

**THE FUTURE OF NETWORK RADIO?**  
We review the versatile Chinese Boxchip S900A

# RadioUser

July 2020 £4.99

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- 300 channels
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- Includes VHF FM broadcast radio
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- Power: 11.7-15.8V DC
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- Weight: 4.1kg

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Create Log Periodic Antennas - Japan as used by the 'Professionals'



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• Gain: 10-12dBi

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• Covers: 24-1800MHz

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Now with Improved:  
• Performance below 2MHz  
• Pre selection Filters  
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- Covers: 1 kHz - 2GHz
- Software upgradable
- Good dynamic range
- Calibrated 5 meter

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- Covers: 1 kHz - 2GHz
- Simultaneous independent receive
- Software upgradable
- SDR UNO supports Diversity Tuning

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## WHISTLER



**Whistler TRX-2**

**£479.95**



**Whistler TRX-1**

**£419.95**

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- Too many features to list here
- visit our web site for more details!

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AOR

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- TETRA, P25 (Phase 1+2), DMR, Mototrbo, dPMR

£999.95

£939.95

AOR



**AOR AR-8600 MkII**  
Communications Receiver

- Frequency: 530kHz-3000MHz no gaps
- Modes: WFM, NFM, SFM, WAM, AM, NAM, USB, LSB, CW
- Memories: 1000 (20 banks)

Optional Mains Power supply....£25.95

£649.95

AOR



**AOR AR-5700D**  
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- 10 digital modes - TETRA, P25(Phase 1), DMR, Mototrbo, dPMR, NXDN, D-CR, D-STAR, Alinco, Yaesu.
- Covers 9kHz - 3,700MHz
- 900kHz wide IQ output

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BEARCAT

NEW



**SDS-100E**  
Advanced Digital & Analogue Scanner

- Frequency: 25-1300MHz (w/gaps)
- Weather Resistant IPX4

Standard Version (licence required to activate DMR, NXDN)

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AOR



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ALINCO



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## RadioUser

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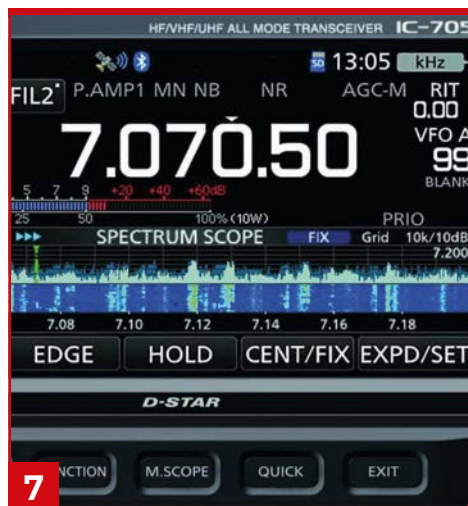
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We regret that replies to technical queries cannot be given over the telephone. Any technical queries by e-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by RU, then please write to the Editorial Offices, we will do our best to help.

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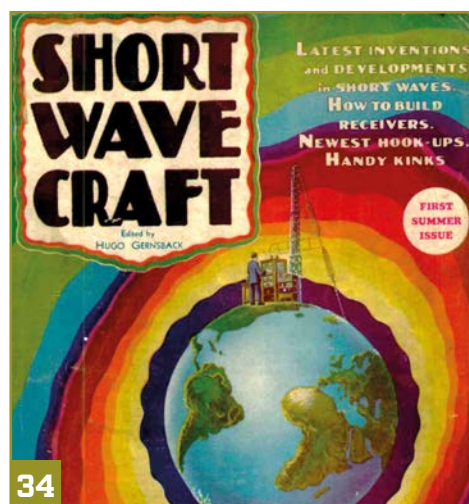
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# Radio Magazines and Aeronautical Communications

**H**ello and welcome to the July issue of *RadioUser*. As the Coronavirus lockdown restrictions are being gradually eased, most radio hobbyists continue to enjoy the hobby indoors or in their gardens, myself included. Therefore, our *News and Products* section will, once again, introduce you to the very latest radios, technical innovations, and accessories that you need to know about right now.

This issue has become somewhat of an 'Airband Communications Special', due to the lack of Airshows that we can attend this season. You can catch up with this section of the hobby by reading about the history and technology of the early aeronautical communications in Britain, in the first of a two-part article by David Smith.

Also, *RadioUser* contributor and author Colin McKeeman looks back over a lifetime of aircraft monitoring and technological advances in this area.

Last but by no means least, Scott Caldwell examines the role of communications in the final flight of the flight pioneer Amelia Earhart, whose disappearance in the Pacific still gives rise to speculations.

Still on the subject of history, one of our main features this month comes from the USA. In it, *The Spectrum Monitor* editor Ken Reitz traces the fascinating history of the early radio magazines in the United States and the impact of some key publishers.

By contrast, Chris Rolinson stays firmly in the present, and he reviews the new Boxchip S900A network radio, which has attracted significant interest in hobby circles.



In the regular sections of the magazine, you will learn about Nazi Germany's war on music, Near Vertical Incidence Sky Wave (NVIS), the genius of television pioneer John Logie Baird, and the maritime automatic identification system (AIS).

Other contributions this month home in on the latest in DRM technology, meteor-scatter, and the future, post-Covid-19, of radio broadcasting and podcasting. Chrissy Brand continues her new International Radio Scene column, by looking at what is worth listening to, catching up with and saving for later, this month.

Stay safe and healthy and enjoy your radios – is there something in the attic that you can revive?

In the meantime, enjoy our new crossword feature and contact me if you wish to contribute a *RadioUser* puzzle of your own in the future.

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

**Georg Wiessala**

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

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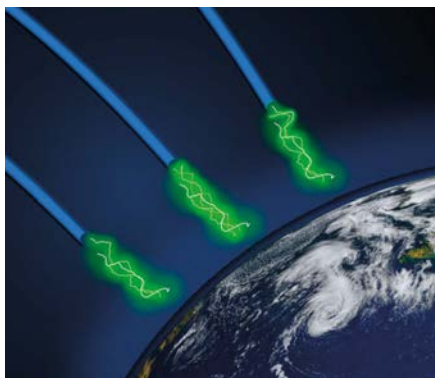
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# What's New

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

## Radio News



**ATMOSPHERIC MODELLING:** The ionosphere, the ionized layer of Earth's atmosphere far above the stratosphere, plays vital roles in many applications of modern technology. Radio signals travel through the ionosphere, for example, as do some spacecraft. Space weather events that direct energetic charged particles and radiation from the Sun toward Earth interact with the ionosphere and even moderate space weather events can cause ionospheric conditions to change substantially. These changes affect the reliability of systems integral to society, such as GPS, telecommunications, power grid distribution, and even pipelines that transport oil, gas, and water (by causing corrosion of the pipes). We have an opportunity to launch a collaborative space weather forecasting effort to facilitate the protection of critical infrastructure, national security assets, and the safety of civil aviation. Ionospheric conductance—the ease with which electrical currents driven by space weather processes travel through the ionosphere—controls how severe the impacts of such events can be. Without a thorough and systematic understanding of ionospheric conductance, which can vary spatially and over time, it is not possible to forecast and mitigate resulting disruptions. The challenges of achieving this understanding are too complicated for individual scientists or research groups to confront alone, so we need community-wide engagement. Read more about this new topic in EoS.

(Source: Öztürk, D. S., K. Garcia-Sage, and H. K. Connor (2020) EoS No. 101)

<https://tinyurl.com/yap88ump>

<https://doi.org/10.1029/2020EO144365>



## IC-705 QRP SDR Transceiver

Icom has announced details about the launch of the IC-705 QRP SDR ultra-portable transceiver. Available to the Japanese amateur radio community from the middle of June 2020, deliveries are planned to the rest of the world shortly afterwards. Our friends at Icom UK are very excited about getting our first 705 models very soon. This new "go anywhere" HF/VHF/UHF is the radio that everyone has been talking about since its announcement at the 2019 JA fair in Tokyo. After being seen at the Show in Japan, the global amateur radio community has been anticipating its arrival with much demand. Including its SDR platform, internal battery, GPS, Bluetooth and D-STAR, in a compact and lightweight body, the Icom IC-705 uses the same 4.3" colour touch screen display as the

IC-7300 and IC-9700 and features a real-time spectrum scope and waterfall display. Icom expects the UK version of the IC-705 to arrive soon after the Japan launch and anticipate a price of around £1299.99 including VAT (subject to confirmation). Icom encourages you to sign up to its newsletter or our social media channels for news updates regarding this model. For more details about the IC-705 including a video introduction to this product, visit the IC-705 QRP SDR transceiver Product Page. As you may expect, the demand for this product is very high when it does hit the UK. So if you want to be one of the first customers to get your hands on this model, contact your Amateur Radio dealer today.

[https://icomuk.co.uk/Icom\\_Newsletter](https://icomuk.co.uk/Icom_Newsletter)

<https://tinyurl.com/yc4hhay3>

**BROADCASTING FROM HOME AROUND THE WORLD:** Radio organizations everywhere have faced a technology challenge of unprecedented scope: how to maintain on-air and business operations when their facilities are off-limits and their employees are sent home. For some, this involved modifications to existing infrastructure and processes; for others, it was a breathtaking change. In this double-issue eBook, find out how major commercial and public broadcasters responded operationally to the pandemic.

Whether it's a leading public station in New York, a massive radio network in Spain, a college station in Colorado, a commercial music cluster in California, an international radio news network or more, our sources all told us: Everything has changed. Learn from them about how stations solved problems, how manufacturers supported them and how these experts think radio operations have changed for good.

(Source: RadioWORLD)

<https://tinyurl.com/y86r4s9e>

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

## Radio News



**CLOUDHOPPING AND VHF RADIO** : Most of us are fully aware of ballooning as a sport or hobby and they are a normal fixture in our skies in the Summer months, at Balloon festivals or sometimes to promote brands at big events such as the London Marathon. But what you may not have heard about is the fast-growing sport of cloudhopping, which originated in the 1960s. Its accessibility in terms of the size and cost of the sport is one of the things that has seen it take off in popularity. This fast-growing community require navigational and communication equipment to guide them through the skies, with Icom being one of the most popular brands among the sport. Worldwide, the sport of flying smaller balloons is taking off, literally. This niche of ballooning is populated by probably 10-15% of all the balloon pilots in the UK and is growing at a fast rate since they are very rewarding to fly and cheap to run. The sport is catching on since the compact nature of the craft means it fits into a typical estate car and can be carried by two people. Steve Roake is the Editor of the popular *Cloudhopper News* newsletter. He said, "Airband communication is imperative for air to air safety on a balloonists' frequency when flying en-masse from an event. It is also very useful in controlled airspace to alert controllers to your position because a lot of the time we do not paint a radar signature and we are slow. My local controlled airspace "Farnborough" is very helpful, often thanking me for giving them a heads up whilst they direct heavy business jets around me, inbound and outbound from the airport." Icom



## New Features for the AOR AR5700D

AOR's AR5700D Digital Communications Receiver now has a GSSI user group filtering function for trunked TETRA network reception. The AR5700D is a 9kHz-3.7GHz high-performance communications receiver for commercial and governmental applications, such as wide-band signal detection, monitoring, voice decoding, digital I/Q recording and playback. radio is the world's first communications receiver to be able to import, bookmark and name tag a Tetra network's GSSI user group list, and to selectively decode its voice communications. The AR5700D decodes many digital protocol signals such as TETRA (Direct mode, trunked mode with GSSI), DMR, NXDN (with 15bit descramble), D-STAR, DPMR, APCO 25,

YAESU, ALINCO, D-CR, and, of course, receives traditional analogue signals, such as FM, FM-stereo, AM, synchronous AM, USB, LSB, CW, analogue I/Q and FM video. The receiver is a power-house of CPUs, DSPs and FPGAs: The AR5700D is fitted with no less than four RENESAS SH2 CPUs, three ANALOG DEVICES Blackfin DSPs, one ANALOG DEVICES ADSP-2185 DSP, and four INTEL (ALTERA) Cyclone FPGAs for powerful signal processing, demodulation and decoding. (Source: Peter Waters, Waters and Stanton/ Mike Devereux, Nevada/ AOR UK/ Japan) [Full Review of the AOR AR5700D: *RadioUser*, April 2020: 14-18 – Ed.]

[www.nevadaradio.co.uk](http://www.nevadaradio.co.uk)  
<https://hamradiostore.co.uk>

is the prominent choice of Airband VHF radio for Cloudhoppers. Steve said, "Sometimes you need a technology you can forget since its quality precedes it. Icom radios sell themselves, not unlike Snap-on tools or Garmin GPS equipment. You want to know once you have purchased, that your buy is future proof and will stand the test of time. I have never questioned Icom quality, having previously owned other handheld devices which were upgraded when 8.33 separation of frequencies made them redundant in the UK. My pair of IC-A3's are being frequently used in the USA by a friend I donated them to, and in the 15 years of owning one set of replacement batteries was all I had to buy. Whilst airborne, I communicate with other pilots for spatial awareness whilst in a congested area, or to a launch master at a festival and obviously to controllers when operating in controlled airspace asking for permissions to operate within their area."

(Source: Steve Roake; Ian Lockyer, ICOM UK)  
[www.cloudhoppers.org](http://www.cloudhoppers.org)  
<https://tinyurl.com/yabqxtz2>



**IT'S NOT A TOY!** : Pure Radio producer Rory Barraclough has made the headlines in Scotland over his trip to McDonald's Drive-Thru in a toy car. In a clip posted on Twitter Rory is seen waiting behind real cars ready to place his order. The Scottish Sun, The Daily Record, The Glasgow Times and more newspaper ran with the story, along with lots more activity on social media. Sadly, the staff at the restaurant refused to serve him because his vehicle didn't have an engine – even though it is battery powered. (Source: Radio Today)  
<https://tinyurl.com/y7bugdjw>

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



## Radio News



**NEW FUNDING ROUNDS:** A total of 81 community radio stations around the country are sharing grants worth a combined £333,152 from the *Ofcom Community Radio Fund* to help during the Coronavirus pandemic. The government recently announced it had brought forward the funding application round for 2020/21 so that stations could get help sooner. A pot of £406,810 was put in place, with the Community Radio Fund Panel making decisions last week on which stations should receive a share of the cash. 202 applications were considered in all, with requests totalling £1.8m. The 81 stations that have been awarded funding represent around a third of the community radio sector around the UK. Grants awarded range from £812 to £12,075, with an average of £4,113. As a comparison, in 2019-20, 26 grants worth an average of £16,464 were awarded after 72 applications had been considered. With just over £73,000 still remaining in the fund, Ofcom is going to invite applications to the Fund again in around six weeks.

Ofcom says its panel favoured proposals that made a strong case that they required urgent support and would otherwise be unable to continue to operate due to the Coronavirus outbreak. Those stations which heavily rely on 'precarious' sources of funding such as advertising, training and events were also given preference over those that are supported through grants and charitable donations. Requests from stations that demonstrated they had exhausted other potential sources of funding were also given preference, and the panel decided to fund stations where a lower amount of money could make a huge difference to keeping the station on the air. Ofcom says some stations requested extremely high levels of funding – up to £100,000 in some cases – while others did not follow the guidance in completing their application and didn't supply the relevant information to enable the panel to make a decision. Projects given funding include small emergency grants to purchase equipment to enable remote working, and fixed costs such as rent, rates and utility bills where stations have been unable to negotiate payment holidays. (Source: Ofcom/ RadioToday; S. Clarkson)

<https://tinyurl.com/ybkl6bl6>

<https://tinyurl.com/y7kyobna>

## Baofeng Handheld

Moonraker now stocks the latest version of this ever-popular handie, and now with a 4.5W on 2m (SKU: 10-873). The radio comes complete with desktop charger, antenna, belt clip & high power 1800mAh battery. Among the key features of the handie are:

- Frequency Range RX: 140-178/400-519MHz
- Frequency Range TX: 140-174/400-470MHz
- Channel Capacity: 128
- Channel Spacing: 2.5/5/6.25/12.5/20/25
- Dimensions: 110x58x33mm
- Weight: 220g
- LCD Menu Operations
- 50 CTCSS 105 CDCSS
- 128 Channels
- Voice Prompt FM Radio Built-in (65.0MHz-108.0MHz)
- Torch Illumination
- Dual Watch/Dual Display/Dual Band
- Low Battery Alert
- CTCSS Scanning
- PC Programmable

For more details, please visit the website.

<https://www.moonraker.eu>



**DRIVE-IN RADIO LICENSES:** The usual two-month wait for a temporary radio licence has been reduced as more people request an RSL for events such as drive-in movies and church services. Given the current Coronavirus pandemic, the regulator is waiving the 60-day notice period for licence applications, and will also process applications quickly, to provide an answer to applicants within two weeks of it being received.

Ofcom said: "We recognise that these events may be a way for communities and congregations to enjoy a film or to worship, while still observing social distancing. In granting any licence, however, we are not authorising the

event itself. It is for licensees to ensure that any events are permissible under Covid-19-related laws and guidance." The quicker turn-around also applies to the Temporary Covid-19 Short-term Restricted Service licence, which is available in light of the extraordinary circumstances of the Coronavirus pandemic for those wanting to provide a radio service designed specifically to share information, news and updates about the COVID-19 pandemic with their community. More information, including on how to apply for a restricted service licence, is available here: (Sources: Ofcom, Radio Today, 24 hours in radio with Wisebuddah Jingles)

<https://tinyurl.com/yb68l9jm>

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

## New from Moonraker

Moonraker is delighted to be appointed the UK distributor for the exciting new RFinder B1. The RFinder B1 is the most advanced Dual Band (VHF/UHF) DMR Transceiver combined with an embedded powerful smartphone. Delivering up to 4 watts of RF power out of its very robust case first delivery expected in June 2020. Price is £199.99.

(Source: Moonraker)

<https://www.moonraker.eu>



**FAKE SDRs:** More and more often in our daily lives, we are being warned of online scams, word trade in counterfeit goods now account for over 3% of purchases, sadly our wonderful radio hobby is being targeted too. Several unlicensed, cloned and counterfeit SDR receivers are appearing usually with tempting savings over retail prices if you are prepared to 'wait a bit'. On website AliExpress you can see what appears to be an example of the popular SDR Play's RSP1. This unit is not licenced and takes advantage of SDR Play's API, driver software. If the unit you bought 'on the cheap' isn't performing as expected, this could be the reason why.

According to RTL-SDR's official website, similar clones and counterfeit devices are appearing as AirSpy and HackRF hardware. For the newcomer (and even some of us 'oldies' too) on first glance, these devices are sometimes worded in such a way as to appear genuine. As with most things in life the adage, 'If it sounds too good to be true, it probably is' has relevance here. If you are not sure if a product is genuine a quick email to advertisers in this magazine should put your mind at rest, it could save you a lot of heartaches and ensure you are getting the best value for your money.

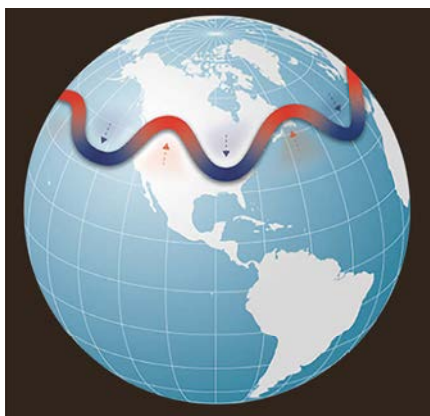
(Sources: Phil Bridges G6DLJ; RTL SDR; Guardian)

<https://bit.ly/2WtdyZt>  
<https://bit.ly/2YY5u4v>  
<https://bit.ly/35Vf9do>  
<https://bit.ly/3ct3vJp>  
<https://bit.ly/3ctZDI8>

**DUBUS MAGAZINE 1/2020:** DUBUS 1/2020 offers articles on the following subjects: Tropo News, New Tropo World Records on 144 & 432MHz; Microwave Europe; Microwave Portugal; Microwave Japan; VHF Australia & New Zealand First VK to ZL 10GHz QSOs by Rex Moncur, VK7MO and Roger Corbett, ZL3RC; FAI News; Aurora News; Solar Cycle 24 Report, February 2020- by Jim Kennedy, K6MIO; 6m & 4m News, and News & Comments.  
<http://www.dubus.org>

## Radio News

**DRIFTING MAGNETIC NORTH:** For some years now, scientists have been puzzling over why the north magnetic pole has been dashing Siberia. Thanks, in part, to ESA's Swarm satellite mission, scientists are now more confident in the theory that tussling magnetic blobs deep below Earth's surface is at the root of this phenomenon. Unlike our geographic north pole, which is in a fixed location, magnetic north wanders. This has been known since it was first measured in 1831, and subsequently mapped drifting slowly from the Canadian Arctic towards Siberia. However, since the 1990s, this drift has turned into more of a sprint – going from its historic wandering of 0–15 km a year to its present speed of 50–60 km a year. This shift in pace has meant that the World Magnetic Model has had to be updated more frequently, which is vital for navigation on smartphones, for example. Our magnetic field exists because of an ocean of superheated, swirling liquid iron that makes up the outer core. Like a spinning conductor in a bicycle dynamo, this moving iron creates electrical currents, which in turn generate our continuously changing magnetic field. Numerical models based on measurements from space, including from ESA's Swarm mission, have allowed scientists to construct global maps of the magnetic field. Tracking changes in the magnetic field can tell researchers how the iron in the core moves. During ESA's Living Planet Symposium last year, scientists from the University of Leeds in the UK reported that these satellite data showed that the position of the north magnetic pole is determined largely by a balance, or tug-of-war, between two large lobes of negative flux at the boundary between Earth's core and mantle under Canada.



Following on from this, the research team has recently published its latest findings in Nature Geoscience. Phil Livermore, from the University of Leeds, said, "By analysing magnetic field maps and how they change over time, we can now pinpoint that a change in the circulation pattern of flow underneath Canada has caused a patch of a magnetic field at the edge of the core, deep within the Earth, to be stretched out. This has weakened the Canadian patch and resulted in the pole shifting towards Siberia." The big question is whether the pole will ever return to Canada or continue heading south. "Models of the magnetic field inside the core suggest that, at least for the next few decades, the pole will continue to drift towards Siberia," explained Dr Livermore. "However, given that the pole's position is governed by this delicate balance between the Canadian and Siberian patch, it would take only a small adjustment of the field within the core to send the pole back to Canada."

[Alanna Mitchell's book is a good introduction to this subject, aimed at the general reader – Ed.].  
 (Source: ESA)

<https://tinyurl.com/y7eyxmjy>



## Radio News

**A 1921 SOLAR EVENT:** The severe space weather event of 13-16 May 1921 produced some spectacular technological impacts, in some cases causing destructive fires. It was characterized by extreme solar and geomagnetic variations, and spectacular aurora, recorded at many locations around the world. A wealth of information is available in scientific journals, newspapers, and other sources, enabling us to reconstruct the storm timeline.

This shows that a series of major coronal mass ejections (CMEs) bombarded Earth in May 1921. The first pair may have prepared the way for latter intense activity, clearing density from the region between Sun and Earth, and energizing Earth's magnetosphere. Thus, a subsequent CME could travel more quickly and drive even more energy into the already active magnetosphere. This CME arrived late on 14 May, driving very intense activity early on 15 May, and leading to the spectacular technological effects. However, some effects, attributed at the time to space weather, were probably coincidental with the storm, and due to more prosaic faults. The timeline of the 1921 event, including the confusion caused by prosaic faults, can be used to construct scenarios for use today by those emergency managers planning how to reduce the adverse impacts of future space weather events.

(Source: AGU, Peter Newton, Mike Hapgood)  
<https://doi.org/10.1029/2019SW002195>  
<https://tinyurl.com/ycfjtk8p>

### IMPROVING ATMOSPHERIC FORECASTS WITH MACHINE LEARNING:

Weather forecasting has improved significantly in recent decades. Thanks to advances in monitoring and computing technology, today's 5-day forecasts are as accurate as 1-day forecasts were in 1980. Artificial intelligence could revolutionize weather forecasts again. In a new study, Arcomano et al. (see below) present a machine learning model that forecasts weather in the same format as classic numerical weather prediction models. Previously, the team developed an efficient machine learning algorithm for the prediction of large, chaotic systems and demonstrated how to incorporate the algorithm into a hybrid numerical machine learning model for dynamical systems like atmospheric conditions. In the new proof-of-concept study, the researchers build on their previous work by using a reservoir computing-based model, rather than a deep learning model, to reduce the training time requirements for their machine learning technique. The researchers

## Global Radio Guide Summer 2020

RadioUser  
STOP PRESS!

During times of emergency and crisis, radio hobbyists worldwide turn on their radios and tune to the shortwave radio spectrum for context, perspective, and insight into what is happening around the globe. As tensions heat up in the world's hotspots, you can follow these events on radio, and you need an accurate and comprehensive radio guide to hear the action. Teak Publishing is proud to announce the release of that all-important radio resource – the Global Radio Guide (GRG), 14th edition (Summer 2020) e-book, by Amazon bestselling author Gayle Van Horn, W4GVH. The book was formerly known as the International Shortwave Broadcast Guide. Teak Publishing co-founder and GRG author, Gayle Van Horn, says that for this 14th edition, they have brought back the popular SDR Buyers' Guide and expanded their coverage of SDR information, by popular demand. (Source: Teak Publishing)

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



trained their model using data from the European Centre for Medium-Range Weather Forecasts and prepared 171 separate 20-day forecasts, each of which took just 1 minute to prepare.

(Source: Kate Wheeling; EoS 101/2020)

<https://doi.org/10.1029/2020GL087776>

**THE ROHDE & SCHWARZ WHITE PAPER:** HF stands for "high frequency" and is usually used to refer to signals with frequencies in the range of 3 MHz to 30 MHz, although in many cases the practical definition of HF has to be extended down to frequencies as low as 1.5 MHz. HF is also sometimes referred to, somewhat loosely, as "shortwave," especially in the context of broadcasting. These HF frequencies correspond to wavelengths in the range of approximately 10 to 100 meters. Given that modern homes contain Wi-Fi access points operating in the gigahertz range and that some 5G deployments are taking place in so-called millimetre-wave bands, the names "high" frequency and "shortwave" may seem a bit misplaced, but it is worth noting that the first experiments in long-distance radio communication by Marconi around the year 1900 used even lower frequency signals. One of the best-known applications of HF is worldwide or

global communications. Both government and commercial broadcasters can reach listeners worldwide using HF frequencies

<https://tinyurl.com/ybs7fyp9>

### THE JUNE 2020 ECLIPSE FESTIVAL OF FREQUENCY MEASUREMENT:

In June 2020, the HamSci site reports: "Changes in ionospheric electron density caused by space weather and diurnal solar changes are known to cause Doppler shifts on HF ray paths. For example, see Figure 7 in Boitman et al., 1999. HamSCI's first attempt at a measurement of these Doppler shifts was during the August 2017 total solar eclipse. We plan a careful measurement during the 2024 eclipse. As part of the WWV centennial, 50 stations collected Doppler shift data for the original Festival of Frequency Measurement, demonstrating the value of volunteer participation in collecting this data. This June, we request that all amateur radio stations, short wave listeners, and others capable of making high-quality HF frequency measurements help us collect frequency data for the June 21 annular eclipse." Have a look at the criteria at the website here:

<https://tinyurl.com/y6ubv2vh>

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

# Decadence, Radio, and the War on Jazz

David Harris

mydogisfinn@gmail.com

**David Harris recommends a title, which investigates both German and British attitudes towards Jazz music and the articulation of 'cultural standards' in the 1930s and 1940s.**

This book looks at how jazz – and other forms of popular music – were both used and suppressed by British and German radio broadcasts during the Second World War. The title is divided up into four chapters, which reflect the different phases of the war in Europe. Chapter One covers September 1939 to July 1940, a period often known as the 'Phoney War', and to which Dr Studdert refers to as a period of 'cultural blackout'.

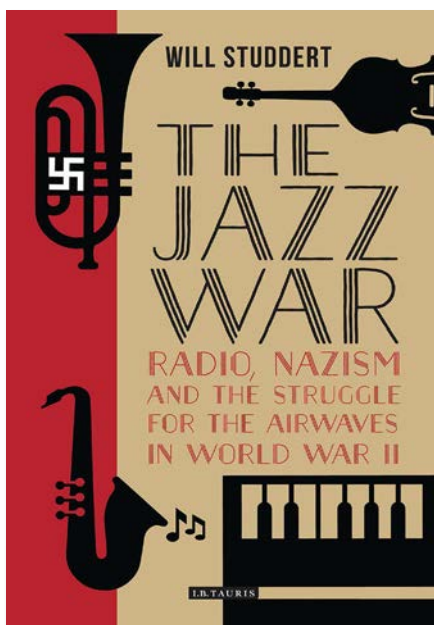
At this time in the UK, there was only the BBC Home Service (now Radio 4) broadcasting, and it shut down at midnight each night. Furthermore, all cinemas, dance halls and other places of entertainment had also been closed down. Many British listeners craved some entertainment and they could find popular music on medium wave at night from as many as 10 different German stations.

The BBC lifted their ban on broadcasting dance music on Sundays (which went back to the Reithian days) but there was tension around what constituted 'suitable' music for playing on the air. Jazz was immensely popular but very little heard on the BBC. Classical music made up a lot of the musical output but was only popular with a small minority of listeners. 'Light' music, some of which was described as 'sugary', was broadcast but very little swing/jazz.

In Germany jazz was seen as 'decadent' music because it was often performed by black musicians and also associated with Jewish musicians and composers. Similar propaganda in Nazi Germany also covered art in general, and the Hitler regime even organised two major, 'didactic' exhibitions about its views, *Entartete Kunst* (1937, 'Degenerate Art') and *Entartete Musik* ('Degenerate Music', 1939).

<https://tinyurl.com/ydamv23f>

Germany had a rich tradition of classical music. However, the genre was only popu-



*The Jazz War – Radio, Nazism, and the Struggle for the Airwaves in World War II*

by W. Studdert (IB Tauris),  
£28.99; pbk; 240pp.

ISBN 9781784538583

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

lar with some listeners. The armed forces of Germany shared a love of jazz and swing music with their opposite numbers in the UK.

This created a tension in both Germany and the UK. Both countries needed to maintain civilian and military morale but also wanted to uphold 'cultural standards'.

What is surprising was the popularity and widespread publicity given to English language broadcasts from Berlin to the UK, especially those featuring William Joyce ('Lord Haw-Haw', see *RadioUser*, June 2020: 56-60). These were seen as being comical and giving light relief to people.

Newspapers of the time would publish details of German propaganda broadcasts. It was estimated that about 1 in 6 UK radio listeners tuned into German broadcasts, which contained some swing music.

The BBC finally relented, and the virtual ban on jazz ended in June 1940 when they started a radio programme, *Radio Rhythm Club*, which featured exclusively jazz. This

was broadcast from 10.20 - 11 pm on Saturday evenings on the BBC Forces service (which eventually became 'The Light Programme', and then Radio 2) The rest of the music played on the Forces network consisted mainly of brass bands and theatre organ recitals. You can read the programme listings for the BBC from the 1920s onward at the BBC Radio Times archive website:

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

The author also discusses the role of 'Black-Propaganda Stations', such as NBBS and 'Station Debunk'. These were German-operated stations but gave the impression that they were broadcast by British dissidents who wanted to end the war.

These stations played jazz, as they wanted to attract listeners. Station Debunk had a role to try to create a rift between the USA and the UK. It was believed that many in the USA, particularly in the Mid-West, were isolationist and did not want to join the war in Europe.

Studdert profiles German presenters such as Mildred Gillars (Axis Sally) who was an American citizen working in Berlin when the war broke out. She broadcast until the end of the war and was eventually captured by the Allies and imprisoned in the USA.

