

SPIES AND RADIO (PART II)
The hidden messages of secret agents

RadioUser

August 2020 £4.99

www.radioenthusiast.co.uk

LEGENDS OF RADIO | **Ronan O'Rahilly & Vera Lynn tributes**



Hytera test

Comparing the updated Hytera PNC380 network radio with the previous model



Black Knight

The first UK review of this innovative inflatable aerial



Airband News

Long-range Drones and Temporary Danger Areas

Delving into Digital Mobile Radio (DMR)

Exploring timeslots, talkgroups, geo-fencing, and codeplugs



The role of radio during environmental disasters

How radio stations, podcasters and broadcasting organisations can help



Broadcasting Formats | Covid-19 and Community Radio | Farnborough Airport
James Clerk Maxwell | NDB DXing | Palomar City Radio | Portishead Radio

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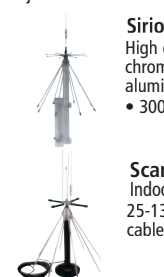
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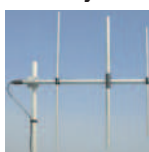
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Bearcat SDS-200E

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- SD card slot

£425

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Robert Connolly has placed Part Two of his quarterly NDB Dxing overview on the Radio Enthusiast website; in this companion article, he launches us into the world of cluster beacons.



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Radio & its Environment

Hello and welcome to the August issue of *RadioUser*. How come we are already half-way through the year, and I have not noticed it? I am, of course, more than happy to offer you another issue, packed full of features and reviews, regular columns, two book reviews, and a plethora of radio news.

Regarding the latter, you will have noticed that we have spread out our news stories a little more widely across the magazine, and you will now also find them outside of the official *News and Products* pages.

Luckily, there are many stories to report each month, and this seems to be a good way of sharing as many as possible with you. Let me know if you agree.

Still talking about news, two absolute radio legends passed away in recent months, Dame Vera Lynn, and Ronan O'Rahilly. In these pages, Scott Caldwell pays moving tribute to the lives and achievements of these two giants who have truly shaped us and who continue to inspire many today.

Our features, large and small, this month begin with Part Two of Paul Beaumont's article on radio, number stations and spies in the Cold War. This time, Paul looks at some of the equipment used by agents and their handlers, and he brings the story of number stations right up to the present.

There is also a short piece on the Alexanderson Day transmission from Sweden, to shed some light on the VLF frequency band, which I am keen to cover more, in terms of the technologies used.

In our occasional series on great radio pioneers, I am finally getting around to profiling one of my all-time personal favourites, Scotsman James Clerk Maxwell.

Moving on, you will find three comprehensive equipment reviews in the pages that follow. To begin with, Keith Rawlings evaluates the 'Black Night' Civil and Military Air Band inflatable aerial from AirAntennas, a



piece of kit that has both radio amateurs and listeners talking at the moment. Chris Rolinson has a review of the latest network radio, the Hytera PNC380. In addition to these, I have had a lot of fun with, and gained weather-insight from, the new Watson W-8686 Weather monitor in the editor's shack.

In *Emerging Issues*, Chrissy Brand offers Part One of an article on Radio and the Environment this month, showing how stations can help to mitigate, prevent or manage environmental crises and disasters.

In our other regular columns, you can travel to Farnborough, follow the flight of drones, receive essential recommendations about this month's international broadcasts, and learn about the very latest in Digital Mobile Radio (DMR), DAB and DRM.

Last, but certainly not least, there is the next instalment of Robert Connolly's indispensable quarterly Non-Directional Beacons (NDB) survey, now in conjunction with the *Radio Enthusiast* website.

Enjoy this issue and do not forget to stay in touch with our contributors, feature-writers, and me, and let me know what is happening in your radio-world.

Georg Wiessala

Editor, *Radio User Magazine*
www.radioenthusiast.co.uk

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The image shows the July 2020 issue of RadioUser magazine. The cover features the headline 'THE FUTURE OF NETWORK RADIO? We review the versatile Chinese Boxchip S900A' and the price 'July 2020 £4.99'. It also promotes '100 years of radio mags in America' and 'BORN IN THE USA'. The cover includes several articles: 'Maiden flight: The pioneers of early aircraft radio explored', 'Radio all at sea: How Covid-19 has meant big changes for shipping', and 'Latest Gear: All the exciting new products available now from the UK's leading radio dealers'. The magazine is shown on a desktop monitor, a tablet, and a smartphone, along with a physical copy of the magazine.

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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

Radio News



RADIO-THEMED FACE MASKS RAISE MONEY FOR SUPPORT FUND:

Handmade face masks featuring radio sets and cassette tapes are helping to support people in the radio industry who have been hit financially by the coronavirus crisis. Proceeds from the sale of the special masks are being donated to the Radio Academy's Audio and Radio Emergency Fund, which is helping those facing hardship with grants of up to £1,000. *Funky Masks*, which was set up by Andrea Day, will give a £2.50 donation to the Fund for each pair of masks sold. Andrea's career in radio has included spells at INRIX and BBC Radio Merseyside, and she now works as a radio operations manager at BBC News. Alongside work during the lockdown, Andrea and her family have been putting their sewing skills to good use making scrubs for NHS workers – and are now creating face masks in a variety of designs. Andrea told RadioToday: "We've been making hundreds of masks in a variety of styles and themes – from popular cartoon characters to rainbows. So when some friends suggested looking for radio-themed material I thought it would be a great idea to support a really important cause and raise money to help those in our industry who are falling on hard times because of a reduction in work or because they can't access the government's financial help. For every pair of Sounds Funky masks bought, we'll be donating at least £2.50 to the Audio and Radio Emergency Fund to help friends and colleagues who are struggling at the moment." Click here to buy a pair of Sounds Funky masks and support the work of the AREF. You can find out more about the Audio and Radio Emergency Fund here:

(Source: AREF, RadioToday)
<https://audioradioemergencyfund.co.uk/intro>
<https://tinyurl.com/y8lhvs6h>

DABH P-9 Mini DAB+ Radio Player

The new DABH P-9 Mini DAB+ Radio Player originates from China, so Coronavirus intervened and delayed my delivery by two months. Never mind, it's here now, and I am loving the honey-colour! The internal battery (1000mAh) charges via USB and the radio offers DAB+ and FM. There is an SD card slot (up to 32GB) and MP3 player functionality. Very neat. Charges (5V) and auto-tunes in a flash and hey presto, you are my attractive new riverside-walking, sitting-on-the-patio and bedside companion. The model is 'Digital Radio Player' DAB P-9. Ergonomically handy too, but do be careful with the small aerial! Yours for Around £17 at retailers such as *Wish*, or on e-Bay.

<https://tinyurl.com/yawwu3xl>
<https://tinyurl.com/ybhahpoo>



Moonraker: Shakespeare-INFL8-HAM Dual-Band End-Fed 3dB Antenna

The GALAXY INFL8-HAM is an inflatable end-feed 3db Dual Band antenna for HAM radio applications (144MHz-148MHz and 430MHz-440MHz). The antenna can be easily deployed either via a CO2 cartridge or manual inflation tube. It inflates to 1.6M to offer a full 3db antenna. Thanks to its inflatable design, the antenna can be deflated and stowed away safely in its easy to spot storage bag until needed again. The antenna can be mounted with its Hook and Loop straps allowing for quick and easy installation. The antenna also features grommets on the top and bottom to facilitate hanging and securing if required. The antenna is fitted with a PL 259 male connector as standard. The price is £99.95.

<https://tinyurl.com/ybchwkbk>



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

Radio News

NOT JUST FOR ENTERTAINMENT: The editor re-visited his local community radio station, Ribble FM, to find out what the broadcaster has meant to the people of the Ribble Valley during the recent Coronavirus (COVID-19) lockdown. We have featured Ribble FM before, here in *RadioUser* (*RadioUser*, April 2019: 54; January 2020: 16).

However, since my local community radio station here in the beautiful Ribble Valley just went through a period of upgrading its facilities, I visited the Clitheroe-based broadcaster again this month. Specifically, I aimed to find out how the station has interacted with the local community during a particularly challenging year, which saw both significant flooding, and the Coronavirus (COVID-19) outbreak in the Spring of 2020. I met with owner and station director Lee Roe and presenter Mark Blackman on a typically wet Lancashire morning and took a tour of the new *Studio 3* – soon to be named *Community Media Studio 3*.

This new studio facility is in the process of being furnished and finished right now. The station has recently upgraded its transmission facilities, in order to reach more of its key audience in the Ribble Valley. It is now available on FM and online, through its own *Ribble FM App*.

It did not take long to steer the conversation around to the significant effect that the COVID-19 outbreak has had on the local community, and I asked Lee what Ribble FM had done to help.

It soon became clear that a very substantial effort had been made to alleviate the pain and suffering entailed by the crisis. Most importantly, perhaps, the station was able to spring into action more quickly than the local Council, and its hand-on approach, involving everyone here, made a deep and lasting impression on local communities.

Lee told me that, Ribble FM quickly created a much-noticed Facebook Group, *Ribble Valley Community and Support (RVCS)*. Within four hours of its institution, this group already had 2,500 members, all willing to volunteer, donate and generally muck in. The main focus of the RVCS was to pool resources, coordinate food and other donations, and make parcel deliveries to those on the 'shielding' list. The group became the hub for the operations and logistics of a huge relief operation, whereas the radio station became the means of



facilitation and communication, and the centre for providing the local effort with effective marketing and publicity.

A building owned by the local branch of the Salvation Army became an ad-hoc distribution centre, and soon a local bread manufacturer became involved too.

With basic structures and lines on communication in place, donations poured in at great speed and in large volumes. At the height of the crisis, radio station staff delivered more than 150 meals three times a week to vulnerable locals, and to those living on the poverty-line – a substantially large group than I would have imagined before.

To make deliveries physically possible, presenter Mark Blackman explained to me that the entire schedule of the station was moved around, to make room for extracurricular activities, so to speak.

What, I asked, was the reaction of the public, and what the long-term effect of these activities, I asked Mark and Lee. Lee's response was interesting. There were, of course, many, many individual thanks from people here; but, more than that, Lee thought, that there was also a shift in attitudes, in that people were beginning to see Ribble FM more as a *local* radio station now, rather than a *community* one. I asked him what he meant by that.

Lee replied that, in his view, the people who live here, thought of the station as both a 'helper in need', as it were, and as a 'comforting voice'; in times of crisis, the station's actions had a 're-affirming' effect, helping to root the



broadcaster much more deeply in the collective conscience of the Ribble Valley.

I could relate to that, for sure. And, as I left the station, I could not help but think that it is often those people like Lee, who, perhaps, shuns the limelight a bit, but who brings out the best in a station in a crisis, and who makes things happen that, otherwise, well, just wouldn't. I wish the station well in the challenging times ahead and I rest assured that here we have a broadcaster who is capable of much more than just entertainment.

My photographs are meant to convey an impression of a station ready to go ahead in new directions with a sense of strategy and purpose, and an unswerving dedication to the local community.

My thanks go to Lee Roe, Mark Blackman and the other station personnel and volunteers, for making my visit both informative and enjoyable.

<http://www.ribbonfm.com>

Radio News



ARGENTINIAN ELVES: The Pierre Auger Observatory in Argentina was not designed to catch elves, but in recent years it has been doing exactly that. Through a bit of serendipity, we discovered that the world's largest cosmic ray detector provides new capabilities to observe rare, ring-shaped emissions of ultraviolet (UV) and visible light high above thunderstorms. Studying these elves, short for emissions of light and very low-frequency perturbations due to electromagnetic pulse sources, could reveal new insights into the physics and effects of strong lightning, including lightning of the highest energy. Lightning produces familiar large bolts and flashes, but strong lightning (i.e. lightning carrying more than about 100 kiloamps of current) can also generate expanding rings of light overhead, at the base of the ionosphere, a plasma layer roughly 85 km above Earth's surface. These 'airglow enhancements', first recorded by a camera aboard the space shuttle *Discovery* in 1989, appear when a fast change in the electrical current generated by lightning produces an electromagnetic pulse (EMP). When the pulse intersects the base of the ionosphere, it transfers energy to free electrons in this plasma. The energized free electrons can then excite electronic transitions when they collide with atmospheric molecules. As these excited molecules relax again to lower-energy states, they emit a wide-frequency spectrum of light in a process known as fluorescence; in particular, some nitrogen molecules will emit UV light. Read more about this mesmerising phenomenon here: (Source: *EoS Buzz Newsletter*, June 2020)

<https://tinyurl.com/yaw2hlmn>

A PLAY ON RADIO: On 5th June 2020, the city of Chelmsford celebrated its status as *The Birthplace of Radio*, 100 years ago today with a special live stream of a new play about the Marconi Company tests of 1920. Britain's first-ever radio entertainment broadcast took place on 15 June 1920 and featured two arias by

The Palomar City Radio

CityRadio, designed by Emanuele Pizzolorusso for Italian design brand Palomar, allows you to access local radio around the world, with a simple – and satisfying – click of a physical button. It's a contemporary re-imagining of radio's early history, where city names were displayed to identify frequencies. As travel looks to remain restricted for the time being, get your multicultural fix through the airwaves. Of course, you can go online and access local radio anywhere fairly easily.

However, for Pizzolorusso, there's a certain romanticism to, and interconnection with, the act of listening physical object. "In my childhood home there was an old portable radio, one of those appliances that had the names of several European cities on the tuning dials – a feature from the time when one could still listen to stations from foreign countries," explains the Italian designer, who is based in Helsinki. "The list of those places, which to me as a child appeared so mysterious and exotic,

stimulated my imagination and gave that ordinary forgotten object a deep sense of magic."

The *CityRadio* is different from all existing radios because it offers a listening experience *organized by city*. Its 18 interchangeable keys with city names activate the radio stations of those cities in real-time. By acting directly on the keys of Nairobi or Paris or Rio, you can immediately connect to the LIVE radio stations of those cities and select and store your favourite radio frequencies. To use The *CityRadio*, it is necessary to download the specifically developed App, which allows you to connect the radio to the Internet and to configure and modify the selection of cities. The streaming flows of over 60,000 radios are ensured for quality and transmission speed by an exclusive agreement with one of the most accredited streaming flow providers in the world.

(Source: *Palomar, Wallpaper, SWling Post*)
<https://tinyurl.com/yavu6d6x>
<https://tinyurl.com/y7y9pz4x>



Australian operatic tenor Dame Nellie Melba, one of most famous singers of the late Victorian era. The broadcast from the *Marconi Factory* was heard all over Europe and was picked up as far away as Canada. To mark the milestone, *Chelmsford City Theatre* streamed the radio

play *The Power Behind the Microphone: The First Live Radio Entertainment Broadcast*. This was about the original broadcast. The play, which was co-written by Felicity Fair Thompson and Tim Wander, is an original production by the theatre, many months in the making, and it was brought together by the creative team during the lockdown. It was originally intended for the stage of the Civic Theatre, in a week-long production, as part of *Essex 2020* – a festival of science and creativity in the county, and it is part of *Marconi Centenary* celebrations in Chelmsford throughout 2020.

(Source: *RadioToday*)

<https://tinyurl.com/ydg9e97s>

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SDRPlay Plugin for DX Cluster Display

SDRplay, makers of the RSP family of SDR receivers are about to release a plugin for their SDRUno software, which will display DX cluster callsigns on their spectrum display. SDRUno already provided band buttons whereby you can press, say, '20m', and the software takes care of all the background work to present you with exactly 14.0 to 14.35MHz fitting in the main spectrum display window. Now, with the new plugin, you can overlay the DX cluster callsigns as they pop up. There is a choice of how long you let them display, and you can control how they appear. A DX cluster is a network of computers, each running a software package dedicated to gathering, and disseminating, information on amateur radio DX activities. The computers comprising the

network are called nodes, and the network itself is called a cluster of nodes. The nodes may be connected either via radio links or through the internet. Internet nodes generally connect using the telnet protocol. The system acts as an aggregator of information, accepting input from various sources, then making that data available to any user who is connected to the network. The RSP family of SDR receivers range in price from around £100 to £240. They are available directly from SDRplay Ltd., or Martin Lynch & Sons, Moonraker, Nevada, Radioworld, SDR-Kits, and Waters & Stanton. Full details can be found on the SDRplay website (The image shows SDRplay's DX Cluster plugin displaying 20m callsigns).

www.SDRplay.com

SDRKits VNWA 3SE

SDRKits have just launched the new VNWA 3SE – a fully-automatic, two-port Vector Network Analyser (VNA). Offering the same dynamic range and measurement capabilities as the original VNWA 3 model, the 3SE also incorporates a two-port switch, which allows forward and reverse S11, S12, S21, and S22 measurements to be taken with a single key click. The SMA version is available from the SDRKits webshop now, with an N-connector version to follow soon. SDRKits will also shortly offer Upgrade Kits, so existing VNWA 3 owners can upgrade their units to automatic two-port functionality. Detailed specifications can be found here:

<https://www.sdr-kits.net>

WSJT-X 2.2.2 Update Released

The digital modes suite WSJT-X version 2.2.2 has been released. This update is a bug-fix release. The primary change is to incorporate the new Radio Amateurs of Canada (RAC) Prince Edward Island (PE) Section PE into the FT8/FT4/MSK144 contest mode for ARRL Field Day. Operators planning to be on the air for Field Day should upgrade to this version to enable accurate logging. Another change is as follows: The FT8 decoder has been sped up in 'normal' and 'fast' modes. This offers a decoding speed closer to that of version 2.1.2., without compromising the number of decodes. It is particularly targeted for slower, single-board computers, such as the Raspberry Pi Model 3 or similar. Moreover, the DX grid field now clears automatically whenever the DX call field is changed.

(Source: Colin Butler, ICQ Amateur/ Ham Radio Podcast, 28th June 2020)

<https://tinyurl.com/yaytakyp>

A Journey into Microphone History

This is truly a labour of love. Marco van der Hoeven's Witnesses of Words – how 20th Century Microphones made history is a richly-illustrated compilation of those beautiful microphones, which have been there to record some key personalities and events over the last century. Publisher Red Tape Productions presents the first edition of a reference work about more than 400 vintage microphones. Many of them played an important role in the twentieth century. Not only the radio and television microphones but also those designed for specific purposes; as for aerospace, for use in full, noisy stadiums or built into a watch for espionage. All microphones in the book are coming from the unique collection



of the author, Marco C. van der Hoeven. Often they are still functioning and in great condition. The type that was used by Albert Einstein, the microphone Fidel Castro used for almost all his

speeches, the custom made models for the East German leaders, down to the two microphones which were always used by Adolf Hitler – he wanted one next to his foot to add audible thumps to his words. The writing of the book took more than six years. In addition to detailed descriptions of the microphones themselves, the book contains beautiful press photographs, advertisements and posters, leaflets and many anecdotes, plus a reference to the original sounds they captured. These sound bites will be available at a forthcoming exhibition about the book and Marco's collection. The book has 136 pages, size: 300 x 240 mm, weight: 1200 grams. Retail price is €27,95. The book can be ordered on eBay, or through this website:

www.witnessesofwords.com

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Radio News

VOLUNTARY REDUNDANCIES: The BBC Director-General Lord Hall has announced plans to allow any member of staff in the public service part of the corporation – including radio – the chance to ask for voluntary redundancy. In a briefing to staff, he highlighted the need for an extra £125m of cash savings to be made to budgets this year and said that more than a third of the BBC's costs relate to its people. He said he hoped offering the chance of voluntary redundancy would mean the BBC doesn't have to make compulsory redundancies further down the line. Lord Hall is himself due to leave the BBC later this year, with former Director of Audio & Music Tim Davie taking over as Director-General in September. Staff will be able to register their interest in taking redundancy from tomorrow (Thursday) for six weeks. It is understood the scheme will be open to all public service employees based in the UK and at all levels. There would be no guarantee the request will be accepted, and any redundancies will be based on business need. Divisions including BBC News had already announced plans to make cuts and the closure of some jobs as a result. Many of those cost-cutting plans were paused during the coronavirus pandemic but are now being re-started. (Source: BBC, Radio Today).

