before software started to be available, which used the soundcard as a modem and the PC's display to show received pictures and select pictures for transmission. Such software is readily and freely available now. Technology has changed so much that there is now even SSTV software available to run on a smartphone.

While SSTV is now a very accessible mode for everyone, it has become much more popular. As well as analogue SSTV, which we have been talking about, there is now Digital SSTV in use on the amateur bands, which you might consider similar to a file-transfer program. Digital SSTV results in very good quality images, almost indistinguishable from an image you may have downloaded from the internet or received by email. As such, perhaps it lacks a little 'charm'. Your view might be different.

*Easypal* (Fig. 4) is an example of a digital SSTV program, which although is no longer under development, seems to have a strong following. You can download it here: <https://tinyurl.com/2p9ajx4s>

You can find SSTV on the amateur bands on a very regular basis. This is useful if you want to test your receiving and transmitting setup – 14.230MHz is a useful frequency to listen to. There, you will often hear a series of tones – this is an SSTV signal. Depending

Fig. 1: *Luna 3* imaged the dark side of the moon and transmitted the image back to Earth using an SSTV system. Fig. 2: The vintage SSTV receiving station of John Magliacane. Fig. 3: Neil Armstrong's first step on the Moon - transmitted by SSTV. Fig. 4: A digital SSTV signal sent with *Easypal*. Figs. 5a and 5b: Two samples of SSTV signals ('5/12' & '1/12') transmitted from the ISS in December 2021 (David Ryan near Doncaster).

on the SSTV system in use at the time, the pictures generally take around a minute to be received. If you do receive pictures at 14.230MHz, please be aware that some people seem to have different values about what make suitable images for transmission.

### SSTV from the ISS

Let us get back to SSTV activity from space! SSTV is transmitted from the amateur radio station in the Russian part of the International Space Station, several times a year (Figs. 5a and 5b).

There is usually a few days' notice before any activity.

Keep an eye on the ARISS (Amateur Radio on the International Space Station) website:

<https://www.ariss.org>

Alternatively, make sure that the frequency 145.800MHz is programmed into your scanner. In any case, 145.800MHz is a good frequency to monitor regularly as you may well hear astronauts making voice contacts with schools and answering questions, which can be quite interesting.

However, if you hear a series of tones, you know that some SSTV activity is taking place.



Signals are generally very strong. The transmitter on the space station runs around 25W, so you will not need specialised receiving equipment. A discone or white stick aerial on your house will almost certainly be good enough to receive signals capable of producing good quality images.

You will need a receiver capable of receiving on 145.800MHz. If the radio has a wide filter, so much the better. You will need a means of taking the audio from the receiver to the input of a soundcard on your computer. A simple connecting lead will get you started, although commercial interfaces provide a degree of isolation, which can be beneficial for both safety and audio quality reasons.

I am assuming here that you have a Windows PC

<https://www.qsl.net/kd2bd/ssstv.html>

you'll need to run some software capable of decoding SSTV. MMSSTV is perhaps one of the best-known bits of software for this purpose which you can download freely at this URL:

<https://hamsoft.ca/pages/mmsstv.php>

The setup is relatively straightforward, once you have installed the software, it is a question of configuring the software to look at the soundcard input where the signals from your receiver come in. If you are lucky, it will default to that input and you will not have to do anything.

## Standards and Signals

As I mentioned earlier, there are many different SSTV standards. SSTV from the ISS is generally transmitted in PD120 mode. Fortunately, MMSSTV should automatically detect that the signal is being sent in PD120 mode and configure itself accordingly. If it does not, you can set the mode manually, of course.

Randy K7AGE has put together a detailed video on how to receive pictures from the ISS, including software installation and configuration, knowing when the ISS is passing your location and lots of other useful information.