The UK also ran black propaganda stations such as *Sender der Europäischen Revolution*, GS1 and *Soldatensender*.

[The latter will be the subject of a forthcoming article in *RadioUser* – Ed.]

These stations broadcast in German. In the case of GS1, this station purported to be the voice of anti-corruption Nazis.

The book also briefly covers the role of Japanese propaganda broadcast to US troops. Radio Japan employed the notorious *Tokyo Rose* (Iva Toguri D'Aquino, née Toguri), an American citizen living in Japan in 1941 (*RadioUser*, April 2020: 50-53).

These broadcasts were provocative but still attracted a big audience.

Towards the end of the war, the UK acquired a 600kW MW transmitter from the USA. It was named *Aspidistra*.

This was extensively used for black propaganda broadcasts including *Deutscher Kurzwellsender Atlantik*, which was aimed at German U boat crews.

<https://tinyurl.com/y9xnkuht>

The author, Dr Will Studdert, is a Visiting Scholar at the Humboldt University, Berlin. This book is based on his PhD thesis at the University of Kent. It has some 40 pages of notes and a 12-page bibliography.

This is an extremely well written and researched book, which illuminates a dark period in German history.



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

# TOP TITLES



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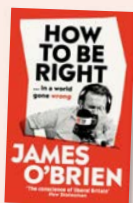
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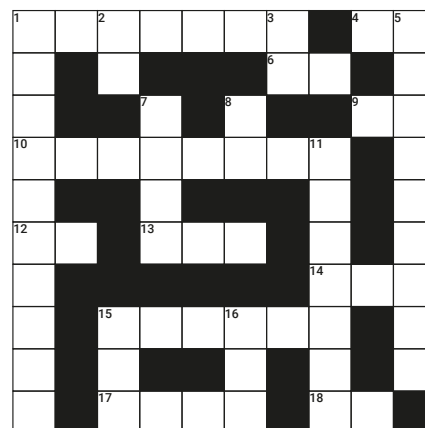
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The crossword on the right was set by Justin Lindars of Lindars Radios. The image above shows a small selection of the radio equipment available at <https://www.amateurradiosales.co.uk/>  
If you are a trader and would like to contribute similar content to RadioUser, please email the editor.

## Crossword

Answers on page 63



### ACROSS

1. The first name of Britain's first lady radio amateur
4. Callsign prefix for Reunion Island
6. Name of the Greek letter used for magnetic permeability
9. Main callsign prefix for Spain
10. What does the 'K' in the KT66 Valve stand for?
12. Morse abbreviation for 'end of transmission' (Two letters, run together)
13. A group of radio amateurs, each taking it in turn to transmit to others in the group
14. The old name for the unit of electrical conductance
15. A three-electrode valve
17. A form of dielectric used in coaxial cable, which gives the cable a velocity factor of about 80%
18. Main callsign prefix for Sweden

### DOWN

1. The first name of a two-name 1920s microwave oscillator
2. Morse abbreviation for a radio receiver
3. Abbreviation for the type of modulation first used by radio amateurs for telephony
5. Old British name for 'regeneration'
7. Name of the effect, where RF current flow is concentrated just below the surface of a wire
8. The French word for 'from', used by radio amateurs in front of the sending station's callsign when using Morse code
11. SI unit for electrical conductance
15. Abbreviation for the French name for 'wireless'
16. SI unit for electrical resistance.

## Radio Round-up

### THE ROYAL METEOROLOGICAL INSTITUTE OF BELGIUM (RMIB):

The web portal of the Ionosphere and Space Weather (ISW) section within the Geophysical Department (CPG) of the Royal Meteorological Institute (RMI) of Belgium provides information on our current research and development activities as well as access to (some of) the services related to ionosphere/space weather conditions and effects. The main areas of research are ionospheric/space plasma structure and dynamics, with emphasis on ionospheric/geomagnetic disturbances, irregularities, and their effects on Comm/Nav

systems' performance; design, development, and programming of robust algorithms for nowcast and short-/long-term forecast of geo-space plasma parameters by utilising ground (ionospheric incidence sounding, geomagnetic, cosmic rays) and space (GNSS, LEO satellite) based measurements, and the Development and programming of theoretical and empirical models for numerical simulation and investigation of Geospace plasma system conditions and associated phenomena

Mailing address:  
RMI Geophysical Centre (IRM-CPG)  
R. Centre Physique 1  
B-5670 Dourbes-Viroinval  
Belgium

Mobile: +32 477 414 994  
[iono-services@meteo.be](mailto:iono-services@meteo.be)  
<http://ionosphere.meteo.be>

## In next month's RadioUser

- Black Knights and Inflatable Aerials
- Spies and Radio (Part Two)
- The Life of Ronan O'Rahilly
- Review: Hytera PNC380 Network Radio

Plus your favourite regular features & columns

The August issue is on sale on the 30th July 2020





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- DMR / C4FMx2 / AMBE+2 Tier 1 and Tier 2 only
- TETRA direct mode (T-DM) /  $\pi/4$  shift QPSK / ACELP
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- Automatic detection of digital modes during scan & search
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All your radio  
needs under  
one roof!







# Temporary Air Routes & Early Aircraft Radio (Part I)

David Smith

dj.daviator@btinternet.com

David Smith reports on the effects of Coronavirus on air transport and a temporary air route over the UK as a contingency plan. He also presents the first part of a feature on the pioneering days of aircraft radio

Eurocontrol's comprehensive assessment of the air traffic situation for 4-6 May 2020, compared with the equivalent period in 2019 revealed the following data: There were 4,803 flights, down 84.8% (this is 26,867 fewer flights). Beginning a few days later, there was a moderate increase, owing to operations by Wizz Air, KLM and Air France and some other airlines.

These have helped to bring Amsterdam

Schiphol and Paris Charles de Gaulle into the top five busiest airports. On Wednesday 6 May, virtually all of Europe's largest airports were managing 80% fewer flights, compared to last year. For example, Paris Orly had no flights, London Gatwick was down 99%, Munich 94%, Vienna 94%, London Heathrow -4%. On the same day, Frankfurt was the busiest airport, with 258 movements, followed by London Heathrow (217), Amsterdam (200), Paris CDG (194), Leipzig (190), Oslo Gardermoen (187), Köln/Bonn (166), Bergen (161), Istanbul (147), and Liège (Leuven, Lüttich, 123).

## Route (T999) for Use During Periods of Extreme Disruption

In the event of London Area Control system failure, and where additional capacity

is required to circumvent the UK airway structure, NATS may, under exceptional circumstances, request that the CAA and Department for Transport establish an emergency flight-plannable route for west/northbound use.

This route will be established in the form of a 10-nautical-mile-wide control area, designated as T999, for air traffic operating from/to airports in south-east England to airports in the northern UK. This Contingency Route will not be available for flight planning unless made notified as active by NOTAM.

<https://notaminfo.com/ukmap>

The airspace allows aircraft to route as follows: BKY-SIVDA-REGSI-OTBED-ODNEK. This is approximately due north from London to The Wash and then left, running parallel with the East Coast.



## Early Aircraft Communications in the UK (Part I)

In 1909, wireless technology was already being used by many ships, although it was still little more than experimental. One of the earliest trials of wireless communication between air and ground occurred in May 1908, when a receiver was installed in the Army balloon Pegasus. "Very good signals" were received at a 20-mile range from the Aldershot wireless station. Some success was also achieved in the sending of messages from the balloon. Experiments were also undertaken at this time with transmitters and receivers in aircraft. However, audible reception proved impossible, owing to engine noise and vibration.

These early wireless sets operated in what we now call the HF (High Frequency) band at wavelengths of 50-100 metres. It so happened that this was the kind of radiation that could be generated and received at the time. To the delight of Guglielmo Marconi (1874-1937) and other pioneers, it was found that it could be received after travelling great distances. O'hallmhúráin (1986) wrote, "In the Army & Navy Illustrated of 22<sup>nd</sup> of July 1899, there appears an account of the first use of wireless in aviation. This was demonstrated by Marconi to the Army Aviation Authorities at Aldershot, whereby a transmitter installed in a captive observation balloon could be used to send signals to a receiver in a smaller balloon some few miles away.

This intelligence was received by the ground staff via a wire from the receiver to the ground. Although the experiment appears to have been very satisfactory, nothing further was done to develop, it and it was not until 1907 that a rather similar series of attempts was recorded. These were carried out by Lt. C.J. Aston, Royal Engineers, who by 1905 was receiving good signals from a ground station while travelling in a free flight balloon some 20 miles distant from the transmission.

The first recorded use of wireless between an aeroplane and the ground was on 27<sup>th</sup> of August 1910, when a Canadian, J.D.A. McCurdy, tapped out a wireless message from a Curtiss biplane 600' up over Long Island, USA. Exactly one month later Robert Lorane, the actor, flying over Salisbury Plain, England, transmitted signals to the nearby Larkhill experimental ground station. The instruments used in all the experiments were Marconi spark transmitters and magnetic detectors."

In 1912, the first Royal Naval Air Service (RNAS) aircraft, a Short S.41 seaplane,



was fitted with wireless, and the range achieved was up to five miles. The following year, Lieutenant BT James, piloting a B.E.2 aeroplane, succeeded in receiving Morse code signals with his engine running at full power in the air.

This remarkable accomplishment was achieved by screening the receiver from engine magneto interference. This was done by enclosing it in a thin metal box and by screening all the leads through wrapping them with copper tape.

By the time of the First World War began

**Fig. 1: The Wireless Room at Biggin Hill around 1920. Fig. 2: A Bristol Fighter, one of the first Royal Flying Corps aircraft types to be fitted with radio. Fig. 3: Robert Loraine's first radio-flight.**

in 1914, the role of aircraft wireless had been thoroughly tested during exercises both on land and at sea. RNAS aircraft were to be used for maritime reconnaissance and naval co-operation. The Royal Flying Corps would spot for the gunners so that artillery fire could be rendered more accurate and effective. It would also carry out reconnais-

**Fig. 4: Robert Loraine, before his Irish Sea crossing. Fig. 5: Robert Loraine's Bristol Boxkite.**

sance overland and report on enemy dispositions and movements.

Although acceptable for air-to-ground use, wireless telegraphy (W/T) in Morse code proved to be too slow for aircraft intercommunication. As a result, radiotelephony (R/T) was developed at the RFC Experimental Wireless Section and was demonstrated in 1916. During the summer of 1915, as work progressed, Major CE Prince of the RFC wrote of an air test of the aircraft wireless Mk 1 transmitter (now in the London Science Museum) that it gave *"some approximation to intelligent speech ... believed to be the very first occasion in the world when wireless speech was received from an aeroplane."*

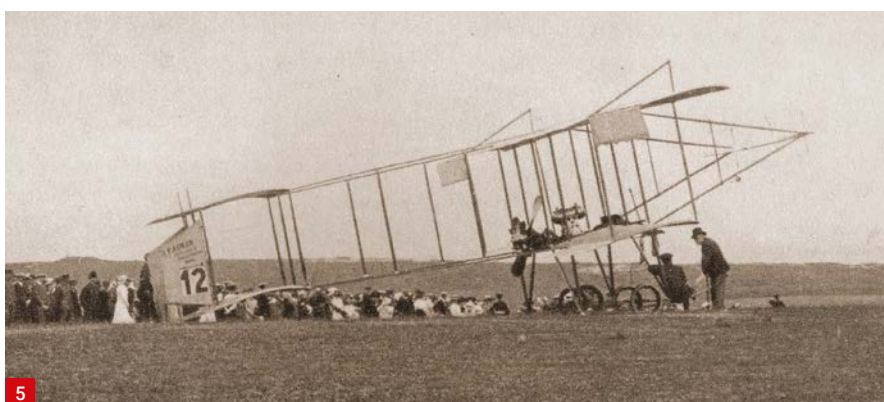
In 1916, Prince produced the Mk II transmitter/receiver, which provided air-to-ground and air-to-air communication. It went into official production in 1917. The electrical circuit used was the 'choke control'.

This was to form the basis for the design of the 1922 BBC transmitters. R/T was introduced experimentally in two squadrons in France in 1918, pilots being sent in pairs for a week's course at Biggin Hill, Kent (Fig. 1).

This included, as one pilot recalled, *"... flapping around in cast-off B.E. 2C aeroplanes shouting into sawn-off telephones!"* The same officer, WFJ Harvey, reported that back in France, No 22 Squadron's Bristol Fighters were having sets installed (Fig. 2). The three Flight Commanders' aircraft had transmitters, the rest of the squadron had receivers only. He went on to say that, *"apart from those at Biggin Hill and the use of valves as bedside reading lamps, the whole thing was unpopular. An air-driven dynamo and 46lb (21kg) was added to an already overloaded aircraft, and there were 120ft trailing aerials with 2½lb (1kg) lead weights which swung round heads and propellers during fighting manoeuvres."*

Nevertheless, they had to persevere, and British Morse operators were amazed at actually 'hearing talking on the wireless', although at the time pilots were not aware that Morse stations could receive them. The enemy could hear them too, and it soon became evident that they were annoyed at the British lead in this field. Their army orders offered large rewards for *"even the smallest piece"* of R/T equipment from crashed British aircraft.

WFJ Harvey takes up the story again: *"By its nature, broadcasting cannot be secret, and soon we were visited by many senior of-*



*ficers of all arms who wanted to hear 'wireless talking'. One US General, newly arrived in France, was asked after a special show put on for him:*

*'Did you hear the pilot distinctly, sir?'*

*'Yeah, very very clearly and distinctly; I heard your buddy singing a vulgar song - MOST remarkable!'*

Large numbers of aircraft were equipped with wireless during 1918, and R/T was brought into use with the UK Home Defence, to pass air raid information and direct protecting aircraft towards interception of the enemy. When the Royal Air Force was created in April 1918, the experimental work carried out at the time three separate establishments – the RFC at Biggin Hill, the RNAS at Cranwell and the Army at Woolwich – was centralised at Biggin Hill.

When Alcock and Brown made their historic flight in a modified Vickers Vimy bomber from Newfoundland to Ireland in June 1919, they had a wireless onboard. However, communications were rendered impossible when its wind-driven generator broke shortly after take-off. A month later, the R.34 airship made an East-West trip across the Atlantic

with two wireless operators in the crew looking after four transmitters.

These were a high power continuous wave (CW) set for long-distance work, a medium power CW set for distances up to 500 miles, a damped spark transmitter for damped receptor stations, and a wireless telephone set to permit R/T to be carried on. The antenna consisted of a phosphor bronze stranded cable 500ft in length which was lowered from the forward gondola.

While it was over Scotland's Firth of Forth and communicating with the Queen Elizabeth, which was some 9,000ft directly beneath it, a station in the Azores 1,400 miles away reported picking up the R.34's signals.

Early wireless relied upon spark gap transmitters and receivers, as developed by Guglielmo Marconi around 1896. At the end of the war, it had become evident that this system would have to be abandoned because of the wide band of interference it caused. In 1919, the RAF and Army jointly decided that all future equipment should be of a design that solved this problem.

This resulted in the development of trans-



# Radio Round-up

mitters based on vacuum valves, which were cheaper and produced continuous waves with a greater range, caused less interference, and could also carry audio, making spark transmitters obsolete by 1920.

T.25 and R.31 equipment was designed for the transmission and reception of R/T messages between reconnaissance aircraft and army units and also for air-to-air communication. A scheme of apportioning wavelengths to the various services was adopted, allowing for an overlap to cater for inter-service co-operation. Unlike its wartime equivalent, the installation worked on fixed aerials, doing away with the unwieldy trailing wires. After many trials, the first production models, 80 in number, were delivered by the contractors in 1924. The ranges obtained varied but averaged 25 miles air-to-ground, five miles air-to-air and eight miles ground-to-air.

A few decades later, as Peter Young wrote, *"Radio was a relatively small but growing business in aviation. In 1931 the company (ST&C) produced its first airborne communication sets. These were in fabric-coated plywood boxes suspended in aircraft by loops of catapult elastic to stop the valves shaking out of their sockets. In 1936, this form of construction gave way to metal chassis with an anti-vibration mounting."*

In respect to this period, I managed to find the biography of Robert Loraine (Figs. 3-5).

The book was written by his wife and published in 1938. Apart from being a well-known actor, Robert Loraine made many flights around 1910, including the first crossing of the Irish Sea. He then served as a pilot in World War One and resumed his acting career thereafter, dying of natural causes in the 1930s. The book is vague on the actual date.

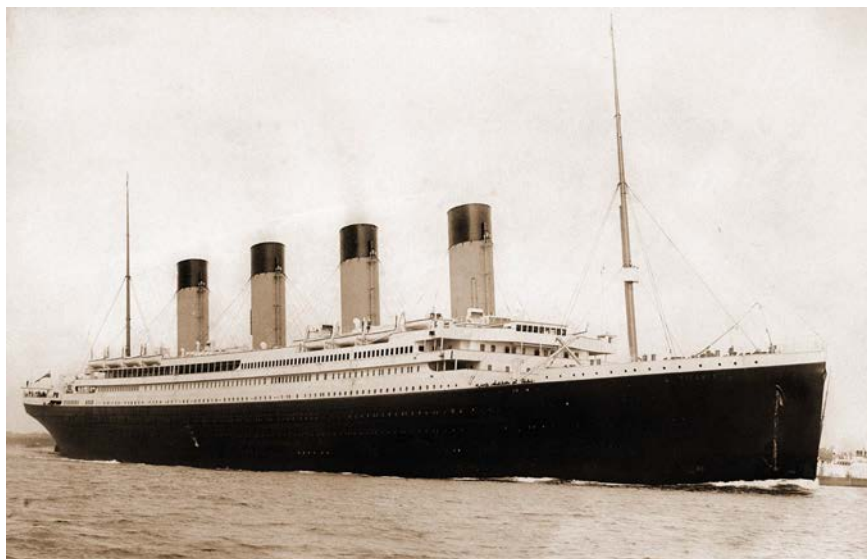
Of his first radio transmission, there is only one paragraph. I quote:

*"He was the first man to send a wireless message from the air. This was done in a Bristol biplane when passing over Stonehenge on Salisbury Plain. Robert's sense of the dramatic caused him to send the message while passing over Stonehenge, to try and associate England's most ancient monument with her latest form of progress."*

More accurately, of course, this should be the first Briton to send a message from the air.

I will explore this era of the history of aviation communications further in the second part of this series.

[Thanks to Ken Reitz, John Levesley and Colin Mc Keeman for additional information supplied – DS/ Ed.].



## JUDGE APPROVES RETRIEVAL OF TITANIC MARCONI WIRELESS EQUIPMENT:

A US federal judge in Virginia has permitted to retrieve the ill-fated RMS Titanic's Marconi wireless gear, which transmitted distress calls from the sinking ocean liner during its maiden voyage. Judge Rebecca Beach Smith of the US District Court in Norfolk ruled that the radio gear is historically and culturally important and could soon be lost within the rapidly decaying wreck.

The Titanic sank after striking an iceberg some 370 miles off the coast of Newfoundland in 1912. "The Marconi device has significant historical, educational, scientific, and cultural value as the device used to make distress calls while the Titanic was sinking .... minimally to cut into the wreck" to access the radio room." David Concannon, a lawyer for R.M.S Titanic Inc., which the court has recognized as the steward of the vessel's artefacts, said the company would try to avoid cutting into the ship, noting that the radio room may be reachable via a skylight that was already open. More legal wrangling may lie ahead.

The National Oceanic and Atmospheric Administration (NOAA) contends that the retrieval expedition is still prohibited under US law and an international agreement between the US and the UK. R.M.S Titanic has said the radio transmitter could unlock some of the secrets about a missed warning message and distress calls sent from the ship. David Concannon, a lawyer for R.M.S Titanic Inc., said, *"It tells an important story. It tells of the heroism of the operators that saved the lives of 705 people. They worked until the water was lapping at their feet."* In an April 2020 court filing, NOAA argued against the salvage effort, saying that any benefit to be realized from cutting into the vessel to recover the Marconi

equipment would not be "worth the cost to the resource and not in the public interest." RMS Titanic sought permission to carry out what it called a 'surgical removal and retrieval' of the Marconi radio equipment. As might be expected, the deteriorating Marconi equipment is in poor shape after more than a century underwater. The undersea retrieval would mark the first time an artefact was collected from within the Titanic, which many believe should remain undisturbed as the final resting place of some 1,500 victims of the maritime disaster. The wreck sits on the ocean floor some 2 1/2 miles beneath the surface and remained undiscovered until 1985. (Source: ICQ Podcast, 24th May 2020 Colin Butler)

**FREE RADIO MAGAZINE:** In response to the ongoing Coronavirus situation, Spain's national amateur radio society (Unión Radioaficionados Españoles) is allowing everyone to download the PDF of the June edition of their magazine Radioaficionados. A translation of the announcement on the URE site says: "One more month, and we have already been three, to accompany its readers in the exceptional situation caused by the spread of COVID-19, the URE in its commitment to collaborate and help to cope with the complicated situation we are currently experiencing in our country, has decided to offer free access to the magazine of June and we remind you that magazines before December 2019 are also available to you. In this way, citizens who wish to can read these publications for free. A small gesture so that nobody feels alone at home in the face of this global challenge." Access is through the website download area, click on "Descargas" under "Junio 2020 – Revista" at the website below: (Source: Southgate ARC)

<https://www.ure.es>

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Colin McKeeman  
downrange@eircom.net

Colin McKeeman looks back at his long-standing interest in aeronautical communications monitoring, and he introduces us to a plethora of signals he has received, and to the equipment he has used over the years.

Some of you may have read the recent review on my book *A History of the Birdlip Aeronautical Communication Complex* in the April 2020 issue (*RadioUser*, April 2020: 20/1) and possibly wondered why I had decided to spend almost four years of my life on such a project.

Well, it all started from my days as an 'aircraft spotter', scanning the local aeronautical VHF frequencies in the early 1960s and wondering if it was possible to monitor such traffic further afield. Someone mentioned that advance notification of potential 'fly-overs' or local airport arrivals might be possible if you could intercept such traffic whilst out over the North Atlantic.

Bearing in mind that my radio equipment at that time, excluding my small Signal 537S VHF tuner (still going strong), was only a domestic four-band LW/MW/SW Philips B31F83U valve radio (Fig. 1), I considered that my capability would be rather limited. However, I noted that the extremity of the SW band on this Philips set possibly covered 5MHz, and rumour had it that oceanic traffic had been heard in this frequency range.

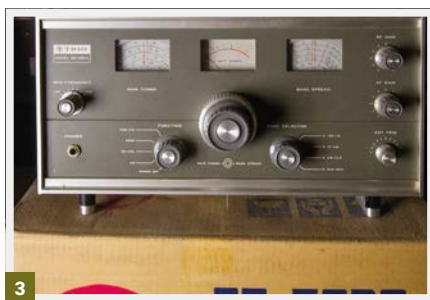
So on Saturday night, 7th September 1963 at 22:45, having jammed some 20' of standard single strand bell wire into the set's aerial socket and fixed the other end to my bedroom's picture rail with a thumbtack, I scrolled down to the end of the dial, with the needle straining against the stops. After several minutes of slow tuning, I heard *Go ahead! Are you calling Prestwick or Iceland?* (asks Prestwick). *Station calling on 5626 repeat your identity please.*"

That was it, I was hooked!

### More Serious Attention

Thankfully, the following day was not a school day, so I anticipated being able to give this more serious attention and thought that I might even be able to copy flights that I could recognise. Sure enough at 14:25 on the Sunday I heard Prestwick working the Air France 007, with his position report being read back by Shannon. Shortly afterwards the *Starflight*

# A Lifetime of Aeronautical HF Monitoring



904 (N904ME DC-7), AZA626, KLM641, SAS913, VC 10302 (RCAF CC-130) and AFR025 with a SELCAL (Selective Calling) code of EJ-AK, all worked either Shannon, Prestwick or London (Birdlip).

It should, perhaps, be appreciated that, during this period, these three stations operated individually on the North Atlantic (NAT), as this was before the advent of the present day 'Shanwick' consolidation. Also, the transmission mode was AM. Single Sideband (SSB) had not yet become the standard for aeronautical HF communication. Mind you, as a 15-year-old, none of this was appreciated at the time, I was just so excited to be eavesdropping on such real-time, long-distance, activity!

Needless to say, each day introduced me to a new station, with Paris, Copenhagen, Iceland, Gander, Bodo, Sondrestrom, Churchill, Santa Maria, Lisbon, New York all soon joining my 'net'. The variation of traffic at that time was considerable and constant, with scheduled jet and piston airliners mixed in with military, charter and private delivery flights. Besides, regular calls were made to and from the various Ocean Weather ships dotted around the

NAT, for example, *Ocean Stations Alpha, Juliet, Kilo*, and so on. These proved to be most interesting as messages regarding pending mail drops to them from the UK via RAF Shackleton, or overdue alerts on single-engine delivery flights from the States or Canada were quite a regular occurrence.

### SELCAL

The most active frequencies within my monitoring range were at that time 5611, 5626 and 5641kHz on all of which the aforementioned SELCAL two-tone pulses reverberated throughout the house. This is a method of raising the aircraft without the flight crew having to keep a listening watch on the frequency.

More importantly from my perspective, I discovered that many of the airlines linked these four-letter codes to the aircraft registration – this gets better! Consequently, multiple letters of request for the airline's fleet/SELCAL code tie-ups were despatched to their various Head Offices. To my surprise, an almost 99% favourable response rate was achieved. However, several airlines assigned these codes to their flight numbers, rather than



ALL PICTURES: COLIN MCKEEMAN



5

the aircraft's registration, PAA and Swissair immediately spring to mind.

During this monitoring, I noted that many of the USAF flights referred to their station called 'Croughton Radio' on 6750 kc/s (kHz). Although this frequency was within my receiver's capability, anytime I tuned into it, all I could hear were voices that seem to have inhaled copious quantities of helium gas! I later learned that this was the impending arrival of the SSB (Single Sideband) transmission mode, which was soon to become the norm for all HF aeronautical traffic. This presented me with a serious problem as my old Philips valve radio would soon be redundant for this vital work, not being SSB-capable!

### Radio Equipment

Regrettably, this set eventually ceased to operate; rather than miss all this activity, I discovered that I could just about afford the weekly rental on an old 'Crosley' domestic radio but obviously with the same frequency and mode restrictions. Needless to say, a dedicated HF communications receiver was, at that time, well outside my budget.

As luck would have it, in November 1971, a friend of mine dropped in a bulky (45 lbs) war-time BC-348 receiver (Fig. 2) which he was unable to get operational. After some research and perseverance, I got its internal 28V dynamotor whirring the following month, running off two old 12V car batteries

connected in series. The initial problem was that the set didn't come with its PL-P103 plug assembly or a manual.

Therefore, the issue of how to connect the eight terminal pins at the rear of the receiver caused some concern. Terminals 2 and 6 needed to be mated and positive power applied to terminals 3 and 4, with the negative source going to 7 and 8.

This type of set was widely used by the USAF in many of their long-range aircraft, e.g. B-17, C-97, C-54, C-121, and so on, and this fact alone made this acquisition all the more valuable, even if it had never 'spoken'!

The major advantage of this piece of vintage equipment was that it had a BFO (Beat Frequency Oscillator). This opened the door to copying SSB transmissions.

I could now terminate the rental on the old Crosley set and dedicate my time to discovering the intricacies of managing the fine tuning required to obtain the optimum single-sideband reception. Whilst this set operated successfully, the requirement to keep the old car batteries charged (the set kept blowing fuses when I tried to utilise a transformer/rectifier) was inconvenient.

### Equipment Updates

As I was now in a position to consider the purchase of a more suitable dedicated communications receiver, I set my sights on a Trio 9R-59DS (Fig. 3). The local cost of such a set was £99, but if I obtained an import licence I discovered that I

Fig. 1: My old Philips domestic radio.

Fig. 2: A BC-348 Receiver (Bottom set on the rack, installed on C-47J, N151ZE, ex-Navy 507783).

Fig. 3: The author's Trio 9R-59DS receiver, on top of its original box.

Fig. 4: A Sony ICF-6800W receiver.

Fig. 5: A collection of the author's active receivers.

could purchase one from the UK for £63 (including post & packing). A considerable saving 47 years ago for someone who had just started working!

Consequently, this new set arrived in May 1973 and served me well for the next 25 years.

The Trio proved to be an excellent set, although it did suffer from some frequency 'drifting'. However, this was much improved through the purchase of a Voltage Regulator valve.

My aerial configuration had by now moved outdoors, as I had the advantage of a long north/south orientated garden. Therefore, I erected a 120' centre fed  $\frac{1}{2}$  wave dipole, much to my neighbours' bafflement.

So far, my receivers were restricted to analogue frequency selection, and I was keen to move into the digital display age. Having saved up for a supplementary set, I managed to purchase a Sony ICF-6800W receiver (Fig. 4) in 1983. This enabled me to monitor both a primary and secondary

frequency, with the certain knowledge that one of the sets was at least correctly tuned to the desired frequency!

The '6800W' served me well for over 30 years. It was eventually replaced by a much more compact ICOM HF-225 receiver, with a keypad. Not wishing to lose the vintage theme, I recently supplemented this set with two Eddystone valve receivers, models '680X' and '940' (Fig. 5).

## A Wealth of Aeronautical Traffic

Enough about the hardware: I will now turn my attention to the nature of aero mobile traffic that was being monitored. As mentioned in an earlier paragraph, multiple agencies provided HF cover over the NAT. As a result, the various frequencies were constantly busy working a myriad of mixed traffic. For those of you who wish to investigate this further may I suggest that you visit my historic HF blog [here](#):

<https://tinyurl.com/r5axa6k>

In it, you will also find details of some of the current NAT HF frequencies and a reference to my book on the old Birdlip communications complex (more on this later).

Initially, I was absorbed by the constant stream of aeronautical voice communications but was also aware that the HF bands covered more than just this form of audio aeronautical traffic. Flight plans, clearances, daily oceanic track structures, metrological data, NOTAMS, and more, were passing between the various centres. Although this was primarily over landlines, some did pass through the airwaves.

During 1995, I 'discovered' the remaining radioteletype (RTTY) HF circuit that existed between Shannon and Santa Maria (Azores) on 8145 kHz. Unfortunately, it was not very busy, at this stage. However, the satisfaction was in that I had managed to observe traffic on this 50 baud circuit. I include here a sample of the afternoon NAT track structure to be observed by flights on the 24th March 1995 (Fig. 6), as copied on this frequency.

The major difficulty encountered in decoding this activity was that, once the received signal strength dropped, the incoming data became garbage with annoying interludes of valid data when the reception briefly recovered.

Whilst this circuit was relatively quiet, I subsequently tuned into a much busier circuit, originating in the Azores on 11190 kHz. I reproduce here a sample flight plan (Fig. 7), copied for a USAF KC-135, call-

NNNNZCZC MZA678 2243  
FF LPLAYFFY  
232240 EGGKZOZX  
(NAT-1/2 TRACKS FLS 310/390 INCLUSIVE  
MARCH 24/1130Z TO MARCH 24/1900Z  
PART ONE OF TWO PARTS-

A 53/15 53/20 53/30 53/40 53/50 YAY  
EAST LVLS NIL  
WEST LVLS 310 330 350 390  
EUR RTS WEST 2 VIA BURAK  
NAR N168 N170 N174B-

B 52/15 52/20 52/30 52/40 52/50 DOTTY  
EAST LVLS NIL  
WEST LVLS 310 330 350 370 390  
EUR RTS WEST 2 VIA DOLIP  
NAR NA148 NA152 NA156B-

C 51/15 51/20 51/30 51/40 51/50 CYMON  
EAST LVLS NIL  
WEST LVLS 310 330 350 370 390  
EUR RTS WEST 2 VIA GIPER  
NAR N122 N128-

D 50/15 50/20 50/30 50/40 50/50 YQX  
EAST LVLS NIL  
WEST LVLS 310 330 350 370 390  
EUR RTS WEST 2 VIA KENUK  
NAR NA102 NA108-

E 49/15 49/20 49/30 49/40 49/50 VIXUN  
EAST LVLS NIL  
WEST LVLS 310 330 350 370 390  
EUR RTS WEST 2 VIA GUNSO  
NAR N82 N86-

END OF PART ONE OF TWO PARTS )

[illegible]

sign TURBO92 (tail number 58-0118) supporting a C-130 deployment on this circuit with message number MZA594. The printout provides vital data on this military flight, such as call-sign, aircraft type, points of departure and destination (KIAB = McConnell AFB/LPLA = Lajes Air Base, Azores), route of flight with position reports, and estimates and additional remarks, including its tail number.