<https://tinyurl.com/y764huze>

10-YEAR RENEWAL FOR ANALOGUE COMMERCIAL RADIO LICENCES: Analogue commercial radio licences due to expire in the next couple of years will be given a 10-year extension under new government plans. During a consultation, the Department for Digital, Culture, Media and Sport had originally proposed either 5 or 8-year extensions, but in light of the Coronavirus pandemic's impact on commercial radio revenues has decided to offer stations an extra 10 years. The stations will still have to commit to a digital future by being on a national, local or small-scale DAB multiplex in order to automatically receive an extra decade on their analogue licence. Just over 40% of UK radio listening is still to FM and AM stations, but DCMS says current trends suggest that analogue could account for just 10% or less of listening by the end of this decade. The three national analogue commercial radio services – Classic FM, talkSPORT and Absolute Radio – went on air in the early 90s and had their licences renewed for the first time in 1999/2000 before benefitting from subsequent renewals. Under the 2010 Digital Economy Act, the licences were renewed for another 7 years and then a further 5 years following additional legislation. They're all now due to expire in early 2022. Analogue



local commercial radio licences currently benefit from a 5 or 7-year licence renewal if they commit to being available on digital radio, and can be re-awarded the licences unchallenged in most cases. Minister for Media and Data John Whittingdale said: "As we move into an increasingly digital world we're making sure the licensing landscape for radio is fair and up-to-date and allows audiences to enjoy a wide range of high-quality stations. Today's step ensures there is no disruption for loyal listeners of treasured FM and AM radio services such as Classic FM, Absolute Radio and TalkSport over the next decade. We will soon be turning our attention to providing similar long-term certainty to support the future growth of digital radio." The announcement by DCMS has been welcomed by commercial radio trade body Radiocentre, which says failure to make this change could have cost the radio industry many millions of pounds in direct costs to prepare multiple bids for local licences and the auction of national licences. Siobhan Kenny, Radiocentre CEO, stated: "Commercial radio is facing a tough time at the moment, with advertising revenues being hit by the pandemic. These measures are welcome as they will offer a degree of stability and certainty, enabling radio stations to plan for the future rather than face the cost and distraction of multiple licence renewals." The legislation to amend the Broadcasting Act 1990, to enable Ofcom to renew these licences, will be laid in parliament shortly, and then the government will move on to consider the future of national and local DAB multiplexes. It says it will consult on changes to extend multiplex licences by the end of 2020. Ofcom is also due to begin advertising small-scale DAB multiplex licences

from September 2020. The changes announced today only affect analogue commercial radio services – digital radio and community radio are subject to different licensing arrangements. The Digital One national commercial radio multiplex's licence is due to expire in 2023.

(Source: Ofcom; DCMS Consultation Response)
<https://tinyurl.com/yba3hy9d>

BEREAVEMENT HELPLINE: Commercial radio stations across the UK are supporting a new charity with airtime and help in kind. The National Bereavement Partnership COVID-19 Hub has been set up to support frontline NHS & care workers who have been working under exceptionally stressful conditions and bereaved families who have been unable to grieve properly because of the dislocation of normal processes caused by the crisis. The Board of Trustees includes Sam Phillips of Omnicom, and Steve Orchard, Chief Executive of *Quidem*. Radio and TV broadcasters and Outdoor companies have donated inventory to support the new charity and a campaign of TV and Radio commercials voiced by Classic FM's Alexander Armstrong and 5 Live's Nihal Arthanayake launched last week. Steve Orchard commented: "Radio has been developing a crucial role in encouraging initiatives to support positive mental health. Radiocentre's recent research shows the importance of radio in providing company and keeping listeners 'in the loop'. A consequence of the pandemic is a burgeoning mental health crisis and I am deeply appreciative of the support my colleagues at Commercial Radio stations across the UK are giving to the Covid-19 Hub." (Source: NBP Covid-19 Hub)
<https://tinyurl.com/y9b27p28>

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The Voice of Hope

Scott Caldwell pays tribute to the remarkable life of Vera Lynn by focusing on her radio work and her role during WWII – Arguably her Finest Hour.

Scott Caldwell

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The year 1940 was a bleak time for the British Empire: France, her main European ally, had been decisively defeated and overrun by Nazi Germany. The British Expeditionary Force (BEF) was now fighting for its very existence and retreating to the only free channel port at Dunkirk.

The British Broadcasting Corporation (BBC) attempted to unite the nation behind her armed forces and Dame Vera Lynn (CH DBE OStJ, 1917 - 2020, Fig. 1) became one of the leading proponents of its broadcasting campaign. It is inferred that the BBC's wartime aim was, "to maintain national unity and to secure the nation's morale".

Vera Lynn was exposed to the influence of music from an incredibly early age, largely due to her family who were enthusiastic singers and performers. She recalled frequent participation in sing-along parties at home, visits to professional music halls, and active performances at Working Men's Clubs. This experience was essential in developing her skills in delivering sincere and loving messages to armed forces personnel.

The 'Force's Sweetheart'

Her rise to national prominence was quite remarkable. By April 1940, Lynn had been voted as the BEF's favourite singer, well ahead of Deanna Durbin, Judy Garland, and Bing Crosby. Soon the BBC was deluged with letters from servicemen requesting for her to sing their favourite song over the airwaves. To capitalise, on her popularity, she was given her own show, entitled *Sincerely Yours*.

This was broadcasted on Sunday evenings, directly after the nine o'clock news bulletin, a primetime slot. Lynn stated that *Sincerely Yours* was, "a letter to the men of the forces from their favourite star. News from home in words and music". She recalled her unique style of presenting



the programme: "Although we did the programme from a studio, I always tried to imagine myself singing and talking from my own home. Addressing myself not to an audience in the conventional sense, but scattered individuals – an intimate conversation, but to a couple of million people".

She utilised her unique broadcasting qualities, a reassuring voice, sympathetic persona, and sentimental repertory. This is best exemplified by her broadcasts from

hospitals and nursing homes that offered hope to the families of injured servicemen, especially when considering the isolated plight of servicemen from remote parts of the British Empire.

It is widely held that the Second World War transformed Lynn's career from a top-ranked dance band singer to hybrid wartime icon. She received over 1,000 letters weekly, guarantying a second series, in addition to her touring schedule and filming commitments.

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However, her sense of national duty forced a change to her schedule, enabling the production of a second series that ran in six parts from February to March 1942. *Sincerely Yours* was built around the presentation of Lynn as a nice girl, rather than a performer of sexy songs. Lynn recalled her role as a “believable girl-next-door, big sister, and universal fiancée”.

The wartime media soon picked up on this and dubbed her as the radio girlfriend that delivered comfort and love to the serving armed forces. Lynn closed every programme of *Sincerely Yours* with the song that has become synonymous with the struggles of war: *We'll Meet Again*. This song was recently utilised by the Queen during her public address about the nation's current struggle with the impact of the Coronavirus.

Comfort, Communications, and ‘Crooner-Bans’

She also instructed her listeners to facilitate in more communications with their loved ones: “How often do you write home, and what sort of letters do you write? Here's an idea: next time you write home to your wife, just for once, forget all about the grouse things. Write about the things that have cheered you up and made you smile. That will cheer her up enormously because her moods and her whole day's happiness depends upon your letters and what they tell her about you. And when you've written that cheerful letter, just you notice how it's cheered you up, too”.

Lynn readily acknowledged that radio was central to the success of her career (Fig. 2) and suggested that, “Live broadcasting over the BBC was for me the link, the point of my most intimate contact with the people”.

In 1944, Lynn joined the Entertainment National Service Association (ENSA) and continued her hectic touring schedule and spent the entire spring and summer performing for armed forces personnel stationed in Egypt, India, and Burma.

Dame Vera's ‘unabashed sentimentalism’ featured heavily in her performances on *Sincerely Yours* and did receive some criticism, concerning what was seen as her ‘over-the-top emotiveness’, which was considered, by some, to conflict with the goal of maintaining discipline in the military and civilian sectors.

This kind of argument was then universally referred to as the ‘crooner ban’, representing a campaign to regulate

broadcasts, subject to performers' sexuality, gender, class, and emotional expression, for a nation that was engaged in total warfare.

However, the dominant view from the armed forces prevailed, and it was concluded that *Sincerely Yours* represented a welcome form of ‘escapism’ for a country that was entrenched in a long-term form of total war.

The entertainment industry also defended her presentation style. For example, a radio critic in *Melody Maker* concluded that “the bulk of requests sent in by soldiers of the Eighth Army to the Overseas Service were for sentimental tunes, with recordings by Miss Vera Lynn specifically and predominantly asked for”.

The Issue of Image Rights

Lynn's distinctive voice and national popularity made her a significant marketing asset and fair game for a variety of impersonators. In early 1945, she decided to act against impersonators who capitalised on her image in both variety acts and radio programming. The BBC supported her request by stipulating that impersonators obtained her consent before initiating her in their programming (Fig. 3).

After the Second World War, Dame Vera Lynn continued her long-term association with the BBC. In 1955, she began working on a television series, *Vera Lynn Sings* (1955- 1959). In later years, she regularly performed her inspiring wartime songs to popular public acclaim.

Her last live performance took place outside Buckingham Palace in 1995.

Conclusion

The early military setbacks created a great need for popular entertainment to boost the morale of both the armed forces and the civilian home front. Thankfully, the BBC had the foresight to utilise the unique personal talents of Vera Lynn and laid the foundations for peacetime popular entertainment, similar to what we all enjoy today.

Later on, in her 1975 autobiography, Lynn expressed almost an ambivalence about her close association to the war and her subsequent popular image. Britain's spirit and will to continue the fight against Nazism was not broken by the more than 50 nights of continuous bombing during the Blitz, nor by the later V1 and V2 rockets, which were equally as terrifying.

Dame Vera Lynn was a beacon of hope.



Further Reading

- Lynn, V. (1975) *Vocal Refrain: An Autobiography* (W.H. Allen)
- Lynn, V. (2009) *Some Sunny Day* (Harper Collins)
- Lynn, V. and Lewis-Jones, V. (2017) *Vera Lynn Keep Smiling Through*. Century: London
- Studdent, W. (2018) *The Jazz War*. (2018) *The Jazz War*. I.B Tauris: London – New York. [Reviewed in *RadioUser*, July 2020: 12 – Ed.].
- Todman, D. (2020) *Britain's War: A New World*.

Radio Choices, Fast Food, and Cultural Diversity

David Harris

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David Harris examines a book on broadcasting categories, in which the author compares the formats of broadcasts in the US and UK and investigates the cultural and commercial reasons these are chosen.

Paul Rusling is no stranger to the pages of *RadioUser*. Many readers will have enjoyed his magnum opus, *The Radio Caroline Bible* (*Radio User*, December 2019: 18). He has also provided a valuable history of pirate station *Laser 558* in the book, *Radio Adventures of the MV Communicator* (*Radio User*, January 2017: 36). This was followed up by *Laser Radio Programming* (*RadioUser*, June 2017: 54).

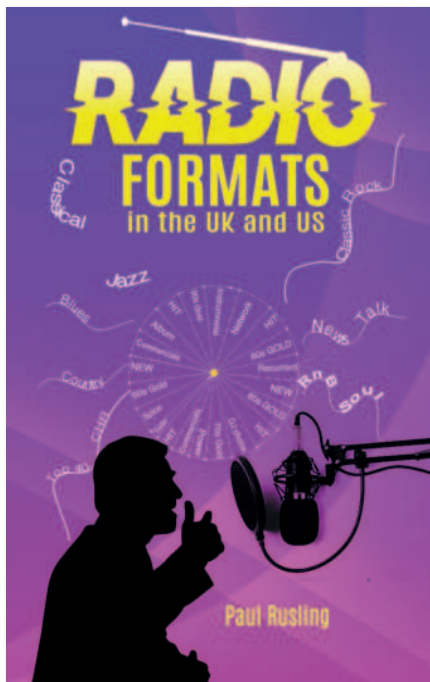
Radio Formats in the UK and USA is a serious attempt to study the output of radio stations. All stations have a format, although some may be looser than others.

Radio station output can be divided into two major categories: *Speech* and *Music*. These, in the case of talk formats, can be sub-divided into genres such as *News*, *Talk*, *Sport*, *Drama* and *Religion*. Music may have the most formats but the most common are: *Pop*, *Soul*, *Rock*, *Country*, *Classical* and *Jazz*.

In the USA, with its light-touch regulatory regime, stations are free to choose their formats, and many will change formats to accommodate changing listener taste or to try to find a new market. In the UK, commercial radio was strangled at birth by massive over-regulation, which attempted to prescribe exactly what a station should broadcast.

Although regulation has eased in recent years, UK stations are still held to their 'key commitments', which limit flexibility. This is in marked contrast to the press, which is free to publish whatever they want providing it is factually correct and openly obtained.

Rusling is very clear that commercial radio is all about advertising, and that stations have to find formats that attract listeners to sell advertising. This, it seems,



Radio Formats in the UK and USA
by Paul Rusling. 2020. World of Radio.
Pbk. 100 pp. £9.99.
ISBN 9781900401227
www.worldofradio.co.uk

has led to a 'race to the bottom', in which the majority of commercial stations all play the same dreary pop music. In some parts of the UK, it is possible to listen to up to 100 stations on DAB.

However, scrolling through a list of DAB stations is not an exercise in cultural diversity but rather more like binging on 'fast-food'.

Paul explores different foundations of formats. These are: *Style* – the type of music played; *Period* – the decade/s the music is from; *Activity* – whether the music is loud or mellow; *Sophistication* – is the music populist or aimed at an intelligent listener.

The idea of radio formats originated in the USA. Here, in the early days, stations were offering a general service to all listeners. The first distinct format to arise was *Country* music which is still the most popular format in the USA with around

10% of all stations playing this music.

Formats took off after the pop music explosion of the early 1960s. The teenage market for pop music was satisfied by top 40 pop stations. As the music matured, new genres appeared such as *AOR* (*Adult Oriented Rock*), which was album-based. In the USA, *News/Talk*, *Adult Contemporary* (Pop from 10-20 years ago), *Country and Pop* (Top 40) are the most popular formats.

Paul writes about the growth of commercial radio in the UK. It arrived in 1973 but was never allowed to fulfil its potential. Initially, commercial stations had to be local and independent.

However, high operating costs led to consolidation, with most commercial stations in the UK now owned by just three big groups: *Global*, *Bauer* and *Wireless* (part of the Murdoch media empire).

Classic FM proved that a niche station targeting an intelligent audience could succeed. *TalkSPORT* is a further example of how aiming at a specific audience can attract listeners. However, these are rare models, and the bulk of commercial radio, the *Capital/Heart/Smooth/Absolute/Kiss/Magic* 'identikit-stations' offer a dreary listening experience.

The second half of Paul's book is taken up with an appraisal of over 100 distinct formats. *Americana*, *Bhangra*, *Children's Radio*, *Christmas stations*, *Jazz*, *Latin*, *Lounge*, *New Age*, *Reggae* and *Urban* are just a few of the kinds of music the explores.

This book is part of a proposed series of six radio books from Paul. Other titles in preparation include books on *Broadcast Licencing*, *Radio Studio Equipment*, *Radio Transmission*, *Audio Processing*, and *Radio jingles*. I certainly look forward to reviewing these titles for *RadioUser* readers.

In conclusion, Paul has written a very thorough, well-researched book, which comprehensively explores the subject to radio formats.

This title should be read by everyone who works in radio or who is studying broadcasting.

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- dPMR / C4FM / AMBE+2 Tier 1 only
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We are pleased to announce the introduction of the long awaited AR-5700D professional communications receiver. Very much aimed at serious monitoring for commercial and government applications, it will also appeal to advanced listeners and ham operators who want a receiver that will handle almost any mode on any frequency. A bold claim that the AR-5700D has achieved. Whether the mode is digital or analogue, there is little that the AR-5700D cannot decode. It is also PC friendly with SDR capability, video decoding and up to 2MHz panoramic display. And of course you get Japanese engineering and reliability. We list some of the many features on the left.

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The brand new IC-R30 covers 100kHz to 3.3GHz and as well as the analogue modes, also decodes D-Star. A lovely big screen with loads of memory capability, built in recorder and long battery life with USB charging facility.

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A Keystone of British Maritime Communications

David Harris

mydogisfinn@gmail.com

David Harris reviews a thorough new history of the Portishead marine radio station, which looks at the key services, staff and technologies of the station, and at its development and place in communications history.

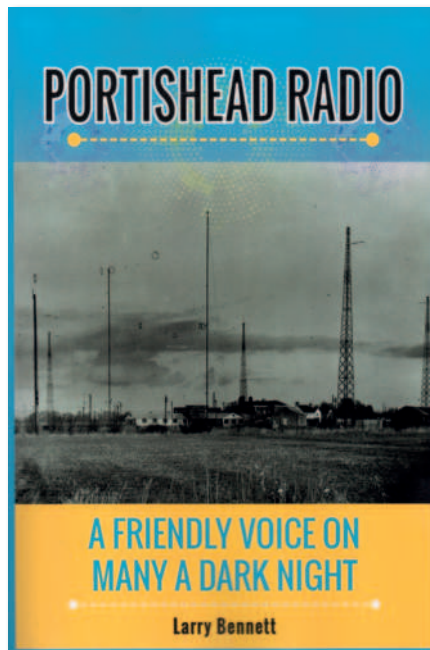
This book is a wide-ranging history of Portishead maritime radio station, which provided global ship-to-shore communications from 1920 until its closure in 2000.

The book begins with a useful chapter on the history of coast signal stations, beginning in 1795 with the establishment of semaphore stations along the South coast of England. Lloyds took over the stations in 1888, which were then linked by wireless telegraphy. In 1903, Marconi established the first coast radio stations around the UK which were acquired in 1909 by the Post Office.

Portishead Radio began in 1920 in Devizes, Wiltshire, where a 6kW transmitter was installed. In 1925, a new receiving station was built at Highbridge, Burnham on Sea, Somerset. The transmitters were located at Portishead, near Bristol. The station was always known as 'Portishead Radio', although most of the staff were based at Highbridge. By 1930, short wave was beginning to replace Long Wave as the preferred means of long-distance WT communication.

During the Second World War (1939-1945) commercial traffic to and from ships ceased, and Portishead focused on receiving distress calls and on Admiralty traffic. Commercial traffic to merchant ships was quickly resumed after the war; by 1949, some 10 million words (most telegrams were very short) had been handled by Portishead operators.

In today's world, we take it for granted that you can directly contact anyone, anywhere in the world by telephone, text, email or video (via the internet). Yet, until the end of the last century, communications with ships were facilitated by coastal stations broadcasting traffic lists of ships names. Many DXers will remember these never-ending lists of names



Portishead Radio. A Friendly Voice on Many a Dark Night

Bennett, L. (2020) New Generation Publishing
Pbk. 322 pp. £9.99
9781800318960

www.newgeneration-publishing.com
www.portisheadradio.co.uk

and call signs being broadcast by coast stations around the world. For a ship to send messages they had to try to contact a coast station, such as Portishead and were then given a 'turn number', having to wait until an operator was free to receive their message. Until GMDSS came into being in 1999, merchant ships carried radio officers.

By 1957, the LW W/T service had ended; eight years later, radio telex services began to be introduced to ships. By 1971, the writing began to appear on the wall with the first trials of satellite communications, and in 1979 the transmitters at Portishead had closed and were replaced with remotely operated facilities at Ongar, Leafeld and Rugby.

Portishead Radio was a largely male domain, populated by skilled operators, many of whom would spend their whole careers in maritime communications. This world began to change in 1976 when the first female

radio offices were employed. Women also began to be employed as radio officers on ships from 1970 onwards. Marine communications were still flourishing in 1979, with 260 staff being employed by Portishead Radio. Satellite equipment was very expensive and was slow to be introduced into ships.

Portishead Radio played a big role during the Falklands War in 1982, by providing communications with the merchant ships that were requisitioned to support the task force.

As the 1980s progressed more use was made of telex services, and Morse W/T went into decline. It was as late as 1995 that the last Morse message was received by Portishead from a British ship that was only equipped with W/T. By 1997 there were only 30 Radio Officers left at Portishead, and the station finally closed in 2000.