You can see the video here:

<https://youtu.be/YgY3saXXTXs>

Randy also covers a very simple means of decoding SSTV from the ISS, which you might like to try if you have never had a go before. If you have a handheld radio or scanner tuned to 145.800MHz, go outside when a suitable pass is due and take a smartphone with a 'tape recorder' feature on it.

All you want to do is to record the audio signals onto your smartphone. Hold the microphone on your smartphone fairly close



JOSEP MATARÓ (EA3DAH | JN11FN)

4 3DAH OP. JOSEP MATARÓ (CATALUNYA) JN11FN \*AND THE HAPPY NEW YEAR\*

to the loudspeaker of the handheld radio so that the audio is nice and strong.

As the ISS passes over your location you will notice variations in signal strength. You will almost certainly find by tilting the aerial back and forth and side to side you will be able to peak the signal up a little bit stronger. This will change through the pass, so you will need to move the set (and the tape recorder) around a fair bit. If you manage to keep the signal strength and audio quality up, you are bound to get a better quality of the image.

## Working with MMSSTV

Once the pass is over – and you may receive several images on the same pass – you can stop the recorder app and head back inside to your computer.

There, you can run up the MMSSTV application. Rather than selecting the soundcard input to the program, select the computer's microphone. Then, start to play the recording you just made and if everything has gone to plan, you should start to see the SSTV pictures on your screen. The quality may not be great, but it is surprising how well this very simple method can work and it's fun to try it out. Of course, if you have a suitable audio cable from the output of your phone to the input of your computer's soundcard, this will work even better.

Making a recording of the signals from the ISS is a good idea anyway. It allows you to have infinite chances to decode the images. You can either make an audio recording as described above (and of course, you can make a recording of the pass from your scanner or base station) and then feed that



DAVID RYAN



into the computer and SSTV program.

If you have an SDR type receiver, you can record the signals from the pass in the SDR software and then, once the pass is over, you can play the signals back in the SDR software and feed the output into your SSTV decoder. There are lots of options! Many people find the decoding of the SSTV images from the ISS fascinating and of course, if you get a good quality image or two, it is nice to be able to show friends and family what you have been up to. I hope you have enjoyed this look at Slow Scan Television signals from space. Perhaps, you might try receiving some of them for yourself.

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# DealerGuide

## For Sale

CHECK OUT OUR WEBSITE! Windows 10 ready CAT and programming cables, latest version RTL-SDR USB sticks and other genuine RTL-SDR.com products, replacement microphones, cables and PTTs for studio microphones, linear switching cables and much more. [technofix.uk](http://technofix.uk) or [www.technofix.co.uk](http://www.technofix.co.uk)

# TradingPost

## FOR SALE

**COLLINS 75S-2HF RX.** Good condition and working order. Very clean inside/out. Winged emblem. Manual. £290. **HMAEG HM 204-2** oscilloscope twin beam

Good condition working order. £60 **TAYLOR 68A** signal generator good condition working order Accurate scale £30. **Contact Rob: 01273 834355**

or email: [shadobi23@gmail.com](mailto:shadobi23@gmail.com) **MID SUSSEX**

**UNWANTED INHERITED GIFT.** SGC SG500 500W linear amp 1.6-30Mhz, 12V operation, 30-100W drive. As new, never used. Recently checked by Kent Rigs. £500. Buyer to inspect and collect. **David G4JMF: 07724 139252**

or email [daveg4jmf@gmail.com](mailto:daveg4jmf@gmail.com) **CHESTER**

**RACAL RA1795.** First class condition, working perfectly, 20-1000Mhz, all mode. Believed used at Hanslope Park in 1982 during Falklands conflict. £1500 ONO. Buyer to inspect and collect. **David G4JMF: 07724 139252** or email [daveg4jmf@gmail.com](mailto:daveg4jmf@gmail.com) **CHESTER**

**LOWE HF150** with PR.150 Pre-Selector AP 150 loudspeaker unit and key pad. This radio and owner appeared in the November issue of RU. Buyer collects. £200 ono. **Lionel: 01795 538599 FAVERSHAM, KENT**