Decoding of this low-speed baud data traffic was achieved via a link to my PC (loaded with appropriate software) and utilizing a noisy tractor fed dot matrix printer which had been discarded from my workplace. Regrettably, these circuits closed down shortly afterwards, and my monitoring reverted to standard voice communications.

## ALE, ACARS and CPDLC

Subsequently, some of the military agencies started using very short high-speed bursts of data traffic which, in respect of the USAF, most frequently arose on 11175 kHz, which was later identified as Automatic Link Establishment (ALE).

Lch= [30/03/2020 12:02:00]  
KL758 (PH-BVF) [H1:7C01A] MODE X  
\*CFBRT1 130MAR20 1101 KLPH-BVF KL758 MPTOEHAM 3117-BCG-00W-15 L 0116 30MAR20  
NCNM  
MSG 23388011 1059 30MAR20 ER1  
EOR  
Lch= [30/03/2020 12:02:43]  
BA0192 (G-CIVY) [H1:0 F56A] MODE E  
#H15BA SOUCAYA,AT1 G-CIVY312C29CF0C0E1  
Lch= [30/03/2020 12:03:03]  
KL758 (PH-BVF) [20:8 M31A] MODE X  
\*FA30110258KL758 MPTOEHAM

Date	Watch Times	REMARKS	Signature
13.4.1965	0715	on V. Ballouay, =	
11 49 30	5611 Kcs	MVB unable to copy MTL 47 portion due to overriding breakthrough of MVB 5626 Kcs transmission. Has been like this since 0715 with interference from 5626/5641/5671/1884/18913 when latter transmissions activated. Also heard when tested. EIP copied MTL 47 and passed via cable.	
1500	Lu Blum	Normal	
200	Off Blum.	= 7848000	

" 12	RC. [1030]	—	53.00	10.00	11.0	6.00	10.00	14.12	187.20
" 13	1000 MPRW	—	61.00	00.00	3.12	08.00	01.00	12.00	170.00
" 14	? [5153]	—	60.23	15.00	20.00	00.00	16.17	13.20	200.00
" 15	IC [1030]	INSTRUMENT	20.00	20.00	14.0	00.00	—	7.50	2.00
" 16	PRTS [1030]	INSTRUMENT	44.06	06.30	14.08	06.13	05.36	15.00	15.00
" 17	SLB [1030]	WPA 2300	00.00	00.00	15.10	—	—	—	2.00
" 18	LC [1030]	—	60.00	10.00	13.00	13.00	10.00	15.00	12.00
" 19	MPS [1030]	—	05.13	05.36	15.00	—	—	—	12.00
" 20	VC [1030]	—	40.00	20.00	05.00	05.00	00.00	14.00	2.00
" 21	VC [1030]	INSTRUMENT	—	—	—	—	—	—	12.00
" 22	RC [1030]	WPA 1100	—	—	—	—	—	—	12.00
" 23	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 24	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 25	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 26	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 27	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 28	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 29	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 30	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 31	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 32	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 33	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 34	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 35	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 36	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 37	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 38	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 39	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 40	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 41	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 42	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 43	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 44	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 45	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 46	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 47	RP [1030]	EGW 1000	02.30	08.00	11.00	12.00	01.00	—	18.00
" 48	RP [1030]	EGW 1000	02.30	08.00	11.0				

Here again, an intercept of this media was possible with the trusty PC.

However, the scant content of the messages being exchanged failed to grab the attention of this seasoned HF listener. Similarly, the HF ACARS (Aircraft Communications Addressing and Reporting System), whilst capable of being intercepted and decoded, lacked the attraction or content of voice communication.

Of course, we are presently in the age of CPDLC (Controller - Pilot Data Link Communication) which I regret to say, from an aviation-orientated HF monitor's perspective, has been a bitter blow to the hobby. Admittedly, there are still many operators on the NAT that are not CPDLC-equipped, but their number is diminishing. We are thus left with most flights simply establishing an initial HF voice contact with a possible SELCAL-check and an on-route frequency assignment, before they disappear into their data environment, to downlink their progress reports and other data.

To digress momentarily from the HF



Fig. 6: RTTY printout of NAT track structure.

Fig. 7: RTTY printout of a flight plan.

Fig. 8: VHF ACARS print for KLM758.

Fig. 9: The Watch Log from Birdlip.

Fig. 10: Extract from the author's HF Log.

Fig. 11: The author's recent book publication.

aspect, I also monitor ACARS on VHF. Whereas this does provide reduced activity it also occasionally gives the odd burst of interesting movements. I have included an extract (Fig. 8) copied on the 30th March 2020 on 131.725MHz, a primary European ACARS frequency, in respect of the KLM 758 routing from Panama City to Amsterdam, (MPTO/EHAM as encoded within the text). The flight passed close to my location.

### A Local Focus, and a Research Project

Due to my westerly geographical location, in Ireland, most of my early years of aeronautical HF monitoring covered 'local' stations such as Shannon (Ballygirreen), Prestwick or London (Birdlip). As previously mentioned, these were later consolidated into a single communications centre known as 'Shanwick Radio' (a combination of SHANnon and prestWICK), located at Ballygirreen, a few miles north of Shannon Airport.

The history of Ballygirreen has already been expertly documented elsewhere, but I discovered that no similar comprehensive history of the Birdlip complex existed.

Accordingly, I decided to try and rectify this situation. After several years of research, both here and in the UK, I published *A History of the Birdlip Aeronautical Communication Complex*. This extensively illustrated book's 470 pages cover its story from the planning stages in 1940, through its growth as a vital communications centre both in war and peacetime, until its closure in 1977.

I have tried to keep the content as non-technical as possible and have included many personal reflections from those

who worked there, often through the harshest of winters.

During this research, I was very kindly given the final, handwritten, *Watch Log* from Birdlip covering the period from 22nd February 1965 to 27th January 1966, when NARTEL operations ceased at this station.

On examining this I noticed an entry, dated the 13th April 1965, where they attempted to contact an RAF Hastings, with a tri-graph radio callsign of 'MJL47'. My own HF notes for this date confirmed that I had indeed copied this flight working Shannon (EIP) on HF, where Birdlip had failed.

I have included highlighted extracts from both my logbook and the *Watch Log* confirming the report of this navigational flight on a 'round robin' from Thorney Island out to its turning point at 09 degrees West (at which time the entry in the Birdlip log appears), cruising at 8,000' (Figs. 9 and 10).

The "over-riding breakthrough" mentioned in the log refers to simultaneous transmissions from Prestwick (MVB) blotting out reception on 5626 kHz.

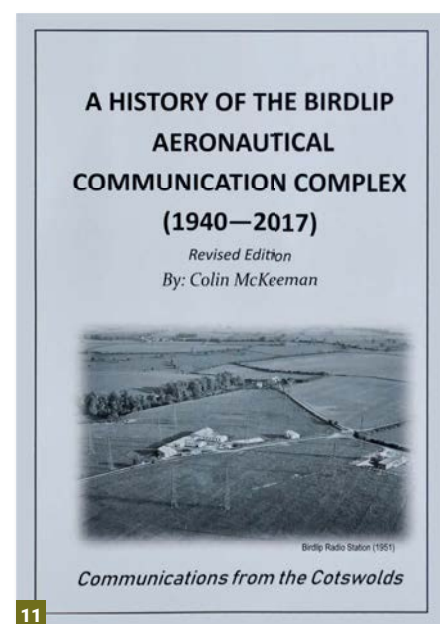
It was great to see confirmation of my jottings in an official document some 55 years after I had monitored the flight, and also to learn that Shannon had subsequently passed this message to Birdlip over their landline.

### Conclusion

As you will have gathered from the above, I have seen and heard many changes during my 55 years of listening to the aeronautical HF bands. It is a testament to the importance and quality of this mode of communication that it has survived into the era of more technical data options.

Indeed the latest available annual statistics from Ballygirreen show an HF traffic handling growth rate of over 1% between 2018 and 2019, with 511,294 flights managed in the period.

This method of long-range



communication is here to stay for many years to come, despite concerns several years ago that its demise was imminent.

For those of you who might be interested in purchasing a copy of my book (Fig. 11), it is available at a specially reduced price of £25 (including p&p) for *RadioUser* readers.

[downrange@eircom.net](mailto:downrange@eircom.net)

<https://tinyurl.com/yatxpwv>

### Resources

*Aeronautical HF Radio Map* (2002)

<https://tinyurl.com/ya2bqzef>

Frequencies

<https://tinyurl.com/y6uebqsd>

Irish Aviation Authority: *North Atlantic*

*Communications: History*

<https://tinyurl.com/y7d6pc5f>

McKeeman, Colin: *A History of the Birdlip*

*Aeronautical Communication Complex*

(1940-2017) Rev. ed., 2019; Lettertec [Self

Publish Books] Carrigtwohill, Co. Cork,

Ireland (Fig. 11)

*RadioUser*, April 2020:

<https://tinyurl.com/yd6euaz5>

SELDEC (1999) *Calling Shanwick* (7th ed.,

SELDEC, historical).

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# Masts, Modelling and Moxons

Keith Rawlings

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**Keith Rawlings continues with aerial modelling, explains Near Vertical Incidence Skywave (NVIS) and responds to some reader feedback on GPO connectors and CCW loops.**

This month, I am continuing with the aerial modelling theme. I am presenting a few more examples of how EZNEC can be used to analyse and predict aerial patterns.

My first case study helps to prove why results were as they were, and the second one evaluates the construction of a Moxon Rectangle to see how it can be expected to perform.

Some years back, a friend and I decided to take part in International Marconi Day with a Jolly outdoors operating portable. After getting permission from a farmer, we set up a station in a field in North Essex that was ideal. It was almost in the middle of nowhere and had quite a high elevation, although we were not allowed on the highest part.

This was not a problem because some HV lines were running near to that part of the field anyway.

A prior site survey revealed that there was no noise coming from the lines and the site was very quiet, so much so that it gave the impression of a receiver fault until a legitimate signal was found.

We housed the station in my 9x9ft ex-army tent and used my friend's vehicle to mount a 30ft mast on.

We hung a full-size G5RV in an 'inverted vee' configuration from it with the feeder coming away at an angle to keep it off of the steel mast.

As we had a great day working a lot of IMD stations on 80, 40 and 20 metres, as well as other amateurs from all over Europe, we decided we would do the same thing again the next year.

One thing we did note, was that on 80m and 40m we struggled to work some of the more distant UK stations.

## A New Mast

Just a couple of weeks later, at a local rally, I spotted a 27ft ex-army Larkspur mast for just £18 (Fig. 1). It came complete with its carry bag, tool kit, stakes, ground mounting base and insulator, to allow its use as a vertical radiator, and it also had provision for



mounting a 5/16"/8 mm rod at the top to extend its length.

I reasoned that as well as being a useful addition to my motley collection of gear, with the addition of a 6ft or so aluminium rod inserted to extend it to a 1/4 wave ( $\lambda/4$ ) on 40m, it would make a decent vertical for that band, as it should provide a low angle of radiation.

With the recent IMD event still fresh in my mind, the mast found its new home, with me.

When the next year's event arrived we erected the army mast, extended to 35ft, with half a dozen radials lying on the ground at one end of our site, and the G5RV mounted in the same manner as in the previous year at the other end. The G5RV was matched with a KW107 AMU, and the vertical was used 'as is due' to its low VSWR on 40 m. We could switch between the two us-

ing an old Heathkit coaxial switch.

By the end of the day, we had had a pretty good time on all bands but most of it by using the G5RV.

It was only when darkness fell that signals started to improve on the vertical; by that time, we had to pack up.

The low-ish radiation angle of the vertical was missing most of the daytime 'local' traffic, and propagation did not seem to be favouring us on the more distant stations during daylight.

## An EZNEC Approach

EZNEC can explain this: Look at Fig. 2. At the top, this shows a modelled elevation plot of our G5RV on 7 MHz. All of our RF was going vertically upwards and was, more or less, coming straight down again. This was great for relatively 'local' UK/Western



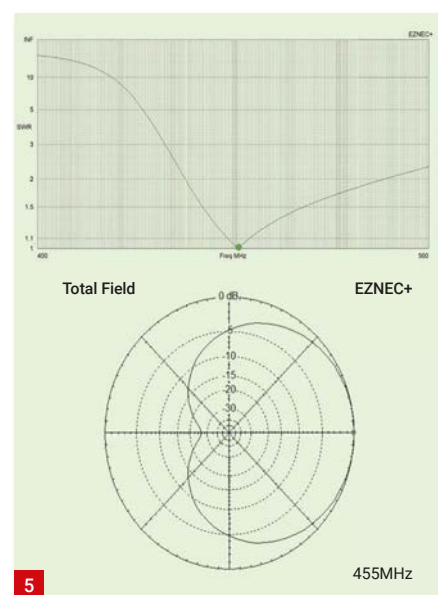
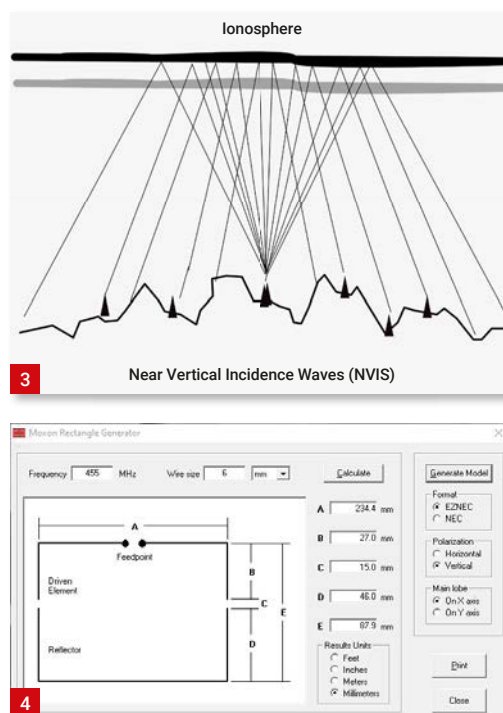
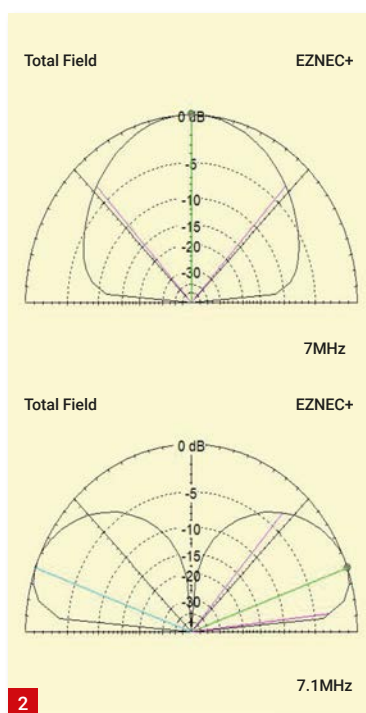


Fig. 1: The Larkspur Mast. Fig. 2: G5RV and Larkspur Comparison Elevation Plots. Fig. 3: An NVIS Diagram. Fig. 4: The Moxon Rectangle Generator Software Interface. Fig. 5: UHF Moxon Predicted SWR and Azimuth Plots. Fig. 6: Wide Band Moxon Azimuth Sweep.

European contacts, probably via NVIS, but not so good for further afield.

Compare this with the lower plot in Fig. 2: This is a prediction of the Larkspur mast on 7MHz, and it demonstrates that the radiation has been calculated as going out towards the horizon, forming a 'skip zone' below, and with nothing going out/ arriving from above. This was as expected, but we did think that we would have had better results on more distant stations. However, on the day this was not so.

## The NVIS Mode

Briefly, Near Vertical Incidence Skywave (NVIS, Fig. 3) is a propagation mode in which high-angle radiation is used to send signals almost straight up so that they are reflected directly back to Earth.

This makes for effective short- to medium-distance communications.

As NVIS is ideal for relatively local HF communications, the military has used this mode of propagation for many years to provide HF communications with units on the ground that may be out of range for reliable V/UHF links. NVIS will only work at frequencies from 2 to 10 MHz, and the signal must be able to penetrate the D-Layer of the Ionosphere so that it can bounce off the F-Layer.

Lower-frequency signals do not penetrate the D layer, while higher frequencies will not bounce off the F layer at such sharp angles and will end up getting lost out in space

## Back to Modelling

By the time this issue is published, I hope we are near to coming out of lockdown. If not, and for something to do, how about building a Moxon Rectangle?

I live a couple of miles outside of our nearest town, and it was easy to receive various transmissions coming from the area on UHF. Gradually most have turned to digital, mainly DMR, and those signals that were a bit noisy but readable on analogue are now difficult to decode.

To counter this I thought that a simple aerial with modest gain should improve matters so I decided to try a Moxon Rectangle. This design was devised by the late Les Moxon G6XN. Simple design software for the Moxon can be found at this URL:

<https://tinyurl.com/y88j4ugb>

Using the software (Fig. 4) is simple enough. Enter the design frequency, 'wire' size and required measurement units, click 'Calculate', and the software will display the aerials dimensions for you.

Press 'Generate Model', and it will generate a model for you in either NEC or EZNEC format.

Now we can model our design to get an idea of how it will work.

I ran MoxGen for a Moxon aerial designed to operate on 455MHz. Mine was made from a 6mm-diameter aluminium rod, but any suitable material may be used.

The dimensions were in mm. I set the model for vertical polarisation and saved

as an EZNEC file.

Note that the model is generated in free space and without wire loss.

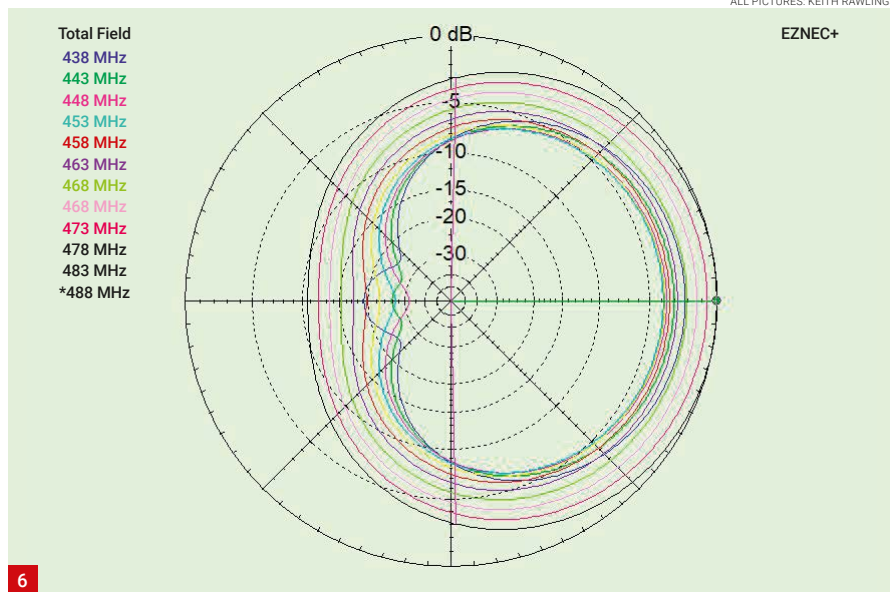
When I loaded the file into EZNEC I got a 'segmentation check warning'.

For convenience, I set 'auto-segment' to 'conservative'. I changed wire loss to 'aluminium' and plot type to '3D'. The ground type was adjusted to 'Real/High Accuracy'.

## Warnings and Improvements

In the 'Wires' window, I immediately received warnings showing that part of the aerial was within the ground. If we say that the Moxon needs to be up at 25 ft, then clearly we need to alter the height (Z dimension) which is presently set to mm. This is not a problem: In the 'Wires' window, go to 'Other-Change Units' and select 'Feet'. From the same window, I selected 'Wire-Change Height By', and added '25' into the 'Height-Change' box. I pressed 'OK'. The Moxon is now sitting at 25 ft!

If we run an SWR sweep from 400 to 500MHz with a step of .1 (100kHz), and we agree that a maximum SWR of 2:1 is acceptable for a reception, then we can see that (Fig. 5, top), we have quite a wide predicted bandwidth from 438 to 488MHz. At first glance, the Moxon appears to be a decent wideband aerial, and the fact that the predicted resonance point is actually at 451.5MHz is of little matter.



The Azimuth plot (Fig. 5, bottom) also looks good with a predicted 6dB of forward-gain and a generous 26dB front-to-back-ratio. The predicted beamwidth is wide enough to cover the target area.

However, low SWR is not everything.

If you now glance at the image in Fig. 6, you will see a frequency-sweep of azimuth plots from 438 to 488 MHz, in 5 MHz steps. I appreciate that these may be difficult to interpret here, but as we move away from resonance the directional properties go completely out of the window in both Elevation and Azimuth.

EZNEC tells us not to expect the Moxon retain its directional properties over a wide range of frequencies.

You may find that in the demonstration version of EZNEC that this UHF model uses more than the 20 segment limit. To evaluate the design, try one for a lower frequency, such as VHF.

I entered a design for a VHF air-band Moxon that ran well with 10 segments

### Readers' Correspondence

Alan G3XOI who recently contacted me with details of the GPO connectors has a non-aerial question that I will throw open to readers: After passing his FT817 on to his son, his question is that he, "longs for a simple top-band and 80m transceiver, in fact, a transceiver version of the old AT5 I started with. Do you know anything that might suit, 10W would be fine?"

I could not think of anything so I asked PW editor Don G3XTT if he knew of anything. He informs me that was is a common question but he was not aware of anything suitable. Asking around has

yielded no results either. Therefore, any suggestions that readers may have would be appreciated.

After I evaluated the CCW loops, Ash from Cheltenham asked if I think that a design on the internet called *The WellGood Loop* would make a good substitute for the 'real thing', by which, I assume, he means a Wellbrook loop. The *WellGood Loop* appears to be an enterprising duplicate of a commercial Wellbrook loop amplifier that had been damaged.

I have never owned or used a Wellbrook Loop, but I know people that do, and their loops have earned a great reputation. I have also seen a few in non-amateur environments over the years too.

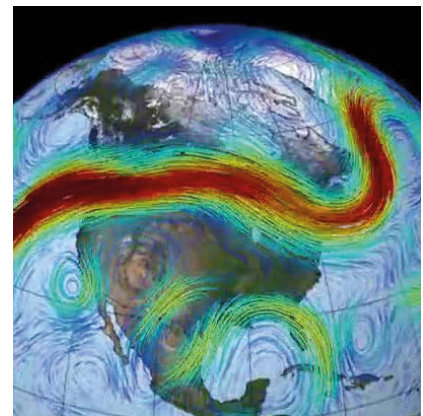
It seems that those who have constructed the *WellGood* design are happy with it.

The design uses a couple of bipolar transistors (where current Wellbrook aerials use JFETS) along with Bipolar types. It claims superior performance with lower noise levels over previous models, so by saying 'substitute for the real thing' in the case of the Wellbrook then probably no, as current models should perform noticeably better. Whether or not the *WellGood* works well or not I can't say, I am sure it does although the construction of the actual loop element will make some difference to results obtained.

As I am presently typing up future pages for AN! while sitting out the pandemic I will take a break and build myself a *WellGood* amplifier and report back. For the 'genuine article', here is the Wellbrook website:

<https://tinyurl.com/y7plv2vb>

Stay Safe - I will see you all next month.



### FORECASTING TAKES INSPIRATION

**FROM METEOROLOGY:** These solar storms can wreak havoc on power grids, satellites, and other infrastructure, but they are difficult to predict more than a few days in advance. In a new review, Dikpati and McIntosh showcase mounting evidence that solar storms arise from solar Rossby waves, a type of wave associated with rotating fluids. Just as the 1939 discovery of Rossby waves in Earth's atmosphere paved the way to accurate weather prediction, Rossby waves in the Sun could be key to predicting disruptive space weather in time to prepare for it. On Earth, atmospheric Rossby waves arise from the planet's rotation, and these large-scale meandering features help transport warm air toward the poles and cold air toward the tropics.

Earth's Rossby waves sometimes have extreme effects, such as those from 2019's polar vortex. Rossby waves in the solar plasma arise from the star's rotation and originate within a transitional layer known as the tachocline.

Unlike Earth's Rossby waves, solar Rossby waves are strongly influenced by powerful magnetic fields. Recent observations and theoretical modelling suggest that these magnetically modified Rossby waves interact with the differing rates of rotation of the Sun's plasma to trigger solar storms. The researchers suggest that computational techniques developed for meteorology could inform strategies to improve solar storm predictions.

In the future, scientists could use observations of the Sun's surface as indicators of Rossby wave dynamics deep below, potentially revealing harbingers of solar storms weeks, months, or even a few years ahead of their eruption. (Source: EoS/ EoS Buzz/ EoS No. 101; May 2020; Space Weather)

<https://tinyurl.com/y8p4tjnk>

<https://doi.org/10.1029/2018SW002109>



# The Early Days, Britbox & HEVC

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**Keith Hamer and Garry Smith examine the 1926 Geneva Plan, John Logie Baird's television system, Britbox, and one of the latest transmission compression systems, HEVC. They also share some exciting TV DXing results.**

On December 14th, 1922, John Charles Walshaw Reith (1889-1971) was appointed as the BBC's General Manager. He began work on December 30th. On January 1st, 1927, the BBC became the British Broadcasting Corporation, and Reith was appointed the BBC's first Director-General.

The Savoy Hill Studios were opened on May 1st, 1923, and, quote, 'evening talks for men' began (Fig. 1).

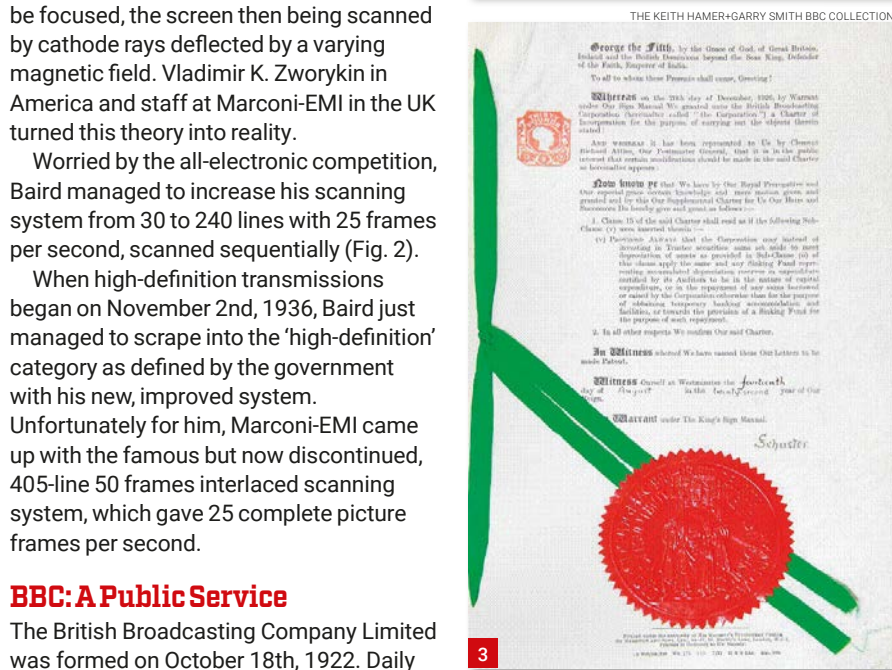
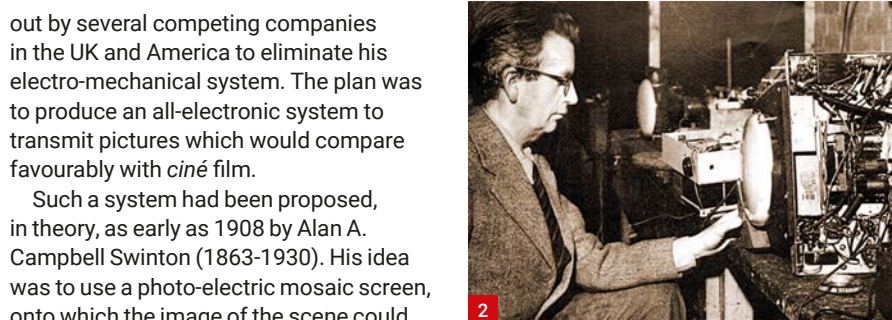
Two years later, on Monday, April 6th, 1925, the 2LO transmitter (with a power of 2kW) was moved from Marconi House to Oxford Street and installed on the rooftop of Selfridge's department store.

## The Geneva Plan

It soon became apparent that as a result of the BBC's transmitters being on separate frequencies (which conflicted with newly-opened European radio stations) a solution to interference needed to be addressed. At the time, there was no specific European frequency plan; stations operated on wavelengths between 300 and 500 metres. A Technical Committee was established by the BBC's Chief Engineer, Mr. P.P. Eckersley. This involved representatives from most of the European broadcasters. Eventually, a frequency plan was accepted. This was known as the *Geneva Plan*. Its success depended upon every transmitter having a carrier frequency which was kept under a close tolerance. After many delays for technical reasons, the plan finally came to fruition on November 14th, 1926.

## Television: The Early Days

At the same time as the original 30-line, low-definition process by John Logie Baird (1888-1946) was fully adopted by the BBC on August 22nd, 1932, experimental work was being carried



out by several competing companies in the UK and America to eliminate his electro-mechanical system. The plan was to produce an all-electronic system to transmit pictures which would compare favourably with *ciné* film.

Such a system had been proposed, in theory, as early as 1908 by Alan A. Campbell Swinton (1863-1930). His idea was to use a photo-electric mosaic screen, onto which the image of the scene could be focused, the screen then being scanned by cathode rays deflected by a varying magnetic field. Vladimir K. Zworykin in America and staff at Marconi-EMI in the UK turned this theory into reality.

Worried by the all-electronic competition, Baird managed to increase his scanning system from 30 to 240 lines with 25 frames per second, scanned sequentially (Fig. 2).

When high-definition transmissions began on November 2nd, 1936, Baird just managed to scrape into the 'high-definition' category as defined by the government with his new, improved system. Unfortunately for him, Marconi-EMI came up with the famous but now discontinued, 405-line 50 frames interlaced scanning system, which gave 25 complete picture frames per second.

## BBC: A Public Service

The British Broadcasting Company Limited was formed on October 18th, 1922. Daily

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Fig.1: The BBC Savoy Hill Studios were opened on May 1st, 1923. Fig. 2: John Logie Baird experimenting with his electro-mechanical television equipment. Fig. 3: The original BBC Royal Charter. Fig. 4: The TS6808E T2 HEVC set-top box, manufactured by TELE System.

broadcasts from the London Station, 2LO, began one month later on November 14th.