There is also an interesting chapter on how Portishead operated an aeronautical air-to-ground radiotelephone service from 1983 to 2000. The book contains annexes containing brief histories of other maritime radio stations. This book is essential reading for anyone who worked as a ship's radio officer. It is an important, and richly-illustrated, text that provides a comprehensive history of many aspects of British maritime communications. The title also paints a vivid picture of a way of life in a pre-computer, pre-internet, pre-satellite world that has now long vanished.

The book stands out because it has been researched extensively and in great detail. It has an index of the radio stations referenced, and it benefits from the use of a large number of original resources, eyewitness testimonies and anecdotes, including on station cats, daring rescues, and even messages to Mars. This is a very detailed history of the station, accessibly written, hugely entertaining and full of fascinating detail.

The title can be ordered via Amazon, Waterstones, and other online retailers. Customers from overseas should contact the author first to ascertain postage rates, as the payment link (below) only works for UK orders. Signed copies can be obtained via the Portishead Radio website:

www.portisheadradio.co.uk

Visit our Book Store at www.radioenthusiast.co.uk

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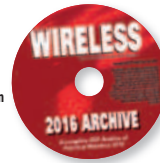
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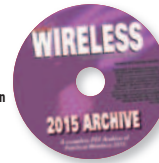
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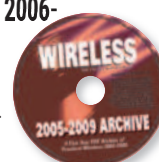
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A Grumman Bearcat at Duxford

German Long-Range Drones and Farnborough Airport

David Smith
dj.daviator@btinternet.com

David Smith reports on trials for the integration of drones with conventional traffic in German airspace.

Droniq, a joint venture between DFS, the German air navigation service provider, and Deutsche Telekom, has launched the first fully operational traffic management system for drones in Germany. This means that unmanned aircraft systems (UAS), can be safely integrated into airspace, making

commercial drone flights over long distances possible at last.

The system has been validated and tested for robustness. To date, the UAS Traffic Management (UTM) system has been used to successfully complete more than 50 long-range flights, covering a flight distance of around 2,350km. The UTM service combines the tracking and control of drones via LTE with the live transmission of video, image or sensor data – a unique service in the current German drone market.

To make drones visible to the UTM system, Droniq has developed a hook-on de-

vice (HOD). This matchbox-sized LTE modem transmits the position of the drone and its identification to the UTM via the cellular network. It also receives the positions of the surrounding traffic and feeds them into the UTM's live air situation display.

Besides, all general aviation pilots in the vicinity of the drone automatically receive a warning directly in the cockpit – even if they do not use the UTM service.

Thanks to its low weight and minimal power consumption, the hook-on device can be attached to any aircraft.

<https://droniq.de/en>

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Temporary Danger Areas Over the English Channel

Until 30 September 2020, a Remotely Piloted Aircraft System (RPAS) will operate out of Lydd Airport, Kent, to carry out operational flights for Maritime Surveillance in the area of the English Channel. As the aircraft will be operating Beyond Visual Line of Sight (BVLoS) and has no Detect and Avoid capability, some Temporary Danger Areas (TDA) will be established to facilitate the safe operation over the English Channel.

The TDA complex will be made up of six Danger Areas to facilitate the transiting and search areas of the RPAS. Only the required Danger Areas will be activated at once to allow for minimal impact to other airspace users.

Due to the operational requirement, less than 24 hours' notice may be given for the activation of the required areas of the TDA complex. While operating within the area of Lydd and the English Channel, where possible, it is requested that aircraft monitor Lydd Approach on 120.705MHz, London Centre on 121.500MHz, or London Flight Information Service on 124.600MHz, as TDA activations will be announced on these frequencies.

In normal circumstances, the TDA will be established from the surface up to 1500ft AMSL during daytime and 1700FT AMSL during the night hours. This month's second photograph of the *English Electric Lightning*, part of the *National Cold War Exhibition* at the Royal Air Force (RAF) Museum, Cosford.

ATC Profiles 23: Farnborough

ICAO Code: EGLF IATA Code: FAB

Frequencies	(MHz)	Hours of Operation
Farnborough Approach/Radar	133.440	Mon-Fri 0700-2200 Sat, Sun and PH 0800-2000
Farnborough Director	130.055	As directed by ATC
Farnborough Radar	134.355	
Farnborough Radar	125.250	Odiham Military Aerodrome Traffic Zone penetration
Farnborough Tower	122.780	Hours as above
Farnborough Ground	121.815	When notified on ATIS
Frequencies may close earlier than 2200 when no further aerodrome movements are expected.		
ATIS		
Farnborough Information	128.405	
Farnborough Fire	121.600 (non-ATC)	Fire vehicles attending aircraft on the ground
NAVAIDS		
ILS Cat I on both runways		
Nominal glide path 3.5° mandatory for all approaches, including non-precision and visual.		
HOLDS		
PEPIS, VEXUB, RUOMO		
RUNWAYS		
06 2440 x 45m		
24 2440 x 45m		

NOTES (A-Z)

Blackbushe

A portion of the Blackbushe Aerodrome Traffic Zone is within the Farnborough Control Zone and operates as a Blackbushe Local Flying Area (LFA). Aircraft operate within this not above 2000ft when in communication with Blackbushe Information on 122.305MHz.

Farnborough Radar

If Farnborough Radar is closed or is unable to provide a radar service outside controlled airspace, the Air Traffic Service Unit at the departure aerodrome will transfer the aircraft directly to the appropriate London Terminal Control Sector, and the pilot must request clearance to join controlled airspace. The appropriate London Control frequencies are 134.125MHz, for routes via CPT and SAM, and 133.180MHz, for routes via GWC.

Cat II/III Operations

Farnborough is not equipped for Cat II/III operations. However Low-Visibility Procedures are used to protect Cat I operations. Low-Visibility procedures will commence when the met visibility is 1500m or below and/or the cloud ceiling is 200ft or below.

Handling

Ground Handling for all visiting civil aircraft will be undertaken by Farnborough Airport Ops (131.865MHz) on North Apron. The use of this airport by scheduled passenger services, inclusive of tour charter flying and bulk freight flights, is prohibited.

Helicopters

Three helicopter aiming points are established at Farnborough: Heli Foxtrot, on that part of the 'F' taxiway between F3 and the entrance to West 2 apron; and Heli Bravo, at the intersection of 'A', 'B' and 'C' taxiways; Heli Yankee is at the centre of South 2 apron.

Frequency Monitoring Code

Pilots operating in the Farnborough LARS West area of responsibility, but intending to remain outside Class A to D airspace, and maintaining a listening watch only on Farnborough LARS West frequency, 125.250MHz, are encouraged to select SSR code 4572. Selection of 4572 does not imply the receipt of an ATC service. Pilots of aircraft displaying the code are not expected to contact ATC under normal circumstances. They remain responsible for their navigation, separation, and terrain clearance, and they are expected to remain clear of Class A to D airspace at all times. While squawking 4572, pilots should be aware that Farnborough Radar may make blind transmissions to ascertain a particular aircraft's intentions/route. When a pilot ceases to maintain a listening watch, code 4572 should be deselected.

Training

The use of the aerodrome for training is generally restricted to home-based aircraft; however, instrument training approaches by non-jet/turboprop fixed-wing aircraft with a maximum take-off weight (authorised) (MTWA) of not exceeding 5700kg may be accepted Mon-Fri 1000-1600, subject to the approval of Farnborough ATC.

Visual Circuit Procedure

All circuits on Runway 06/24 will be to the south of the aerodrome (i.e. Runway 06, right-hand circuits; Runway 24, left-hand circuits). For aircraft over 2730kg maximum take-off weight authorised (MTWA), the minimum altitude is 1,500ft above ground level until turning onto base leg. For aircraft of less than 2730kg, the minimum altitude is 1,000ft above ground level (AGL).

Visual Reference Points

Alton; Bagshot; Farnham Castle; Fleet Pond; Frensham Great Pond; Guildford; Hook; M3 Junction 3; M3 Junction 4; Tongham.

Warnings

Due to intense gliding activity, pilots should avoid flying within 2.5nm of Lasham Aerodrome below 5,000ft altitude. When available, Farnborough Radar will provide navigational assistance, as necessary. Danger Areas EG D132, EG D133A and EG D133B are within 3 nm of the Eastern aerodrome boundary. On approach to Runway 24, the 3.5° GP is mandatory, both for noise abatement purposes and to ensure safe clearance above Danger Areas EG D133A and EG D133B. Traffic carrying out instrument approaches to Runway 27 at Odiham will pass approximately 2.5 NM South of Farnborough aerodrome at 2000 FT QNH or lower. Oakhanger High-Intensity Radio Transmission Area (HIRTA) is situated 8nm south-west of Farnborough. Fair Oaks Airport is situated 9nm northeast of Farnborough; Fair Oaks departures may trigger TCAS warnings for Runway 24 instrument approach traffic.

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

Spy Messages and Number Stations (Part II)

In Part Two of his article, **Paul Beaumont** looks at some of the specialist receiving and decoding equipment used by spies, and he briefly surveys the contemporary number stations scene.

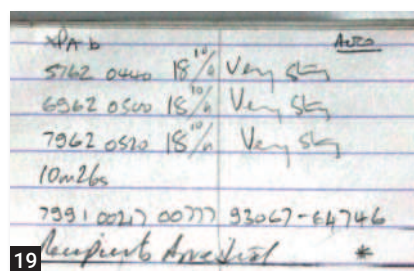
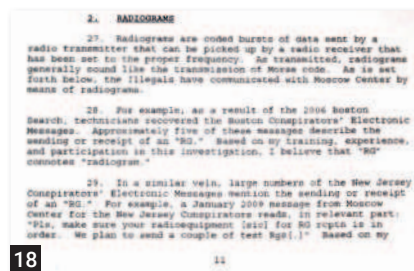
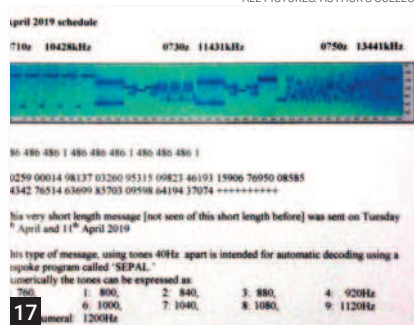
Paul Beaumont G7VAK
g7vak@yahoo.co.uk

Cuban voice and Morse transmissions are nowadays more likely to be heard as a preamble for RDFT (Redundant Data File Transfer), although direct interception on a local receiver and decent antenna is presently difficult, due to the poor propagation and the unabated, and rising, noise floor in the UK but try listening: Sunday/Monday/Wednesday: 0800z 9065kHz; Friday: 0800z 9330kHz. Polytone transmissions seem very noise-resilient. Consisting of a series of tones (in this instance separated by 40Hz, with zero nominally 760Hz and one being 800Hz, and so on, up to nine, which is represented by 1120Hz), the message text is sent in blocks of 64 five-figure groups. Each block is separated by seven tones with varying length and formed of 1000 and 840Hz tones of variable duration: 6262626 (Fig. 17).

Around 2002, and across one week, I was monitoring six different schedules; five sent at 10Bd, the other on Tuesdays and Fridays, usually weak, at 20Bd. The 20Bd transmission schedule disappeared after the arrest of Anna Chapman and her 'illegals' on 27th June 2010. The speed of exchange for Russian agents for the Chapman 'illegals' was extremely fast and included one errant Russian Colonel in the Military Intelligence [GRU] who clandestinely acted for MI5. His name was Sergei Skripal. As is well known now, he was later treated to a sample of the *Novichok* nerve agent for his betrayal of the Russian Federation.

In the FBI Affidavit concerning this 'illegals programme', it was noted that communication with Russia was by 'Radiogramma' which sounded almost

ALL PICTURES: AUTHOR'S COLLECTION



musical. Further information concerning the decoding of this complicated system was to be found in Germany in 2011 (Fig. 18).

Heidrun Anschlag sat at her receiver at 0440z on the 18th October 2011 in the kitchen of her Marburg house. As expected, and just two seconds late, the toggling tones of the Polytone station's tuning signal sounded. Listening through her earpiece, Heidrun adjusted the frequency to light the radio buttons on the screen displayed on the laptop computer

which, using the bespoke program 'Sepal', would display to the screen her message *en clair* after her security passwords were input (Fig. 19).

The message itself consisted of the expected schedule ident 799, produced from the 100kHz figure of the three frequencies in her schedule for that month: 5762kHz at 0440z, 6962kHz at 0500z and 7962kHz at 0520z. The ident is followed by several messages in the transmission - in this case, one - then the decoding key and the group count. The group count of this message was 777 and took 10m26s to send.

Heidrun never heard the message text being sent, as GSG-9 Special forces forced entry to her kitchen with such aggression that she fell from her stool, ripping the earpiece plug from its socket allowing the varying tone values to fill the room as the arrest was made. Some distance away, her husband Andreas was also arrested.

They were given six- and five-year sentences respectively for their espionage.

One has to ask if the Anschlags had been warned of matters unfolding.

Two British monitors travelled to East Germany on 10th July 2011 to carry out some intercepts from their hotel rooms. The location was notable. I was one of them, and I intended to measure the signal strength of XPA schedule B (Tuesday/Thursday, July frequencies: 0440z 9287kHz, 0500z 10487kHz, 0520z, and 11487kHz (Fig. 20)).

Antennas thrown out of the hotel windows allowed excellent reception, and the target station provided very strong signals, much greater in magnitude to those heard in London.

The message details (with message text not shown) for Tuesday 12th and Thursday 14th July 2011 were 244 1 00559 00187 24675 [msg txt] 06516.

Fig. 17: Radiograms: This shows the message construction.

Fig. 18: Reference to Radiograms in FBI 'Illegals' Complaint.

Fig. 19: Author's log of message 18th October 2011. Note that final line!

Fig. 20: Author's East Berlin monitoring position, a few hundred metres from the old Stasi HQ (Normannenstrasse).

The message duration was 4m19s. The three administration groups here and the last group are shown only; 244 is the schedule ident taken from the 100kHz figure of each frequency in the schedule. '1' denotes the number of messages in transmission, while '00559' is the message serial number. '00187' is the group count, with '24675' being the decoding key.

Before August 2011, the group count was generally low to medium (60 to 190). In August, the group count rose to higher levels, notably 299, 363, 511, and finally 547 groups, recorded on 30th August 2011. There was also a sending with two messages, one with 77 groups, the other one repeating the previous sending of 511 groups (Fig. 21).

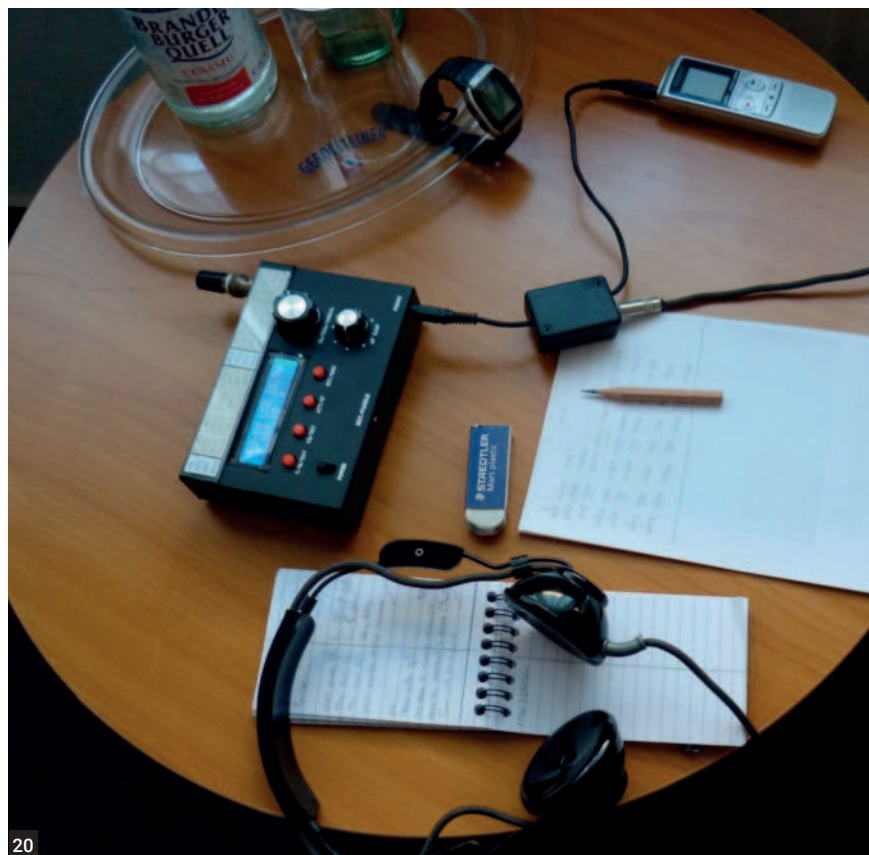
A Sign of Things to Come?

September 2011 saw a massive increase of group count with the first scheduled sending on Thursday 1st Sept sporting 817 groups, followed by 773, 689, 611, 963 for the next three transmissions. These were followed by three 'null' messages. The last two transmissions on 27th and 29th September 2011 being just 316 groups long.

In October 2011, it seemed that things had become desperate. The first transmission of Thursday 4th October had been missed, due to my train being cancelled, but the next one on Tuesday 11th consisted of 795 groups, followed by a massive two-message emission on Thursday 13th October. There were 145 groups in the first message and 795 in the second one [a repeat from Tuesday 11th October].

The message of Tuesday 18th October was a large 777-group message, taking 10m26s to send. It was during the first scheduled sending at 0440z 5762kHz that GSG-9 forcibly entered the Anschlag's Marburg home, arresting Heidrun.

Perhaps the best indication of problems occurred on 18th August when, among the sudden increase in group counts, a



267-group message, constructed somewhat differently, was sent. Apart from the usual header (formed from the 100kHz figures of the three scheduled frequencies) the decoding key and group count were displayed in another form. The decode key and group count were shown twice, and no zeroes were added to construct the five figures commonly seen in the Polytone series.

The ending was also strange; the ten repeats, usually displayed as plus signs, were completed by the addition of a last group (6666676) of seven characters (Fig. 22). Whether this transmission was a mistake, or whether it was specially constructed to send a warning, is not known. However, large group counts and repeated transmissions began after this, and they continued right up to the Anschlag's arrest.

Hambledon's Luminaire and Hacker's Plinth

In late June 2012, another high-level spy was arrested. His radio messages were sent in the early hours of Saturday morning, repeated the same time on Sunday as shown in Table 4.

The spy, a Dutch diplomat named Raymond Poeteray, was arrested boarding an aircraft at Amsterdam's Schiphol International Airport, as he attempted to leave for Vienna to meet his handlers.

Four USB thumb drives in a spectacle case were recovered from his person and found to contain copies of high-level military and political intelligence taken from the European Union and NATO. There were also files taken during his employment with the Dutch Ministry of Foreign Affairs. It was Poeteray who supplied the Anschlags with the secrets they sent to Russia. He received a sentence of 12 years.

Raymond Poeteray received no warning. His voice messages (Table 5) were transmitted in the early hours of Sunday at 0030 and 0130, for Summer and Winter at 0130 and 0230, repeated on Saturday. His Ident was 759, and his message group count varied between 30 to 50 groups, with no apparent change until the closure of those schedules on 16th June 2012.

Information, in the German news magazine *Der Spiegel*, suggested that the Anschlags used the same mode to receive their messages from Moscow Central



21

via short wave and had once been contacted by one of Anna Chapman's 'illegals' in the USA.

One has to ask why the sudden discovery of two spy groups and a single spy occurred as they did.

Enter Colonel Aleksandr Poteyev, the Former Deputy Head of Directorate S of the Russian Foreign Intelligence Service, now SVR. Poteyev ran 'illegals' in the United States, and probably elsewhere. He defected to the US on 26th June 2010. Chapman and her 'illegals' were arrested the next day.

The illegals, the Anchlages and Poeteray probably facilitated his entry to the US.

It was information from a Polish Diplomat (Michael Goleniewski, who was also a triple agent, supplying the CIA with details of a spy at the Royal Navy's Underwater Warfare Establishment) that did for the Portland Spy Ring, active 1955 to 1961, once the information was passed on to MI5.

But there have been others, involving radio.

Russian spy Professor Hugh Hambledon was arrested immediately after stepping from his flight from Montreal, Canada, to London Heathrow on 24th June 1982.