## WANTED

**VINTAGE CABINET.** chassis, tuning capacitor, scale and pointer suitable for building a valve TRF receiver (PW October 1956) as was available then from radio dealers. Please email: [nickdewhurst@hotmail.co.uk](mailto:nickdewhurst@hotmail.co.uk)

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## DIGITAL & ANALOGUE

**SANGEAN ATS-909X2**  
The Ultimate SSB / FM / SW / MW / LW / Air / Multi-Band Receiver in White or Graphite



The Fusion 600 is a multi-purpose network streamer. The tuner makes it possible to play music files via wired or wireless network.

**UNIDEN UBC-355CLT**  
Quality base and mobile scanner in an elegant cabinet. Designed for home and mobile use, with a large speaker for excellent sound.



**UNIDEN UBC-125CLT**  
Compact 500 channel handheld scanner. Covers 25-88MHz, 108-174MHz, 225-512MHz and 806-960MHz.



**UNIDEN UBDC3600XLT**  
New digital TruckTracker V Professional Scanner Receiver. 25-1300MHz wideband frequencies. The TruckTracker V operation allows this scanner to scan APCO 25 Phase 1 and Phase 2, DMR, Motorola, EDACS, LTR Tracked Systems as well as conventional analog and P25 digital channels.



**ELAD FDM-DUOR**  
A Receive-only Version of the famous FDM-DUO!  
10kHz-54MHz Direct Conversion SDR Receiver. SDR receiver that offers the possibility to operate stand-alone like traditional radio or attached to a Personal Computer discovering the possibilities offered by the SDR technologies. After the great success of the FDM-DUO transceiver the manufacturer now offers the "R1" as a receiver — as to be expected by Elad in a sleek Italian design and equipped with top-notch technology.

**Elad Companion Speaker SP1 for FDM-Duo.** £134.95

The Discover 909X is the perfect world band radio to roam the globe with.



The Fusion 600 is a multi-purpose network streamer. The tuner makes it possible to play music files via wired or wireless network.

**AR-DV10**  
The ULTIMATE all mode digital handheld scanning receiver. Latest firmware! 100kHz-1300MHz Analogue & Digital Modes.



**WHISTLER TRX-2**  
DIGITAL DESKTOP MOBILE RADIO SCANNER. Multi-system adaptive digital trunking scanner capable of monitoring these unencrypted channels/systems: Conventional DMR (Entered as a DMR trunked system, NXDN™, Hytera XPT, MotoTRBO™ Capacity Plus, MotoTRBO™ Connect Plus, and MotoTRBO™ Linked Cap Plus systems and NXDN.



**SF Screen Protectors** For Yaesu, Kenwood and Icom. ONLY £7.95

**ICOM IC-R8600**  
100kHz-3GHz Receiver with SDR Technology from IC-7300.

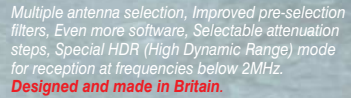


The IC-R8600 replaces the IC-R8500 wideband receiver and features technology incorporated into Icom's best selling IC-7300. The IC-R8600 receives a wide frequency range from 0.01-3000MHz frequency in analogue and various digital modes (D-STAR, P25, NXDN and dPMR). The IC-R8600 also features a larger 4.3 inch touch screen display which displays a fast moving spectrum scope and waterfall display.

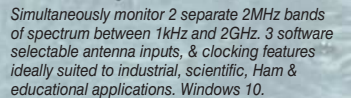
**Includes an Icom AD-55 PSU worth £49.95!**

## SDR RADIO

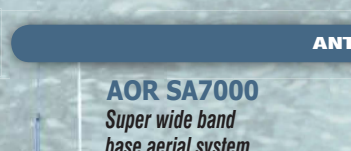
**SDRPLAY RSPdx**  
New Mid-range SDRplay Radio. Complete redesign of the popular mid-range RSP2pro 1kHz-2GHz receiver.