The organisation became the British Broadcasting Corporation under a 10-year Royal Charter on January 1st, 1927 (Fig. 3). To mark the occasion, the Chairman of the BBC Board of Governors, the Earl of Clarendon, wrote: *"Broadcasting is an established and accepted institution. People may still marvel at the wonder of wireless, but perhaps they should marvel still more that in so short a space of time this new Public Service should have become so essential and so powerful a factor in our life. No doubt some of the ramifications of it will come as a surprise."*

*The change in constitution which took effect at the beginning of 1927 was indeed the logical and inevitable result of the public service policy adopted from the outset by the old Company. This change and the establishment of the Corporation by Royal Charter recognise the dignity and status due to the service of the B.B.C."*

The entire staff of the original BBC were kept and the policy and methods of administration were maintained. With the change to the Royal Charter constitution, there came a greater degree of autonomy, absolute in some instances. The Corporation, even back in 1927, was often referred to as a "State concern", even though, officially, it was not under Government control in the ordinary sense of the expression.

Over 90 years later, many licence payers may still think that the BBC is an arm of the government. This idea was even part of a story-line in an episode of the BBC comedy programme, "Yes, Prime Minister" featuring the fictional Sir Humphrey Appleby attempting to extract inept Prime Minister Jim Hacker out of the mire. Jim made an embarrassing slip during a recorded interview about the government bugging MPs' telephones, which turned out to be true! Following a cosy luncheon between Sir Humphrey and BBC, with certain diplomatic threats to the future of the BBC's upcoming Royal Charter, the item was mysteriously dropped!

No doubt the programme strengthened the view amongst some viewers that the BBC was indeed a little too close to

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the executive when it was broadcast in January 1988.

## More On BritBox

In the May column (*RadioUser*, May 2020: 22-23) we covered the launch of the BritBox streaming channel. ITV's group director for streaming, Reemah Sakaan, said, perhaps over-optimistically: *"There is a whole slate of original programmes in development for BritBox. While the service will be a second or third subscription choice for many viewers, it will be able to rival the likes of Netflix, Amazon Prime and Apple TV+. It's got the widest range of UK box sets of any service. Ostensibly, the other streamers are US-focused so they make dramas for the US market, whereas BritBox will be the faces, people and places that you know. For some time, we've been bringing our shows back home and now that we've got a destination in BritBox, that's something we'll be doing more actively. We'll still be working in partnership with Netflix and Amazon and all of the other streamers."* She added that some archive programmes that have been aired on services like Netflix will now move to BritBox.

## Techno Topics: HEVC

One of the latest television innovations is HEVC. We have often mentioned this in our DX-TV columns. But just what is this technology?

HEVC is the abbreviation for High-Efficiency Video Coding. Due to the increased interest in Ultra High-Definition Television (UHD TV) services, the developments in video compression techniques have involved many technical challenges for engineers. The HEVC standard (also known as H.265) is considered to be the most suitable coding technology due to its enhanced compression efficiency. This helps considerably with problems encountered

due to the significantly increased data rates in UHD TV signals.

Unfortunately, the much-enhanced compression performance of HEVC has come at the expense of increased data-handling complexity which is estimated to be up to four times that of its predecessor, the H.264/AVC (Advanced Video Coding) standard. The development of real-time HEVC/H.265 encoders for UHD TV initially provided engineers with a huge challenge (Fig. 4).

## DX Corner

DX is usually sparse during the first few months of the year but several tropospheric, and even Sporadic-E, openings have added a little sparkle to the otherwise mundane conditions.

For details of tropospheric openings and DX catches from February to April 2020, please check out the Radio Enthusiast website:

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

Stay tuned, check our loggings online and get in touch with us at the e-mail addresses in the head of this column.

## Further Reading

- Baird, J.L. (2nd ed., 2004) *Television and Me. The Memoirs of John Logie Baird* (Mercat Press)
- Brown, D. (2000) *The Three Dimensions of John Logie Baird* (RSGB)
- Emerson, A. (2009) *Old Television* (Shire)
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- Higgins, C (2015) *This New Noise: The Extraordinary Birth and Troubled Life of the BBC* (Guardian-Faber)
- Kamm, A. and Baird, M. (2002) *John Logie Baird: A Life - A Personal Biography* (NMSE)
- McIntyre, I. (1993) *The Expense of Glory: Life of John Reith* (Harper Collins).



TELE SYSTEM.



# Coronavirus and the Maritime Environment

**Robert Connolly** evaluates the big changes brought about for seaborne trade and traffic by COVID-19, logs some interesting maritime voice comms, revisits AIS and speculates on the future of summer events.

**Robert Connolly**  
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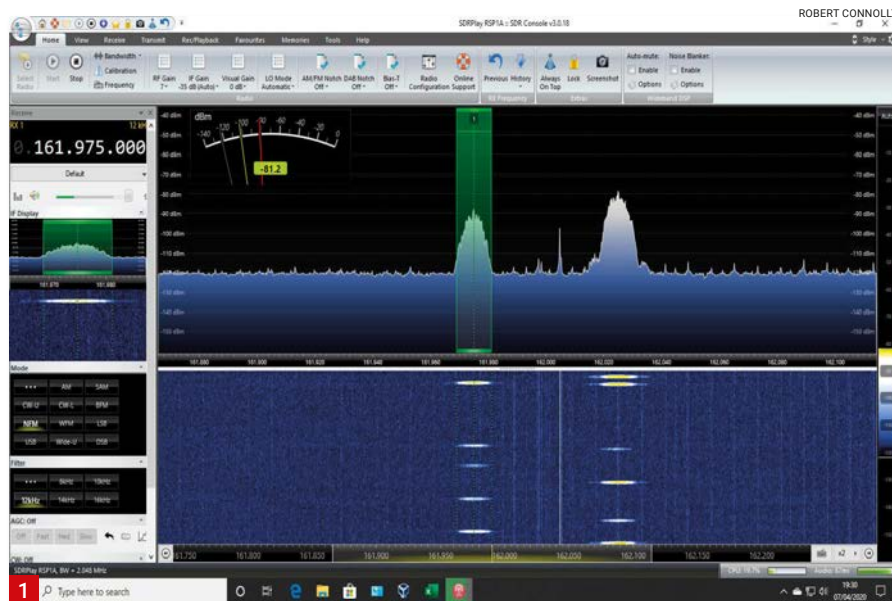
In the last few months, shipping has faced an unprecedented event, in the form of the world-wide Coronavirus pandemic. Some cruise ships began making international news headlines as cases of the virus were detected in passengers on board. As the pandemic started to worsen, ports began refusing entry to cruise ships that had cases of the virus onboard, forcing them to seek to remain at sea for longer periods or seek alternative destinations.

The authorities operating the Panama Canal refused one cruise ship transit through the canal because it had several infected passengers on board. Passengers had to be transferred by tender to a sister ship several miles from land. By mid-March, passengers from all cruise ships had been landed, and the ships were laid up in various ports or safe anchorages around the world.

At my location, the first signs of the effects of the pandemic came to light in late January. One of the local fish factories, which exports over three tons of shellfish to the Chinese, Japanese and Korean markets every week, lost all its orders overnight, due to the lockdown implemented in those countries.

This was very quickly followed by a crash in the fish market price paid to the various local shellfish vessels, leaving it not viable for them to put to sea. Boat expenses would be higher than the prices they would receive for their catches, and crew members who are all share fishermen would earn nothing for their hard work.

Share fishermen are paid a share of the price the catch makes when it has gone to market after the boat's expenses, vessel loan repayments, navigation equipment rental costs, vessel maintenance, fuel and insurance etc are taken out. A share fisherman can work hard all week and get



paid nothing for their efforts if the fish landed is auctioned at too low a price – with the price depending on market demand.

At the time of writing this column, it looks as if our boats will begin shell fishing again in early June because the Asian markets are starting to re-open.

## Ferries, Transport and Oil Markets

Ferries have also been affected, as countries went into lockdown. Fewer passengers were travelling, and many went only for essential business. Many freight ferries, that normally carry a limited number of lorry drivers, insisted on just carrying unaccompanied loads.

With the lockdown across the world in place, the production of goods for export by many countries effectively stopped. As a direct result, cargo ships, which had been busy trading across the world, suddenly found themselves struggling to secure orders. I have noticed that many vessels visiting the various ports in my area have quickly discharged and then went to an

anchorage for several days, to await their next set of orders.

Moreover, crews on cargo vessels were not rotating as frequently as normal, to minimise the risk of replacement crew members coming into contact with the virus while they were travelling to join a ship.

That is of course if they could travel to a port where they were to join a ship. The majority of passenger aircraft, of course, became grounded as more countries closed their borders.

As I write this column in late April, oil tankers were facing problems. With little or no manufacturing currently taking place, people working from home, and the lockdown resulting in empty roads, the demand for oil fell through the floor. At one point, oil producers in the USA were paying companies to take their oil away.

The rapid decline in the oil industry quickly hit tankers who began to struggle for cargoes. Some tankers are now used as oil storage facilities, in preparation for when some form of normality returns.

### Lockdown Radio Syndrome

While being in lock-down reduces the income for many, and restricts the activities of radio enthusiasts, it does provide extra time for listening. Please note that I do *not* recommend spending all your time at home in front of your receiver, as this could be detrimental to your physical health.

Remember that your partner or family also cannot get out and about – their patience will have a much shorter fuse. This could result in your having a frying pan with a raised centre matching your head!

During my recent monitoring of the marine MF/HF bands, I came across some interesting transmissions. I noticed that, during April, there was some excellent reception from Asia. For instance, I heard the channel marker for the coast station XSQ Guangzhou in China on 8435, 12613, 12622.5 and 16880kHz.

I also received coast station VRX in Hong Kong on 8812kHz. Another interesting coast station from Asia was HSW Bangkok Metrological Radio, Thailand on 8743 and 6765.1 kHz. It transmits weather information for the region in both the local language and English. However, what makes this a rather interesting station is that – between weather transmissions – is broadcasts a musical interlude, a bit like an ice-cream van.

Furthermore, good reception from Asia occurred most evenings in April around 1900 UTC.

Other HF maritime coast stations I heard recently include NMG New Orleans USA on 8502kHz, NMN Portsmouth USA on 6501kHz, 3AC8 Radio Monte Carlo Monaco on 8728kHz, ESA Tallinn Radio Estonia on 8761kHz, and CTA Centro Radio Portugal on 2657kHz.

### Monitoring Maritime Voice Comms

When listening to maritime voice MF/HF radio transmissions, it is important to remember several factors. To begin with, there is much less radio traffic when you compare the maritime HF voice frequencies with airband HF. Aside from vessels moving much slower, compared to aircraft, ships generally do not give position regular position reports by radiotelephony.

Instead, these are transmitted on VHF AIS, and by satellite for the long-range tracking system. Incidentally, commercial fishing vessels also constantly transmit position information by satellite, so that government fishing authorities can monitor

their position and ensure that they are not fishing in a closed area.

Ships – being ships travelling across the oceans – are, of course, on the surface, and this greatly reduces the capability of reception from vessels, unlike aircraft flying at 33,000 feet, or higher, over the ocean. As a result, it will be mainly coast stations that you hear. The other difficulty in hearing ships is that they generally use their mother tongue, to be able to communicate with ease. The exception is where the matter in hand concerns the safety of the vessel or navigation. In those cases, English is used.

If you don't have a listing of MF/HF voice frequencies used by coast stations (there are plenty available on the Internet) then a good frequency to monitor is 2182kHz, the distress and calling frequency. Before a coast station begins an MSI broadcast, it will announce the working frequency on that frequency and MF DSC.

With the availability of MF/HF DSC, ships will now use this – and include the frequency requested – to contact another vessel. If you have an MF/HF DSC decoder, for example, YADD or COAA's *DSC Decoder*, you can monitor the DSC frequencies for a

ship requesting to contact another vessel and then listen on the frequency requested. Many DSC transmissions are routine checks, and monitoring can be a little bit like sorting the wheat from the chaff.

### Summer Events?

During the summer months, many will visit the seaside resorts around the UK. In the past, many of these resorts have held various maritime-based events, including RNLI Open Days. Many of these events provide search and rescue demonstrations, and these are always a 'crowd-puller'. Some resorts in the British Isles will also stage popular air displays. Assuming that the Covid-19 lockdown restrictions are eased before the summer arrives, there is still a strong expectation that social distancing will be with us for many months to come. Therefore, many annual maritime events are likely to be either cancelled or severely restricted.

In Northern Ireland, the two annual air shows always carried a maritime rescue demonstration. Before lock-down restrictions were announced the *Airwaves* two-day airshow, held annually at Portrush, a



KEVIN HEWITT

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Fig.1: AIS data bursts received on both AIS Channels. Fig. 2: The Royal Caribbean *Explorer of the Seas* at Gibraltar.

Co. Antrim, had already been cancelled, due to the local council being unable to provide any funding for the event.

In mid-April, the Newry Mourne and Down Council, which normally funds the annual *Festival of Flight*, that attracts well over 100,000 visitors to Newcastle, Co. Down, decided to cancel this year's event due to the Coronavirus situation.

By the same time, the government of the Republic of Ireland announced the prohibition of any event that may attract 5,000 people or more. Although no official confirmation has been made by the organisers of the annual *Bray Air Display* (just south of Dublin) it looks likely that this too will be cancelled.

In general, if you go to a resort regularly, just to attend an event, the simple message is (once again, assuming lockdown restrictions are eased): Check that the event is still being held *before* you travel.

When visiting a seaside holiday location, maintain your social distancing, not just for yourself but also for the locals who may not be just as welcoming as usual due to the fear of possible Covid-19 infection.

## Personal and General Safety

Remember to keep yourself and your family safe. Summer is the peak time for incidents requiring coastguard and lifeboat assistance. Any such incidents now mean that the lifeboat crews and coastguard team cannot maintain social distancing. This potentially places them at risk of infection.

When lifeboats return from a task, the vessel must now be sanitised, as the crew cannot know if the casualty who has been rescued is carrying the virus. The pandemic has changed the world as we knew it, and we are all having to get used to a new way of life for many months to come.

## AIS and SOLAS

For maritime VHF listeners, there is still radio traffic out there to be heard. Coastguard maritime safety information (MSI) broadcasts continue, as does traffic between vessels and ports and pilots.

For the benefit of those who have recently taken up maritime monitoring, I am going to provide some basic information regarding the maritime Automatic Identification System (AIS).

This is a broadcast transponder system,

which displays details of other ships at sea. If fitted to a vessel, it must be active at all times unless the ship's master deems that it is unsafe from a security point of view, for example, in the case of high-risk areas of vessel piracy.

There are two types of AIS: Class A is mandated for all vessels of 300 GRT and above engaged on international voyages, as well as for all passenger ships.

Class B provides limited functionality and is intended for non-SOLAS vessels – those not covered by the Safety of Life at Sea (SOLAS) Convention. It is primarily used by vessels such as pleasure crafts.

<https://tinyurl.com/qy3psge>

The system operates on two marine VHF channels; Channel 87B on 161.975MHz and Channel 88B on 162.025MHz. It uses the Self Organizing Time Division Multiple Access (STDMA) technology to meet the high broadcast rate. The equipment used consists of one VHF transmitter, two VHF TDMA receivers, one VHF DSC receiver, linked to the shipboard display, and sensor systems.

Position and timing information is normally derived from an integral or external GPS receiver. Each station transmits and receives over two radio channels to avoid interference and possible loss of communications from ships. Position reports from an AIS station fit into one of 2,250 time slots established every sixty seconds.

All AIS stations continuously synchronize themselves to each other, to avoid overlap of slot transmissions.

Class A data transmissions are sent every two to ten seconds, depending on a vessel's speed while underway, and every three minutes while a vessel is at anchor.

Class B data is transmitted every three minutes where the vessel's speed is less than two knots, or every thirty seconds, in the case of greater speeds. An AIS slot is 26.66 ms long, with a data modulation of 9600 bit/s. This results in a maximum capacity of 256 bits for each slot.

The image in Fig. 1 shows some of the marine AIS data bursts received on both channels.

In a forthcoming issue of *RadioUser*, I will provide more detailed information on AIS. Meanwhile, this is all for this month.

The photograph in Fig. 2 is of the Royal Caribbean *Explorer of the Seas* at Gibraltar.

Until next month, stay safe and remember social distancing rules when out and about.

*Fair Winds.*

# Radio Round-up

## TIMES RADIO

**TIMES RADIO:** Times Radio launched at 6 am on Monday 29 June with Mariella Frostrup, Phil Williams, Carole Walker, Giles Coren, and Hugo Rifkind joining the schedule. Former BBC Radio 4 presenter and Sky Book Show host Mariella Frostrup will be presenting afternoons, Monday to Thursday. 5 Live's Phil Williams will host the evening slot, Monday to Thursday. TV and radio journalist Carole Walker, former BBC political correspondent will look after lates, while Times columnist, restaurant critic and TV presenter Giles Coren will have a weekly Friday afternoon show. The regular weekday schedule is completed by former 5 Live and Radio Scotland journalist Calum Macdonald as the presenter of early breakfast for one hour from 5 am weekdays. The full weekend schedule announced today includes, on Saturday mornings, Times columnist and critic Hugo Rifkind and former Labour shadow minister and ex-political editor of GMTV, Gloria De Piero on Friday mornings with the station's Chief Political Commentator Tom Newton Dunn on Sunday mornings in a pairing they're calling G&T. Offside Rule podcast presenter Kait Borsay, previously with Sky and ITN, will host lates Friday to Sunday. Alexis Conran, who has recently been presenting on talkRADIO, will host lunchtimes on Saturday and Sunday. Alexis is best known for co-hosting the BBC Three show *The Real Hustle* and is a member of the Magic Circle. Popular political commentator, broadcaster, stand-up, editor of the *Evening Standard's* *Londoner Diary* and former Labour advisor Ayesha Hazarika will present the drivetime slot on Saturday and Sunday. Other people joining Times Radio for specially-commissioned shows and podcasts include former Conservative Home Secretary Amber Rudd with her journalist daughter Flora Gill, talking about their different takes on the world, and international businessman, Brexiteer and broadcaster Lord Digby Jones will present a series looking at how businesses are getting ready for 'Brexit'. Times columnists Rachel Sylvester and Alice Thomson will host an interview series in which they talk to leading figures about how overcoming the challenges of their early lives shaped the people they have become. Confirmed guests so far include Tony Blair, Kirstie Allsopp, actor Brian Cox, and Sir Paul Nurse.

(Sources: eRadio with Broadcast Bionics, RadioToday, 24 hours in radio with Wisebuddah Jingles)

<https://tinyurl.com/y9py39zv>

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**BP-287** hi capacity 3280 mAh replacement battery for IC-R30 ..... **£77.95**  
**BP-293** dry cell case (3x AA) for IC-R30 ..... **£35.95**  
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**CS-R8600** software for IC-R8600 ..... **£72.95**  
**RS-R8600** remote control software for IC-R8600 ..... **£99.95**  
**RC-28** remote control system for IC-R8600 ..... **£279.95**  
**SP-38** desk top speaker for IC-R8600 ..... **£149.95**  
**SP-39AD** external speaker with DC power supply for IC-R8600 ..... **£199.99**  
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### Uniden



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**UBCD-3600XLT** (NXDN Version) 25-1300 MHz Digital & Analogue scanner ..... **£479.99**  
**SDS-100** Advanced 25-1300 MHz Digital & Analogue scanner ..... **£589.95**

#### Mobile/Base

**UCB-355CLT** 25-960 MHz 300 channel analogue scanner ..... **£84.95**  
**UBC-370CLT** 25-960 MHz 500 channel analogue scanner ..... **£119.95**  
**BCT-15X** GPS enabled 25-1300 MHz 9000 channel analogue scanner ..... **£249.95**  
**SDS-200E** Activated DMR+NXDN+ProVoice 25-1300 MHz Digital & Analogue ..... **£779.99**

#### Accessories

**UBCD3600XLT** soft leather case ..... **£29.95**  
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### DIAMOND ANTENNA

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#### Scanner Antennas

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**WS1025** 29-512 MHz 200 channel analogue scanner ..... **£89.99**  
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**Flightaware Prostick Plus** ..... **£29.99**  
**Flightaware Prostick** ..... **£25.00**  
**FlightAware ADSB** 1090MHz Band-pass SMA Filter ..... **£16.99**

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Tecsun is a world famous manufacturer of AM, FM and shortwave radios. They offer a great range of portable options from just £44.95



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**PL-360** This pocket world band radio, with AM & FM reception, keeps you in with the action from Long Wave, Shortwave(2.3-21.95MHz), FM (87-108MHz) ..... **£44.95**  
**PL-380** is a portable FM Stereo/LW/SW/MW DSP Receiver FM 87-108 MHz (Russia 64-108 MHz MW 531-1602kHz AM 522-1620 kHz SW 2300-21950 kHz LW153-513 kHz ..... **£44.95**  
**PL-606** is a DSP-based portable LW/MW/FM/SW (2.3-21.95MHz) shortwave radio ..... **£44.95**  
**PL-310ET** is a portable multi band radio covering FM 76-108 AM 522-1620 kHz SW 2300-21950 kHz LW 153-513 kHz ..... **£49.99**  
**PL-680** is a fully featured world band portable radio with SSB covering FM 87-108 MHz MW 522-1620 kHz SW 1711-29999kHz LW 100-519 kHz AIR 118-137 MHz ..... **£149.95**  
**PL-880** is the flagship portable radio fitted with analogue Hi-Fi circuit, multi conversion, & DSP decoding technology, which greatly enhances the sensitivity, selectivity and reduces interference from close by stations. Covering FM 87-108 MHz, SW 1.711 – 29.999 MHz, MW 522 – 1620 kHz, LW 100 – 519 kHz ..... **£189.95**



MFJ Enterprises, founded in 1972 by Martin F. Jue, is a manufacturer of a broad range of products for the hobby radio market. They specialise in station accessories, such as antenna tuners and antenna accessories. MFJ manufactures more amateur radio products than any other company in the world.

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**MFJ-1022** 300 kHz – 200 MHz active antenna covers the HF to VHF bands. It easily plugs into your general coverage receiver or scanner ..... **£94.95**  
**MFJ-1020C** 300kHz to 30 MHz tuned indoor active antenna system performs as well if not better than a long wire ten metres long. Tuned circuitry minimises intermod, improves selectivity and reduces noise. You can also use it as a tuned preselector with an external antenna ..... **£129.95**  
**MFJ-1024** 50 kHz – 30 MHz active antenna complete with control unit, 15m coax and external antenna ..... **£197.99**  
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The Bonito brand defines over 38 years of reliable software in the field of worldwide weather data reception on board and of course Ham radio. Bonito is one of the leading software manufacturers for receiving weather information via shortwave radio, such as WeatherFax, Navtex, RTTY, CW and Synop as well as Satellite Fax Images from NOAA, Goes, ESA / EUMETSAT Meteosat. As well in Ham radio Software, SDR-Receiver and active Antennas and many more ham radio and DXer products.



**Boni-Whip** 20 kHz-300 MHz portable (17cm length) active wideband antenna ..... **£109.95**  
**MA305FT** MegActiv 9 kHz -300 MHz portable (30cm length) active wideband antenna ..... **£179.95**  
**POLORAN** 200 9kHz – 200 MHz broadband passive loop antenna ..... **£179.95**  
**GA3005** GigActiv 9 kHz-3000 MHz portable (19cm length) active wideband antenna ..... **£379.95**  
**MEGALOOP** FX 9 kHz – 180 MHz indoor/outdoor flexible loop antenna ..... **£349.95**  
**MD3000X** Mega Dipole 9 kHz-180 MHz active wire antenna ..... **£389.95**



Alinco is a Japanese manufacturer of radio equipment, established in 1938 in Osaka, Japan and has been a trusted source for radio scanners for years.

### Handheld

**DJ-X3ED** 100 kHz – 1300 MHz AM/FM/WFM 700 channel analogue scanner ..... **£109.95**  
**DJ-X11E** 500 kHz – 1300 MHz All mode 1200 channel analogue scanner ..... **£299.95**

### Base

**DX-R8E** 150 kHz – 35 Hz all mode 600 channel receiver .. **£469.95**

### Accessories

**ERW8** USB Interface cable for DJ-X11 scanner ..... **£39.95**  
**ESC50** soft case for DJ-X11 scanner ..... **£23.95**  
**EBP74** replacement 1800mAh battery for DJ-X11 ..... **£34.95**  
**EDH36** spare dry cell case for DJ-x11 ..... **£17.95**  
**EME26** curly cord earphone ..... **£10.95**  
**EME6** straight cord earphone ..... **£10.95**  
**EPB54M** high power battery for DJ-x3 ..... **£29.95**  
**EDC105** drop in charger for DJ-X3 ..... **£14.95**  
**EDC43** DC power cable for DJ-X3 ..... **£12.95**  
**EDC37** 12v DC cable for Alinco scanners ..... **£9.95**  
**EDS17** remote head fitting for DX-SR8 ..... **£39.95**  
**ERW7** USB computer interface cable for DX-R8E ..... **£39.95**



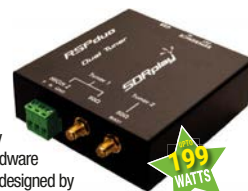
We were established in 1978 and are the largest manufacturer of Amateur, CB and Scanner antennas and accessories in the UK.

### Scanner Antennas

**SKYSCAN MOBILE** is a great all-round scanning antenna, which should enhance the reception capability of any radio scanner. Each of the nest of four different length antenna that make up the Sky Scan are designed to pick up a specific frequency range, this method has proven to work extremely well and delivers great results over 25-2000 MHz ..... **£24.95**



The people behind SDRplay are a small group of engineers based in the UK with strong connections to the UK Wireless Chip Industry. They have both software and hardware expertise and the RSP was designed by them here in the UK.



**RSPDUO** is a dual-tuner wideband full featured 14-bit SDR which covers the entire RF spectrum from 1kHz to 2GHz giving 10MHz of spectrum visibility ..... **£239.99**  
**RSPDX** covers all frequencies from 1kHz through VLF, LF, MW, HF, VHF, UHF and L-band to 2GHz, with no gaps ..... **£194.95**  
**RSP-1A** it is a powerful wideband full featured 14-bit SDR which covers the RF spectrum from 1kHz to 2GHz. All it needs is a PC and an antenna to provide excellent communications receiver functionality ..... **£99.95**



AOR, LTD is a renowned Japanese communications equipment manufacturer established in 1978, headquartered in Tokyo, Japan, serves the monitoring enthusiasts, communication professionals, amateur radio operators and electronics industries throughout the world

### Handheld

**AR-8200MK3** super wide band 100 kHz-3000 MHz 1000 channels analogue scanner ..... **£459.95**  
**AR-8200D** same as AR-8200-MKIII with the following added features: \* APC025 Decoding \* Voice Recording \* MicroSD Card Slot \* 4GB MicroSD card Included \* USB Port \* CTCSS built-in \* Voice Inversion built-in ..... **£669.95**  
**AR-DV10** 100 kHz-1300 MHz Digital scanner with TETRA DMR. NXDN. dPMR. APC025. D-STAR ..... **£899.95**

### Mobile/Base

**AR-8600** MKII 100 kHz-3000 MHz all mode analogue scanner ..... **£599.95**  
**AR-DV1** 100 kHz -1300MHz Multi mode digital base scanner ..... **£1199.00**  
**AR-5700D** 9 kHz – 3700 MHz Advanced digital communications receiver ..... **£4595.00**

### Accessories

**DA-3200** 25-3000 MHz professional discone antenna ..... **£169.95**  
**DA-5000** 700-3000 MHz professional compact discone antenna... ..... **£269.95**  
**LA-400** 10kHz – 500 MHz Magnetic receiving loop ..... **£399.95**

**SKYSCAN DESKTOP** This is the best all round wideband desktop scanner antenna on the current market. Keeping within the famous discone design but smaller for internal use has proved wonders for indoor reception. The antenna covers 25-2000 MHz and comes complete with a heavy 125mm base 4m RG58 coax and terminated in BNC. **£59.95 NOW £49.95**  
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**ROYAL DISCONE 2000** generally regarded as the best all round discone antenna. Not only does it cover 25-2000MHz on receive you can also transmit on 6/2/70 & 23cm ..... **£59.95**  
**HF DISCONE** Great antenna for all HF/VHF and UHF! Ideal for listeners wanting shortwave but do not have the space for a long wire. Centre radiator includes helical trapped wire encapsulated in fibreglass to receive all HF bands. Covers 0.05-2000MHz with 5 star reviews on our website ..... **£69.95**

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# MODERN ELECTRICS

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**IN THIS NUMBER.**

WIRELESS TELEGRAPHY  
By Wm. Maver, Jr.

EXPERIMENTS IN STATIC  
ELECTRICITY — By J. H. Hooton

HOW TO MAKE A "DRY"  
STORAGE BATTERY FROM A  
"WET" ONE — By H. Gernsback

THE SPEAKING GLOVES.  
RECHARGING DRY CELLS.  
HOW TO MAKE AN ELECTRIC  
WHISTLE.

HOW TO MAKE A MERCURY  
INTERRUPTER.

WIRELESS DEPARTMENT.  
THE ORACLE.

ELECTRICAL PATENTS  
OF THE MONTH.

TECHNICAL NOTES.

L. J. Coppershall

**"The Electrical Magazine for Everybody"**



Ken Reitz

ks4zr1@gmail.com

One hundred years ago, there was no television, cable-TV, satellite-TV, satellite radio or Internet, and its unending number social media platforms. For cutting edge technology, there were hard-wired telephones, 78 rpm records, and global interest in the subject of wireless communications—an unprecedented sensation of the time. Aside from local clubs and various organizations that promoted this subject, how did aspiring radio enthusiasts further their interest in radio and keep up with the technology? The answer: magazines.

### The Impact of Hugo Gernsback

It is hard to imagine the world of radio magazine publishing without knowing about Hugo Gernsback, born in Luxembourg as Hugo Gernsbacher, who found his way to America in 1904 at the age of 20. His was the classic immigrant's story—landing in New York City with \$100 to his name. One thing he had going for him was a basic education in electrical engineering from the *Technikum* in Bingen, Germany.

Gernsback's timing could not have been better—it was the dawn of the Wireless Age.

One hundred years ago, manufactured radio receivers were expensive, beyond the reach of most who were interested in this technology, so enthusiasts were left to build their own sets. Recognizing the scope of the demand for parts to make radios, young Gernsback began importing those parts from Europe through his newly formed company, Electro Importing Company (EICO).

It was through EICO that he became instrumental in the fledgling amateur radio hobby. To further that effort, in 1906 he founded *Modern Electrics* magazine, the first issue of which came out in April 1908 at 10 cents and consisting of 36 pages (Fig. 1). *Modern Electrics* was sold in 1912 and eventually became, after a complicated series of transactions, the publication known today as *Popular Science*.

After his initial success with *Modern Electrics*, Gernsback founded *The Electrical Experimenter* in 1920 (Figs. 2 and 6). This publication would eventually become *Science and Invention* (Figs. 3 and 6).

Gernsback used his publications to promote products he sold through EICO, as well as taking on advertisements for other manufacturers that sold all manner of electromechanical devices. He also wrote

# US Radio Publications 100 Years Ago

Ken Reitz, the editor of *The Spectrum Monitor*, traces the US radio publication industry back 100 years and finds the unstoppable force of Hugo Gernsback behind many of the most popular titles Stateside.

untold numbers of articles, many under pseudonyms, often detailing inventions of his own such as a device that "Brews your coffee while you sleep" or an electric 'sun alarm', to wake the user at sunrise.