In his possession was a Grundig Receiver fitted with special filters.

Apart from the usual paraphernalia of the global espionage business, Hambledon carried a device called the *Luminaire* (Fig. 23). The signals were displayed on a numbered graticule from received serial tones.

I was privileged to see this device in a

828 828 828 1 828 828 828 1 828 828 828 1
543 267 543 267
69180 61112 66699 09505 67190 50303 10955 71908 41079 64859
49645 43315 56155 22376 01358 44419 14558 60893 58611 35238
26702 41375 67708 33r42 n0066 46651 45210 35386 23200 29432
75581 89129 79168 88845 00115 29966 40293 13888 19071 70289
99213 45935 53820 28445 84316 33981 81936 89142 75971 84206
n7152 06238 22059 02897 19000 75722 63877 67921 38238 55851
55402 77076 35702 99669 86860 29788 14822 64208 70394 55666
90840 75020 81063 99115 97559 6655n 22622 82696 30107 77396
63670 27571 87332 56028 68328 14522 36596 12433 67663 95714
2610n 63017 31637 1887519838 51316 25875 99655 30065 22972
n0077 55n37 21832 25374 92953 55251 17048 24527 93621 11486
24693 13552 49347 17605 00410 29649 48798 74114 19798 84386
93921 79741 63855 73736 77196 33780 29988 93935 51464 27363
89736 41588 88651 51276 13157 43162 58112 62294 16122 39598
01464 98974 04721 95406 05203 08720 65566 07970 8107n 22355
00408 72216 63740 35513 40309 77495 00849 50018 00212 88524
72065 88205 21967 23831 68542 43696 83044 49430 42834 62856
51698 48994 38877 33948 n6161 n5594 72847 56699 62379 84380
87114 42000 01899 37845 24050 18557 45584 23726 17250 08632
83993 91170 52628 68669 65377 22017 29500 07866 29995 88744
27954 24810 54193 32101 00570 92973 12849 62710 20805 27368
96402 66251 45081 63687 14596 70157 29268 51482 75116 89379
79651 16453 02738 n5921 90414 91993 n8489 17644 19186 99075
79826 59870 30555 88397 79456 85553 36579 01523 21463 22722
56066 82024 51438 57312 28725 08935 699r5 64672 49272 86875
553 36034 89832 55600 65700 78110 87228 20425 70293 58801

22

Fig. 21: Notably long XPA1 b schedule message for Heidrun Anschlag. Two-message format.

Fig. 22: Note 267grps. Would normally be 270grps 267+3 admin groups sent as 00543 00267 + dk. Letters appear where the decoding program has missed the numerals.

Fig. 23: Hambledon's Luminaire: Characters illuminate in graticule, top right, upon reception of satisfactory signals.

Fig. 24: Hacker Super Sovereign plinth.

Fig. 25: Homemade tone decoder wheel for XPA1 and XPA2 numeral manual decodes.

Fig. 26: XPA1 c 0750z 7th April 2020 486 1.

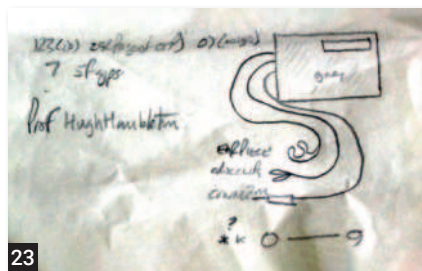
most private museum where photography is forbidden. What I did was to nip into the gent's and sketch the unit!

Next to the device was a screw-top, D-size, cell and a table lighter, both concealment devices used by Gordon Lonsdale and the Krogers.

I was to see one of the table lighters again at the London Science Museum's *GCHQ: Top Secret* Exhibition in their excellent *Portland Spy Ring* offering.

Hugh Hambledon had been of interest for some years to the Canadian authorities who requested that he be arrested and tried upon his arrival in Britain. However, the matter was more complicated; Hambledon had been offered up by another defector, Dalibar Valoushek, an 'illegal' originally placed in Canada.

Erwin van Haarlem, more correctly



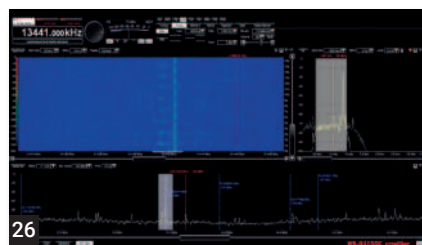
23



24



25



26

Václav Jelínek, who spied for the then Czechoslovakian StB, lived in Friern Barnet, North London in a first-floor apartment. He received his messages using MCW in the 49m band and sent by OLX, a well-known 'allo message sender. OLX even confirmed such transmissions by QSL card if sent a report by SWLs.

The receiver used by van Haarlem was a *Hacker Super Sovereign* covering SW frequencies in two ranges: 3500 to circa 10500kHz and 11000 to 28000kHz [10.9 to 33 metres and 27.5 to 89 metres] (Fig. 24).

A socket is provided for an additional wire antenna, and van Haarlem used an additional piece of wire, although he also extended the rod antenna. He favoured using an earpiece to copy his Morse message; on Saturday 2nd April 1988 he sat

on a stool in his kitchen receiving the coded text of a message with a group Count of 134, which started 92263 36148 44101 40683 73189 and continued to 09401, the 132nd group.

As he wrote down the next group, Special Branch personnel entered the flat with such force causing Haarlem to leap from his stool; his earpiece to fell from his ear allowing the officers present to hear the last characters of his message.

The British media stated that van Haarlem had been caught due to interference to a local *Neighbourhood Watch* member's TV set, causing white lines across the screen in concert with Morse characters. The inference was that van Haarlem's non-existent transmitter was causing this interference.

There was nothing further from the truth since van Haarlem had been handed over by the latest Soviet defector, Oleg Gordievsky.

Number Stations Today

Number stations messages still abound, not as aplenty during Cold War times but regularly. With the internet and its global reach, one has to ask why the system is

not used for this type of messaging.

The answer has to be the security of the user because – whatever is sent or received – can, of course, be tracked. Even when using methods designed to stop tracking, over time a full analysis can be made.

One only needs to look at the fate of Kendall and Gwendolyn Myers whose replies were known by the FBI agents who investigated this case.

Israel, the United States, Britain and other countries have all used radio transmission for encrypted transmissions to their agents overseas. So where have they gone?

I think the answer has to be the Broadband Global Area Network (BGAN) and Satellite phones.

Indeed, there have been arrests involving MOSSAD officers using disguised BGAN's, and Heidrun Anschlag using a Satphone for her returns.

If all that seems too technical, then one only needs to look towards Cuba's Ana Belen Montes who was the Head of the US Department of Naval Intelligence's Cuba Desk. She made her returns to Cuba utilising the US Pager system,

which was most efficient in this most unexpected use.

Monitoring Polytone Stations

In terms of my own monitoring today, my speciality is Polytone Stations, which I have followed for many years. There are different tones and different systems. At the moment, I follow only one schedule at 0710/0810UTC, repeated at 30 and 50m past the hour (Figs. 25 and 26). The transmissions are always very loud.

I also follow a certain English transmission at 2000/2100UTC repeated at 20 and 40m past the hour and the next day at 0430/0530 and 0450/0550 and 0510/0610. These transmissions are always very strong, no real antenna needed here. The message associated with the above image is reproduced in Table 6. As you read this, ask yourself if the intended recipient could live in your street.

For a listing of active number stations, you can check out the list at the *European Numbers Information Gathering & Monitoring Association (ENIGMA)*, who publish the comprehensive *ENIGMA2000 Newsletter*:

<http://www.signalshed.com>

GMT(z)	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
0030				6918	8099	8142	9061	7981	6874	6797		
0130	5796	5846	5879								5837	5796
0130				5133	6949	7608	7844	6953	5179	5122		
0230	4514	4817	4923								4583	4516

Table 4: Raymond Poteray's Radio Messages Schedule.

15 and 16th October 2011

759 620 31
05891 38747 36971 00608 87737 55794 73923 31803 12351 29352
42887 50790 69330 18595 11421 80751 83328 79088 56801 30106
89135 92676 62087 45049 99282 76539 72578 22461 18902 31757
48966
620 31 00000

22 and 23rd October 2011

759 210 34
50213 76370 56418 34231 92560 62380 86648 30328 17981 15248
85181 20834 93985 84025 29777 32023 14318 24323 07934 23627
63843 66490 76549 80893 47589 04600 25589 26671 19900 85916
44190 45685 74603 05548
210 34 00000

Table 5: Voice Messages for Raymond Poteray (15th to 23rd Oct 2011).

486 486 486 1 486 486 486 1 486 486 486 1

00111 00112 39100 36064 43180 60812 18994 50816 82220 34990
52942 74650 52763 07284 65727 64125 87056 78865 37367 15705
34078 31502 35928 81423 36723 02911 75764 54530 11632 81422
64300 30382 78264 77639 66108 72179 42900 05963 75099 94955
99305 70433 24160 41739 23329 00964 25790 26555 37053 74207
56524 39648 73230 54320 71070 45905 68650 88416 31129 15720
67688 62847 25446 10018

60852 31455 05768 07282 75181 95638 82647 74251 17480 39797
64561 79114 86381 02332 78527 03443 75706 98759 30990 70602
63629 20626 47931 09965 29342 26974 83709 29972 88111 04037
18346 15035 39930 53137 10122 59840 96565 78308 13060 47494
30507 32354 01061 20076 90646 61182 31074 46739 64379 48010
40613

Table 6: Message associated with Fig. 26.

Black Knight Shining Bright

Keith Rawlings

Keith.g4miu@gmail.com

Keith Rawlings reviews the Air Antennas 'Black Knight' Civil and Military Air Band Inflatable Antenna, before taking a look at the AN-SOF antenna simulation software suite.

As I live on the edge of East Anglia, I am well placed to receive ATC traffic from the military airfields of, Mildenhall, Lakenheath, Marham, and Wattisham, and I am also close enough to London to hear civilian traffic from all of the major airports, including Stansted, which is no more than 10 miles away.

However, right now when I stand outside there are no contrails in the sky, and there is very little aircraft noise. At night, all is silent with few 'winking' lights to be seen in the darkness. The radio is substantially quieter than usual. Such is the situation thanks to the COVID-19 outbreak.

This made me wonder if it was going to be a bit of a challenging to evaluate the 'Black Knight' (BN)

The BN is quoted as having a frequency range of 118-450 MHz and, what makes the BN quite different from other aerials is that it is inflatable (Fig. 1).

The Brains behind the BN belong to Tom Morris, GM3HNN. He originally developed an emergency aerial for the marine communications market, in a form that was similar to what is manufactured today.

From these origins, and after a lot of investment and prototyping, a Ham Dual Band aerial was launched and proved to be an instant success. Being waterproof, highly portable, and capable of taking up to 100W of transmitting power, it has been selling well ever since.

The idea of designing and producing an airband version came to Tom after speaking to some enthusiasts near to where Tom lives at Prestwick Airport. After discussing the various pros and cons of aerial types they explained how they required a portable aerial that was good enough for base station use but also portable enough to be taken to airshows and similar events.

As Tom explains this was his 'light-bulb-moment', and he developed the Black Knight, which he named after the mysterious satellite.



A Hands-On Aerial

The BN arrived in a small package, and after a suitable period of quarantine I opened it up to find the BN folded up within a small pouch (Fig. 2). The aerial unfolds to a length of 1.65m and is very light, weighing in at 400g.

Permanently fitted is a generous 6m length of RG174 coaxial cable connected to a BNC plug. For those that have SMA fittings an adaptor will be needed, but these are quite cheap and can easily be sourced online.

At the base of the aerial are a couple of Velcro 'straps' used to fold the aerial up and a plastic tube which is used for inflation/deflation.

My overall impression was that the BN is very well made.

I understand that it takes only a few puffs to fully inflate the aerial but I chose to use a worn-out bicycle pump and after four or five pumps the aerial was suitably 'rigid' to put into use.

Now I don't know why, but every time I get an aerial to review it seems to rain, and the BN was no exception!

However, it passed its first test. I can confirm that it is waterproof.

Tom comments that he gets the best performance from the aerial by suspending it from the eyelets at the top.

However, for me, it was easier to get going by attaching the BN to a fibreglass pole mounted on a tripod using the Velcro straps. This worked well until the breeze got up and,



being held as it was at the bottom, the BN understandably bent over.

This was easily remedied by moving the BN down a tad and tying the top in place with a spare bootlace.

This did the trick, and – despite some strong gusts – it stayed in position for the duration of my home tests.

As the aerial is very light and has quite a wide cross-section, on a gusty day it may need tethering at the top and bottom if suspended; otherwise, I suspect it may be blown about.

Reception Results

As Tom correctly points out, few aerials will remain resonant over the full spectrum of 118-450MHz. Since the BN is aimed at airband use, it has been designed for the most popular airband frequencies, the main

KEITH RAWLINGS

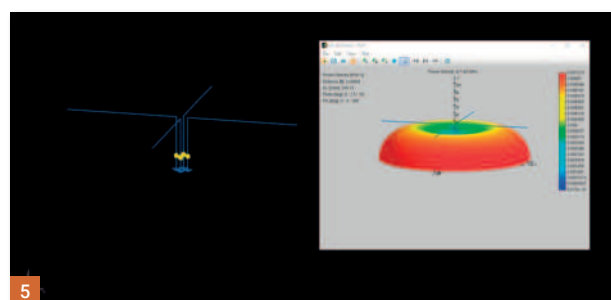
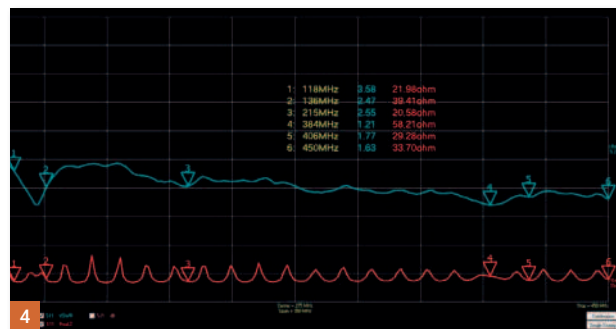


Fig.1: The Black Knight antenna inflated, with a camera bag. Fig. 2: Black Knight folded up, with a camera bag. Fig. 3: The Black Knight on a tripod mast at my 'test range'. Fig. 4: The Black Knight Standing Wave Ratio (SWR) and Impedance Plot. Fig. 5: AN-SOF medium wave broadcast aerial simulation. This demonstrates power density (above) and current distribution (below).

resonant points being at 127MHz (Civil Air), 223MHz (Military), 370MHz (Military), and 406MHz (Civil & Military).

I used my UBC125XLT for my tests. This is a popular receiver with many aviation enthusiasts.

Despite the lack of airliners, civilian airband was quite busy during the review period, and I found a lot of informal chatting going on between light aircraft and gliders with the ATC controllers at Essex Radar and Luton Approach.

With the base of the BN up at about 10 feet, I made comparisons with my discone which is presently at about 20ft. There was not a lot between the two on civil airband if anything, the BN was slightly better at receiving vehicles and aircraft on the ground at nearby Stansted.

I received traffic from all of my local Essex General Aviation (GA) airfields, as well as from those some distance away, such as North Weald (19 miles), aircraft in the circuit at Duxford (22 miles), and aircraft reporting overhead at Cambridge (30 miles).

On the military side of things, it was quieter. Nonetheless, I could easily hear aircraft working Lakenheath Approach on VHF inbound to Mildenhall, and then those same aircraft calling Mildenhall Tower.

On UHF, I caught Typhoons out of RAF

Coningsby on A/A, and also Typhoons off of the north Norfolk coast working with a Voyager tanker.

Also noted were some calls made to Swanwick Military, and I caught aircraft calling in to Cranwell and Marham approach and AAC Wattisham, not so far away.

Although not optimised for it, the BN caught a fair number of local PMR signals received on VHF.

On UHF PMR only the stronger local signals were heard.

However, considering the height and mounting location of the aerial, I would expect this.

I took the BN out along with the 125 to my 'test range' on a local farm. Not only was it easy to deploy, but it also worked very well indeed (Fig. 3). Transferred to a better location, reception naturally improved even further – and I found that I attracted some interest from others on the site!

Aerial Measurements

I ran a sweep of the BN while it was on the tripod mast, by using my VA5 analyser. I then interpreted the results on my PC using the DG8SAQ VNWA software. Compared with the supplied details as above, I found the measured minima as follows: 131, 215, 384, and 406 MHz. These figures are not

too far out, and there will naturally be variations due to the mounting and location of the aerial. The impedance of the aerial varied over the range, as could be expected. Near to the design frequencies, the measurement values improved. Overall, these figures are better than those presented to a scanner by a 'rubber duck' type aerial (Fig. 4).

Conclusions

The Black Knight performed very well, especially so, positioned as it was, just 10 feet up, and in a relatively closed-in area throughout most of the evaluation period.

Reception improved further when it was tested in the clear.

The BN folds down to approximately 10 inches; it is lightweight and easily transportable.

It makes a good choice for situations where an aerial needs to be put up very quickly, easily taken down, or moved to a better position.

It is also ideal for someone with restricted space or no permission for an aerial and it can easily be used within a loft space.

For those that sit by the fence at airfields, this innovative aerial will considerably improve the reception range over scanner top aerials.

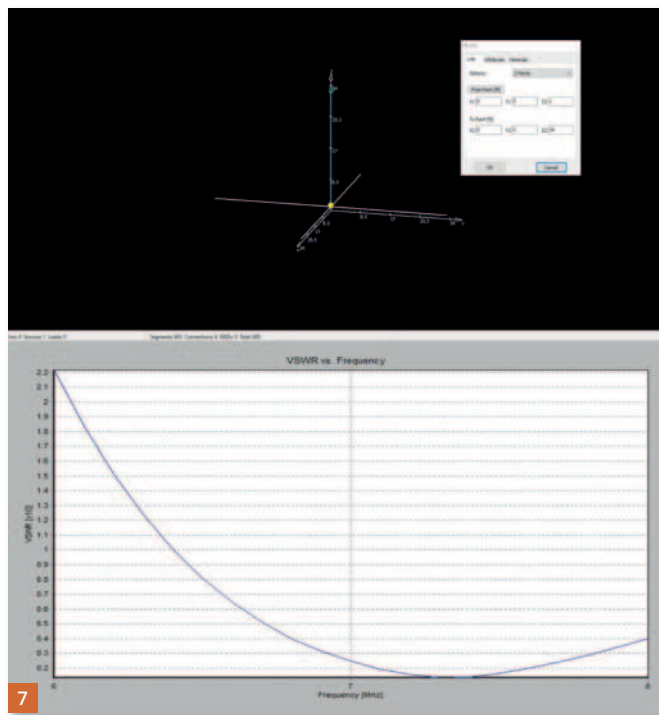
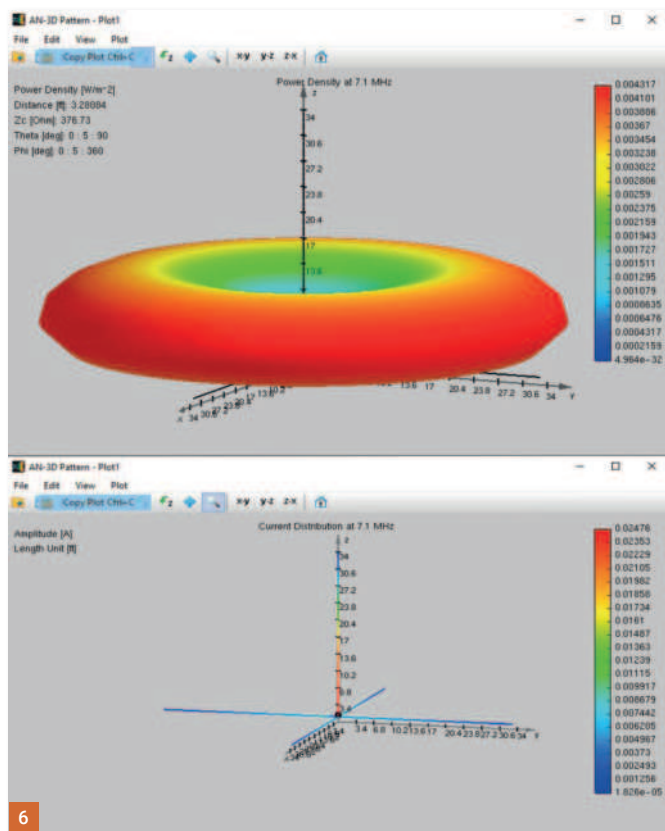


Fig. 6: Larkspur power density and current distribution plots (see also: *RadioUser*, July 2020: 24-26). Fig. 7: Larkspur data entry (above) and predicted SWR below.