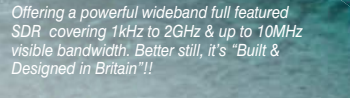
**RSPduo DUAL TUNER 14-BIT SDR**  
Dual-Tuner wideband full feature 14-bit SDR, 1kHz to 2GHz, 10MHz of spectrum visibility.



**KerberosSDR**  
A Coherent RTL-SDR with 4x Channels. For direction finding, passive radar, beam forming, or just as four RTL-SDRs!



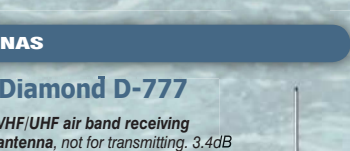
**SDRPLAY RSP1a**  
Brand new design. The RSP1a is a major upgrade to the popular RSP1.



**FUNcube Dongle Pro+**  
Wideband SDR Receiver. 150kHz-1.9GHz incl SAW Filters.



**HackRF One**  
HackRF One from Great Scott Gadgets is a Software Defined Radio peripheral capable of transmission or reception of radio signals from 1MHz to 6GHz.



## RECEIVERS

**AR-5700D RECEIVER**  
Advanced digital communications. Frequency range 9kHz-3.7GHz. Tuning steps 1Hz-999.999kHz.



**AOR AR-DV1**  
Communications Receiver. Covers 100kHz to 1300MHz in traditional analogue modes (SSB, CW, AM, FM, S-FM, W-FM) as well as various digital modes. In fact, we know of no other radio in this category that can decode Icom's D-STAR mode, Yaesu's new C4FM mode, Alinco's digital mode, NXDN (note: 6.25kHz only), P25 Phase 1, etc. Plus lots of interesting features!

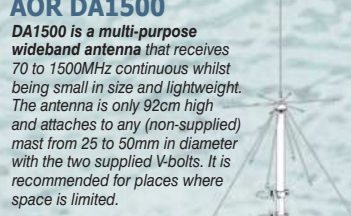


**AOR SA7000**  
Super wide band base aerial system. The SA7000 is an ultra-wide range external receiving aerial with a useable frequency coverage of 30 kHz to 2 GHz - short wave / VHF / UHF. The aerial is designed for areas where space is a problem or when an "unobtrusive" installation is essential.

**ML&S: £209.95**

## ANTENNAS

**AOR DA1500**  
DA1500 is a multi-purpose wideband antenna that receives 70 to 1500MHz continuous whilst being small in size and lightweight. The antenna is only 92cm high and attaches to any (non-supplied) mast from 25 to 50mm in diameter with the two supplied V-bolts. It is recommended for places where space is limited.



**AOR LA400**  
10kHz-500MHz, Receive only Magnetic Loop. Since the invention of this revolutionary concept by KOLSTER in 1915, loop antennas, especially of the active type, have also been widely used by the military in the 70s, before becoming very popular among hobby listeners.

**ML&S ONLY: £149.95**

**Diamond D-777**  
VHF/UHF air band receiving antenna, not for transmitting. 3.4dB on VHF (120MHz) and 5.5dB UHF (300MHz) with an approximate length of 1.7 metres. The antenna is constructed from fibre glass materials and it is pre-tuned and fully weatherproofed. Mounting components are included. It's fitted with an SO239 connector, so can be connected to a PL-259 without the need of an adaptor. Tuned to receive 108-137.975MHz civilian air band, 225-400MHz military air band.



**Diamond D-190**  
Super Discone Antenna covering 100 to 1500MHz for receiving and 144/430/904/1200MHz for transmitting. Rust-free stainless steel is employed in major component parts making the antenna rust resistant and durable with 10m cable included.

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**MyDEL Smart Wire Kit**  
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