The ambitious Gernsback founded the Wireless Association of America (WAA) in 1908, six years before the American Radio Relay League (ARRL). It claimed 10,000 members within its first year. It would not be the last of such organizations that seemed less a radio organization than, perhaps, a mailing list for his various enterprises—the WAA had no particular goal, requirements, or cost in joining. One needn't be a licensed amateur to join WAA, and I found no evidence that Gernsback was ever a licensed amateur, though he was part-owner, along with his brother Sydney, of commercial radio station WRNY—a 500W station broadcasting in New York City, and licensed to the Experimenter Publishing Company. He would eventually lose control of both the station and *Electrical Experimenter* as part of bankruptcy, which his business suffered in 1928.

### A Neglected Memory

One might imagine that there was some sort of rivalry between Gernsback's WAA and Hiram Percy Maxim's American Radio Relay League (ARRL), which Maxim co-founded in April 1914 as a non-profit organization. I say imagine because, exploring the archives of the League's magazine, *QST*, there's little material on the subject of Hugo Gernsback to be found. The first mention comes, along with a photo of Gernsback, in the August 1957 issue under a "Strays" heading—*QST*'s equivalent

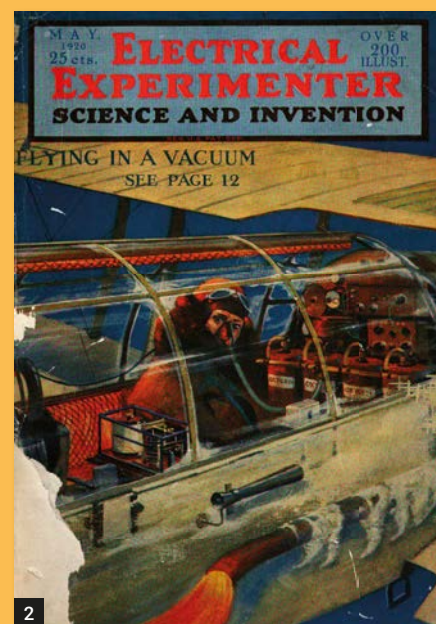


Fig.1: Miniature copy of the April 1908 issue of *Modern Electrics* magazine, the first publication of Hugo Gernsback.

Fig.1: The Hugo Gernsback magazine *Electrical Experimenter* of May 1920. The October 1915 issue contained an article on the station of 'famous inventor' Hiram Percy Maxim, using the call letters '1ZM', under special licence for relay work in the American Radio Relay League (ARRL). This was one year after Maxim co-founded the ARRL.

of a 'filler'—that reads, "Hugo Gernsback, well-known publisher and inventor, presents a model of his 1905 Telimco wireless set, reported to be the first home radio marketed in the world, to Dr Shelley of the Henry Ford museum."

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

Fig. 3: The cover of the August 1920 issue of Hugo Gernsback's *Science and Invention* magazine, the successor to *Electrical Experimenter* magazine that began in 1913. It shows the change to science in general and speculative science that would eventually become science fiction. *Science and Invention* would cease publishing with the August 1931 issue.

Fig. 4: One hundred years ago—the May 1920 cover of *The Wireless Age*, already in its seventh year of publishing, shows members of Congress “sitting as a Committee on Army Appropriations getting their data by radio ‘phone.’”

Fig. 5: Cover of *Pacific Radio News*—May 1920 issue, with articles on *New De Forest Company*, *An Amateur Radio Relay Station*, *Sixth District Amateur Stations*, and *Construction of Modern Radio Apparatus*.

QST did manage to note his death, again under a small “Strays” heading, on page 76 of the January 1968 issue, wedged between the Hamfest calendar and an announcement for the 1968 ARRL National Convention. In the QST obituary, Roland Bourne W1ANA, Chief Engineer for the Maxim Silencer Co., wrote, “He will be remembered by all old-timers as the founder of the Electro-Importing Company and Modern Electrics magazine. The E.I.Co. was about the only source of supply for ham gear in the early 1900s.”

The obituary goes on to describe the E.I.Co. catalogues as ‘the ‘bible’ for hams in those days and the descriptive matter was practically irresistible.

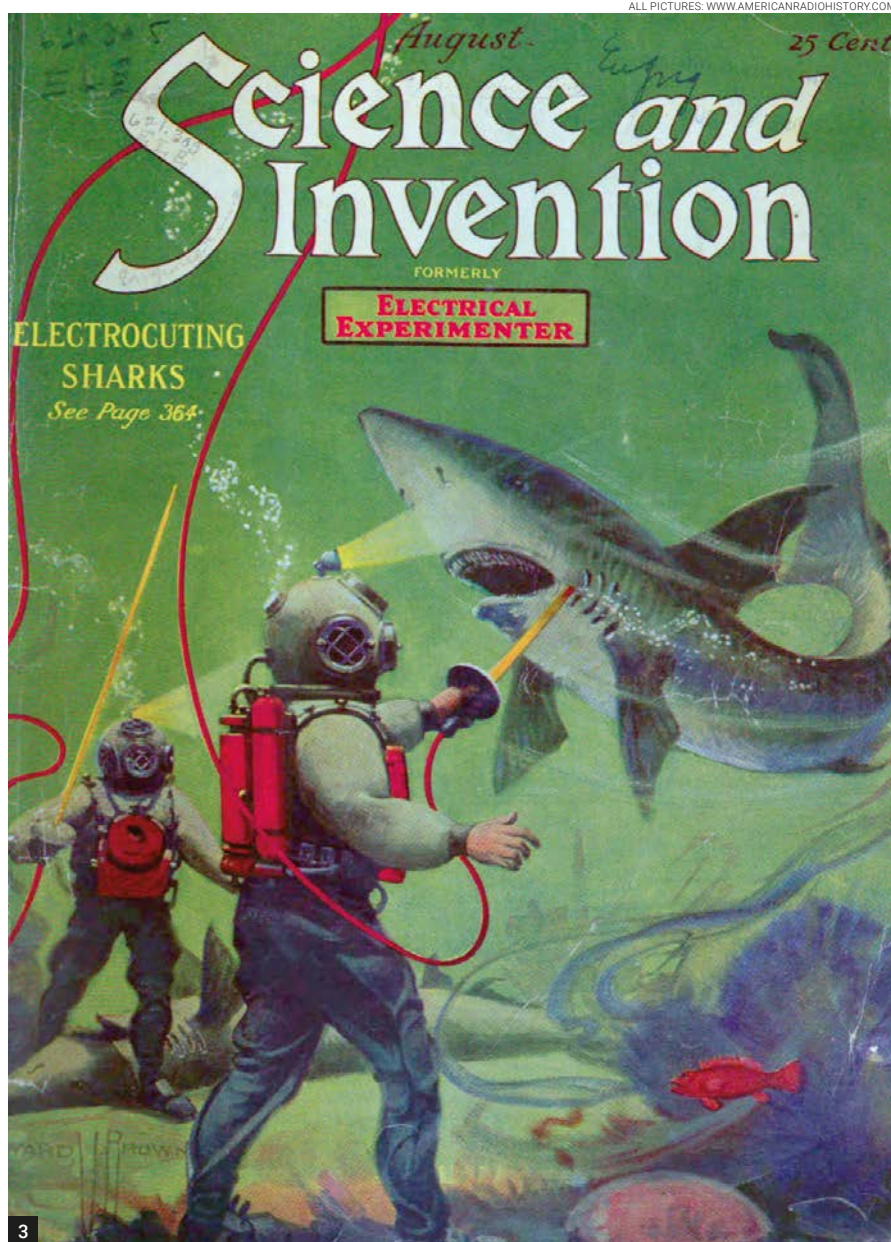
The obituary concludes, “He had an almost prophetic vision in the field of science and most of the wonders he predicted have come to pass.” That is about as close as anyone has come to capsulizing Gernsback’s real genius—imagining future world technology.

### A Master of Scientifiction

It was not until February 1995 that a three-page piece appeared in QST titled, ‘Remembering Hugo Gernsback’, by Gil McElroy VE1PKD, that almost restores Gernsback to the pantheon of early amateur radio. McElroy traces the enmity between Gernsback and the League to an incident in 1916 when, “the *Electrical Experimenter* would refuse advertising from the ARRL as it saw QST and the League as a competitive threat to Gernsback’s latest radio organization, the *Radio League of America*.”

Now that is holding a grudge!

Today, Gernsback would be considered a workaholic, a go-getter, a hustler and



tireless promoter of modern inventions and speculator on those to come. And it was that speculation that caused him to venture into the field of science fiction or, as he preferred, ‘scientifiction’.

He would eventually publish dozens of magazines in the radio/science fiction genre. When he died in 1967 at the age of 83, the *New York Times* declared him to be the “Father of modern science fiction, who predicted radar and beamed TV in 1928.”

Of course, Gernsback had detractors, most notably among critics of his science fiction writings (it was deemed by most critics as of poor quality at best) and writers, whose work appeared in his publications sometimes for low pay or no pay at all.

### Ahead of His Time

Gernsback did not shy from publicity or controversy—he seemed to court both. He supported Lee de Forest’s claim to have developed the *Audion* and having discovered regeneration - which claim was famously disputed by Edwin Armstrong, in a series of legal battles lasting years. This eventually ended up in a US Supreme Court decision in De Forest’s favour. De Forest’s byline is seen in many early Gernsback publications, and De Forest’s manufacturing company advertised extensively in his magazines.

Gernsback was a friend of Nikola Tesla and was credited with obtaining a pension from Westinghouse (referred to in the Gernsback obituary in *Radio-Electronics* as a ‘consulting retainer’) for Tesla in the final





years of his life.

Following his bankruptcy in 1928, his *Radio-Electronics* obituary noted, his critics were emboldened to dismiss him 'as a harebrained crackpot'. But throughout his life, Gernsback seemed to shrug off such characterizations, ploughing ahead with his ideas about publishing, radio, and science fiction.

Indeed, he was among the first to recognize the potential for short wave broadcasting when he founded *Radio Craft* (1929), which became *Radio-Electronics*. Moreover, he explored the potential of television, with the magazines *Television* (1929) and *Television News* (1932).

Gernsback seemed always ahead of his time in technology, but despite his undis-

puted position as an early pioneer of amateur radio, he is not widely recognized as such today. Instead, he is recognized in an even greater realm—the world of science fiction publishing.

### A Fascination for Science Fiction

His restless imagination was always quick to leap from the capability of current electronics to what he imagined to be the future. That led to the founding of science fiction magazines including *Amazing Stories* (which he also lost, it appears, as a part of his 1928 bankruptcy).

But even in the world of science fiction publishing, his questionable business practices, and tireless self-promotion—his science fiction pieces often appeared as cover stories in his publications under absurd pseudonyms—earned him a dubious reputation among those with whom he did business.

Regardless, there seems to be a grudging acknowledgement among science fiction cognoscenti, despite those negative attributes, that his publishing efforts helped to popularize the genre that has given the world such colossal franchises as *Star Trek* and *Star Wars*. Indeed, the awards given each year at the World Science Fiction Convention—the Hugo Awards—are named for him.

### 100 Years of Radio Publications

Radio related publications date back well over 100 years, and we can see many of these early publications in full, in PDF form, thanks to the amazing American Radio History collection at for which all radio enthusiasts and history buffs should be thankful.

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

However, when looking at the issues published from that long ago, modern readers may easily be offended at the occasional blatant ethnic and racial stereotyping that many publishers engaged in at the time.

As the 1920s wore on, more and more stations became licensed, and the radio listening hobby changed from home-built to using manufactured sets. Programming became king and radio stars were born.

From this point on, the publishing industry focused on the programs and stars much the way it would be during the golden age of TV in the 1950s and 60s, with technical magazines becoming less popular with the general public. Even so, if the publications started, run, or absorbed by the Gernsback empire were taken out of the radio landscape it would be quite bare. Of

course, Gernsback did not have a monopoly on radio publications, but he dominated the industry for decades.

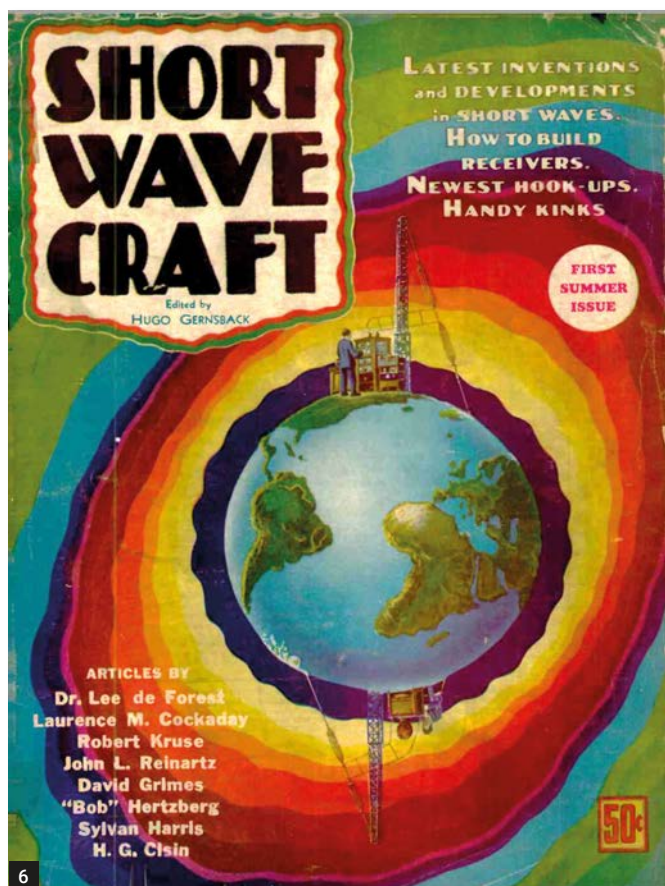
Here is a thumbnail look at some of the most popular titles of the genre from 100 years ago, including some you may never have heard of.

### Wireless Age

Another of the first radio publications was *Wireless Age* (Fig. 4), which began with the October 1913 issue (the first official US government regulations had been written just the year before—the *Radio Act* of 1912). However, *Wireless Age* had already been earlier published as a newsletter for the Marconi Corporation under the title, *Marconigraph*. Even in the first issue of *Wireless Age*, they made it clear that the magazine would continue to report on all Marconi Corporation news.

The 86-page first edition of *Wireless Age* is long on radio and electronic theory, with reports from around the world of construction progress on high-powered Marconi radiotelegraph stations. In their five-page, first issue introduction, the editor notes, "Just one year ago we had an idea that a certain proportion of the American public would welcome a magazine devoted to wireless telegraphy. We set about to discover just how large an audience we could address, providing we reached each individual concerned with radio communication. From the best sources of information we could command, one hundred thousand seemed to be a fairly accurate estimate...practically all of these people were engaged in serious experimenting or were devoting their energies to advancing the commercial phases of the art, they had no adequate medium of expression, had little opportunity of learning what their co-workers were accomplishing, and had been depending principally upon a few scattered textbooks, new and old, for a way around the difficulties they encountered."

Keep in mind that the first edition of *Wireless Age* predates the first issue of *QST* by more than two years and that in 1914, according to the *Radio Service Bulletin* (official publication of the Bureau of Navigation, Department of Commerce—the predecessor of the US Federal Communications Commission), there were only 2,796 licensed amateur radio stations in the US. Some 97,000 people imagined to be interested in such a publication were not licensed amateurs. *Wireless Age* continued monthly publication until August 1925, when it was taken over by *Popular Radio* magazine, a Hugo Gernsback publication.



### Pacific Radio News

*Pacific Radio News* (Fig. 5) began with the January 1917 issue and managed to get only five issues published before the start of WWI when, as many such periodicals did, publication was suspended for the duration of the war. It resumed publication with the January 1920 issue, continuing until November 1921 when it became known as *Radio*. *Pacific Radio News* billed itself as the "First and only Pacific Coast publication devoted to radio communication." Subscriptions were \$1.50 per year (\$2.00 in Canada and "foreign countries"), the equivalent of \$20.06 in today's dollars. The monthly 36-page magazine contained 16 pages of advertisements.

### Electrical Experimenter

The battered front cover of the first issue from 100 years ago of *Electrical Experimenter* (Fig. 2) was an early preview of the direction of a Gernsback publication. It was subtitled, *Science and Invention* and shows a blending of radio, science, and fiction in this May 1920 debut. The 116-page magazine was loaded with ads for would-be radio technicians, chiropractors, and bodybuilders. It catered to the amateur

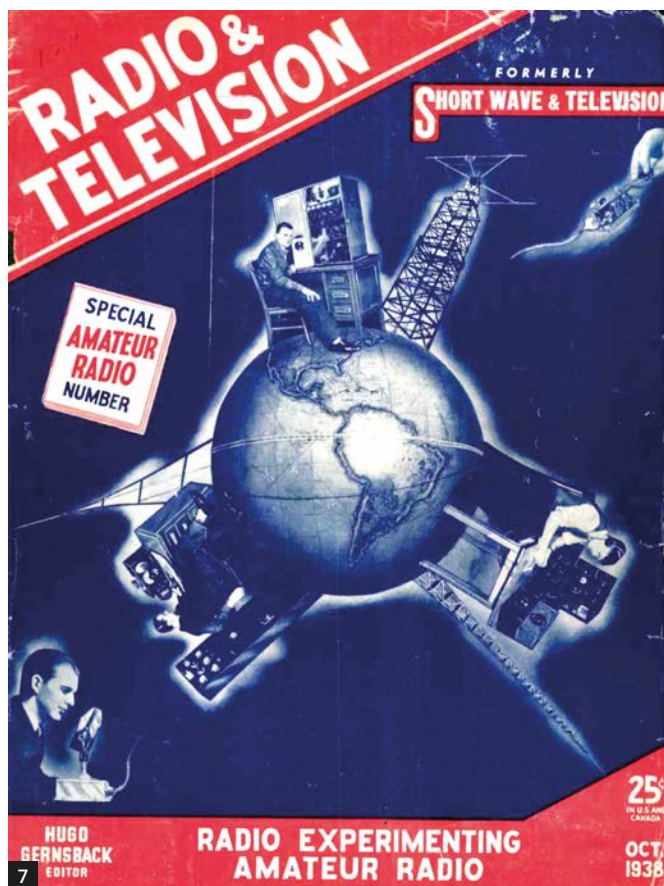
radio enthusiast and amateur scientist and was published from May 1913 until July 1920, when it became *Science and Invention* (Fig. 3). Gernsback would later revisit this theme with *Science and Mechanics* magazine.

### Radio Review

At a pricey 35 cents per issue (\$5.22 in today's money), *Radio Review* was, "A digest of the latest radio hookups," edited by S. Gernsback (Hugo Gernsback's brother, Sidney) and published by the Consrad Co., Inc. (at the same address as all his other publications). *Radio Review*, in addition to reprinting articles previously published in other Gernsback publications, had many advertisements for various other Gernsback publications, including the *Radio Listener's Guide*.

### Short Wave Craft

*Short Wave Craft* (Fig. 6) was a bimonthly publication that began with the June-July 1930 issue. Gernsback wrote in his introduction, "Just now, short-wave activities are certainly the hotbed of new radio developments." He claimed over 100,000 short-wave enthusiasts in the US and Canada alone, "who are daily listening



to short-wave voice and music broadcasts." *Short Wave Craft* cost 50 cents per issue (\$7.55 in today's money).

Fig. 7: The front cover of *Radio and Television*.

to short-wave voice and music broadcasts." *Short Wave Craft* cost 50 cents per issue (\$7.55 in today's money).

### Radio and Television

*Radio and Television* (Fig. 7, Formerly *Short Wave Craft and Television*) made its debut with the October 1938 issue in which Gernsback noted that the name change was necessary to keep up with the times. Sensing the effect that TV would have on the nation, he pledged to continue in, "helping to shape the radio destiny of those serious-minded young people, who are just getting underway in radio and who, ten years hence, will be the backbone of the radio industry itself." This turned out to be a prophetic statement and one that presaged the switch from an interest in television to the fascination with personal computers, which would take place decades later

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



# The Journaline Signage Service and Other Digital Innovations

**Kevin Ryan**  
kevin@kpr-web.co.uk

**Kevin Ryan shares his recent lockdown experiences of tracking changes to UK DAB, monitoring DRM broadcasts and attending virtual seminars on some exciting DRM innovations.**

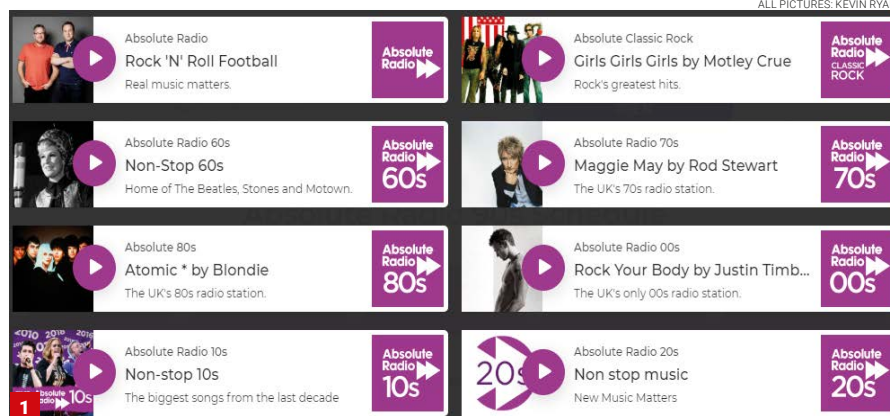
The current COVID-19 pandemic has forced many changes in the BBC's radio output. I noticed that the BBC World Service, for example, has replaced the weekday morning edition of *The Newsroom* with a much longer *Newsday* programme, running from 0500-0730 BST. The *Weekend* programme was cancelled. Each week other subtle changes happen, as the stock of new programmes is gradually depleted.

Moreover, in early May 2020, BBC Radio 5 Sports Xtra put on two weeks of exercise routines, repeating from 0500-1000 BST, with a new routine each day. I was unaware of this but spotted that BBC Radio 4 was in mono because the BBC launches two identical services of Radio 5 Sports Xtra to keep compatibility with older DAB receivers. I also spotted that the handover from the World Service to Radio 4 is now at 0533 BST (used to be between 0518 and 0520), making the shipping forecast 13 minutes later than usual. It is also interesting that BBC Radio London became the key station network overnight; its output is simulcast on Radio 5 Live, and by default on all local radio stations as well.

## Times Radio

The news station, advert-free, from the Times newspaper may well be on the air when you read this. They will likely be on the Sound Digital multiplex. In May, the Times provided some more details on the lineup of presenters, but the only familiar names were Assmah Mir, whom I remember from the BBC Radio 5 drivetime show, alongside Peter Allen and John Pienaar of TV fame. Michael Portillo was named as the Friday night presenter.

A look at some programme details reveals a standard schedule of a breakfast show, a mid-morning discussion format



with political guests, and a drivetime show. Times Radio is supposed to be a direct competitor to BBC Radio 4, but I think it will impact some LBC and talkRADIO shows as well.

At the time of writing the station had not built a web presence as yet, but there is some information on the media.info website:

<https://tinyurl.com/y9n4blvt>

## DAB UK

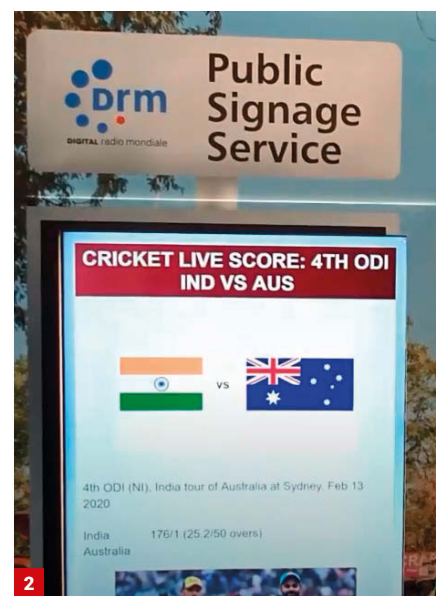
Absolute Radio 00s (Fig. 1) is now on the London 1 multiplex, although it became a 24-hour pop-up station called Absolute Radio 40s to mark the 75<sup>th</sup> anniversary of VE Day. Bliss Radio is gone from North East Wales and West Cheshire multiplex, and Baikal Radio will not be added to the Surrey multiplex because it did not launch on the multiplex within the required period.

## DRM Activities

The DRM consortium has been busy of late, making submissions in the both the UK and USA, updating their website, and preparing for various events in Asia. I doubt that the FCC in the USA will allow DRM on domestic bands.

## DRM Submission to UK Review of Radio

The DRM Consortium submitted the Government's Department for Digital, Culture, Media, and Sport (DCMS), asking that DRM be included in an unbiased and realistic review of all digital radio options. There were many tests of DRM on short



wave including on 26MHz in London, for local coverage (a small-scale DAB solution) on medium wave in Devon, and FM in Edinburgh.

The Consortium's key proposal is to use DRM to revitalize the AM band for wide-area coverage, and DRM+ in the FM band for small coverage areas, because this is a more efficient solution, both in terms of spectrum usage and power than DAB+. An example of this would be if eight community stations want to broadcast to a small town. Using DRM+ on the VHF bands (I and II) would use 200kHz of the spectrum, while DAB+ would use 1.5 MHz in Band III. This point is demonstrated by the huge number of new transmitters being set up

Why not visit our new online bookshop at [www.radioenthusiast.co.uk/store](http://www.radioenthusiast.co.uk/store)

Fig. 1: The Absolute Radio family of stations to date. Will the 40s and 50s be added one day?

Fig. 2: An information board without an internet connection. It can become a warning/alarm system in an impending crisis.

Fig. 3: Online schedule information with an updated interface; more up-to-date than usual, but some minor errors still exist.

Fig. 4: STARWAVES: One of many 'concept-radios' available to go into production – if large enough orders are placed with the supplier.

in countries like UK, Australia, or Norway, where coverage is still not optimum.

For radio stations broadcasting to small coverage areas, and with only a few programme services, the transmission capacity of DAB+ is far too high and is, therefore, not spectrum-efficient.

## DRM Consortium: Key Recommendations

The key recommendations in the DRM Consortium submission coalesced around three main areas:

(1) To allow DRM AM to give full digital coverage with services in all corners of the UK instead of pushing expensive, spectrum-hungry and impractical solutions.

(2) To promote "digital radio" as a combination of sister platforms (DAB and DRM) that can cover all scenarios, offer advantages to the big networks but also to the local, small, community stations, whose existence and roles are increasing, rather than diminishing.

(3) To encourage the industry to build new receivers with multi-standard chipsets. This task is easier than a decade ago and because some of the technicalities like codecs are shared adding a DRM feature to a DAB+ receiver could be done at minimum cost and with minimum effort.

This is a chance to maximize export opportunities as well. Some countries in the world are considering the double-deployment (Indonesia, South Africa, and, possibly, even Australia). This means that DAB+ is useful to have but would not offer coverage of the entire country.

Radio is here to stay for the foreseeable future, and recent events have shown that the medium gives all citizens a chance to continue to be informed and take part in society, even if they do not have access, or cannot use, the internet.

## An Assessment of the Recommendations

The proposal makes a number of assumptions and ignores the *Small-Scale*



DAB Plan, which is currently being put in place by Ofcom.

<https://tinyurl.com/ycgv6lhp>

The commercial groups are abandoning AM, by slowly shrinking their coverage. I do not think that they want to revive it. I am also not sure that the review will recommend a digital switchover date, or that analogue signals will be around for some time to come.

## New and Plans from Australia

The Australian Communications and Media Authority (ACMA) released its *Future Delivery of Radio* report to define how the country can best use its limited broadcasting frequencies (Table 1).

The report stated that DAB+ remains the industry-preferred long-term solution for digital radio. This is partly due to how much money has been invested in the technology already.

Meanwhile, the Commercial Radio

Australia body (CRA) does not support investment in DRM for this very reason. However, both the Community Broadcasting Association of Australia (CBAA) and the Australian Broadcasting Corporation (ABC) support exploring DRM on AM for wide area coverage.

The CBAA that DRM+ might allow additional radio services because a multiplex can be squeezed into the gaps between the analogue signals in the FM band.

A satellite solution, like Sirius in the USA and Canada, was ruled out because there are no suitable frequencies available, and it would probably be expensive. 5G is seen as a complementary solution to traditional radio, not as an obvious solution for regional or coverage of remote areas.

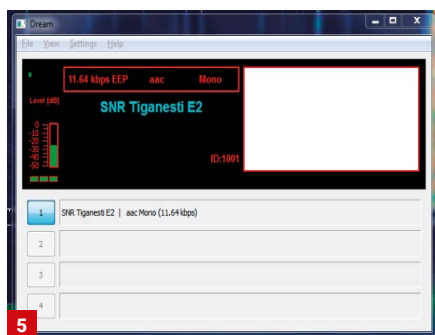
ABC: <https://www.abc.net.au>

ACMA: <https://www.acma.gov.au>

CBAA: <https://www.cbba.org.au>

CRA: <https://tinyurl.com/y7hqdo45>





**Fig. 5:** After many years, RRI has adopted a more robust version of DRM encoding, similar to the one used by China National Radio, and more suited to noisy urban environments.

### An ABU Webinar

The Asian Broadcasting Union (ABU) hosted their annual series of webinars in the spring, starting with two on DRM technology. Much of the content was familiar, such as the emergency warning function (EWF), which I highlighted last month for DAB (*RadioUser*, June 2020: 48-50).

However, there were some interesting developments: First, the DRM *Journaline* Signage Service (Fig. 2). For this service, a public, poster-sized electronic sign has a DRM receiver built in that displays the same *Journaline* content that is broadcast to radio receivers. The demonstration showed a data stream, rich in content and well laid out with images. This is several steps forward from the current *Journaline* data provision on the BBC World Service. The billboard is a DRM receiver that can be turned into a public address system, using the EWF function.

Second, there is a similar use called Data-Casting. Here, a DRM broadcast in pure DRM (no regular audio) sends adverts to a billboard. The web links pick up the same video.

<https://tinyurl.com/yd4v6otz>

<https://tinyurl.com/yd4v6otz>

The third development is an interactive short wave broadcast online tool, which is a slightly revamped version of the schedules on the DRM website. The link (Fig. 3) takes you through to the main website:

[www.schedule.drm.radio](http://www.schedule.drm.radio)

<https://tinyurl.com/ydx6edqo>

Furthermore, the DRM Consortium has developed a live online service to monitor the content of DRM broadcasts. This allows management, engineering and – most importantly – editorial staff to have direct access to, and feedback from, even remote transmissions. The service was introduced

Finding 1	Australia's geographic diversity and range of listening environments will continue to require a mix of radio delivery platforms.
Finding 2	FM and DAB+ cannot economically replicate high-power, wide-coverage, AM transmissions.
Finding 8	DAB+ remains the industry-preferred long-term digital platform, given the level of investment to date. However, there are mixed views about the cost and benefits of DAB+ outside the capital cities. In the short- to medium- term, DAB+ is likely to rollout where a commercial licence area can be served with a cost-effective number of transmitters, and/or where market pressures require it.
Finding 9	Internet protocol (IP) streaming will remain complementary to AM, FM, and DAB+ for the delivery of radio for in-vehicle and portable devices in the short to medium term.
Finding 14	Small-scale DAB+ is not feasible as a digital delivery platform for the FM sub-metropolitan community services because there is insufficient spectrum to accommodate all such services in a metropolitan area.
Finding 15	Digital Radio Mondiale (DRM) for VHF-FM is suited to replicating the coverage of FM radio. It could be evaluated as a potentially more scalable and cost-effective solution for local digital radio.
Finding 16	DRM for AM (also called DRM30) can match the coverage of high-power AM services. Hybrid chipsets, which include DRM for AM chipsets, are available and are being produced and installed in cars at scale for the Indian market.

**Table 1: Selected Findings from the Australian Report on the Future Delivery of Radio.**

with AIR's DRM transmissions at BES 2020. It will grow over time to cover all DRM transmissions around the globe.