All in all, I found that the BN was fun to use and performed very well.

Once the present crisis has settled, you may see a BN by the fence at a certain airbase on the Cambridge/Suffolk border.

Incidentally, the BN stayed inflated for over two weeks during the main evaluation period.

My sincere thanks to Tom for the review model and his enthusiastic responses to my questions.

Presently the cost of the Black Knight is £99 +£5 UK shipping.

Tom tells me that they are looking at developing a civil airband transmit version of the BN and also a magnetic-mount car version, so keep an eye open for them.

<https://www.airantennas.com>

AN-SOF Antenna Simulation Software

As well as the modelling packages previously described in this column (EZNEC, 4NEC2, and MMANA-Gal), there are several alternative aerial modelling options to choose from.

However, some of these offer features (and price tags) of limited interest to the casual enthusiast.

AN-SOF, the modelling software I am covering this month, does not appear to be universally well known among radio amateurs.

Yet, it has a strong feature list, coupled with moderate cost.

<https://www.antennasimulator.com>

I have owned a copy of AN-SOF Pro for some years and have used it extensively for certain jobs ever since.

The software is presently running at Version 5.06 and is being continually updated.

While software like EZNEC and MMANA-Gal use the *Method of Moments (MoM)* technique to calculate the currents flowing in a design, AN-SOF uses *Conformal Method of Moments (CMoM)*.

The benefits of CMoM are increased simulation accuracy, reduction in the number of calculations needed, concomitant reduction of calculation times, and the ability to run larger models, due to the economical use of memory space.

AN-SOF can make calculations from ELF through to microwave frequencies.

Full details, including a presentation and informative user guide, may be found here.

<https://www.antennasimulator.com>

AN-SOF is paid-for software, for which there are various options. However, a trial version is available. This is fully featured and does not expire, but it is limited to 100 segments.

This limit is more than enough to model an interesting number of designs.

The software has to be activated with a registration code, which I have found arrives within a few hours.

Like other packages, AN-SOF provides some ready-made models (such as an MW vertical, Fig. 5).

Some models are quite complex and will need to be run on the full version.

AN-SOF is capable of simulating Patch Antennas, Printed Circuit Boards, Microstrip Arrays, as well as the more simple forms of aerial such as the humble dipole. The one thing I do appreciate in this software is the ability to use mixed materials in a design.

As mentioned, AN-SOF comes with plenty of features; it excels at presenting results in graphical format.

This can be seen in Figs. 6 and 7.

This depicts a 40m ground plane based on the Larkspur mast I covered in the last issue (*RadioUser*, July 2020: 24-26).

As you can see, the graphics have a great visual impact.

Configuration and operation of AN-SOF are moderately different from other packages. For a general introduction, have a look at this website:

<https://tinyurl.com/ydhnq2fw>

I will continue with further details and more examples of AN-SOF over the following months.

Stay safe, and I will see you all next time.

Peter Newton
pwnewton42@yahoo.co.uk

RadioUser friend and occasional VLF correspondent Peter Newton GMOEZR reports on the Alexanderson Day transmission from the Heritage Radio Station SAQ Grimeton on 5th July 2020.

It was that time of year again when SAQ Grimeton made one of its few transmissions of the year. For its latest annual transmission on Alexanderson Day (5th July 2020), the station sent 2 transmissions, one at 09:00 UTC, and the other one at 12:00 UTC. Both of them were on 17.2Khz, with the call sign 'SAQ'.

If you are interested in VLF, then this is a great time to try receiving this station. The website is at

<https://alexander.n.se/?lang=en>

Many visitors attended last year's Alexanderson Day event in June 2019. This year, due to the Corona (COVID-19) pandemic, no visitors were present for either of the transmissions, and a reduced staff was in attendance. However, the event was covered live on YouTube. Both videos were pretty much the same but were well worth watching because they covered both the start-up of the transmitter and its shut-down. This is interesting to watch if you have not seen it before.

The URL for the 09:00 UTC video is here:

<https://tinyurl.com/y7e9mnyk>

The URL for the 12:00 UTC video can be found here:

<https://tinyurl.com/ybj9w9e2>

I was only able to pick up the 09:00 UTC transmission, as I had other commitments for later in the day. On the day, I used my home-made pa0rdt MiniWhip-style aerial (Fig. 1) outside, at about 4 meters high, as well as the *Spectrum Lab* software suite to receive and display the signal.

Pa0rdt:

<http://dl1dbc.net/SAQ/miniwhip.html>

Spectrum Lab:

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

Fig. 2 shows the Swedish operator sending the message. It was in CW and came in two parts. The tune-up of the transmitter began at 08:30 UTC, and the message was initiated at 09:00.

I was able to record both messages at my location in Fife, Scotland.

Fig. 3 displays the first part of the tune-up, which went on for a while. The screenshot in Fig. 4 displays the complete transmission starting at 09:00 UTC. I did not use any software to decode the CW message.

If you have received this transmission don't forget to send in an SAQ reception report to

Alexanderson Day 2020 at SAQ Grimeton

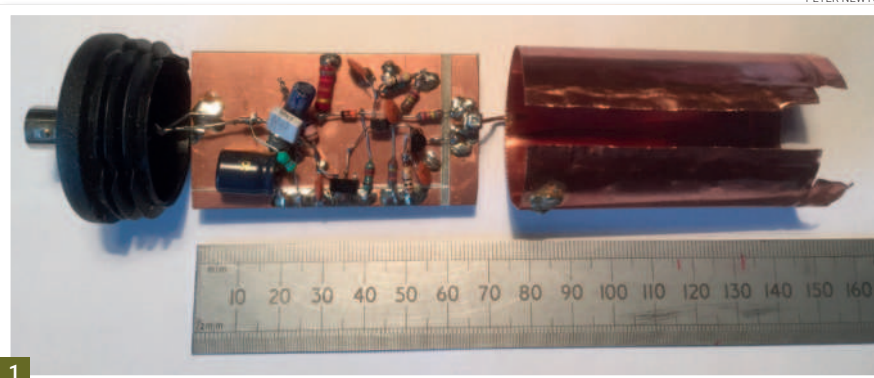


Fig. 1: My homebrew aerial.

Fig. 2: Sending the message.

Fig. 3: Tune-up; Fig. 4: The full message.

the station at this URL:

<https://tinyurl.com/y8tx7kx>

The next transmission should be on UN Day in October 2020; after that, there will once again be the traditional Christmas transmission.

Further Information

Earth Probes used as Antenna:

<https://tinyurl.com/y46bmvoj>

RSGB-IF-Group:

<https://tinyurl.com/y7qhahkv>

Sabine Cremer's website:

<http://dl1dbc.net/SAQ/>

Vlf.it website:

http://www.vlf.it/parmigiani/saq_eng.htm

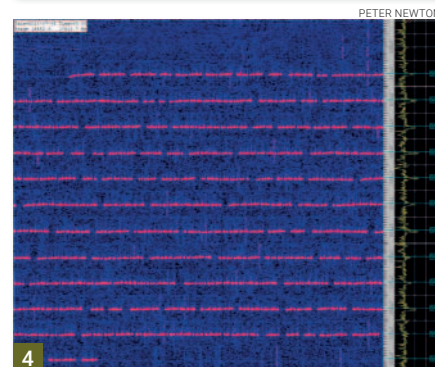
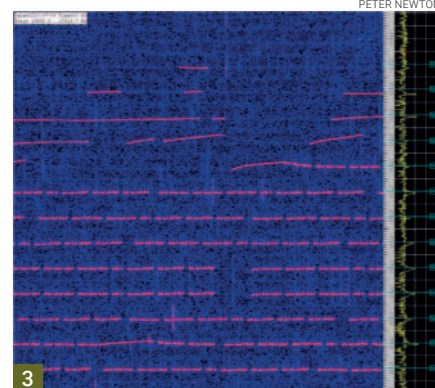
VLF:

<https://groups.io/g/VLF/messages>

VLF-ULF-ELF Forum:

<https://tinyurl.com/yc95ogka>

RadioUser, June 2018: 33; August 2019: 24; December 2019: 32.



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The Pirate Who Gave Us What We Wanted

Scott Caldwell

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Ronan O'Rahilly (1940 – 2020) was ahead of his time, and he is regarded as the 'founding father' of commercial radio in the United Kingdom. When he launched Radio Caroline in Easter 1964, he planned to break the British Broadcasting Corporation's (BBC) monopoly of radio entertainment. The BBC was committed to delivering reliable and bland current affairs programmes, with playful adult entertainment and limited programmes directed at younger children.

This format was completely different from the 'Rock 'n' Roll Revolution' that was dominating American commercial radio. The BBC's purpose was set out by its first Director General, Lord Reith (1889 – 1971) who stated that it would educate, inform, then entertain its listeners.

However, by the dawn of the 'Swinging Sixties', there was a growing perception that the BBC concentrated too much on the first two objectives and less on the latter. The BBC only played pop music for two hours per week, and completely failed to understand the changes in society and culture.

The BBC's monopoly was originally under the jurisdiction of a Royal Charter. This monopoly was subsequently ratified and expanded by the British Government to include the sole management of determining the content of radio broadcasting, including the selection of music.

However, the BBC did not solely have the jurisdiction for musical selection. A contractual agreement with the Musician's Union limited the amount of recorded music that was permitted for broadcasting. This was universally known as the *Needletime Agreement*, and it limited the broadcasting of recorded music to only 28 hours per week per radio station. A maximum limit was set at five days per week.

This limitation was further decreased in 1964, to only 20 hours per week.

Scott Caldwell offers a sketch of the life and work of the charismatic Radio Caroline founder Ronan O'Rahilly, who redefined commercial radio in the UK.

His Early Life

O'Rahilly was described as a 'rebellious child', who did not conform to the social norms that were a prerequisite of his privileged background. He subsequently claimed that he was expelled from school a total of seven times. This rebellious nature seemed to run in his family. His family history was dominated by Irish Republicanism. His grandfather, Joseph O'Rahilly was shot by British soldiers when he attempted to storm a machine-gun post during the 1916 Easter Rising in Dublin. His grandfather became a legend in Irish Republicanism, his life was subsequently celebrated in the form of a poem and a street in Dublin was named in his honour.

Ronan O'Rahilly would remember this tragic event in his family history; during the build-up to Radio Caroline taking to the airwaves in Easter 1964, he exclaimed that: *"It would appear that I was taking an Easter revenge against English authorities. I guess I was!"*

His father, Aodhogan O'Rahilly was a successful businessman who also had a great interest in Irish politics.

Bohemian London

In 1960, O'Rahilly moved to London and he settled in one of the most affluent areas, Chelsea, which was dominated by expensive wine bars. This environment suited O'Rahilly's personality, who used his money and good looks to the maximum. He operated under a veil of secrecy.

O'Rahilly did not answer to his own name, calling himself 'Bobby Kennedy'. He claimed that he did not own a telephone and communicated via public telephones; he borrowed phones from the shops, located along the affluent Kings Road. It was a well-known fact that O'Rahilly lived in a smart square off the King's Road.

However, the front door was never answered, and few visitors were actively

welcomed. The authorities were allocated the codename 'The Blue Meanies', which had been popularized as a character in The Beatles film *Yellow Submarine*. He often joked that he was paranoid and that the authorities were out to get him. His personality, and his considerable powers of persuasion, would enable him to manage Radio Caroline throughout the political and economic difficulties experienced throughout the 1970s and 80s.

The Pilkington Committee

The Pilkington Committee was set up by Harold Macmillan's (1894-1986) Conservative Government. It was the Fifth Committee of Enquiry to determine the future of broadcasting in the United Kingdom. It was headed by the energetic industrialist, Sir Harry Pilkington (1905-1983). The Committee consisted of the members listed in Table 1.

The *London Times* reported on 13th May 1964 that *"Backbenchers like Radio Caroline and they have urged a rejection of the Pilkington Committee's recommendations for safeguarding the BBC's monopoly in radio broadcasting"*. The *Times* further reported on 19th May 1964 that *"Directors of Radio Yorkshire were seeking a meeting with the Postmaster-General to discuss a full-scale experimental local broadcasting network for the West Riding area of Yorkshire"*.

The time for a radical change to British radio broadcasting had reached its zenith.

The Emergence of Radio Caroline

Radio Caroline has a unique place in broadcasting history, largely due to its style of broadcasting unlicensed and uncensored pop and rock music. At the peak of its success, Radio Caroline had an audience of 25 million listeners, The station was set up as a private company

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



The MV Ross Revenge.

Sir Harry Pilkington

Chairman of the Committee/
Industrialist – Chairman of Pilkington Glass

Harold Collison

General Secretary of the
National Union of Agricultural Workers

Elwyn Davis

Secretary to the Council of the University of Wales
and the Board of the Welsh University Press

Joyce Grenfell

Actress and Author

Richard Hoggart

Senior lecturer of English at Leicester University

Edmund P Hudson

Managing Director – Scottish
Agricultural Industries

JS Shields

Former Vice-President of the Classical Association

RL Smith – Rose

Specialist for radio communications in the
Department of Scientific and Industrial Research

Elizabeth Whitley

Social Worker and journalist

Billy Wright

Professional Footballer

Professor FH Newark

Professor of Jurisprudence at the Queen's
University Belfast

John Megaw

Recorder of Middlesbrough

Peter Hall

Director of the Shakespeare Memorial Theatre

Sir Jock Campbell

Table 1: The Pilkington Committee.

to provide airplay time for the popular bands, including the bands that O'Rahilly managed. The inspiration for Radio Caroline came from *Radio Veronica*, a pirate ship anchored off the Dutch coast.

O'Rahilly named his radio station after Caroline Kennedy, the daughter of US President John F. Kennedy (1917 – 1963).

The motivation behind Radio Caroline was based on O'Rahilly's firm belief that freedom of expression was a 'birthright'.

Working on the Ship

Working life on Radio Caroline was extremely hard, unlike the portrayal by the film *The Boat that Rocked*. Beer was limited to only two a day, drugs were banned (a rule not always strictly enforced), and girls were not permitted onboard. The only true luxury was cigarettes, but their supply was unlimited. The average rate of pay for a Radio Caroline presenter was £25 per week.

Johnnie Walker, a radio DJ who worked for Radio Caroline, described O'Rahilly as "an amazing man who made the impossible possible and changed radio forever". O'Rahilly was very shrewd in his management of Radio Caroline and used

the station to promote his philosophy of 'loving awareness', which empowered peace and love over hate. He even created a band called *Loving Awareness*, to further his cause.

Radio Caroline began test transmissions on Good Friday 1964. A regular programming schedule would commence the following day. The first record played was *Not Fade Away* by the Rolling Stones.

Within a few weeks, it became apparent that Radio Caroline had been well received by listeners, especially the younger generation, who felt ignored by the dogmatic management of the BBC. A *Gallop* Poll commissioned within the first few weeks also provided some encouragement for O'Rahilly and his team, it revealed that approximately 7 million listeners had tuned in during the stations first three weeks of broadcasting.

The debates in Parliament over the influence of Radio Caroline were often heated and, on some occasions, quite humorous. This is reflected by the remarks made by Lord Herbert Stanley Morrison (1888-1965): "I am not one of those who say that 'pop' music should not be played; ... Nor am I against these chaps with long

Song Title	Artist/ Band	Music Style
Anytime is the Right Time	Ray Charles	Gospel/ R&B
Something Special	Dusty Springfield	Popular
Baby Don't Cry	The Puppets	Popular
Summer Place	Andy Williams	Ballad
America	Trini Lopez	Soundtrack/ West Side Story
I Just Wanna Stay Here and Love You	Mike Sammers	Light Orchestral
Yesterday and You	Ellenka Balluska	Continental Ballad
Sunday	The Stringalongs	Instrumental
My Favourite Things	Mark Murphy	Soundtrack/ Sound of Music
Little Egypt	The Marauders	Popular

Table 2: The Chris Conway Show (24th May 1964, 12:10 to 12:40 pm).

hair, who seem to cause the most exciting emotions among the girls – and I am not jealous, I am beyond the age of jealousy [...]. But why should we have 'pop' music pushed down our throats, or rather into our ears [...] Anybody who says – and this is the implication – that the general run of the British people [...] has not got a soul above 'pop' radio and 'pop' music at any hour of the day or night, is wickedly slandering the British people [...] One of the greatest achievements of the British Broadcasting Corporation was in the war years – and they did a little immediately before – in putting on first-class concerts of music which enormously improved the British taste for good music".

Table 2 shows an example of programming content, in this case for the *Chris Conway Show*, on 24th May 1964, from 12:10 to 12:40 pm.

The Caroline / Atlanta Merger

On the 2nd of July 1964, it was formally announced that *Radios Caroline* and *Atlanta* would merge their broadcasting operations. Their name would be *Caroline*, and they would broadcast from two separate locations. The first location was allocated to the ship *MV Caroline*, which would broadcast from a position five miles from Ramsey (IOM).

This would service listeners based in the North, on a wavelength of 199m. The *MV Mi Amigo* would remain stationed off the Essex coast, and its broadcasts would cover London and the Home Counties on the same wavelength.

Good propagation conditions would enable Radio Caroline signals to be received in Holland, Denmark, France, Belgium, Sweden, and Finland. This would attract additional advertising revenue, through the station's subsequent expansion into new broadcasting markets.

The finances of the merger agreement

accounted for a total figure of £500,000 and facilitated less market competition in attracting customers who wished to purchase airtime for advertisements. A constitutional battle soon materialised, when the Manx Parliament complained that they were denied their right to decide if and when *The Marine Broadcasting Offences Act* should be implemented.

In the end, an order in the Privy Council was utilised to resolve this issue and it subsequently extended the legal jurisdiction to waters around the coastline of the IOM.

The 1967 Marine Broadcasting Offences Act

To make sure that Radio Caroline would not contravene *The Marine Broadcasting Offences Act of 1967*, O'Rahilly introduced several innovative controls. He employed DJs who were not British subjects; he set-up an administrative office for the station in Spain, logistically supplied the vessel from France and Holland, and obtained non-British based advertising. *The Marine Broadcasting Offences Act 1967* is regarded as a fairly successful piece of legislation. However, it could not regulate and prevent radio pirates broadcasting.

It ultimately did not provide the government with control over the very space where such broadcasting was permitted – the vast expanse of the high seas. In response to the success enjoyed by Radio Caroline, the BBC finally relented and launched its own music radio station on Saturday 30th September 1967, when *Radio 1* took to the airwaves. At last, the younger generation had a voice on national radio.

The style employed by Radio 1 was similar to that of Radio Caroline, and some DJs joined the ranks of the new station when the Act outlawed the broadcasting of pirate radio stations.

Further Reading

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Conclusion

In 2013, O'Rahilly returned to his native Ireland. On 20th April 2020, O'Rahilly tragically died from advanced vascular dementia. In a mark of respect, Radio Caroline played many tributes. Radio Caroline issued their official tribute to O'Rahilly: "a clever man, sometimes verging on genius. Eccentric, of course, sometimes unscrupulous, but suddenly kind and warm-hearted. A rogue maybe, but a charismatic and loveable rogue. He will be missed".

It cannot be denied that O'Rahilly was ahead of his time in his perception that local radio broadcasting should have its independent voice, away from state regulation and control.