### DRM Receivers

The webinar session on receivers was pretty interesting with updates from NXP on SDR-based solutions. The latter included a single-chip, integrated, receiving system called *Mercury*. Inntot plan to produce a receiver, while Starwaves (Fig. 4) and Gospell announced an updated and cheaper model of the Avion model.

<https://tinyurl.com/yb5vbbox>

<https://tinyurl.com/ybx8622>

Finally, a new version of the DRM Handbook is due out in June 2020.

<https://tinyurl.com/y396utw4>

### DRM Logs

The Voice of Nigeria is erratic on 15120kHz and can disappear for long periods. The station returned in late April 2020, with a strong signal of 21.4 dB SNR but no audio. It is probably as simple as a jack plug left out of a patch panel.

After complaining about Radio Romania International (RRI) and their choice of encoding parameters (64QAM for the data payload or Main Service Channel), I noted that the transmissions in English from Țigănești were using 16QAM encoding and mono audio decoding with an SNR of 10dB, instead of the 15dB+ needed for a higher encoding rate.

RRI uses Țigănești on 7325kHz at 0530 UTC and 9760kHz at 1700 UTC (Fig. 5). I sent a message to the engineers via the

English service hoping they will stick with this configuration. However, at my QTH in Berkshire, I find that RRI is subject to a lot of deep fades.

The RRI service from Galbeni at 2030 UTC on 7315 kHz still uses 64QAM to provide stereo but it is usually unreadable on my equipment, mainly due to interference in a crowded 41 Mb. Stereo is possible with 16QAM, and China Radio International has used this on some of its transmissions.

Radio Kuwait broadcast its main Arabic channel on all its short wave transmissions, including its only English broadcast on DRM on 11970kHz from 0500 to 0800 UTC, directed towards India. The only other DRM broadcast I found is the Arabic service to Europe on 15110kHz from 0925 to 1345 UTC.

Unfortunately, it can suffer from co-channel interference from a station in China.

I logged KTW's weekly Sunday English programme to India, via a remote SDR on 15200kHz at 1026 UTC with their usual two-channel broadcast of audio and a slideshow.

### DRM via KiwiSDR

I raised a couple of issues on the support forum concerning *Journaline* and extracting a slideshow from the data stream. The developer of the extension replied that these were not straightforward developments and almost on the same scale as porting the *DReaM* code and implementing the xHE-AAC decoder.

1

**Chrissy Brand**  
chrissyLB@hotmail.co.uk

**E**ach month, I will now present a short review of around half a dozen programmes that I hope readers will enjoy listening to. The programmes might be on AM, DAB, FM, or podcasts and anywhere from the Azores to Zanzibar.

Sometimes, my recommendations will be 'themed'. For instance, for this month I look at half a dozen programmes that concentrate on the arts.

Moreover, I will introduce a new feature; this is a small selection of programmes which I will focus on in the part of the column called *The Month Ahead* (Table 1).

I would like to encourage *RadioUser* readers to send in their suggestions and tips for radio programmes of interest.

Readers are still welcome to send in logs, preferably concentrating on programme content and recommendations.

### Artful Audio

In the UK, the Higher Education sector acted quickly under the lockdown caused by Covid-19, devising online teaching and support for undergraduates. The UK's music conservatoires, with both feet planted

# International Radio On Air and Online

**Chrissy Brand** continues to adopt a new approach to her column, recommending a variety of radio stations, programmes and podcasts from across the globe – with an emphasis on new and noteworthy content.

firmly in music and the arts, were well placed to do this. The Royal Northern College of Music, for example (RNCM, Fig. 2), launched its own online radio station. It has a potential audience that reaches well beyond academia and into the public sphere.

RNCM Radio has a weekly programme hosted by musician, composer and lecturer, Larry Goves, going out live online each Tuesday at 1200 UTC (1300 BST). Each

programme can, of course, also be heard at your leisure, using the playback or listen again facilities.

Content includes health and wellbeing, a catch up with staff and students, interviews, talks about music and the performing arts, all interspersed by performances of music from students, staff and alumni.

[www.rncm.ac.uk/media/rncm-radio](http://www.rncm.ac.uk/media/rncm-radio)

KZMU is a community radio station in Moab that I visited last year (*RadioUser*,





Fig. 1: WTAM in Cleveland echoes across nearby Lake Erie. Fig. 2: Radio RNCM, risen like a Phoenix from the Pandemic. Fig. 3: The notice board at KZMU in Utah. Fig. 4: Radio OZ-Viola in Denmark can be heard on 5825kHz. Fig. 5: A Radio Slovakia 2019 QSL of the 'UFO-Tower' in Bratislava.

July 2019: 50-53). I have been a big fan ever since. One of their many arts programmes is *Arts Talks*. There was a moving episode in April with Moab artist Pete Apicella (PiMo), called *Creation and Impermanence*. It covered art in the age of Covid-19, as well as his mother's death through the disease in New York. KZMU is a station worth dipping into (Fig. 3).

<https://tinyurl.com/y82kd2vk>

Flirt FM is a community station in Galway in the Republic of Ireland. Along with a variety of culture and information, the station airs a monthly programme that covers issues in the media. *Wireless* delves into all aspects of radio, including analogue and digital broadcasting, questions of ownership and aspects of radio's past, present and future.

In the May programme (Episode 42) there was a look at the legacy of, pirate radio legend and founding father of Radio Caroline, Ronan O'Rahilly, who passed away in April. *Wireless* often pays homage to the influential 1980s' Irish pirate radio scene as well.

The April edition (Episode 41) included an interview with yours truly. Presenter John Walsh and I talked about radio in the UK during COVID-19, the hobby of DXing and the work of BDXC and the EDXC.

[wirelessflirt.radio.ie](http://wirelessflirt.radio.ie)

*First Impressions* is a podcast that started during the lockdown in April and aims to be a weekly or fortnightly book club. It is hosted and run by teenager Mali Delargy. She is cer-

tainly an up-and-coming talent in arts podcasting and broadcasting, having also given a talk in Welsh and English at the Wallace Collection in London last November.

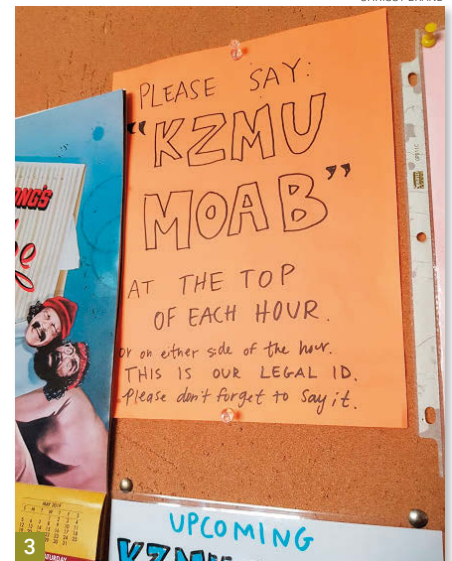
The first book covered in Mali's podcast was *The Mysteries of Udolpho* by Ann Radcliffe. This is a gothic tale of mystery and romance set in 16th century Europe. Episode 2 focused on *Now We Shall Be Entirely Free* by Andrew Miller, with themes of love, war, hope and morality in early 19th century Britain.

Episode 3 was *The Handmaid's Tale* by Margaret Atwood. *First Impressions* is available across most podcasting platforms, including Anchor, Google Podcasts, Overcast, Spotify and Radio Public.

<https://tinyurl.com/yd4n65qj>

Radio Prague continues to cover the arts creatively. The Czech literature scene has always been full of exciting authors creating works, often written with a pained pen. *Czech Arts* is a weekly programme in the station's Saturday broadcast. Programmes look at contemporary Czech writers. The April 16th programme covered *Druhé město* or *The Other City*, "a second novel by Michal Ajvaz. The English translation of the book, by Gerald Turner, which came out in 2009, was voted by Amazon as one of the best novels in the genre of sci-fi and fantasy. The story begins in a second-hand bookstore in Prague, where the narrator discovers an unmarked volume bound in purple velvet, written in a strange alphabet."

Two books that I read during lockdown had a strong Prague connection and make for some evocative and atmospheric reading. *Innocence* by Heda Margolius was a recommendation on Radio Prague a few years ago. It is in the style of Raymond Chandler,



played out in a Kafkaesque Czechoslovak capital in the 1950s.

*Prague Spring* by Simon Mawer takes place in and around Czechoslovakia in the summer of 1968 and cleverly merges fact and fiction. In the programme, the radio station features towards the end.

[www.radio.cz](http://www.radio.cz)

A pub that sets up a radio station may seem a little strange at first. However, when you think about it, there is a lot of synergy between the two. Radio stations and pubs are both central components to community life. People turn to them for relaxation, information, entertainment and good conversation. TOAT Radio (The Old Abbey Taphouse) is clearly a Manchester pub with a difference.

Each Saturday at around 2 pm, lecturer, archaeologist and flint-knapper John Piprani interviews artists and performers on how

Date	Time (UTC)	Station	Programme	Podcast	URL/ Stream
Sunday	1100 to 1130 1430 to 1500 1530 to 1600	Radio Slovakia International	Listeners' Tribune	Tune-In app	<a href="https://enrsi.rtv.s.sk">https://enrsi.rtv.s.sk</a> 6005kHz
First Monday of each month	1400 to 1500	Flirt FM	Wireless	<a href="http://wirelessflirt.radio.ie/">http://wirelessflirt.radio.ie/</a>	<a href="https://flirtfm.ie">https://flirtfm.ie</a>
Tues Weds Sat	2032 0132, 0632, 1332 1532	BBC World Service	Digital Planet	BBC Sounds app	<a href="https://tinyurl.com/lmcevp">https://tinyurl.com/lmcevp</a>
Daily	0500 to 0600 1100 to 1300 2000 to 2100 2300 to 0000	Radio Damascus, Syrian Arab Republic	News, Political Commentary, Press Review	<a href="https://tinyurl.com/ydy8p5cw">https://tinyurl.com/ydy8p5cw</a>	<a href="http://www.en.ortas.online">www.en.ortas.online</a>
Weekdays	0530 to 0600 1900 to 2000 2030 to 2045	Radio Thailand	Thailand Outlook	Tune In, Google Podcast and other apps	<a href="https://nbt.prd.go.th">https://nbt.prd.go.th</a> 17640 9920
Saturdays	0030 0400 1300	Radio Prague	Czech Books	<a href="https://tinyurl.com/ybvqdonx">https://tinyurl.com/ybvqdonx</a>	<a href="http://www.radio.cz">www.radio.cz</a> and World Radio Network
Second weekend of the month	24/7	Radio Caroline North	Pop and rock with pirate radio vibes	Radio Caroline app	<a href="http://www.radiocaroline.co.uk">www.radiocaroline.co.uk</a> 648 and 1368kHz
Monthly	Second Friday at 2000. Repeated third Wednesday at 1900	Radio Emma Toc World Service	2MT Remembered. The Electra Report. Our Friends in Radio. Station Zone. Contact.	<a href="https://tinyurl.com/ycbn94mf">https://tinyurl.com/ycbn94mf</a>	<a href="https://tinyurl.com/ydels884">https://tinyurl.com/ydels884</a> Channel 292 on 6070kHz

**Table 1: The Month Ahead**

they make a living in the arts. Artist Teresa Kirk and poet and activist Steph Pike were the guests when I last tuned in.

[www.facebook.com/toatradio](http://www.facebook.com/toatradio)  
[www.mixcloud.com/TOAT](http://www.mixcloud.com/TOAT)

## European Summer Sounds

Due to most of us in Europe probably being confined to our own countries this summer, the next best thing might be to tune to some European radio stations.

The radio station Radio OZ-Viola in Denmark can be heard on 5825kHz. *Midnight Jazz* is the station's main offering, which was recently on a Wednesday at 2000 UTC. It is usually heard on weekends too, though there is often interference from two RTTY machines on the same frequency (Fig. 4).

Sharp Radio is my local pirate or free radio station, broadcasting on 93.9MHz across the south coast and online, including on Facebook Live. It sprang into action in April under the banner of "Lockdown radio", broadcasting a series of live radio programmes. This was unusual because Sharp Radio, as with many free radio stations, was previously more intermittent in its transmission times and programme content.

During the day, I heard rock and pop including the Manic Street Preachers and Katy Perry. The station used to consist mostly of relays of archive recordings from

other stations. One of these that was retained has been editions of *Stafford's World* with Mark Stafford.

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

Friday night music on Sharp Radio is aimed at a younger audience, and it is good to hear a wide range of styles. Drum and bass was the name of the game. I was surprised that the presenter took a risk by being visible in the Facebook live stream, with a DJ deck that looked to be in the cellar of a breeze-block built room, possibly in a tower block.

Radio Slovakia International first came to the air in 1993, when Slovakia and the Czech Republic went through their velvet divorce. The station airs a daily programme of news and views, highlights of the week on Saturdays and a programme of music and listener interaction on Sunday (Fig. 5 and Table. 1).

For further programmes in English from Slovakia, you might enjoy *Spectacular Slovakia*, which is The Slovak Spectator podcast, on Soundcloud. Recent editions have consisted of a quiz, a look at Slovakia's mulberry tree capital, Pukanec, and how to cycle across Europe.

<https://tinyurl.com/ybeptasb>

We move now to two stations that are new but sound familiar. Euro Radio is a new-comer to the short wave bands (6205kHz) and about to run test broadcasts. However,

this was first stated in 2017, and nothing happened. There seemed to have been some activity this spring though. Check out their Facebook page for more information.

[www.facebook.com/euroradio6205](http://www.facebook.com/euroradio6205)  
[encoreradio@outlook.com](mailto:encoreradio@outlook.com)

Sensibly, the station asked what its potential audience would like to hear in the broadcasts, posing the question, "If you could create your own ideal shortwave station, how would it sound? Here at Europe's shortwave station - Euro Radio we are doing just that but what would you like to hear?"

The early responders seem to understandably be of a certain age and listening pedigree. One person asked for the station to copy programmes of the past such as *Sweden Calling DXers*, *DX Partyline* and 1990s' *RadioFax*.

Another requested a station with content that will make people listen, "Not the repetitive tracks of today's radio. Great DJs with classic American jingles! Sound like RNI, Veronica or London as a start." But that has all been done before so surely is repetitive in itself?

I agreed with the person who asked for unbiased and accurate news and information. A plea for listener participation programmes with live contacts by WhatsApp, email and Messenger was something that Euro Radio said they already plan.

I asked for programme content to include



literature (readings, poetry and book reviews), details of new cinema releases and music of different genres from all around Europe. Watch this space!

I was delighted to see that Radio Emma Toc took to the air in May. A similar station, called Chelmsford Calling World Service, took to the air with a monthly programme, a few years ago (*RadioUser*, November 2015: 42). Jim Salmon in Essex is behind the station, which tells the story of 1920's radio station 2MT. It also covers radio news and music. The programme can be heard online and is relayed on short wave and FM. WMRI on 9955kHz at 0000 Thursdays and 9455kHz on Mondays. Also on **Unique Radio Australia**, World FM (for New Zealand and parts of the Pacific). In Europe, Scandinavian Weekend Radio is on board, as is Channel 292 in Europe on 6070kHz (See also Table 1). QSL cards are given, even for online reports. Check the website for further relay information.

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

### Readers' Reports

Graham Smith spotted an interesting feature about Syrian station Radio Alwan (Radio Colours) on the BBC website, *The Syrian Broadcasters in Exile* (December 2019). The station started in 2013 as a community radio station in Saraqib, northern Syria, initially broadcasting four hours a day from a transmitter mounted on a van.

Radio Alwan was forced to leave Syria and was broadcasting into the country from Istanbul. It is now off the air but is planning a comeback. BBC Radio 3's *Between the Ears* aired a programme all Radio Alwan in 2017.

<https://tinyurl.com/wknz3xm>

<https://tinyurl.com/y7k4drpx>

Also from Syria, Damascus Radio, the Broadcasting Service of the Syrian Arab Republic, can be heard online in a variety of languages. A live, hour-long programme is repeated throughout the day, in English, French, German, Russian and Turkish. One of the weekly programmes in English is entitled *Palestine Forever*, which is aired on Wednesdays. (See also Table. 1).

This former short wave station still produces QSL cards for reception reports,

presumably even if the broadcasts are only heard online.

[ts@nexus.org](mailto:ts@nexus.org)

Lionel Clyne heard the Spanish broadcasts of Radio Exterior de España from the Noblejas transmitter site, on the penultimate day of April. He logged them just before and after 2100 UTC on 9690, 11940 and 12030kHz. The station's English broadcasts and podcasts were replaced with REE Spanish programmes during the Covid-19 outbreak.

Graham Smith noted that the Radio Romania International series of QSL cards for 2020 feature Romanian coins and banknotes. These can be viewed at the station's website, along with the current schedule, programme content details and much more.

Radio Romania International still produce some really enjoyable programmes. I listen out for the double-headed *Expat in Romania* and *Student in Romania*. This is aired on Thursdays in the broadcast which starts at 1900 UTC. It is repeated at 2300 and 0000 UTC, and on Fridays at 0100, 0300, 0600 and 0830 UTC.

As with much of the station's content, transcripts for *Expat in Romania* are on the website. The programme consists of interesting insights into the lives of people who have moved to Romania. Recent editions have included Joyce Easton, a physical therapist who moved from Scotland.

Another interview was with artist and musician Humberto Miquilena, who moved to Bucharest from Venezuela. One of the many elements of Romanian life he enjoys is the humour. He said that it is, "similar to the Latin American humour. The Romanian language is similar to Italian but, to me, it is more like Spanish. Spanish has five vowels while Romanian has seven. Pronunciation and spelling are different."

<https://tinyurl.com/ycbdehl8>

[www.rrl.ro/en\\_gb/program](http://www.rrl.ro/en_gb/program)

[www.rrl.ro](http://www.rrl.ro)

In late April, Graham Smith noticed that Romanian station Antena Satelor on 153kHz was relaying news station Radio România Actualităţi throughout the night,

perhaps a knock-on effect of Covid-19's impact. Graham added that, "the retune message from BBC 3CR on 630kHz has now gone, so it is easier to hear Radio Timişoara. Currently, the station also relays Radio România Actualităţi through the night. Another station I can hear on 630kHz is Portuguese station Antena 1, for about an hour before sunrise. The Romanian station on that frequency fades out before the Portuguese."

Lionel Clyne, on April 19th, heard Radio Tamazuj at 1630 UTC on 1515 kHz broadcasting in Sudanese-Arabic from Talata-Volonondy. In May, he also logged the BBC World Service transmitting from Ascension Island at 1930 UTC, on 6195, 7445, 13660 and 15400kHz.

China Radio International is still dominant and Lionel listened to the station on several parallel frequencies. He stated they all, "consisted of a programme dedicated to the rehabilitation and humanisation of Chairman Mao. A task as daunting as trying to put toothpaste back in the tube."

Scott Caldwell gave a tentative rather than a definite identification of a station on 1100kHz at 0401 UTC. He wondered if this was WTAM in Cleveland, Ohio. Part of the iHeart network, WTAM 1100 is Cleveland's only news radio station and states it is an award-winning source of local news.

To my ears, WTAM appeared to fit the tired, but tried and tested, formula of "shock-jock" radio. I tuned to the weekday morning (early afternoon here in Europe) show, *Geraldo In Cleveland*. On April 23rd, Geraldo and co-hosts blamed Covid-19 on "the Chinese" and a "damn accident in the Wuhan pathology lab", complaining that, "This is China's Chernobyl." which "the Chinese have lied about and covered up, It is grotesque."

Cleveland restaurant owner Tony George was also on the programme, advocating an end to the lockdown to save the economy and to reopen his restaurant of the shores of lovely Lake Erie (Fig. 1).

Some of WTAM's programmes can be accessed as podcasts from the iHeart podcast app or webpages.

<https://wtam.iheart.com>

<https://tinyurl.com/yce4knbc>

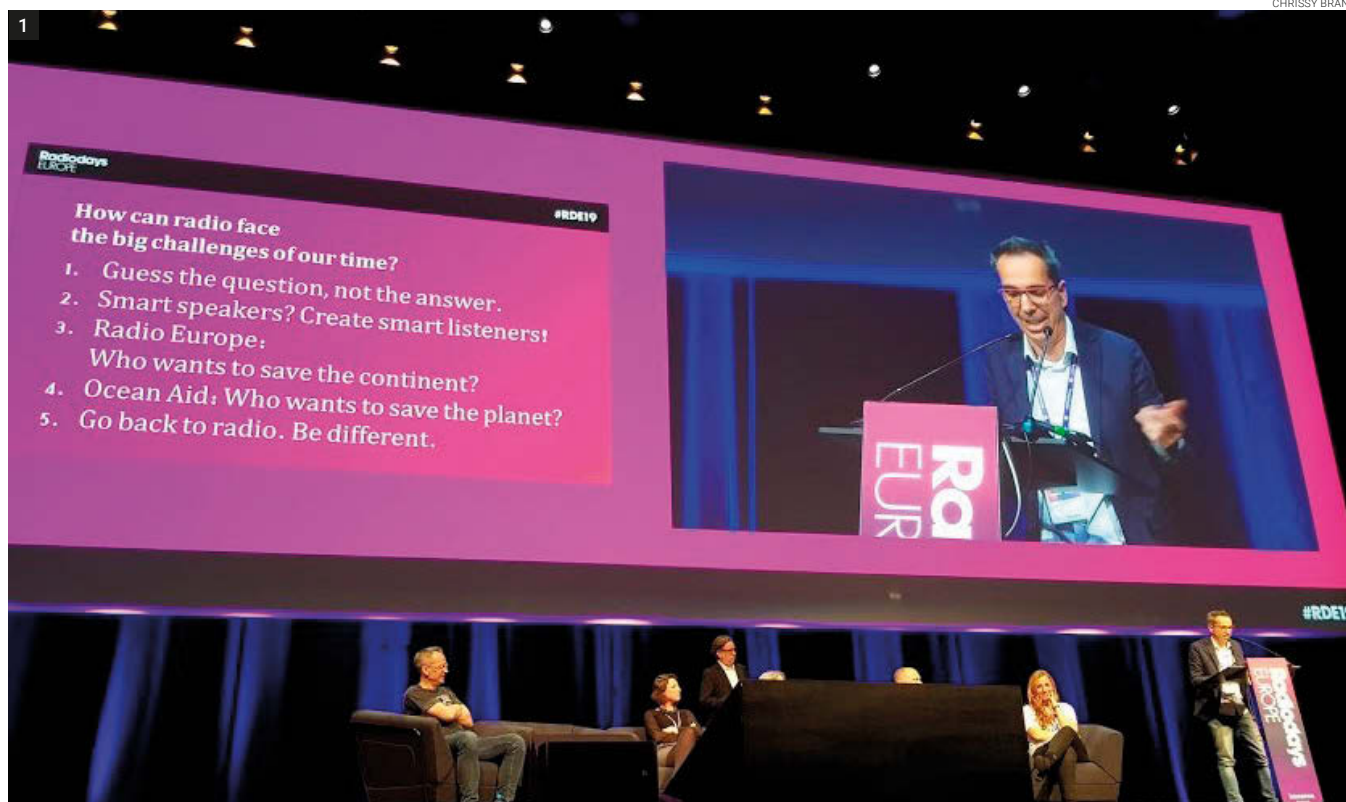
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CHRISSY BRAND



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# Pandemic: Problems, Plans and Potential

**B**ack in early 2020, radio and podcast professionals were enjoying stable audience figures and approached the new year with confidence. Coupled with ever-evolving technological and content innovations, we were in halcyon days. It seemed that everyone was benefiting, with advertising revenues steady in commercial radio while investments and sponsorships were gradually increasing in podcasts. The consensus at meetings around the globe was that the future looked rosy, and friendly competition was manageable, between and across radio stations and podcasters.

Then the pandemic struck, and a whole new way of working sprung up overnight. As I discussed last month, broadcasting from home quickly became the new norm for much of the radio industry. For most independent podcasters, production from home was usually already well established, so some had a head start in making this transition work out smoothly. The rest of the radio studio and office-based workforce were thrown into a brave new world of

**Chrissy Brand** looks at what is currently being discussed in the radio and podcast industry, in terms of Covid-19, and she offers some hope as to what might unfold when we emerge from the crisis.

online video meetings and working from kitchen tables, living room floors (Fig. 2) or bedrooms.

Radio and podcast production from home saw a sudden increase, and listening figures also underwent an increase, with heavier demand for news and entertainment. Statistics can be used to give a variety of messages, of course, but, according to *Radiocentre* in early May, "38% of commercial radio

*listeners are tuning in for an extra hour and 45 minutes each day since lockdown. The driving force behind this increase is the 'newly working from home' – with 45% of this group listening to more radio now, on average for an additional two hours each day."*

In the long run, the increase in the percentage of the population working from home several days a week could be a positive outcome concerning travel



KATE OSEEN ON UNSPLASH

**Fig. 1: Filippo Solibello offers his tips on keeping radio fresh. Fig. 2: Independent podcasters are used to working from home.**

and the environment. Additionally, it would boost radio stations' audience numbers and, therefore, their advertising revenue.

### Radio Roadshows

The annual *Country Radio Seminar* took place in February in Nashville, USA, and it was a well-attended, thought-provoking event. Many of the ideas, strategies and rules that apply to country and Americana music can, of course, be applied to music radio of all genres. Over three days, the fortunate participants were wrapped up in educational programming, presentations on new technology, business practices, personal career development topics, and new music showcases. *Reading the Teen Leaves* was one of the best-named presentations. Among the key points were the need for stations to create an environment where the on-air and off-air passions of staff can be tapped into. How do they discover music, what artists or songs do they feel most passionate about and what pop music moments have captivated them? The on-air talent should also create podcasts in their area of interest. The biggest growth in the podcast market is amongst those aged 12 to 24 years old, with music being the number one topic of interest for podcast content (Edison Research, *The Podcast Consumer 2019*).

<https://tinyurl.com/ycdtb7vp>

You can uncover more insights, and discover some cracking tunes and artists along the way, at the Country Radio Seminar website.

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

We remain in the USA with *Podcast Movement*, which bills itself as the world's largest community of podcasters. Its first Podcast Movement meeting of 2020 was in March in San Diego, California (Fig. 3). The event attracted more than 50 community members, including *Academy of Podcasters Hall of Fame* member and New York Times bestselling author Scott Sigler. George Maurer of *The Leadership List* podcast remarked that. "It was great fun meeting other podcasters sharing ideas and advice. I learned podcasters are a very collaborative community of people. I also met two book authors who will probably be featured in future episodes of my podcast."

The Podcast Movement hopes that its annual conference will take place in



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**Fig. 3: Downtown San Diego, where some of the podcast community met in February 2020.**

**Fig. 4: The Logo of the Podcast Movement, which is planning a meeting in Dallas this autumn.**

**Fig. 5: CBC Canada programmes are made in studios and remotely across the country.**

October, in Dallas (Fig. 4). That sounds an optimistic date to me but I wish the event well. Over 3,000 podcasters from around the world will gather for 200 educational sessions, an exhibitor trade show and, “the best parties and networking opportunities in podcasting.”

[www.facebook.com/podcastmovement](https://www.facebook.com/podcastmovement)

### In Tune Online

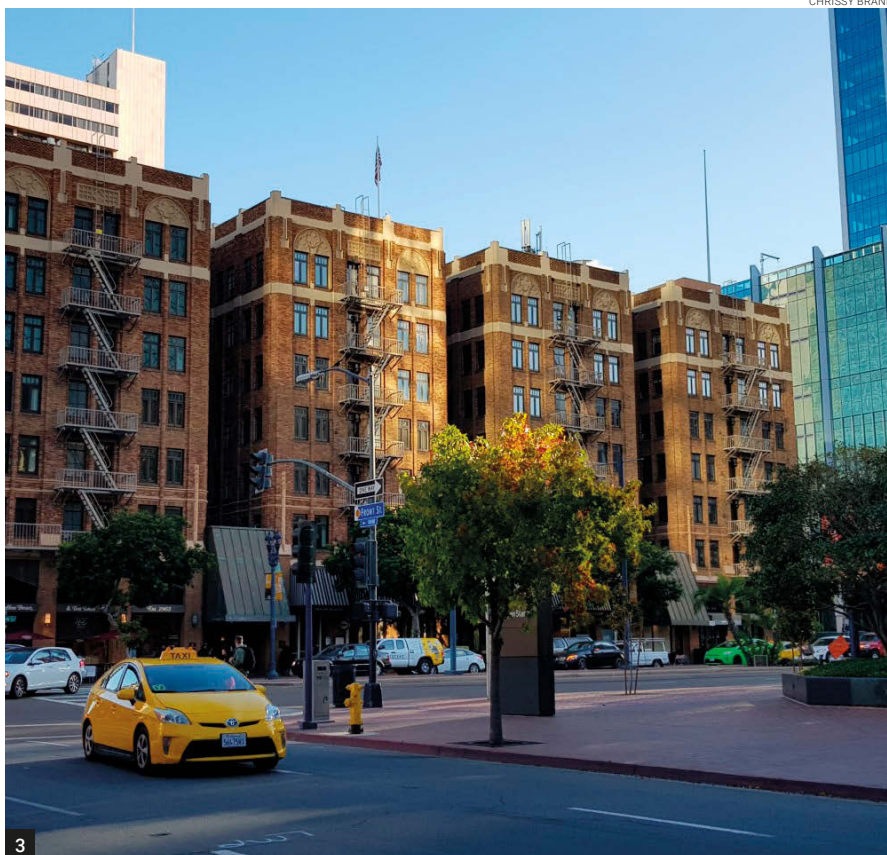
In March, the third annual *HamSci Workshop* at the University of Scranton, Pennsylvania, took place. Rather than meeting in person, it took place over Zoom. It successfully met the main objective of bringing together the amateur radio community and professional scientists.

The theme of the 2020 *HamSci Workshop* was “The Auroral Connection: How does the aurora affect amateur radio, and what can we learn about the aurora from radio techniques?” Speakers included Dr Elizabeth MacDonald, who is a NASA Scientist and founder of *Aurorasaurus* (a citizen-science project for the study of the aurora) and Dr James Labelle, a Dartmouth Space Scientist and expert on radio auroras.

Organiser Professor Nathaniel Frissell W2NAF told the American Radio Relay League (ARRL) that the online version of the workshop was, “In some ways, good for us. We actually got many more participants than had we just held it in person.” *HamSci* was expected to attract around 100 participants. In fact, the online event resulted in far wider participation, with 290 unique log-ins from 24 countries.

<https://hamsci.org/hamsci2020>

The *Radiodays Europe* conference in March was postponed until December. However, going through my notebooks made me recall the *30 Ideas in 45 Minutes* presentation at the 2019 conference in Lausanne. All of the ideas that were given there are as vital in the pandemic and post-pandemic worlds as they were before. The session included Florence Fischer, who presents music and football programmes on SR3 in Switzerland. She emphasised the need to not spread ‘fake news’. This can be achieved by not falling for ‘click-bait’, plus simply not sharing information unless it has been verified from at least two trusted



CHRISSY BRAND

sources. Florence reassured the audience of radio and audio professionals that it is good to doubt news stories and to go back and check on their accuracy. Another significant point was her conviction to trust your judgment, and to “make emotions your alarm clock.” I feel that this can be applied to matters of trusting the source, but also as an instinct as to what can make good quality programme content.

### Caterpillars and Radio Battles

Filippo Solibello is the host of RAI Radio 2 morning programme *Caterpillar*. He is also behind *RadioBattle*, the first European radio championship and an Italian commentator at the Eurovision Song Contest. Filippo outlined what he saw as the five biggest challenges for radio (Fig. 1). Some of these were slightly cryptic but the audience knew what he meant, and I hope readers will too: “Guess the question, not the answer, Smart Speakers? Create smart listeners!; *Radio Europe*, who wants to save the continent? *Ocean Aid*, who wants to save the planet?” and “Go back to radio and be different.”