Selection of Websites

Guardian Obituary
<https://tinyurl.com/y8k296c4>
 Irish Times Obituary
<https://tinyurl.com/y882tpyn>
 Radio Caroline History
<https://tinyurl.com/ycf4tlvg>
 Radio Caroline
<http://www.radiocaroline.co.uk>
 RC Tribute to ROR
<https://tinyurl.com/ydre5zf>
 The Telegraph Obituary
<https://tinyurl.com/y7w38fuy>
 Times Obituary
<https://tinyurl.com/ybpkodzh>

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ICOM



2083 WATTS

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Handheld

IC-R6 100 kHz-1300 MHz AM/FM/WFM 1300 memory analogue scanner **£199.95**
IC-R30 100 kHz-3300 MHz All mode professional digital scanner **£569.95**

Base

IC-R8600 is a super wideband communication receiver that covers the radio spectrum from 10 kHz to 3 GHz. It also has the capability to decode selected digital communication signals including, D-STAR, NXDN, dPMR and P25 **£2499.95**

Accessories

BC-194 drop in charger for IC-R6 **£21.95**
CP-18E cigar lighter cable **£24.95**
CS-R6 cloning software for IC-R6 **£34.99**
SP-27 clear acoustic earpiece **£24.95**
BC-223 rapid charger for IC-R30 **£59.95**
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**
CS-R30 programming software for IC-R30 **£59.95**
LC-189 soft case for IC-R30 **£24.95**
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**
AH-8000 100-3300 MHz professional discone receiving antenna

Uniden



650 WATTS

Uniden is the best known manufacturer of scanner radios in the world. Under its renowned "Bearcat" brand name, Uniden scanners are at the cutting edge of design and technology. Their high-end scanner radios, while complex, are used by radio hobbyists, media, businesses and at all levels of government and there lower end versions are beautifully designed and easy-to-use

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Handheld

EZ1-33XLT 78-174/406-512 MHz 180 channel analogue scanner **£64.99**
UBC-75XLT 25-512 MHz 300 channel analogue scanner **£99.95**
UBC-125XLT (best seller) 25-960 MHz 500 channel analogue scanner **£129.95**
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**
UBC-125/75 soft leather case **£24.95**
ARC-536 pro software for UBCD-3600XLT **£49.99**
ARC-536 basic software for UBCD-3600XLT **£29.99**

DIAMOND ANTENNA

Based in Japan, Diamond Antenna manufactures a wide range of antennas and accessories for both hobby radio and commercial use. They are well known products that meet the highest standards in quality.



100 WATTS

Scanner Antennas

D777 is a VHF/UHF civilian and Military air band receiving antenna. It has a gain of 3.4dB on VHF (120MHz) and 5.5 dB UHF (300MHz) with a length of 1.7m and SO239 socket for easy connection **£64.99**

D-190 is a high performance wideband discone antenna covering 100-1500 MHz including 10m RG58 terminated in PL259 **£89.99**

D-130M is a Discone antenna with wide frequency coverage on receive 25 to 1300MHz and covers 6m (20W) and 2m (200W) when used with a transmitter. This model is supplied with 15m RG58A/U and 2 x PL259 plugs **£119.95**

WHISTLER



400 WATTS

The Whistlers Scanners are USA designed and built to last - The TRX-1 & TRX-2 are our best-selling digital versions with sales 10-1 against any other brand. We have worked with Whistler to customise a UK band plan for these scanners! This ensures the radios cover UK bands in the correct steps and the correct mode. When a user does a service scan it will search in the correct steps for the selected band ensuring maximum received stations.

Handheld

WS1010 25-512MHz 200 channel analogue scanner **£89.95**
WS1040 25-1300 MHz storage for 1800 frequencies analogue scanner **£299.95**
TRX-1E 25-1300 MHz best-selling Digital & Analogue scanner **£419.95**

Mobile/Base

WS1025 29-512 MHz 200 channel analogue scanner **£89.99**
WS1065 25-1300 MHz storage for 1800 frequencies analogue scanner **£279.95**
TRX-2E 25-1300 MHz best-selling Digital & Analogue scanner **£479.95**

Accessories

MRW-TRX3 Triple hand held replacement antenna pack to increase performance **£39.95**
TRX-1 or TRX-2 SD Card - preprogramed with Airband, Marine, 446, FM/DMR/NXDN/25 Repeaters + FM/DMR simplex **£19.99**

FlightAware
Live Flight Tracking



25 WATTS

FlightAware has revolutionized the world of USB SDR ADS-B Receivers with the FlightAware Pro Stick and Pro Stick Plus, high-performance USB R820T2 software defined radios (SDR) with a built-in RF amp for maximum ADS-B/MLAT performance. The first of its kind, FlightAware's Pro Stick is compatible with PiAware or any other device that supports USB RTLSDR receivers, and is less expensive than any other RTLSDR USB receiver in the world. The Pro Stick Plus adds a built-in 1090 MHz bandpass filter for increased performance and range of reception in areas with moderate RF noise as is typically experienced in most urban areas.

Flightaware Prostick Plus **£29.99**
Flightaware Prostick **£25.00**
FlightAware ADSB 1090MHz Band-pass SMA Filter **£16.99**

bhi Noise Cancellation Products

bhi design & manufacture a range of DSP noise cancelling products that remove unwanted background noise & interference from noisy voice & radio communication channels to leave clear speech. Aimed at a number of different radio related & voice communication markets, our products incorporate unique Digital Signal Processing technology to enable clear communications from within noisy environments.



100 WATTS

NES10-2 MK4 Noise Eliminating Speaker replaces the MK3 version and removes unwanted background noise, hiss, hash, QRM, QRN, computer hash, plasma TV interference, white noise etc from speech, so that you can hear more clearly and listen stress free. Works across all radio bands and is also suitable for shortwave listening and for use in radio base stations. **£119.95**

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Airspy is a line of super popular Software-Defined Radio (SDR) receivers developed to achieve high performance at an affordable price using innovative combinations of DSP and RF techniques. The goal is to satisfy the most demanding telecommunications professionals and radio enthusiasts while being a serious alternative to both cost sensitive and higher end receivers. Airspy Radios feature world class reception quality and ease of use thanks to the tight integration with the de facto standard free SDR# software for signal acquisition, analysis and demodulation.



HF+ Discovery 0.5kHz – 31MHz VHF 60-260MHz SDR receiver ... **£199.95**
R2 VHF/UHF 24-1800MHz SDR receiver **£209.95**
MINI VHF/UHF 24-1700MHz SDR dongle..... **£119.95**

TECSUN

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



Portable

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.

Receiving Products

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**
MFJ-1025 1.5-30 MHz noise canceller (alternative to the MFJ-1026) without the built-in Active Antenna. Plug your station antenna into the MFJ-1025 and your antenna system turns into a directional receiving array! **£219.95**
MFJ-1026 This unit is designed to eliminate local electrical noise even before it reaches the antenna socket of the receiver – it covers 1.8-30MHz – great just to only here the wanted signal in the clear. **£279.95**



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**
EPB54N 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**



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**



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**



MRW-125 Super Gainer Scanner Handheld Antenna
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1



Chrissy Brand
chrissyLB@hotmail.co.uk

Driven By Sound

Usually, at this time of the year, many of us would be looking forward to hearing radio stations in an idyllic holiday destination. Perhaps Italian radio in Tuscany, Spanish and English stations in the Costas, trying to understand Slovenian or Croatian in the Balkans, or maybe an adventure on another continent.

However, since 2020 has been blighted by Covid-19, there will be far fewer of us leaving the shores of the UK. A radio-related question that this situation begs then is, what stations should we tune to for a laid-back summer vibe? Any vacation radio listening that we might undertake requires a different approach this year.

Sunshine Radio

This summer, Global Radio (93.6MHz) in Malaga, on Spain's Costa del Sol has a listenership that mostly consists of the British expats already living there. Normally, it would be bolstered by an influx of holidaymakers, boosting both advertising revenue and local businesses.

Should you be longing for a music mix that includes the likes of Atomic Kitten,

Chrissy Brand selects and recommends an up-to-date range of radio programmes and podcasts for this month. She also cranks up the volume driving on those south coast roads.

Dire Straits and Mr. Mister, you can join Clare Lloyd for her Global Radio weekday morning show. The station, as you would expect, streams live online. Pop and hits from the past forty years, competitions, weather, international and local news, information on entertainment and holiday activities, plus the ubiquitous travel reports, are the staple sounds of this bright and breezy station. Like many stations of this type, it does offer a 'feel-good' factor. <https://global.fm>

Talking of home and, looking for positives, there is plenty to attract holidaymakers and radio enthusiasts within the UK. Perhaps I might head as far afield as Gairloch in the north of Scotland, where you can hear Two Lochs Radio (2LR), which is the smallest station in the UK.

Broadcaster and author Charlie Connolly captured the spirit of Two Lochs Radio, along with many other stations and stand out radio individuals, in his evocative book *Last Train to Hilversum, A Journey in Search of the Magic of Radio* (2019).

The station's genesis in the community and battle to get on the air in the first place is worthy of an entire book. Once licenced, erecting and maintaining masts on treacherous mountainsides was another challenge. The station has thrived, thanks to goodwill and good presenters. Have a listen to the varied programmes of music and chat online.

www.2lr.co.uk

If you take a trip to the Welsh coast, you will be able to hear Irish FM stations, such

Fig. 1: Pulling in FM signals from France and Belgium on the Seven Sisters.

Fig. 2: A 'Lockdown-hoedown', aired from the rather cute HQ of Hailsham FM.

Fig. 3: Rick Steves is a popular travel writer and podcaster.

Fig. 4: Channel Africa, The Voice of The African Renaissance.

as RTÉ Lyric and Today FM. Of course, there are also plenty of Welsh stations to tune to, including BBC Cymru and Rhondda Radio.

Ofcom has now awarded new licences for a further three community radio stations in Wales, taking the country's total to 13. The three latest recipients are Radio Aber, Merthyr Radio and Sound Radio.

Radio and the Open Road

Driving accompanied by loud music first found a place in European culture (and hearts) after German company Blaupunkt (Blue Dot) installed a car radio in the 1920s. That first piece of kit, the Blaupunkt AS5, was a bit of a beast, taking up about ten litres of space and weighing as much as a modern microwave oven.

On the plus side, it did possess medium, long and short waves, which was more than most of its counterparts did, even during the golden age of short wave in the 1950s to the 1970s.

Inevitably, car radios and in-car entertainment systems rapidly evolved, in design and style, through the rest of the last century, with some looking and sounding far better than others. In my childhood, our family car had no such luxury and we relied on taking along the kitchen radio to entertain us; one memorable holiday being when we drove from London to Loch Ness and I annoyed my parents by constantly retuning to hear as many BBC and commercial local radio stations as possible.

Times moved on and in-car entertainment systems for the masses improved, firstly with 8-track cartridge, players, then audio cassette players, CD players. Eventually, DAB radio and mp3 ports became standard. Today, we are entering the age of the connected car.

<https://tinyurl.com/ybq3rd2e>

<https://tinyurl.com/yaxfbcd3>

Signal quality remains the key, of course, for most in-vehicle listeners, although us DXers are happy, indeed prefer, to hear distant stations fade in and out or overlapping on the adjacent frequencies. However, for most people, programme content is the determining factor in the world of in-car entertainment.



Whether it is blasting up the A 816 to Oban heralded by Puccini on BBC Radio 3 or driving through London to the sounds of reggae music on pirate station Citylock Radio, there is something about the intoxicating combination of meaningful music and speed or, at least, music and movement.

I was reflecting on this whilst driving on the coast road after a recent walk on the South Downs. As well as being fertile walking ground, the Seven Sisters area is a good place to scan through the FM band. Sunshine and high pressure brought in a lot of French stations on FM plus English local and community radio stations from many miles away (Fig. 1).

It is always a pleasure to hear VRT 1 in Brussels on 95.7MHz as well, playing a nice mix of Flemish and Dutch music, including *Engelenkoor* by Ferry Heijne.

Rhythm and Blues artist Mahalia came to attention with last autumn's *Love and Compromise* album. The 22-year old, from Leicestershire, has since secured a lot of radio play across the western world with the release of her *The Isolation Tapes* EP. VRT played one of its three tracks.

I have always been impressed with Hailsham FM (Fig. 2) and the *Afternoons with John Steven* programme was very well-crafted. After a news bulletin, the programme aired its own version of a feature beloved of many stations, "Guess the Year?" I am usually hooked by these and, on this occasion, heard four chart songs from 1983. I also admit to being enough of a radio geek to have instantly recognised the



year from the music, some of which seemed aptly chosen songs, all these decades later: Bananarama's *Cruel Summer*, Cara with *Flash Dance*, *What a Feeling* and Bob Marley and the Wailers' *Buffalo Soldier*, a paean to black resistance.

Juxtaposed with this was John Stevens' *Lockdown Hoedown* feature. Clearly a country and western and Americana fan, community radio gave him the flexibility to share this passion and knowledge. He played tracks by four different artists in this section, including Gretchen Wilson and The Shires.

www.hailshamfm.uk

Travel Bug

I sincerely hope that the only bug you will catch this summer is the travel bug. I have stayed alert and worked my way through half a dozen travel podcasts and radio programmes that I would like to share with you. Radio and travel do seem to go hand-in-hand.

Date	Time (UTC)	Station	Programme	Podcast	URL/ Stream/ Frequency
Daily	24/7	WRNO	News and Talk For New Orleans	https://tinyurl.com/y9qpblf	https://wrno.heart.com
Daily	0730-1000	Eye Radio, South Sudan	Soundtrack Show with Lady Lin. African contemporary music	https://eyeradio.org/podcasts	https://eyeradio.org/live-stream
Weekdays	0400-0500 1600-1700	Eye Radio, South Sudan	English: news, health, agriculture.	https://eyeradio.org/podcasts	https://eyeradio.org/live-stream 7340kHz 15410kHz
Weekdays	1500-1600	Voice of America	Border Crossings music requests with Larry London	https://tinyurl.com/ydd6f5vd	www.voanews.com 4930, 5930, 15580, 17530kHz
Monday to Thursday	2330	KEPW, Eugene, Oregon	Shortwave Report by Dan Roberts	www.outfarpress.com/short-wave.shtml	https://kepw.org
Monday, Wednesday, Friday	2200-2230	Radio Exterior de España	English Service: Panorama, news, features and music	https://tinyurl.com/yazj3l8h	https://tinyurl.com/y9xgsyhp 9690, 11670, 11940, 12030kHz
Saturday	2100-2300	Two Lochs Radio	Highland Fling with John Matheson and Sandra Burt, Highland Ceilidh music	https://tinyurl.com/y9a3crfk	www.2lr.co.uk
Saturday	1850-1905	Radio Mali, Bamako	English Magazine	N/A	www.ortm.ml 5995kHz

Table 1: Unmissable Listening for the Month Ahead.

On the subject of music and travelling down roads, *Dirt From The Road* is an entertaining listen. It consists of well-told yarns from Brett Newski and his band, on tour in Europe and the Americas. It is definitely one of the best programmes I have heard this year, although, understandably, it does contain adult content.

"We've slept in weird crusty places... mouldy punk squats, abandoned warehouses and World War II bunkers. We've played shows in makeshift venues...bakeries, yachts, train stations, rubber factories. All along the way, we encounter absurd characters: Swiss pimps, thieves, coked-out venue owners, old German hippies living off-grid, 90's rock legends. So many bizarre things happen to us on the road after we leave the stage. You cannot make this stuff up."

<https://brettnewski.com/podcast>

The Voice of Vietnam cover travel in their programme called *Discovery Vietnam*. A few months back, I heard the station state how Da Nang City was to be a popular tourist destination in Vietnam in 2020. Sadly, that is now unlikely to be the case, but hopefully, people will visit next year instead.

Discovery Vietnam looks at food and culture as well as offering information on delights like the pristine coastal beauty of Phú Yên. I rather like the idea of joining the Suoi Giang commune in Yen Bai province for a cuppa, made from centuries-old Shan Tuyet tea trees.

<https://tinyurl.com/ydz434ly>

I first encountered Rick Steves' travel

guides a few years ago (Fig. 3). He also hosts a hugely enjoyable weekly podcast, *Travel with Rick Steves*, which covers a lot of ground, usually two or three places in one programme. I have learnt about millennials in The Netherlands, family travel plans, a week in Andalucía, the world's grooviest gardens, and ghosts in Papua New Guinea.

www.ricksteves.com

Travel Radio Australia is another programme that captures the imagination is presented, primarily, by Ren Zwiers on Australia's Gold Coast. Although it is taking a break during Covid-19, there are fifty past episodes to dip into. A team of reporters around the world contribute to this exciting programme, interviewing travellers and tourists along the way. Learn about buying property in Brittany, e-bikes in Amsterdam and 'glamping' in Kings Canyon in central Australia.

<http://travelradio.blogspot.com>

Next up is the *Zero to Travel* podcast. Jason Moore explores how people can travel for as long as they want, on their own terms, while spending as little money as possible. Along with travel tips, there is other useful information, such as how to run a business while on the road. In the May 26th episode, Blake Boles spoke about alternative travel and education and helping children chart their own paths. While on May 5th, Francesca Trotman talked about how her passion for ocean conservation and ethical travel and how this took her to a life in Mozambique.



4

<https://zerototravel.com/travel-podcast>

I will finish with a slightly different programme, from the former short wave station Channel Africa, The Voice of The African Renaissance, run by the South African Broadcasting Corporation (Fig. 4).

Gateway to Africa a weekly 45-minute programme which is researched, produced and presented by Pule Phalatse. It covers tourism, travel and business. Recent programmes have looked at the impact of Covid-19 on Kenyan wildlife and tourism students from Walter Sisulu University visiting the Chinese city of Jinhua, as part of an intercultural exchange programme.

<https://iono.fm/c/1501>

With thanks to Graham Smith for his suggestions of VoA's *Border Crossings*, WRNO and Eye Radio. Do send in your programme suggestions for inclusion in future columns of IRS.

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From Spectrum-Efficiency to ‘Stun-and-Kill’: The World of DMR

Tim Kirby

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A few weeks ago, before the lockdown started in earnest, I was sat chatting to some friends who run a communications business here in West Wales – Communic8 Hire

<https://radio-hire.co.uk/about-us>

The firm is based in Neyland, near Pembroke Dock. As part of its business, it runs a network, based on Motorola MOTOTRBO technology. This covers the whole of Wales.

The company also supplies the amateur radio market with DMR radios (Fig. 1).

As we talked about the system, I realised that – although I know a reasonable amount about using DMR technology as a radio amateur – there is a lot to the MOTOTRBO system and its associated capabilities, which are in use commercially. Therefore, I thought that, perhaps, this might be of interest to readers.

So, this month, I will try to give you an overview of Digital Mobile Radio (DMR), and the principles and technologies involved.

I will also outline how the Motorola MOTOTRBO technology sits on top of that and how it can be used by organisations and businesses.

DMR Basics

Wikipedia summarises DMR as follows: “Digital Mobile Radio (DMR) is a limited open digital mobile radio standard, defined in European Telecommunications Standards Institute (ETSI) TS 102 361, parts 1–4. It is used in commercial products around the world. DMR, along with P25 phase II and NXDN, are the main competitor technologies in achieving 6.25 kHz-equivalent bandwidth, using the proprietary AMBE+2 vocoder. DMR and P25 II both use two-slot Time Division Multiple Access (TDMA) in a 12.5kHz channel, while NXDN uses discrete 6.25kHz channels, using frequency division, and TETRA uses a four-slot TDMA in a 25 kHz channel.

“DMR was designed with three tiers: DMR tiers I and II (conventional) were first published in 2005, and DMR III (Trunked version) was published in 2012, with manufacturers offering products within a few years of each

This month, **Tim Kirby** takes a deeper dive into the world of Digital Mobile Radio (DMR) and finds out about such phenomena as timeslots, talkgroups, geo-fencing, and codeplugs.

publication. The primary goal of the standard is to specify a digital system with low complexity, low cost, and interoperability across brands so that radio communications purchasers are not locked into a proprietary solution. In practice, given the current limited scope of the DMR standard, many vendors have introduced proprietary features that make their product offerings non-interoperable with other brands.”

It is, perhaps, also worth looking at the different tiers of the system. I’ve taken the following from the Hytera website (Hytera is a manufacturer of DMR equipment): “The European Telecommunications Standards Institute (ETSI) first developed the specifications for the standard in 2005, with the trunked standard specification following in 2012. The DMR interface is set out in four key ETSI documents covering: Air Interface Protocol; Voice and General Services and Facilities; Data Protocol; and Trunking Protocol. These are now commonly referred to as DMR tiers 1, 2, 3 & 4.

“One of the reasons DMR provides such an easy migration path for existing analogue radio users is that it operates within the existing 12.5kHz channel spacing used in licensed land mobile frequency bands globally. This removes the need for time-consuming and expensive frequency re-cycling or special frequencies allocation. Most manufacturers enable mixed fleets of analogue and digital radios to operate together to enable a gradual transition.

The great benefit of DMR is that it provides two voice channels, for every one analogue channel, through the use of two-slot Time Division Multiple Access (TDMA) technology. This [TDMA technology] divides a 12.5kHz channel into two independent time slots. It also means that DMR achieves the 6.25kHz channel-equivalence (6.25e), specified by many global regulators seeking greater spectral efficiency.”

This last paragraph contains a key point: For each allocated frequency – or ana-



Fig.1: An Anytone DMR handset, mainly used by radio amateurs.

logue channel – you can have two voice channels, by virtue of the two timeslots (Timeslot 1 and Timeslot 2), which are active simultaneously. Of course, a single receiver can only receive one of these timeslots at a time. A repeater, however, can be transmitting on both timeslots at the same time – as well of course, as receiving both timeslots on the input of the repeater.

If you are using a scanning receiver with DMR capability – it will most likely scan both timeslots but will indicate which timeslot the signal you are receiving is on.

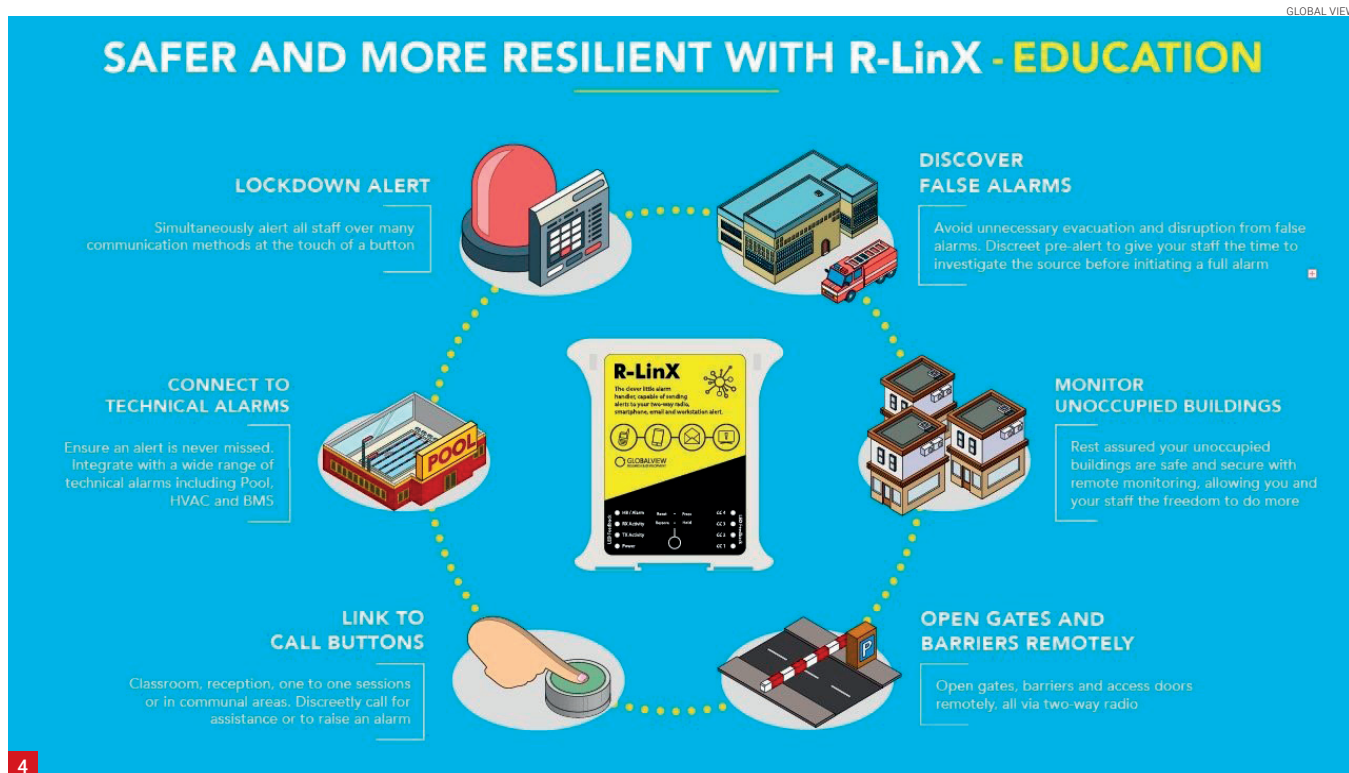
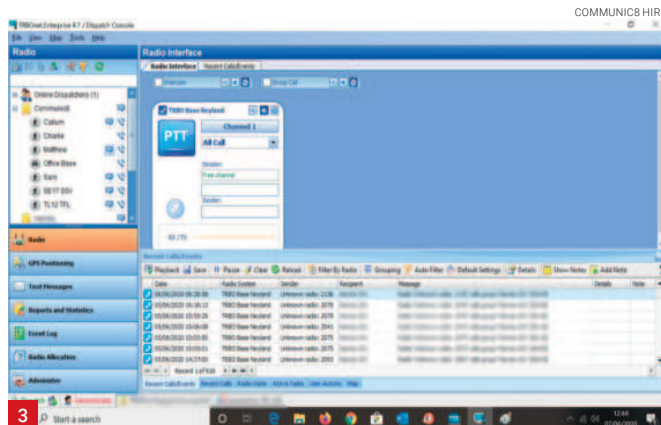
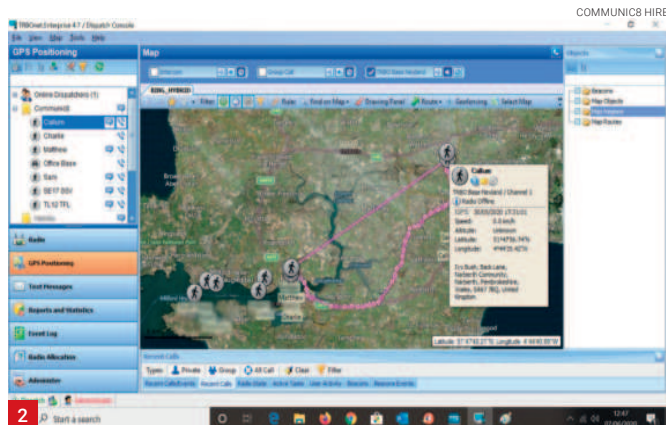


Fig. 2: A MOTOTRBO Dispatch console. It displays the track of a GPS-enabled DMR set.
Fig. 3: Another view of a MOTOTRBO Dispatch console. It can playback messages received.
Fig. 4: DMR systems can be extended using other products, such as R-LINX.

Understanding Talkgroups

Then there are talkgroups to get your head around. These are, as you might imagine, groups of users who need to talk to each other. In a commercial context, it might be 'All Gritters' or 'Security', whereas, for radio amateurs, we often define talkgroups on a regional basis, such as 'Wales Chat' or 'Ireland Calling'.

Each of these talkgroups will have an 'identifier'. A repeater can, and will, carry multiple talkgroups, spread over the two timeslots.

On your DMR-capable scanner, you will almost certainly be able to see the talkgroup identifier displayed, as well as the Radio ID of the station transmitting.

In a commercial context, it is likely that someone in one talkgroup will not be able to listen to another talkgroup, unless this kind of functionality has been pre-defined.

Radio amateurs often take a different approach (*"I want to hear everything that's going on!"*)

The Radio ID should be unique on a DMR system. You will probably find that most companies start their Radio IDs from 1. As they add new radios into the system, they increment the radio ID each time.

Radio amateurs have a different arrangement with the radio ID, also indicating the country that the user is from (For instance,

my Welsh ID is 2353537, whereas my English ID is 23518180).

There are some other parameters, such as colour code, which you need to be aware of if you are setting up a radio or a DMR system, but as a listener, they are of little concern!

GPS, Bluetooth and Recording

Many DMR radios contain a GPS receiver, capable of establishing their latitude and longitude, data which can be transmitted back over the network to show where the radio is. In a commercial context, this can be shown on the MOTOTRBO Dispatch screen, so that a dispatcher knows where their personnel are at any particular time.

Callum at *Communic8* very kindly provided a screenshot of their Dispatch Console, with mobile locations showing on the screen

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(Figs. 2 and 3).

Radio amateurs too use this GPS capability and can take advantage of the Digital Position Reporting System (DPRS) to send their data back to the Automatic Position Reporting System (APRS), where the data is combined with positional data coming from analogue systems and can be displayed on a map:

<http://aprs.fi>

If you have not seen the APRS data before, it can be quite interesting to look at.

More modern DMR radios also have Bluetooth capability. This may allow them to activate suitably-equipped doors and gates automatically – all the while feeding back data into the Dispatch console. It is also possible to integrate fire or intruder alarms into the system, which can trigger an alert in the Dispatch console.

Using the Geo-fencing capability, it is possible to locate the nearest team member who can be tasked to go and investigate the alert – through a message on their radio, which they can either accept or reject – depending on whether or not they are available.

Another feature available on more modern DMR radios is the capability to record both incoming and outgoing voice traffic. Useful if you didn't quite catch what someone said, or you were away from your radio – all those scenarios which can easily happen.

With the availability of cheap memory that can be installed into radios, many hours of traffic can be recorded. A centralised recording function is also available system-wide, as well as on individual handsets and mobiles.

TRBO System, R-Linx, and the Codeplug

It is interesting to note that many different systems are being built around the TRBO system. Avalon is a CCTV system, which can be integrated into the DMR structure, allowing alerts to be triggered into the system, as well as offering the capability to switch on security/intruder lights, as necessary.

Callum also recalled seeing a demonstration of a window switch being triggered, simulating a break-in.

This triggered an alert in the Dispatch Console, allowing a response to be co-ordinated.

You might like to look at R-Linx (Fig. 4).

R-Linx is a product from GlobalView. It is essentially an alarm handler, capable of passing data to two-way radio systems, such as Motorola or Hytera repeaters. You can see more details here:

<https://tinyurl.com/ybua8y4x>

If you hear radio amateurs talking about DMR radios, it will usually not be very long before you hear them mention a 'codeplug'. The codeplug for a DMR radio is just a fancy word for its *configuration*, which is all packaged up and uploaded into a radio. Programming software is available to run on a computer to allow you to set up the required channels, talkgroups, radio IDs and so on and then upload it into the radio.

Like in any form of programming, you have to do things in a particular way, otherwise, unexpected results can occur! If you want to understand codeplug programming, the best thing to do is to build your own simple one from scratch and get that working! That, as they say, is another story!

I was very interested to learn, however, when I was chatting to Callum, that it is possible with some of the newer radios to program them over the air and essentially upload a new codeplug into a radio using Over The Air Programming (OTAP).

This could be ideal if you have a widely dispersed workforce and do not want to have them to bring their radios in for programming. Incidentally, many DMR radios have 'Stun' and 'Kill' features built into them. This means that there is the capability to disable a particular radio by sending it a particular type of message if it fell into the wrong hands, for example.

Radio amateurs tend to disable these features, although it has been known for friends to play around and 'stun' each other's radios, and very occasionally in less friendly scenarios! I should add that reloading a valid codeplug into the radio will bring it back to life – it is not a permanent 'kill'!

I hope you have enjoyed this slightly deeper dive into the operation and capability of DMR systems.

Perhaps, it may help you to understand a little bit more about what your scanner is doing when it receives a DMR signal. If you have not yet tried this branch of scanning, it may encourage you to try it out. There is plenty to listen to, both from radio amateurs as well as in commercial traffic.

If you are considering a purchase of a DMR-enabled scanner, if you can, try checking in with some of your local enthusiasts to see how much DMR traffic there is around you. If you are out in the countryside, like me, you may find there is less DMR traffic than if you are in an urban situation.

Finally, my warm to Callum and the team at *Communic8 Hire* here in West Wales for their warm welcome, and for showing me all the features of DMR networks I had never seen before – *Diolch!*

IMPROVING SPACE WEATHER

FORECASTING: The field of space weather forecasting could take cues from its Earthly counterpart to increase the reliability of models as well as warning times ahead of inbound solar storms. As humanity becomes ever more dependent on technology, nations are investing more resources into space weather forecasting to predict hazardous solar storms, which can knock out power grids and disable satellites. Yet the performance of space weather forecasting lags well behind that of conventional weather forecasting. To close this gap, space weather forecasting should expand its frontiers with more satellite monitoring stations and should borrow and adapt techniques from weather and climate research, wrote Morley in a recent analysis. Compared with atmospheric weather models, space weather models have fewer observational data to drive them, which limits the predictions they can make to short lead times.

Whereas weather forecasters can track storms using satellite imagery of the entire planet, space weather forecasters must rely on just a few satellites to monitor the solar wind and possible solar storms. The National Oceanic and Atmospheric Administration's Deep Space Climate Observatory (DSCOVR) satellite, for example, sits at the location in space called 'L1' (The First Lagrange-Point), where the gravitational pulls of Earth and the Sun cancel out.

At this point, which is roughly 1.5 million km from Earth, or barely 1% of the way to the Sun, detectors can provide warnings with only short lead times: about 30 minutes before a storm hits Earth in most cases or as little as 17 minutes in advance of extremely fast solar storms. To provide longer lead times, satellites could be stationed farther upwind by using a solar sail to propel the spacecraft closer to the Sun. NASA's Sunjammer mission was designed to demonstrate this concept but never flew. Satellites could also be positioned at other gravitational null-spots—like the L5 point, off to one side of the Sun—to provide more spatial coverage of the Sun's magnetic field.

There are also computational tools that space weather forecasters could borrow from weather forecasters to extend lead times. Statistical 'down-sampling', for example, is often used in climate models to artificially generate details from sparse data sets based on previously observed correlations. (Source: AGU: *Space Weather*, Volume 18, Issue 3, March 2020)

<https://doi.org/10.1029/2018SW002108>

<https://tinyurl.com/yakxw5dx>

Portable DAB Radios, RAJAR Figures, and Small-Scale DAB

Kevin Ryan

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Kevin Ryan uses a portable DAB radio in a queue, some noteworthy worldwide DRM developments and provides a short overview of the many changes happening to DAB in the UK in the summer of 2020.

Now that we are into a period of having to queue up for access to almost everywhere, I have started using my personal (pocket) DAB radios to pass the time. I have acquired a few of these 'on-the-go' DAB radios over many years but had to retire a couple of them because they cannot decode DAB+.

The first personal radio I bought was a Perstel BlueNote, and I still use it occasionally because you can select a multiplex and scan through each station in turn.

Unfortunately, it is so old that it does not even detect the DAB+ transmissions and relies on a telescopic antenna, rather than using the earphone cable as the antenna.

Just before Christmas 2019, I bought a Majority Petersfield 'Go' (Fig. 1), which clips to your belt. Moreover, in the post-Christmas sales, I picked up a VQ Blighty that fits in your pocket.

I will let you next month about my experience with each of them.

Unknown DRM

An unknown transmission was logged just once in May on 17775 kHz at 0800 UTC. It carried a data channel with a website (known as an 'MOT Website'). I guess that this broadcast is from China because China National Radio is usually on 17770 kHz until 0900 UTC, and this is probably an error at the transmitter site. It may be connected with feeding the DRM-driven public signs that I mentioned last month (*RadioUser*, July 2020: 39-41). The transmission seemed to use the latest coding standard. This means that the website pages in the main data channel could not be decoded from the payload bit of the data stream (known as the Main Service Channel).

There was some initial speculation that the experimental station WE2XRH in Delta Junction in Alaska had come back to life,



1

but I do not think so. There is more information on thinking behind using DRM in the sub-polar regions on this website.

<https://tinyurl.com/yb4kxevg>

Radio Purga (Radio Blizzard) was noted with one of its test transmissions on 12025kHz at 0230 UTC in Japan in AAC mono at 11.64kbps and 10kHz bandwidth. When it finally goes operational, there should be two audio channels, as well as relevant data for this inhospitable region in North-East Russia. This is a difficult station to log, even when using a remote SDR in the Far East.

RFI is carrying multimedia on 3965kHz (Fig. 2) throughout the day. I have not found a way to extract the images as of now. I keep searching for an easy way to put the I/Q signal onto a 12kHz carrier so that I can use either an old version of *DReaM* or the DRM Software Radio. Has anyone solved this problem?

New: DReaM 2.2.1

A DRM enthusiast ('Zelfie') has released a fairly stable version of the latest *DReaM* DRM decoder for Windows 10, and an updated version for Windows 8.1/Windows 10. He is working on a version that is compatible with Windows 7, but I am not hopeful that he will achieve it.

This version of *DReaM* decodes xHE-AAC audio used by All India Radio's medium wave stations and Radio Marti. China National Radio is expected to

use it very soon.

An analogy is moving from a DAB to DAB+ receiver where the latter decodes both versions of digital audio. I tried the releases on Windows 7, but *DReaM* does not launch correctly because some of the underlying software components are only compatible with Windows 10.

The Windows 10 version launches OK but crashes when you change things like the input audio source or the channel options. The developer explains how to work around this on his blog post by copying a configuration file with the settings you want from another version of *DReaM* into the *DReaM* 2.2.1 directory.

<https://tinyurl.com/ydcvmcqc>

I tested the Windows 10 version and was successful with a BBC WS transmission in AAC on 15620kHz, decoding both audio and *Journaline*. I did not get anywhere near 100% decoding – mainly because the remote SDR I tried had locally-produced interference at around 15610kHz.

Later that day, I tried to receive KTWB on 15200kHz, also directed to India. However, at a guess, I achieved about 15% audio decoding. Using the DRM extension in the KiwiSDR produced nearly 100% audio decoding.

The KiwiSDR version is based on *DReaM* 2.2.1. However, its developer changed some of the code, to better handle the xHE-AAC technology. Another possibility may be the feeding of an I/Q signal from the remote receiver via the internet, and a virtual audio cable to the *DReaM* decoder on my PC.

I was keen to try out the decoder on Radio Marti (Fig. 3), which uses the xHE-AAC encoder. I tuned in, via several remote Caribbean receivers around 2000 UTC, with poor results. The signal was very weak, and I noticed that *DReaM* crashed after a period of low signal input. The KTWB transmission was also poor but *DReaM* did not collapse with an AAC signal.

Bauer Plans

The Bauer group aims to create UK's largest network by rebranding 49 stations acquired from the Lincs FM, Celador Radio, UKRD and Wireless, mainly as 'Greatest Hits Radio'. Bauer is not rebranding any of

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Fig. 1: A queue-busting personal DAB radio. It offers good sensitivity and enjoyable audio quality.

Fig. 2: Radio France International's relay, via a low-power transmitter at Issoudun.

Fig. 3: A brief period when Radio Marti from Greenville produced perfect decoding, before *DReaM* crashed a few minutes later.

Fig. 4: A very useful map from Ofcom, showing in which areas small-scale DAB licences will be advertised.

its own local stations ('heritage' stations) at this time, and only three of the acquired stations will become heritage stations. Cornwall and Lincolnshire are seen as having distinctive local needs. Pirate FM in Cornwall and Lincs FM will survive this huge exercise happening in September.

Four other stations keep their local name. They are producing their own breakfast shows but are relaying the Hits network for the rest of the day. Bauer has an agreement with the Nation Group to rebrand their stations as either 'Hits Radio' or 'Greatest Hits Radio', while Nation continues to produce a drivetime show.

Eight digital-only stations will close because Bauer already has stations they overlap with.

Bauer believes it needs to act now for three reasons. First, there is a significant shift to digital listening – that is 74% for Bauer, more than the national figure of 60%.

Second, people are listening to less local radio output because of the wider choice of digital.

Third, many advertisers now want more straightforward ways of running radio campaigns than those that an average national radio network can offer.