To expand a little, Filippo was emphasising the need for radio presenters and producers to concentrate on making radio programmes instead of overusing *Tic Toc*, *Twitter* and *Instagram*. Saving



THE PODCAST MOVEMENT

Europe and the planet by ocean aid were references to harnessing the power and enthusiasm of the youth climate change protests that took place throughout 2019. Moving away from dull radio content and tapping into that zeitgeist is as important as ever.

I imagine you are still wondering what the above-mentioned *Radio Battle* is. It was, “fought with the beats of music from the four corners of the continent.” One of the battles can be heard on *Mixcloud*, where Estonia, Serbian and Latvia



competed. Spoiler alert, the winner was Latvijas Radio 5.

<https://tinyurl.com/y7xcx2fs>

<https://twitter.com/radiobattle1>

In April, there was an online *Radiodays Europe* meeting for RAB Serbia (Radio Advertising Bureau, an association for Serbian radio broadcasters). Filippo Solibello popped up again, as the facilitator for an event which attracted more than 100 broadcasters from the Balkan countries. The questions and themes relating to the pandemic that are plaguing broadcasters and the wider media industry everywhere cropped up too: the impact on commercial campaigns and programming, challenges of remote working and the usage of language in crisis situations. The concluding comments were hopeful, in any language. *"Radio will be ready when the pandemic passes, as it always was, the fastest and the best media – a true friend to listeners."*

### A Brave New World

Radio Futurologist James Cridland has led in his field for many years. In one of many predictions on how the 'new normal' will look, he opined, *"Just like many things after this virus, I suspect that radio broadcasting will never be the same again. I suspect we're seeing quite a few people realise that fancy studios might not be required anymore; 58% of stations, apparently, according to iHeartMedia's Inside Radio, have many broadcasters [working] from home."*

At the time of writing, it is unclear when it will be safe for broadcasters and interview guests to return to radio studios while networking events and exhibitions in the radio industry look to be situated on a more distant horizon.

The 2020 Media Democracy Festival in London in March was one of the first media conferences to run foul of the impact of Covid-19. Organised by the Media Reform Coalition, the event *"imagines a future alternative media landscape built on cooperative and innovative values that serve communities, informs citizens and holds power to account as it seeks to build a diverse and powerful movement for media democracy in the UK."*

The conference, which is open to the public, has been postponed to a date yet to be announced.

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

Meanwhile, many meetings and events have been held online and certainly, more will continue to take this form, or offer

virtual attendance as an option. This will surely be the case even in that future world where a Covid-19 vaccine has been safely administered to the global population.

The boom in holding satisfactory online meetings has been made achievable through Zoom, Skype and other video apps. My experience of attending and speaking at many political, community, podcasting and radio events, meetings and webinars during lockdown is that the technology works very well. It is not the same as wandering around an exhibition or being able to comment on the person sat next to you. Nor does it afford the unexpected but often useful diversions that arise when groups of people gather in real life. But it will work for now.

Even when events are held gain conventionally, relaying a live stream will surely become commonplace. It may require a payment of some kind so that events can meet their financial costs. Or there could be a daily recap, just in the way for example, that BBC Radio gives highlights and a podcast from each day's play at a Cricket Test Match.

Live streaming, or at least daily highlights packages, could also open the door to a wider audience of professionals and enthusiasts who cannot afford the time or money to fly or drive to an event but who have valuable contributions to make, and who can learn and partake in knowledge exchange.

### Drive-Through Events

Concerts and festivals could well take place in a new, drive-in format, thanks to radio. Writing on the *Consequence of Sound* website in May, Nina Corcoran reported how singer-songwriter Mads Langer gave a concert to a live audience. This was performed on a specially constructed stage located on the outskirts of the Danish city of Aarhus. Gig goers attended in their cars (at an acceptable social distance) tuning their car radios to an FM frequency to hear the music.

This model has worked for decades at drive-in movies in North America. In the UK too, several Restricted Service Licences (RSL) have been issued by Ofcom for drive-in movie events. Some examples of this include Harewood FM in Leeds, The Dark Outside FM in Dumfries and Galloway, and Filmair in Hatfield, Hertfordshire. All of them used the 87.7MHz frequency for events back in 2013. That same summer, Portadown played host to Young at Art Events FM on 107.8MHz.



A further exploration and implementation of this idea could be a positive solution to experience live music festivals for the foreseeable future. I am sure that radio stations could sponsor and relay such gigs to a wider audience as well.

At the start of 2020, CBC aired a one-hour long special, looking at how technology shapes human communication, and how the internet is shaping the language we use. *Us, But Nobody is Here* was presented by colleagues Craig Desson, based at CBC in Quebec in Montreal and Kieran Oudshoorn, who was 2,000km away in Iqaluit in Nunavut.

The CBC Canada (Fig. 5) programme was developed over several months, using remote technology, shared Google documents and Zoom. The subject matter turned out to be rather prescient, with interviews and features about single-person households, isolation, long-distance relationships and working remotely, in Laos, Iraq, New Zealand and the UK, as well as Canada.

Loneliness, working across different time zones with flexible hours and often without the support of colleagues are all very much a theme for our age. The effect of remote technology on individuals and society is profound but, in my mind, carries hope.

<https://tinyurl.com/ybl24vfc>

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# The Boxchip S900A: The Future of Network Radio?

Chris Rolinson  
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**F**rom the start of the current interest in Network Radios, there have been folk desiring the 'best of both worlds'; a device that can work as their main phone, while at the same time possessing the PTT button and 'feel' of a traditional hand portable radio. Regular readers will know I have glanced at Samsung's new offerings sporting PTTs in recent columns.

One of the great advantages of Android OS is its ability to be tailored to almost any usage; yet at the same time, one could regard this as a weakness, as it was *primarily* designed to work best in a smartphone environment. My Planet Gemini, for example (Fig. 1), is an Android cell device, but often struggles with apps that do not cater for landscape orientation.

Most Network Radios already work as basic phones, though most enthusiasts will tell you the ergonomics can be 'clunky'. Conversely, most phones will also work as PTT devices, but you might well be pushing that virtual PTT on a screen or resorting to purchasing a Bluetooth PTT accessory. The whole experience can get a little 'messy'. Now add in an FM/DMR RF section and there's plenty of room for confusion, along with endless possibilities for fun!

## A New Approach

Boxchip, like many Network Radio designers, is a Chinese company and is well-known to many who frequent social media groups around Network Radio. They have a reputation for engaging with users, for trying to adapt to what enthusiasts say they want and giving regular software updates to their devices.

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

Quite a few people got hold of one of their early radios, the S700A. This was Boxchip's first hybrid project; a Network Radio, FM and DMR handheld radio all-in-one.

It also had its foibles, for example, as a first-generation device, there was no Band 20 which meant many O2 UK users had no con-

**Chris Rolinson** dives into the world of hybrid network radios, taking a closer look at the Boxchip S900A. The device offers a range of very exciting features for radio hobbyists.



nection. No such issue this time around on that front, I'm pleased to say.

## Not a Straightforward Concept

Conceptually, this is a great idea. If Boxchip can make one device that can supplant VHF/UHF HTs, DMR HTs, PoC Radios and phones all in one unit, that will be a big gain; not just for business users, but of course, for hobbyists too.

It's not a new idea – many years ago, I recall Martin Lynch in the UK used to stock a cheap Android phone/HT that had a simple low-power UHF TRX in it. Besides, Runbo and RFinder branded devices have been around for a while too, though I have not seen one of those close-up yet.

<https://tinyurl.com/y759htgd>

<https://tinyurl.com/y9xt9gv2>

The main problem with the design of any hybrid device is that it has, by definition, to be

a 'jack-of-all-trades' unit; it will do everything pretty well but may well not be outstanding on every aspect of use.

As a parallel in Amateur Radio, for example, take the well-known shack-in-a-box transceivers like the Icom IC-7100, Yaesu FT-991 family or the Kenwood TS-2000. They are all great units, but you probably would not want to use any of them in a contesting or DXing environment.

## The New Radio

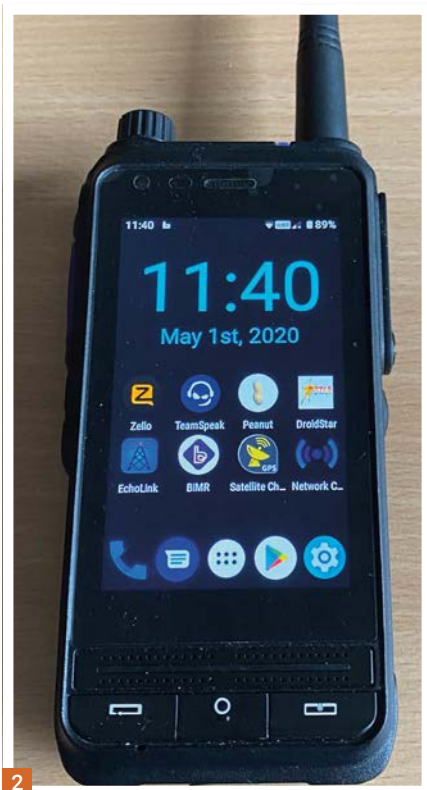
So how does the new Boxchip shape up? My initial thoughts are, surprisingly well!

The unit is supplied in a tasteful box with the usual extras; charger, USB cable, belt clip, VHF or UHF antenna (depending on the version) and manual (Fig. 3) However, a drop-in charger (arguably essential), earphones, speaker/mic and other accessories are optional.

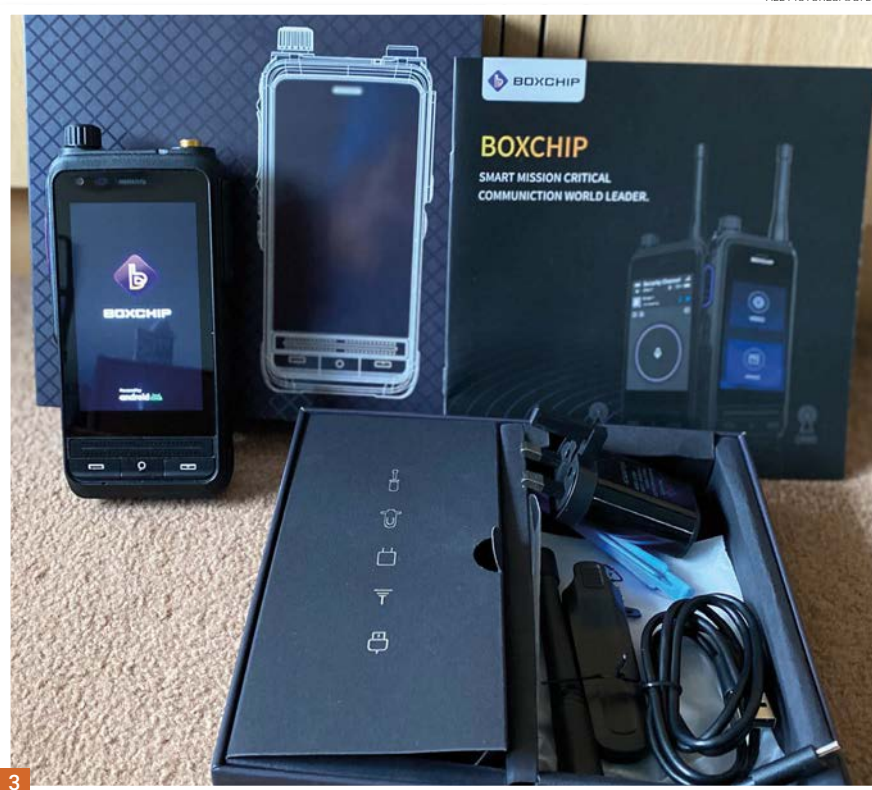
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ALL PICTURES: ©G7DDN



2



3

Physically, the radio tends more towards phone-like. It is only a tad smaller than my iPhone 11 daily driver; however, it is *considerably* thicker (about 1" including the battery) but not as deep as a dedicated HT, such as a typical Ham one. Thus, it does not stand up on a flat surface easily on its own but does work really well 'on-body' with the supplied clip.

The screen is also more phone-like, being large for a Network Radio at 4" with Gorilla Glass III screen. Resolution is 480 x 800 pixels at 160dpi resolution – it also can be used with gloves on, which is good news.

There are the usual Android phone-style controls below the screen, although I did find the printed logos a little similar-looking and thought they could be made more obvious. The tiny hole for the main microphone is underneath the 'back' button (Fig. 4).

There are various push buttons on the sides of the unit – the one on the right-hand side actuates the 'flippable' camera. On the left, from bottom to top (Fig. 5) there are volume control + and - buttons, again in the vein of phone design - a rotary knob would usually perform this function in a traditional PTT device.

The rather tasteful PTT button is next - it stands outlined in a purple band; there is a further button above it, which swaps between DMR and PoC modes when using the Boxchip-supplied BiMR app – just press and hold for a few moments for an audible and

haptic tone to actuate it. Note that this disables Zello use of the PTT completely, which will please many users.

Along the top is an orange button, aimed at the kind of SOS programmability that many business devices use. Moreover, there is a notched rotary control, which changes channels when in DMR/FM mode. However, it is also programmable using an app like the excellent 'Button Mapper', which is much beloved of NR enthusiasts. Just don't mistake it for the aforementioned volume control.

The radio side is catered for by the supplied rubber antenna, also situated on the top, which only works on either VHF or UHF, depending on which version you purchase. Since most DMR hobby activity is on UHF, that is likely the one most will plump for.

I found the UHF version (SMA connection) worked really well, but there is always the option to replace it with another antenna if you wish. Note that the PoC side has no extra external antenna socket.

One oddity, if you think of it that way, is that there are still, like the earlier S700, two microphones – one at the front at the bottom, as referenced above, and another one at the top on the rear of the unit (Fig. 6).

I tested this with Zello's echo-test facility and they both work.

This is almost certainly one of those compromise scenarios referred to earlier: On a PTT radio, you would ideally *not* want a sec-

**Fig. 1: Planet Gemini – Not so good in 'portrait' mode. Fig. 2: The Boxchip S900A with a customized home screen. Fig. 3: A nice package!**

ond mic, but on a *phone*, that second (noise-cancelling) mic is '*de rigueur*' – no modern phone would be without one.

So what does a designer choose for a hybrid unit? Boxchip have probably made the right decision for this unit, as I stated above. It seems more phone-like in basic design, and compromises simply have to be made!

### I Must Be Getting Old

Funnily enough, my biggest head-scratching moment was trying to switch the device on - cue laughter! I know I am getting old, but not knowing this device, I pushed every button I could find and nothing happened.

After many attempts, it was time to admit I needed to consult the Quick Start Guide, which showed me that one needs to press down and *hold* the rotary control on the top – this doubles as the on/off switch – again, do think about it as a phone and it makes more sense. It is even marked with the international symbol, but I can see that now!

Once underway, the Boxchip was as straightforward to get into as any Android device. It runs Pie v9, so is well up-to-date, though bear in mind the caveats from my earlier review of the Talkpod N59 (*RadioUser*, January 2020: 28-30) about not necessarily



**Fig. 4:** The tiny microphone under the 'Back' button. **Fig. 5:** The left-hand side controls of the S900A. **Fig. 6:** There is a second microphone at the rear. **Fig. 7:** The right-hand side of the S900A, featuring the M6 port (and the dust cover). **Fig. 8:** The rear of the S900A, with a removable battery and dual SIM slots.

always having the latest Android updates and security patches – and the reasons why.

## Specifications

The technical specs for this unit are pretty high; no MediaTek processor here. It's a Quad-Core ARM A53, coupled with 2GB RAM and 16GB storage. Dual nano-Sims are also supported - you could have one for your main phone and another for PoC data use.

The usual array of Bluetooth, Wi-Fi, NFC, and GPS is in there, and – should you wish – you can use the device as a hotspot too. External third-party accessories are well catered for, with the business-standard M6 Port on the top right-hand side – you can connect your external mics, speakers, and other accessories here (Fig. 7). There is a 5MP front-shooter camera, capable of being used as a bodycam when worn, and a rear camera with 8MP for higher-resolution shots.

You will also find both user-removable and user-replaceable (very handy) 4500mAh Li-Ion battery, so spares can be carried around to extend battery life (Fig. 8). Boxchip is to be commended for making it particularly easy to remove and replace 'in the field' with a very clever lightweight one-touch button – the best solution I have ever seen on an HT to date.

Transmit power on VHF/UHF is in the re-

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gion of 1-2W, rather than the 5W you might expect on a dedicated unit. This is a trade-off that one has to accept with a hybrid device. For local contacts and local repeater usage though, it works fine. The audio is loud for outdoor use – rated at 1W. In real-world use, I kept having to turn it down, which can only be a good sign.

### More about VHF/UHF

It's worth a quick explanation as to how the S900A works on the RF bands. Needless to say, it is software-driven. There is a Windows app called BPS (Boxchip Programming Software) which allows you to program and upgrade the device. It will also install an on-device app called BiMR, which handles the RF side of the unit. Like pretty much all software apps, this is a work in progress.

I found it worked well, even if it is not arguably the most intuitive app I have ever used. But like all software, you very quickly get used to it. And once you do, it doesn't take long to program in your favourite repeaters, frequencies, DMR hotspots and nodes. There are some nice touches – you can even get the radio to read out the channel names to you (in a pleasant female British voice).

The really useful thing to note here is that Boxchip is very responsive on Social Media – this means that not only are updates frequent, but they attempt to accommodate users' ideas too. I found the Boxchip folk very keen to try to 'get it right' for the communities they serve. Yes, the business sector is going to be their main target with this device, (and there are a *lot* of options within the software to play with) but they listen to hobbyists too!

I did not get to use the DMR side much, but what little I did worked well. On both DMR and FM, I had no problem programming in my local repeaters and then writing my settings to the radio. I particularly liked the little S-meter at the top right of the radio's screen when in use. BiMR by default also seems to record your outgoing messages (even on FM) – that could be very useful.

Performance-wise, the unit was very lively and easily the equal of my Icom Ham HTs.

On that note, what a pity it doesn't do D-STAR as well!

I assume the AMBE Codec chip is in the radio already, but since DMR is *the* business-centric digital voice mode, expecting that might perhaps be a step too far – however, if you are listening, Boxchip...

It is worth noting that the radio can also act as a bridge between DMR and PoC modes. This is quite a unique feature. Boxchip provide a walkthrough video on how to do this on their YouTube site

<https://youtu.be/xsh8DpZXV4s>

It is a straightforward procedure, but do note that you may need an amateur radio licence to engage in such activity.

### A Second (and Third) Opinion

I've always been a fan of asking real-world users to contribute to reviews, as one person's thoughts can be biased. Therefore I asked two others that I know have purchased this device for their thoughts, Karl Hobson G1YPQ and Carrie Rankin MM0RKN.

### G1YPQ's observations

Karl noted that he was struggling to get good audio using his BT microphone although, like me, he finds that the received audio is excellent. Karl also commented positively on the robust build quality of the device. Battery life in the real world seems especially good to him, and he particularly commented that the screen is simply 'superb'.

G1YPQ and I agree on the size of the Boxchip – being a hefty device, having a large hand helps. It can be quite tiring to hold for long periods. Karl has been using his Boxchip on DMR and reports it plays well with his hotspot and he has received very good audio reports using that mode.

### The Votes of the Scottish Jury

Carrie says she has been using the S900 for around 3 months now (longer than I have had it!) and that it is now her 'go-to' radio.

Initially her (admittedly very early) unit did not have Google Play Store and the earlier versions of the BiMR app had some audio issues. However, even with these initial teething problems, corrected in updates, she found herself liking the device.

She also commented that the ease of access to DMR (meaning not having to carry around a hotspot and Mi-Fi) make this a fantastic device on the go.

MM0RKN says she finds herself switching the radio on in the morning and monitoring DMR most of the day till she falls asleep. Like Karl, she also reports the audio as exceptionally clear and loves that she can just pick up the radio wherever she is and have a quick contact.

Carrie tested the 70cms analogue on her local repeater. Like myself and Karl, she was impressed with the audio. And all three of us also had no issues getting into a repeater, even from an indoor location.

As more of a 'power user' of this device, Carrie notes that the battery lasts her a full day, using Zello for an hour or so in the mornings and then switching to monitoring DMR with a few QSOs during the

day. She comments that she has never yet found herself without power. That's quite a recommendation.

I caught up with MM0RKN just before finishing this review and she confirmed: *"I'm still using the 'Boxie' every day and finding that the more I use it, the more I like it!"*

### Customer Service

Early on, Carrie did report an issue with her battery percentage monitor not reading correctly; and perhaps this is an appropriate place to comment on Boxchip's customer service – something that gets left out of too many reviews.

Carrie reported her issue directly to Ella Li of Boxchip, and her team investigated the issue. Ella worked with Carrie personally to resolve her problem and ensured a replacement was sent. As Carrie had decided the charging dock was a 'must-have' accessory by this point, she requested that Ella send the battery with this, which duly happened - she received her updated package direct from China in just 3 days.

Carrie, therefore, echoes my thoughts, language barrier notwithstanding, about Boxchip listening to the users; she cites one example with the BiMR app, where many DMR users had requested callsigns to be made visible, along with improved battery quality and repeater search facilities.

In a recent update, those requests were included.

### Conclusion

For sure, no hybrid device is going to please *all* of its users *all* of the time. However, this new Boxchip goes a long way towards addressing the 'conundrum' of the hybrid device. During the time I spent using it, I became increasingly impressed with its abilities. This is a radio to live with, not just pick up and think you will understand it in a day - it very much grows on you.

Yes, it is a compromise device, and more so on the PTT side in my opinion. But how handy is it to have your phone, your Network Radio and a 70cms DMR/FM HT in one unit? Very!

My thanks to Ella Li of Boxchip for supplying the review radio. In the UK, the S900A is available from specialist PoC dealer G6 Global and Martin Lynch & Sons.

<https://tinyurl.com/y8o3w9nt>  
<https://tinyurl.com/y87qvcdv>

At the time of writing, the retail price is around the £575-600 mark. [Watch out for a forthcoming RadioUser competition, in which we will be offering this hybrid network radio as a prize – Ed.]

<https://tinyurl.com/yawot34q>

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Tim Kirby

longworthtim@gmail.com

**This month, Tim Kirby is providing an introduction to one of his favourite forms of communication from space: Meteor Scatter.**

It has fascinated me for over 30 years, and I realise that I experienced it, before I knew about it, as a short wave listener on both the broadcast and amateur bands.

How does it work? As the Earth moves through space, particles of differing sizes enter our atmosphere. As they arrive, they start to burn up and create a trail of ionized particles in the E layer of the atmosphere (Fig. 1).

This is good news for radio enthusiasts, as it creates a very temporary reflecting area in the E layer (think of it as a transient Sporadic E opening!). Assuming that the ionization trails are dense enough, they can reflect radio signals. Frequencies affected tend to range between the high HF region, around 25MHz and above, through to the lower VHF bands (the amateur 50 and 70MHz bands), and to the Band II FM segment, right up into the mid-VHF bands (the amateur radio 144MHz band is widely used for meteor scatter).

By and large, reflections on lower frequencies are longer but weaker. However, on higher frequencies, you have more aerial gain so reflections can be very strong. In the USA, meteor scatter contacts are sometimes made on the 220MHz band (not available outside North America, sadly).

It is unusual for meteor scatter to be noted above this frequency. Having said that, some attempts have been made to make meteor scatter contacts on the 432MHz band, but it is thought likely that many of the signals exchanged were actually the results of aircraft scatter, rather than meteor scatter.

### A Little History

The interaction between meteors and radio signals was first noted in 1929. However, it was not until the early 1950s that there was an attempt to use meteor scatter communication in earnest. This took place in Canada over a path of around 2,000 kilometres between Prince Albert, SK, and Toronto, ON. The frequency used was around 90MHz, and the system was used for around eight years.

NATO began to use meteor scatter communications for data in Europe from around 1965. Later, satellite communications start-

# Radio Messengers from Outer Space



ed to take over from meteor communications by the early 1970s. It is not just in the defence field where meteor scatter communications proved of value. Utility companies such as water boards used meteor scatter communication to report data from outlying locations to a central point before mobile telephone communications were ubiquitous. Of course, it might take an hour or so before the data reached the central point. However, as the outlying stations only needed to report a water level once a day, this was not a problem. I suspect that this system probably also benefitted from the effects of aircraft scatter.

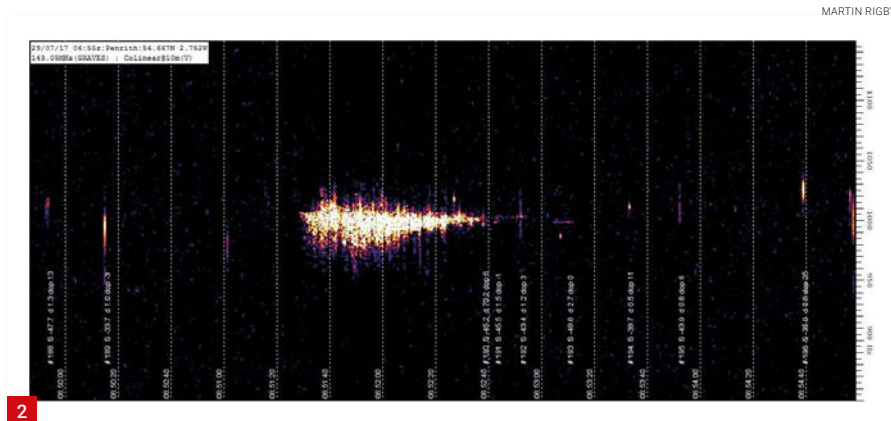
### Radio Amateur Use

Radio amateurs have used meteor scatter communication on the VHF bands to exchange signals over what would otherwise be difficult paths or distances. Back in the 1980s, when I was first interested in meteor scatter, the best method was to use high-speed Morse code. We would transmit Morse at a speed of around 200 words per minute using a memory keyer, which allowed you to key in at a normal speed (say 12wpm), and then speed up as you transmit a signal.

You would transmit a signal consisting of this message repeating for up to five minutes at a time. Hopefully, during that period a meteor burst would occur, causing your message to be reflected back down to earth at the receiving station. The receiving station would be using a tape recorder to record the Morse code signal. The tape recorder would have been modified to allow the speed of the cassette to be reduced, thus allowing the high-speed Morse code to be read at a normal, perhaps 12 to 20 words per minute.

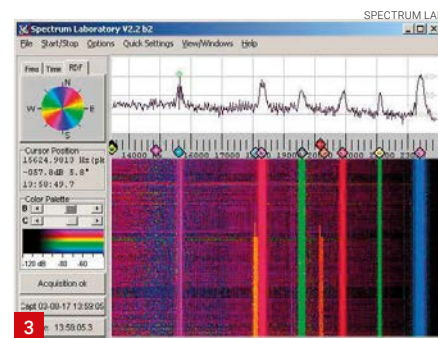
Many operators also used an 'upconverter', so that when the signal was recorded onto the tape, its audio pitch was increased. When the tape was played back at low speed, the pitch was a normal 600-900Hz, rather than a very low pitch, which could be hard to understand. Not everyone used Morse code for meteor scatter. Some used SSB transmissions and repeated a message over and over again! This was hard work on the throat, especially in the days before voice recorders! It did work surprisingly well when there were a lot of meteor bursts such as in the peak of a good meteor shower like the Perseids, which peaks in August, or the Quadrantids in January.



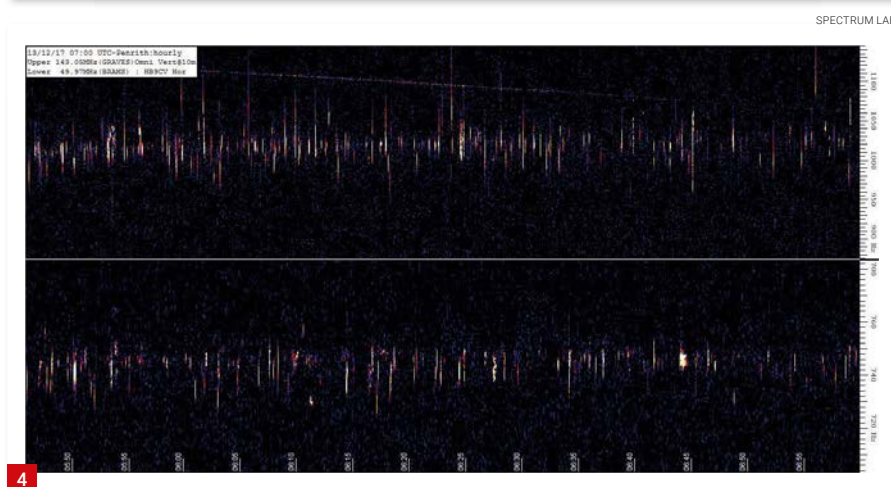


2

MARTIN RIGBY

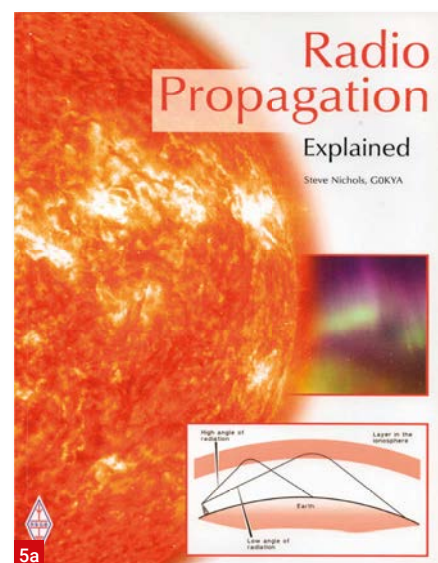


3



4

SPECTRUM LAB



5a

## Modern Methods

Time moves on, and these methods have now been superseded. Most radio amateurs who use meteor scatter utilise software to generate and decode a high-speed data signal. This is much more effective than the old Morse or voice systems. It has put meteor scatter contacts within the capability of many modestly-equipped stations on the amateur 2m band.

What does meteor scatter communication sound like? You may well have heard it yourself. Have you ever been listening to a normally quiet frequency, when suddenly a signal comes up to great strength and then vanishes as quickly as it appeared? I occasionally noticed this as a short wave listener on the broadcast bands around 25MHz. Sometimes a European transmitter would pick up for just a few seconds and then disappear once again. It wasn't until years later that I realised how this happened.

As a radio amateur, I have made meteor scatter contacts using normal speed Morse code on the 28MHz band between Canada and the United States. However, if you are a regular listener on the 28MHz band you

may well be used to hearing short snatches of signals from transmitters up to 1,000 miles away. This is very likely as a result of meteor bursts.

## GRAVES Reflections

Meteor burst propagation can be an aid to making some interesting loggings of FM broadcast stations on Band II. It used to be that you would set up your receiver on a frequency clear to you, point your aerial somewhere that you hoped would be productive and wait and see what comes up.

With the advent of SDR receivers, things have become more exciting, because now you can record everything in Band II that is happening at the same time as a data file on your computer. I was chatting to a listener in Ireland who said that he waits to hear a burst, hits record in the SDR software and later 'looks' through to see what has been received. He was telling me that others record the spectrum continuously and then use software to review and find the bursts! Fascinating.

Would you like to try to hear a signal by meteor scatter? You would! Great! Have you got a receiver capable of SSB

**Fig. 1: A meteor streaks across a summer sky. Fig. 2: A big reflection from the GRAVES radar. Fig. 3: A screenshot of Spectrum Laboratory – useful software for monitoring meteor reflections, and much else besides. Fig. 4: Simultaneous monitoring of reflections from the GRAVES and BRAMS signals. Notice the sloping line on the upper trace from GRAVES – this is the signal reflected from the moon. Fig. 5a: Some further reading can be found here.**

reception around 143MHz, and a simple dipole or vertical aerial? If you have, you're all set. The station we're going to listen to is located in France and is a very high power satellite detection facility called the GRAVES radar (GRAVES = *Grand Réseau Adapté à la Veille Spatiale*, Fig. 2).

You can read about it here: <https://tinyurl.com/y8u9fpfl>

Tune your SSB receiver to 143.049MHz or thereabouts. As the radar is on 143.050, this will mean that anything you hear will have a pitch of around 1kHz. Depending on your radio and your location, you may be able to hear a weak signal almost all the time. There were days when this was the case when I lived in Oxfordshire. Out here in West Wales, there is no direct signal. Keep

listening; hopefully, you will shortly hear a 'ping' (a very short transmission) or a longer burst of signal, sometimes with an almost musical note. You may well hear the signal changing pitch.

This is another example of Doppler shift demonstrated by radio, as a meteoric particle enters the atmosphere and streaks through the sky at high speed, reflecting the radio signal as it goes.

If you are using an SDR program, you may well notice weak traces on the screen which you do not even hear! Stronger signals can be quite dramatic – with the signal strength and Doppler shift being visible.

## Random Meteors

The best time for 'random meteors', in other words, not a meteor shower, tends to be around 0600-0800 in the morning. However, the Graves signal is so strong that something can usually be heard at any time of day if you listen for a little while. The month of June is one of the best for 'random meteors', so it's a good time of year to try this experiment.

The majority of 'meteors' we hear are probably the size of a grain of sand. They are certainly not the size of meteorites so beloved of Sci-Fi films, so do not be alarmed, once you realise how much is going on above us!

Now that you have found the Graves radar signal, you could try listening for it when the International Space Station (ISS), or perhaps one of the chains of *Starlink* satellites are overhead. You should see more traces on your screen, but will perhaps notice different characteristics, either visually or audibly which, with a little practice, should enable you to tell whether you're seeing a meteor or a satellite on your screen. On some occasions, you can even see the Graves signal reflected back to earth from the moon!

It's quite fascinating.

## How to Catch Meteors

It is worth mentioning that you don't need a super-station to hear these signals. A sim-

ple 'white stick' vertical will do well – or you could try making a dipole up – or even try a short 2- or 3-element beam (143MHz is close enough to the 2m amateur band for these aerials to work). In some respects, a shorter beam will be better than a longer one, as, with the shorter beam, you'll get more vertical beamwidth and thus 'see' more sky where the reflections will be taking place. With a longer beam, although signals may be stronger, when you see them, you'll be 'illuminating' less sky.

If you're using a 'non-SDR' receiver and want to see a visual trace, you can take the audio output of your receiver and feed it into your computer's soundcard input. You can use software to display the signal. Many meteor enthusiasts use a program called Spectrum Laboratory and written by Wolfgang Büscher, whose amateur radio callsign is DL4YHF (Fig. 3).

You can read about and download, this essential piece of software from here:

<https://www.qsl.net/dl4yhf/spectra1.html>

You might also like to take a look at the website of Martin Rigby, based in Penrith, Cumbria. Martin monitors the GRAVES radar or 143.050MHz, but also a lower-power radar called BRAMS (Belgian Radio Meteor Stations) in Belgium which transmits on 49.97MHz (Fig. 4). He uploads images of the reflections he has heard onto his website at this URL:

<http://www.g4fui.net/meteors.html>

<https://brams.aeronomie.be>

Martin's website contains several links that will be of interest to anyone who is intrigued by this aspect of the hobby. Martin has kindly supplied me with some screenshots to accompany this article.

The subject of meteor scatter is also covered extensively in many books on radio wave propagation and space weather (Figs. 5a and b).

I hope meteor burst reception catches your imagination in the same way that it caught mine. I like it because, even if you live at the bottom of a valley, or on the wrong side of a mountain range, you can still make some fascinating VHF loggings.

## Resources

- AMSAT UK  
<https://amsat-uk.org/tag/meteor-scatter>
- ARRL  
<https://tinyurl.com/yajrz4xh>
- Branegan, J. (1991) *Space Radio Handbook* (pp. 206-217) (RSGB)
- British Astronomical Association  
<https://tinyurl.com/yc3d4hrk>
- Chitwood, L.A. and Norton, O.R. (2008) *Field Guide to Meteors and Meteorites* (Springer)
- Electronics Notes  
<https://tinyurl.com/yxwrsart>
- Lashley, J. (2010) *The Radio Sky and How to Observe It* (Springer)
- Meteor Shower Guide 2020  
<https://tinyurl.com/ybdpvyjs>
- Nichols, S. (2016) *Radio Propagation Explained* (Ch. 11, RSGB)
- Poggi, P. (2015) *Hamsat* (RSGB)
- Poole, I.D. (2004) *Radio Propagation: Principles and Practice* (Ch. 9, RSGB)
- RSGB  
<https://tinyurl.com/s7a84ys>

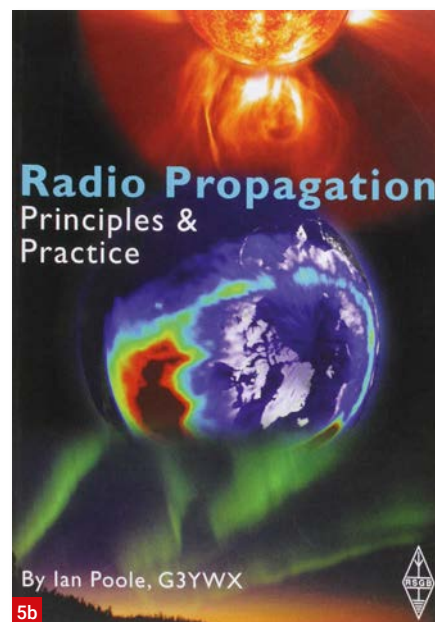


Fig. 5b: A background title reading for space radio fans.

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# The Final Flight of an Aviation Pioneer

Scott Caldwell

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**A**melia Mary Earhart (1897 – 1937) was leagues ahead of her time. She was a pioneering aviator, at a time when her male counterparts dominated engineering, science, and commerce. To some commentators, she was the most famous woman in American society.

Her feats are quite remarkable at a time when the world was dominated by male endeavour. She was the first woman to fly solo across the Atlantic Ocean, an author of seven successful books that detailed her experiences, and she acted as a role model for other women, inspiring them and giving them the confidence to fulfil their dreams and potential.

In 1935, Purdue University employed Earhart as an aviation pioneer and career counsellor for female students. They also contributed to the purchase of her iconic *Lockheed Electra* plane, which she subsequently dubbed as her “flying laboratory”.

Recent interest in Earhart has been generated by the high-profile expedition headed by Dr Robert D. Ballard (discover of the wrecks of the *Titanic* and *Bismarck*) to locate the remains of her plane (Ballard located the wreck of the *Titanic* in 1985).

This expedition placed great emphasis on the final radio transmissions from Earhart’s plane.

## Equipment Failures

Earhart’s previous world flight attempt nearly resulted in disaster. On 20th March 1937, the *Electra* failed to take off correctly from Honolulu, ironically bound for Howland Island. The *Electra* had become very heavy, due to the extreme fuel payload that was a necessity for such long-distance aviation. There is also a consensus that the *Electra* had a limited range when compared to other long-distance planes of the era.

The radio communications equipment was designed and manufactured by the Western Electric Company,

Scott Caldwell examines the final flight of Amelia Earhart and wonders whether a look at her surviving radio communications can help to solve the enduring mystery of her disappearance.



the manufacturing division of the American Telephone and Telegraph Company (AT&T).

The company had been pioneers of aviation radio communication equipment and by 1937 they were considered as leaders in the industry.

(see also last month’s issue on aeronautical communications; *RadioUser*, July 2020 – Ed.)

However, Earhart’s radio communications equipment was hardly considered as cutting-edge technology and the design was more than three years old. The receiver (Model WE20B) was a regular four-band aircraft receiver. It provided coverage of long wave, medium wave, tropical short wave, and international short wave.

The tuning controls were located in the console between the two pilot operating positions, and the receiver was installed under the right-hand seat. The receiver weighed 14 pounds (exclusive of the dynamotor unit and the control head). The receiver was powered from the *Electra*’s 12-volt DC electrical system.

The model WE20B receiver was designed for optimum performance in the low-frequency bands (Table 1).

The *Electra* was equipped with two main aerials; they were a V-doublet and a long trailing wire. The V doublet aerial was located on top of the fuselage and atop the twin tails. The long trailing wire aerial was hung underneath the plane, and it was to be unrolled and deployed when it was required.

However, there is historical evidence that suggests that this antenna was missing, either removed in the US or ripped off when they took off from the rough runway at Lae (now a city in Papua New Guinea).

Earhart also had access to a newly designed Bendix Direction Finder that was equipped with a rotatable loop located directly above the cockpit.

## The Radio Equipment

There is a surviving 1962 letter from 1992, written by W.C. Tinus, the Vice President of Bell Telephone Laboratories. In it, he said, “I was the radio engineer who was responsible for the design and installation of her radio communications equipment [at the Newark Airport, New Jersey in February 1937 [...]]

“I had been a radio operator aboard ship in my younger days and knew the importance of being able to communicate at 500kc [kHz] over the oceans. I persuaded Miss Earhart and Mr Putnam on this point and modified a standard three-channel Western Electric equipment of the type

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

Fig. 1: Amelia Earhart, aviation pioneer.

Fig. 2: The Earhart Light (Beacon) on Howland Island.

then being used by the airlines to provide one channel at 500 kc and the other two at around 3000 and 6000kc [3105 and 6210kHz. [...].

"A simple modification also enabled transmission to be made on CW or MCW, as well as in voice, and a telegraph key was provided which could be plugged in, in addition to a microphone for voice communication.

"It was my thought that many ships throughout the world had 500kc radio compasses and could probably better obtain bearings if the key were held down for an extended period while radiating modulated CW (MCW)".

## Amelia Earhart's World Flight

The plane selected for Earhart's *World Flight* was a Lockheed 10E twin-engine *Electra*, extensively modified for long-distance aviation. Earhart's World Flight was planned as a series of legs that consisted of 20 hours flying time. This made an allowance of an emergency fuel reserve tank that permitted a minimum of four hours additional flying.

Fred Noonan (1893 – 1937), was selected as Earhart's navigator on her second *Word Flight* attempt. He was a vastly experienced navigator, previously employed as a lead navigator at Pan American Airways. He had navigated the Pan American *Clippers* on all their survey flights across the Pacific Ocean.

Remarkably, Earhart did not have any coordinated access to the frequencies utilised by British Imperial Airways, the Royal Navy, the French Navy, or especially Pan-American Airways, given Noonan's previous association with them as a lead navigator.

By 1937, Pan-American had the luxury of an extensive radio communications network and direction-finding posts across the Pacific. Noonan would have been well-versed with its operation, reducing their navigational dependency on the support provided by the *Itasca*.

Before, the takeoff from Lae to Howland Island (now an unincorporated, unorganized, territory of the United States) Noonan had considerable difficulty setting his chronometer. Adverse conditions and extreme radio interference had made it virtually impossible to distinguish the standard 'time ticks' from other radio signals. This was a serious problem, as accurate chronome-



ters reading is essential in obtaining accurate fixes on the position of heavenly bodies in celestial navigation.

The stopover in Lae led to a delay of one day' and Earhart cabled her disappointment, claiming "Personnel unfitness" as a contributing factor for the unscheduled delay. The contents of this cable have been the subject of considerable controversy. What did Earhart mean by personnel unfitness? Was she referring to excessive drinking by Noonan?

Or was she indicating that they were both mentally and physically exhausted by the demands of this World Flight? Their professional relationship has been investigated by historians. After almost a month of working together, there is no reliable evidence to suggest that their relationship had become difficult. They would have become accustomed to each other's idiosyncrasies as they were confined to the cockpit for long periods.

## The Final Radio Transmissions

Earhart's *World Flight* was allocated the radio call sign KHAQQ. The *Itasca* (call sign NRUI) was a 250 ft Lake Class Coast Guard cutter that was providing communication support, radio-direction, weather observations, and ground maintenance for Earhart. Their standing orders were quite succinct: "to act as plane guard and furnish weather reports for Earhart".

To facilitate additional navigational assistance, *Itasca's* hull and superstructure were painted white, and she produced black smoke that was detectable from a long distance.

The *Itasca* was under the command of Warner Keith Thompson, who subsequently submitted a detailed report on the radio communications that his ship transmitted and received, such as this one:

"From: Comfrandiv

To: Comsousec

Inf: ITASCA, Headquarters, ComHawSec  
6009 Direct ITASCA be prepared on short notice to proceed Howland Island via Honolulu direct from San Pedro 0931."

Table 2 is a list of the radio operators of the USCG *Itasca*.

Thompson's initial preparations were meticulous, as he organised a radio network that spanned across the Pacific from the west coast to Australia and New Guinea to the US Coast Guard base at San Francisco.

Earhart's close links to US President Franklin D. Roosevelt (1882 – 1945) had paid dividends. The commander of the *Itasca* was also instructed to notify all other stations of Earhart's progress, including the US Navy tug *Ontario*, thereby extending the communications network. The *Ontario* was stationed in between Lae and Howland Island, providing additional weather reports and transmissions of radio homing signals for Earhart and Noonan's navigational support.

The weather reports indicated that the headwinds to Howland Island would be much stronger than was originally reported. Harry Balfour – a Guinea Airways radio operator stationed at Lae – had tried repeatedly to report this vital meteorology information to Earhart, at 1020, 1120, and 1220 hrs. local time.



## Further Reading

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- Fleming, C. (2011) *Amelia Lost: The Life and Disappearance of Amelia Earhart*. New York NY (USA): Penguin Random House.
- Long, M.K. and Long, E.M. (1999) *Amelia Earhart: The Mystery Solved*. New York NY (USA): Simon & Schuster.
- Lovel, M.S. (2009) *Amelia Earhart: The Sound of Wings*. London: Hachette Digital Publishing.

## Websites

- *Amelia Earhart: The Official Licensing Website of Amelia Earhart*  
<https://www.ameliaearhart.com>
- *The International Group for Historic Aircraft Recovery (TIGHAR, USA)*  
<https://tighar.org>

## Intermittent Communications and a Disappearance

For seven hours, *Itasca* had repeatedly sent a letter A in Morse code (·–) to Earhart's navigational fixes. However, there was no confirmation that Earhart ever received this continuous message. It has been suggested that neither Earhart nor Noonan knew how to read Morse code.

However, the code was a critical concept for the ship-based radio direction finder system, which the US Navy operated to support navigation. Chief Radioman Leo Bellarts had meticulously checked that *Itasca's* radio equipment (transmitters and receivers) were in full working order. At 0245 hrs, Earhart finally made contact, and she calmly reported that the weather conditions were "cloudy and overcast".

The remainder of the message was lost in a wave of static interference. The weather conditions were deteriorating and made navigation extremely difficult.

Around 04:00 hrs., the US Coast Guard at San Francisco sent a message to the *Itasca* requesting if they had received any information from Earhart: "Have you established contact with the plane yet?"

The answer from Radioman 3<sup>rd</sup> Class Thomas O'Here consisted of the following comments "We've heard her, but don't know if she hears us".

*Itasca* continued to monitor the airwaves. Just before, 05:00 hrs., the operators were suddenly alerted to another partial message from Earhart, which consisted of more meteorological information – "Partly Cloudy".

Once again, the radio operators became

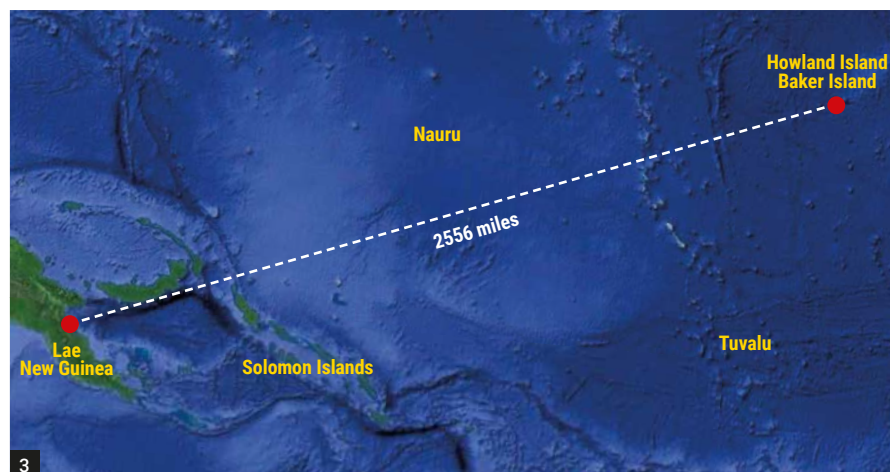


Fig. 3 Amelia Earhart's final flight route.

frustrated, as the remainder of the message was lost in static interference. The atmosphere in *Itasca's* radio room was becoming increasingly tense.

Bellarts leaned ever closer to his receiver, hoping to re-establish communication with Earhart. For over an hour, the airwaves remained silent, suddenly Earhart's voice reappeared at approximately 06:14 hrs, she requested a bearing to aid their navigation – "Itasca, This is KHAQQ. Want bearing! Will whistle in Mike".

At that moment, the crew of *Itasca* were completely stunned, their direction finder was unable to receive the radio frequency that Earhart was broadcasting on.

At 07:42 hrs., Bellarts managed to receive the following message: "We must be on you but cannot see you, but gas is running low, have been unable to reach you by radio we are flying at 1000 feet". This signal was strong and led Bellarts to conclude that Earhart was flying directly over the ship.

He dashed out on the deck and scanned the sky in vain, half expecting to hear the droning sound of the plane's engines. Unfortunately, for history, he did not see Earhart.

In his report, Commander Thompson concluded that, between 07:30 and 08:46 hrs., Earhart did appear to be close, and that her signal strength was rated as 5, based on the output power of a 50W transmitter.

By 07:58 hrs the situation was becoming desperate: "KHAQQ Calling Itasca! We are listening but cannot hear you". Bellart's heart sank. He now was left in no doubt that Earhart was in serious trouble, as she should have reached Howland Island or the *Itasca*.

Earhart was lost in the vast expanse of

the Pacific Ocean.

At 08:00 hrs., an additional message was received by the *Itasca*. "KHAQQ calling Itasca. We received your signals but unable to get a minimum. Please take bearing on us and answer on 3105". This message confirmed Bellarts worst fears that Earhart's radio was malfunctioning. She did not know that they were unable to get a bearing on 3105 KC. All that the radio operators on *Itasca* could do was render assistance in the form of continuous radio messages to Earhart. Bellarts later recalled that they all worked frantically in providing as much assistance as was humanly possible.

The final transmission from Earhart was logged at 08:45 hrs.: "We are online 157 – 337. We are running online North and South". The sheer fear in Earhart's voice made a lasting impression on Bellart's, and initially, his blood started to run cold. He recalled the memory: "I 'm telling you, it sounded as if she would have broken out in a scream. She was just about ready to break into tears and go into hysterics. I'll never forget it".

## The Search for Amelia Earhart

When it became apparent that Earhart's plane was missing after failing to maintain radio contact, the US Navy at San Francisco through the jurisdiction of its Hydrographic Office broadcasted an 'All-Ships-Alert'. This instructed any vessels operating near the remote Howland Island to monitor the frequencies of 3105, 6210 or 500 Kilocycles for any broadcast originating from Earhart's plane.

President Roosevelt personally became involved: He ordered the Secretary of the Navy, Claude A. Swanson (1862 – 1939), and Admiral Leahy, to organise a search

for Earhart and Noonan.

The International Group for Historic Aircraft Recovery (TIGHAR) has concluded considerable research into the disappearance of Earhart's plane. The Executive Director of TIGHAR, Ric Gillespie stated that *"Amelia Earhart did not simply vanish on 2<sup>nd</sup> July 1937. Radio distress calls believed to have been sent from the missing plane dominated the headlines and drove much of the US Coast Guard and Navy search strategy."*

*"When the search failed, all of the reported post-loss radio signals were categorically dismissed as bogus and have largely been ignored."*

In conclusion, TIGHAR reported that 57 out of the 120 reported signals were credible.

The US Navy allocated several ships to participate in the search for Earhart's plane.

The USS *Colorado* was equipped with three onboard catapult seaplanes. She left Pearl Harbour on July 3rd, 1937 and was instructed to proceed towards Howland Island and assist in the search. The aircraft carrier USS *Lexington* was one of the fastest ships in the US Pacific fleet. On July 5th, after prolonged preparations, she departed the North Island Naval Air Station in San Diego, was accompanied by four escorting destroyers.

To coordinate a search, a total of 62 planes were carried on board, these were essential for covering a search of the vast Pacific Ocean.

The *Lexington's* planes flew for 1,591.1 hours and covered over 151,556 square miles of the Pacific.

### Communications at Howland Island

Initially, the *Itasca* searched to the north of Howland Island, and her radio room continuously monitored Earhart's operating frequencies. At approximately, 06:00 hrs. a very weak signal was detected on Earhart's night-time frequency of 3105kc. The signal was subjected to prolonged periods of static interference. However, the radio operators could not discern any meaningful words. It was

inferred that the signals had originated from Earhart's plane.

To try and reassure Earhart and Noonan, *Itasca* immediately began replying in both voice and Morse code. They failed to receive any acknowledgement. At dusk, atmospheric conditions improved, and the signal reappeared – yet it was still extremely weak and unreadable.

This unusual signal was also collaborated by the Pan American radio station, based at Mokapu Point in Hawaii. In their logbook are the remarks *"received a steady carrier on 3105, no modulation, very weak"*.

This led many to infer that Earhart must have managed to land or crash land, on dry land. The critical question was (and remains) *where?*

So far, the vast Pacific Ocean remains unwilling to surrender its secrets. In total, the US military searched 250,000 square miles at a remarkable cost of \$4.9 million (approximately \$58 million in today's money).

However, on 18th July 1937, the US Navy officially terminated their search for Earhart and Noonan.

This resulted in Earhart's husband, George Putman (1887 – 1950) privately financing his own search.

It relied on naval experts (and even 'psychics') to locate her.

But eventually, President Roosevelt somberly announced that *"Facts must be faced"*. Putman was left devastated, and he remained isolated in the radio room of the US Coast Guard at San Francisco. He paced back and forth for days on end without the desire and need for sleep, his mind was racing through numerous permutations. He remarked to the assembled press that *"AE will pull through. She has more courage than anyone I know"*.

Until his death in 1950, Putman continuously worried that the mystery of her disappearance would overshadow her achievements.

### Short Wave Radio Listeners

Betty Klenck, a 15-year-old schoolgirl from St Petersburg in Florida, liked to spend hours in front of the family's radio,

listening to her favourite music. She was also a very keen short wave radio listener, and her father had encouraged her passion for radio, by erecting a 60ft random wire antenna.

One particular day, while she was searching the broadcast bands (unfortunately she cannot exactly remember the date), she was startled to hear a woman's voice over the airways *"This is Amelia Earhart. This is Amelia Earhart"*. She became fascinated by this signal and began to record its content in her notebook.

In doing so, she substituted words she did not understand for words that made sense to her. The signals faded in and out, distorted by interference, and it disappeared on occasions for up to seven minutes. Most significant is the claim by Betty that Earhart was in the company of a man who had suffered a head injury and was delirious.

She even managed to hear them struggling with each other for the microphone as the water started to rise up. When her father arrived home from work, she relayed the content of the messages that she had received. He immediately raced to the local coast guard station. The response was very sceptical as they did not believe that a domestic radio in Florida was capable of receiving distant signals from *Electra's* transmitter.

The question remains unanswered to this today. Did Betty really receive the last signals transmitted from Earhart? If so, she may well have been the last person in the world to hear Earhart's voice.

Fig. 3 shows Amelia Earhart's final flight route.

### Conclusion

On 5th January 1939, both Earhart and Noonan were officially declared dead by the Superior Court in Los Angeles. However, Earhart and Noonan were never given a funeral or memorial service, as their remains had not been recovered.

The search for answers continues, without any sign of ending any time soon, as the world has not given up on finding Earhart.

Band	Mode of Communication	Frequency Range
1	Beacon and Marine	188 – 420kHz
2	Standard Broadcast	550 – 1500kHz
3	Standard Broadcast	1500 – 4000kHz
4	Standard Broadcast	4000 – 10000kHz

Table 1: Frequency Coverage of the Model WE20B Receiver.

Service Rank	Name
Chief Radioman	Leo G. Bellarts
Radioman 3rd Class	William L. Galten
Radioman 3rd Class	G.E. Thompson
Radioman 3rd Class	Thomas J. O'Hare

Table 2: Radio Operators of the USCG *Itasca*.



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# Feedback

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

## A Short Wave Harvest

Our reader **Graham Smith** wrote to our *International Radio Scene* and *Emerging Issues in Radio* columnist Chrissy Brand, to report on some short wave gems. Graham wrote [...]: "I am writing to send you some more information for your columns in *RadioUser* magazine. There is an extra broadcast from Iran for Turkey during Ramadan, from 0020 to 0120 UTC. This is in the middle of the night in Turkey. The broadcast is mostly religious. The Algerian station on 891kHz was off the air for a while, but it is back now. The WRTH supplement containing the A20 schedules is available at this URL:

<https://tinyurl.com/y8cobs2b>

The latest RAJAR figures are out and they show that the share of digital listening is now 58.6%, up from 58.5% last quarter. See:

<https://tinyurl.com/ybn9lf98>

The Romanian station Antena Satelor (on 153kHz) was relaying the news station Radio România Actualități during the night, but it has now gone back to playing Romanian folk music. Also, the station Radio Timișoara on 630kHz now carries its own programme through the night.

The Voice of Vietnam is holding a contest (closing date July 15):

<https://tinyurl.com/yd6hut2v>

A new page (as far as I know) has appeared on Facebook for something called Texas Radio Shortwave

<https://www.facebook.com/texasradiosw>

It is now 60 years since Radio Veronica started

<https://tinyurl.com/ybqjkl6>

Here is a DX website:

<https://www.dxcentralonline.com/>

Radio Six International will be on SW on 6 June, according to this website:

[https://aer.org.es/archivos/19258 \[...\]](https://aer.org.es/archivos/19258 [...])

[Thank you very much for this amazing input, Graham, and keep up the good (monitoring) work – Ed.].

## No Lockdown-Blues

Lionel Clyne wrote in to report on antenna matters. He said, "Dear Chrissy, over 20 years ago I bought an MFJ 1020B active anten-

na because I did not have access to garden space for a long wire. Since then, I have had access for almost 20 years so it has been unused for most of that time. At the time of purchase, I was a shortwave novice and did not have internet access so I had not read any reviews. The reviews I did subsequently read were lukewarm at best: the main failing being the cheap (although not very cheerful) original equipment whip antenna. However, reviews were slightly more favourable when the 1020 was used in conjunction with a long wire or an upgraded whip preferably installed externally. As a result, I did the external installation using two old whip antennas joined end-to-end thus providing a height of about 95 cm to which I attached a wire loop. Another source of avoidable irritation was the tuning dial, which consists of five concentric arcs of frequency info however the tuning knob did not have an extended cursor rendering it almost useless. I corrected this shortcoming by glueing a hand from a small clock to the tuning knob. This happened to be the most difficult part of the whole operation because I had to avoid the hand from being permanently stuck to the body of the unit. So far, I have not performed an objective study using SINPO-ratings to compare it with my other antennas but it does not appear to perform as well as my random wire or 70cm loop but it does appear to out-perform my independent whip. In any case, it did prevent me from getting the lockdown blues too badly."

[Keep well Lionel, and don't forget to stay in touch with *RadioUser* – Ed.].

## From David to David on a Frequency

Broadcaster **David Lloyd** (DL) wrote to our book reviewer, David Harris (DH), about his (DH's) book review (*RadioUser*, May 2020: 14). DL said, "Hi, I've been forwarded your review of my book. Thanks for troubling to read it. Appreciated. You suggested it appeared like a self-book with some psychology. I'm pleased! It is a self-help book for podcasters and broadcasters. And, of course, there is psychology about much of radio. As you will be aware, earning from such targeted books earn little for the author – it is more a case

of my trying to help. The majority of quotes are from people who work in radio, and the reason I draw on other sectors is that I have found that many radio folk (me included) can be notoriously insular and not look to the outside world to establish context and reason in a changing world. I hope the people I spoke to inside and out - offered insight into how they helped address issues. I was deliberately less high in the mix of opinion than in HTMGR. And my own stories largely sit in *Radio Moments*. I don't think it is fair to suggest that the book is about selling advertising, it's about generating audience – focusing on the listener, and that is as relevant to a *Radio 3* listener as to a *Capital* listener. So many podcasters – and BBC local presenters - miss the audience focus – as I am sure you have experienced. There are those people who view *Classic FM* as bland. It uses the very same techniques which pop music radio uses – familiar tracks played frequently. That distinguishes it from *Radio 3*, which can afford to be more exploratory. I hope the topic of why stations play the same old songs is outlined in the *Music* chapter. Some stations have sought to be more adventurous but they simply do not attract the desired level of audiences, so they change [...]. I am unsure whether the headline 'Idiosyncratic view of commercial radio' is about my book or your review! But – thanks again for reading it - yours was a well-written review. But I fear you are not my audience. [Thanks to you both for this exchange - Ed/].

## Crossword solution

1	B	A	R	B	A	R	8	A		4	F	5	R
	A		X				6	M	U		E		
	R			7	S	3	D			9	E	A	
10	K	I	N	K	L	E	S	11	S				C
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12	A	R		13	N	E	T		E		I		
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	S		15	T	R	I	O	D	E		N		
	E		S			H			N				
	N		17	F	O	A	M		18	S	M		



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## Fighter

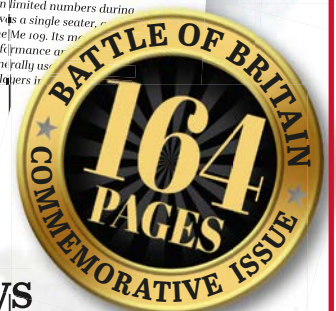
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had been found on the ground – despite the numbers claimed as shot down – did the RAF finally realise they had been duped. However, this was not before even Sir Chief Marshal Sir Hugh Dowding, the C-in-C of Fighter Command in 1940, had written of the type in his 1946 despatch to the London Gazette on the Battle of Britain.

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Includes an Icom AD-55 PSU worth £49.95!

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**KEEP CHECKING WEBSITE FOR FURTHER DETAILS**

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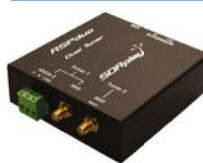


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## Expert Electronics

### Colibri DDC

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New digital TruckTracker V Professional Scanner Receiver, covers 25-1300MHz wideband frequencies.

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### ICOM IC-R6E

The 100 Ch/Sec Wideband Signal "Search Machine"

Communications handheld receiver. While retaining basic features of its popular predecessor the IC-R6, the IC-R6E contains many improvements including 100 channel per second scanning speed, 1,300 memory channels, 15 hours of continuous receive capability, optional drop-in charger stand and voice control squelch.



**ML&S: £199.95**

### WHISTLER TRX-1 DIGITAL SCANNER



The Whistler TRX-1 Handheld Scanner is a multi-system adaptive digital trunking scanner with Motorola P25 Phase I, X2-TDMA, Phase II and DMR making it capable of monitoring unencrypted channels/systems.

**ML&S: £419.95**

### AR-DV10



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100kHz-1300MHz Analogue & Digital Modes.

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