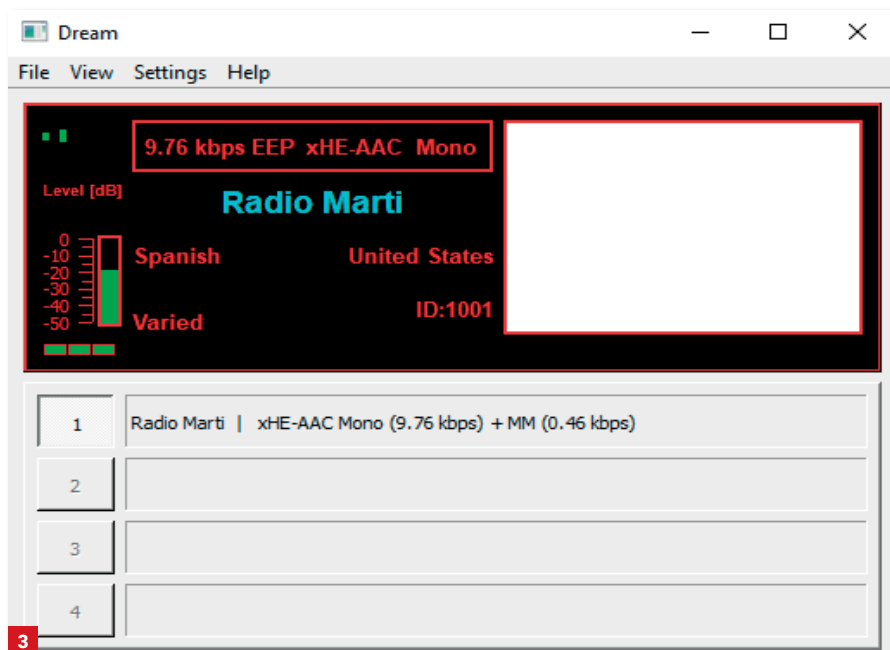
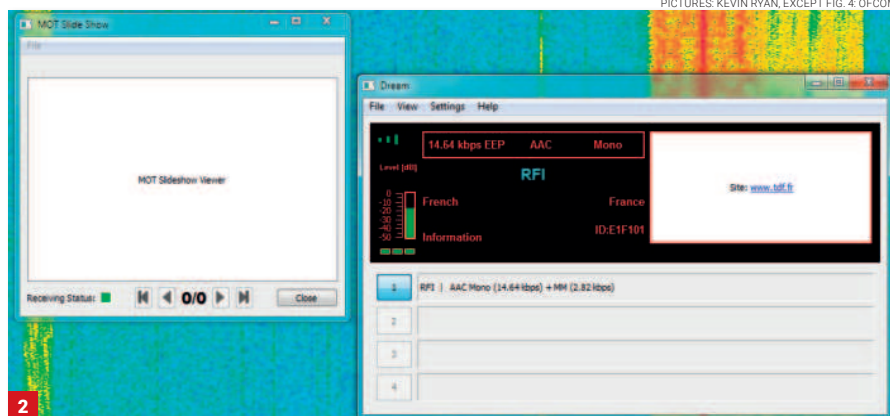
This is a major change that will affect nearly all local multiplexes. On my local multiplex of Berks and North Hants that already has Greatest Hits, the station The Breeze will become Greatest Hits. I am sure Bauer will not keep both stations for long.

<https://tinyurl.com/y96yt2wh>
<https://tinyurl.com/ybu8uwvz>

Latest RAJAR News

The radio body issued the first quarter (Q1 2020) listening figures in mid-May. They showed that DAB radio set ownership has not changed much since 2019. The digital share of radio listening has gone up to 58.6%, although this level is now pretty irrelevant given the new review of radio that is taking place.

The number of people listening to the BBC's national networks fell across the



board, including digital-only stations (Radio 4 Extra, World Service, Radio 1 Xtra, 5 Live Sports Extra). The exception is BBC 6 Music, which was showing a small increase of just 1.6%.

Table 1 lists the top 20 digital stations. I have excluded any station with an AM/FM transmitter. This may be very unfair on stations like Capital Xtra, which is mainly delivered via digital but also has three small FM transmitters in London, as well as LBC News that retains its AM service for the capital.

LBC is doing very well: The LBC News programme has 657,000 listeners, with 72% of them in London.

It is a very mixed picture in the commercial sector. There has been a widespread decrease in listeners for established stations, mainly because so many 'themed' stations launched in 2019. The clear winner is Virgin Radio: All three stations attracted more listeners, and Virgin

Anthems doubled them.

Magic Soul, Absolute Radio 70s, talkRADIO and LBC (see above) also did very well.

Multiplex Changes

Cyber Radio left the Surrey multiplex, IBC Tamil and Rathergood Radio closed on the London 3 multiplex, and Radio City Talk closed in Liverpool. North East Wales and Cheshire is gaining 88.3 Centreforce, a station I can hear on the London 2 multiplex. I spotted that Radio 210 on my local Berkshire multiplex is now 80s & 90's Glow, offered in a 56kbps DAB encoding.

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

SDL National Mux

On the 9th of June, talkSPORT 2 changed from DAB mode 64 kbps mono to DAB+ 32kbps stereo so that fans, "can listen to all of the live sport in glorious stereo sound". The website provided detailed instructions on how to tune into the new service if the



DAB radio had not automatically updated its station list. Most modern DAB radios can receive DAB+, so your ability to listen to talkSPORT 2 should not be affected.

<https://talksport.com/listen>

On the same morning, I noticed that talkRADIO had a message on screen alerting listeners with "We are moving! Please retune to talkRADIO+". My PURE Elan E3 had automatically rescanned the multiplex, and talkRADIO+ was also broadcasting in DAB+ stereo using 32kbps. I think this is the first time I have come across a retuning message on DAB. They are, of course, quite common on Digital Terrestrial TV (DTT).

A day or so later, when I tuned in talkRADIO+, the station ID changed to 'Absolute Radio 00s', without audio, and I had to go back to the DAB version. The situation reversed later in the day, with Absolute Radio 00s in the station list but switching immediately to talkRADIO+ when I selected it.

Interestingly, this just happened on the PURE Elan E3. The John Lewis Octave did not even list it, and DABplayer did not show it in the multiplex configuration. The station was on the London 1 multiplex. Perhaps it is going national, once capacity is available.

<https://talkradio.co.uk/how-to-listen>

The audio in DAB+ sounded better (and less 'muffled') than the DAB version but that might be just my ears deceiving me. The on-air announcement on the move to DAB+ stated that it would be like being in the studio, but I am not sure about that claim. Another advantage mentioned was less interference, which was probably a way of explaining that DAB+ is less prone to the 'bubbling' audio sound DAB produces at low signal levels.

I am not sure how long stereo broadcasting will last. When LBC News initially

	Station	Q1-19	Q1-20	% +/-
1(1)	BBC 6 Music	2.515	2.556	+1.6
2(3)	KISStory	1.845	2.066	+12.0
3(2)	BBC R4 Extra	2.238	1.983	-11.4
4(5)	Virgin Radio	1.301	1.496	+15.0
5(4)	Absolute R 80's	1.737	1.459	-16.0
6(-)	Heart 80s	1.422	1.249	-12.2
7(6)	Planet Rock	1.212	1.209	-0.2
8(7)	BBC R1 X	1.050	0.986	-6.1
9(9)	Absolute Radio 90's	0.958	0.837	-12.6
10(8)	Smooth Extra	0.962	0.819	-14.9
11(10)	BBC 5 Live Sports Extra	0.708	0.601	-15.1
12(12)	Mellow Magic	0.603	0.590	-2.2
13(14)	Jazz FM	0.571	0.566	-0.9
14(13)	Kiss Fresh	0.588	0.519	-11.7
15(17)	talkSPORT 2	0.424	0.489	+15.3
16(16)	Heart Extra	0.470	0.472	+0.4
17(-)	Heart 90s		0.456	
18(15)	Kerrang!	0.517	0.438	-15.3
19(18)	talkRADIO	0.339	0.424	+25.1
20(19)	Magic Soul	0.288	0.393	+36.5

Table 1: Kevin's Top-20 Digital-only Stations (compiled from RAJAR figures, August 2020).

started in DAB+, the station used stereo. However, it now transmits in mono with 24kbps. The talkRADIO station ceased the DAB service on the 26th of June – just in time for Times Radio to start broadcasting (see the following paragraph).

Times Radio

Times Radio launched at 6 am on Monday 29 June, with the Breakfast Show on the SDL national multiplex presumably in DAB to keep compatibility with BBC Radio 4. When Scala Radio launched, they used DAB in joint stereo – once again, compatible with BBC Radio 3.

However, if Absolute Radio 00s is also due to launch then Times Radio will have to use DAB+.

The TR broadcasting week is split into four chunks: Monday-Thursday, Friday, Saturday and Sunday and the broadcasting week in 0500-0100 BST. There will be specially commissioned shows from time to time.

<https://tinyurl.com/yba27ass>

Small-Scale DAB

Ofcom plans to advertise the first ('Round One') small-scale radio multiplex licences on Tuesday 1 September 2020 (Fig. 4).

This will also be the date from which applicants will be able to apply for a Community Digital Sound Programme (C-DSP) licence to broadcast a C-DSP service on any of the multiplex services for which licences are being advertised in Round One.

Once Ofcom advertises the multiplex licences, applicants will have 12 weeks to prepare and submit their applications before the closing date. The list of multiplex licence areas (Fig. 4) is as follows: Alnwick & Morpeth, Isles of Scilly, Basingstoke, Kings Lynn, Derry/Londonderry, Leeds, Bradford, Newcastle & Gateshead, Cambridge, North Birmingham, Cardiff, Norwich, Clevedon, Avonmouth & Filton, Salisbury, Dudley & Stourbridge, Sheffield & Rotherham, East Bristol, Mangotsfield & Keynsham, South Birmingham, Edinburgh, Tynemouth & South Shields, Exeter, Welsh Valleys, Glasgow, Winchester, and Inverclyde.

I am hopeful that I will be able to hear the Basingstoke multiplex, and possibly the one at Winchester too. However, I might need to find space in my loft for a DAB antenna pointing roughly towards the Southwest.

I have plenty of time because the stations will not appear until the middle of the next year.

CHRIS GALLAGHER ON UNSPLASH



Chrissy Brand
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Radio and the Environment (Part 1)

The detrimental environmental impact that humankind has inflicted on the Earth has, as we know, escalated dramatically over the past 100 years or so. This period coincides with the evolution of global radio broadcasting, and much more beyond the communication industries, including the harmful effects of transport, to fossil fuel burning.

While power-hungry radio stations have added to the planet's carbon footprint, this is arguably counterbalanced by all of the good that radio has brought the world, in terms of communication and cooperation, information and enrichment, personal wellbeing and entertainment.

Sustainable Stations

Radio stations everywhere can become greener and more sustainable, indeed, they doubtlessly need to, on both economic and environmental grounds.

KTAOS in New Mexico (Fig. 2)

Chrissy Brand takes a look at how radio stations, podcasters and broadcasting organisations can respond to the impact of environmental disasters and emergencies.

became the first station in the US to harness solar power, back in 1991. Its solar array consists of 140 solar panels, producing 100kW of power, with each panel generating 32kW of electricity daily. KTAOS complements its adult album alternative format by holding the annual *Toas Music Festival*, which is entirely solar-powered.

WXRV in Boston, Massachusetts and KIDE in Hoopa Valley, California, are further examples in the USA, while KZMU in Utah has been entirely solar-powered since 2008, using a 12kW photovoltaic

system (Fig 3).

In 2012, Greenpeace Africa launched a solar-powered community radio station in Oshwe, in the Congo Forest basin of the Democratic Republic of the Congo. The rationale behind this was, in part, to bring an end to the stop-start issues over fuel supply, which were hampering the radio station's ability to broadcast.

There are many other examples around the world. As to the power consumption, and costs, of running a radio station, that is a subject to be explored in a future article. However, there were some

Fig. 1: Flooding in Bingley, West Yorkshire.

Fig. 2: The sun shines on the solar-powered KTAOS station in New Mexico.

interesting discussions around it on the Quora website in May.

<http://ktao.com/blog>

<http://ktao.com/SolarRadio>

<https://tinyurl.com/y8wrksd>

<https://tinyurl.com/yb5axwu8>

In 1971, Greenpeace was one of the first environmental pressure groups and campaigning organisations to take root in the western psyche. Surprisingly, perhaps, it took decades before a Greenpeace radio station was established, in the USA. This eventually happened in 2011, since when it has given 'the inside scoop' on the organisation's work on solving global warming, stopping toxic chemical threats, and protecting endangered forests and oceans.

There are also podcasts from the various Greenpeace groups worldwide, such as Greenpeace Canada. In its podcasts and broadcasts, Greenpeace also highlights other areas of concern. For instance, it is publishing reports and initiatives on the drive for a greener internet. More on this particular campaign can be heard in a 2018 podcast, *Greening the Internet*, from *The Restart Project*, with Andrew Halton, Head of Greenpeace IT UK.

He explained that "cloud services include the vast array of online platforms we use daily to work, share files or watch movies. Given their massive traffic, we need to put pressure on the big companies enabling these services to adopt more sustainable practices, such as shifting to renewable energies. Companies need to be critical about where their energy comes from and about their plans for a greener cloud."

<https://tinyurl.com/ybjdwth7>

www.greenpeace.org/usa/podcast

<https://tinyurl.com/y7vp75ot>

Emergency Frequencies

In times of crisis, radio has always been able to step up to the mark: Public broadcasters and other organisations relaying updates, specialist radio stations and podcasts, can come into their own.

Now that climate crisis has taken a grip, there are daily battles to be fought to limit and repair damage to the environment, both locally and internationally. Every broadcaster has a role to play.

When a region is affected by, for instance, an earthquake or tsunami, communications infrastructure is often

wiped out. There may be no electricity and no internet. Local radio and television stations are carriers of vital sources of information but they might be forced off the air, flattened or devoid of electricity. However, short wave radio signals, beamed in from regions that are unaffected by the disaster, can help with rescue and recovery.

The CDAC network (Communicating with Disaster Affected Communities) rightly states that, "Shortwave technology is absolutely disaster resistant." CDAC is a platform of more than 30 humanitarian, media development, social innovation, technology and telecommunication organisations, dedicated to saving lives and making aid more effective through communication, information exchange and community engagement.

The High-Frequency Coordination Committee (HFCC) also plays an important role in utilising short wave.

<http://www.hfcc.org>

Its main purpose is as the global body responsible for allocating short wave frequencies to ensure that there are no clashes. However, the HFCC points out that, since its genesis in the 1920s, short wave radio has been associated with its potential of being a communication tool in emergencies. HFCC also observes, "the huge technical potential of international shortwave broadcasting that operates transmitter facilities tens, or hundred times, more powerful than those of amateur radio, remains almost unused in emergencies. At the moment when local and even regional communication and information networks

are needed most, they are destroyed or overloaded and the population suffers from an information blackout. Shortwave radio is capable of remaining the only source of information."

In partnership with the Arab States and Asia-Pacific broadcasting unions, HFCC works on the International Radio for Disaster Relief (IRDR) project. As of June 2020, the following frequencies (plus the channels 5kHz either side of them) are allocated for use by IDRF: 5910, 7400, 9430, 11840, 13620, 15650, 17500, 18950, 21840, and 26010kHz.

In 2014, a trial of IRDR was made during the *Media Summit on Climate Change, ICTs and Disaster Risk Reduction*, in Jakarta. A trial, 30-minute programme was transmitted (Fig. 4). Made by Jacqueline Dalton of *BBC Media Action*, it explained how radio is key for a crisis and aids humanitarian responses. Along with examples from Japan and Philippines radio, it spoke of public service announcements about zones to avoid, what to do, announcements of missing persons, where safe drinking water and shelter could be found.

A dozen international radio broadcasters including ABC (Australia), All India Radio, BBC, NHK World Japan and the Sri Lanka Broadcasting Corporation, combined with transmitter bodies Babcock and MGLOBAL (a company set up by former Radio Netherlands employees in Madagascar) took part.

<https://tinyurl.com/yclzk28f>

<https://tinyurl.com/yazuajer>



Fig. 3: Solar panels at Moab radio station KZMU.

Fig. 4: An International Radio for Disaster Relief (IRDR) QSL card for a trial broadcast.

Fig. 5: Radio can save lives all over the world.

Life-Saving Radio

Community radio has long been in place to deliver key information and save lives when the ever more commonplace environmental disasters occur (Fig. 5). A good example of this being in the democratically-elected, communist state of Kerala, in India. In August 2018, the area experienced the worst flooding for a century. Nearly five hundred people perished and a further one million were evacuated.

UNESCO and the Kerala State Disaster Management Authority had successfully integrated community radio into disaster management planning and response plans. Five main points explained how this could be enabled: Creating a publicly accessible directory of community radio stations; Financially supporting the physical establishment of new community radio stations in disaster-prone and vulnerable areas; Providing technical and advisory support for the establishment of new community radio stations in vulnerable areas and the existing ones; Establishing regular capacity building programmes for community radios in Kerala, and establishing a Kerala State level Community Radio emergency fund.

As well as natural disasters, Kerala also acquitted itself well during the Covid-19 pandemic, with radio having a role to play. A radio frequency is also being allocated to broadcast information dedicated to emergencies and natural disasters.

Radio DC is based in the Kerala state capital of Thiruvananthapuram and has around 50,000 listeners; they relied on community radio during the floods, as it was the only accessible medium. It is one of a dozen community stations in Kerala, with others including Radio Benziger, Radio Mattoli, Radio Neythal and Radio Media Village.

In May 2020, Shainu Mohan, writing in *The New Indian Express*, stated how community radio stations in Kerala immediately replaced the regular schedule with informative and interactive programmes about the pandemic.

Station director of Radio Mattoli, Father Bijo Thomas, said that the majority of the indigenous tribes and farmers in the remotest areas have no access to mainstream media. The station's audience



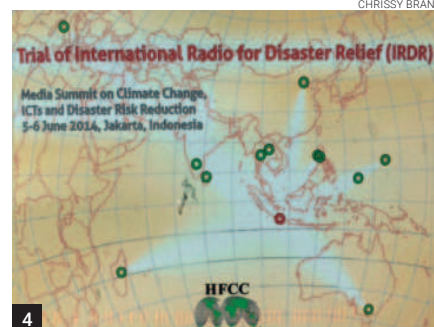
figures increased and between 50 to 100 callers rang into Radio Mattoli daily.

Radio Brahmaputra is another community station, which started in 2015, in Assam in India. It is the first grassroots community radio station in the north-eastern region, disseminating information on agriculture, health, education, livelihood, disasters and climate change.

These and other topics are covered in programme formats of chat shows, music, drama, interviews, quiz shows for school children, programmes for women, for older people, public service announcements, traditional music and cultural events.

The target audience of Radio Brahmaputra is, "the people of island villages, as well as the tea garden communities and mainland urban and rural settlement through direct participation of local volunteers and community-based broadcasters."

In 2015, Matthew Lasre reported for Radio Survivor on community radio responses in Zimbabwe, where Newsday's Peter Makwanya proclaimed, "Community radios remain the medium of choice for engaging local discussions on how the environment is failing them, or how they are even failing the environment themselves. This is the same, one and only, environment they have known for the [whole] of their lives, and they are quite better placed to nourish it. As the mouth-piece of the



marginalised, community radios provide these people with time and space to articulate issues about what has happened to their rivers, wetlands, springs, weather patterns, flora and fauna including the normally dependable rainfall patterns."

In 2017, Asia Radio Today also reported on how community radio became Nepal's lifeline during landslides and floods: The Association of Community Radio Broadcasters (ACORAB) made programmes for the county's community radio stations, broadcasting lifeline programmes and public service announcements in the Maithili and Bhojpuri languages.

<https://www.acorab.org.np>

Moreover, some radio stations offer help in other practical ways. Janaki FM in Janakpur was involved with relief distribution to 500 families. Asia Radio Today stated that, "To stop the spread

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of infectious diseases and to raise the awareness a health camp was organized at Sanosri Village Municipality by community Radio Sadbhav. According to Nabin Giri, the station manager, more than 700 hundred people got benefit and 50 serious cases were referred to Nepalganj Hospital. The station also collected funds to support a local person reconstruct his house."

This was in reaction to the fact that 29 community radio stations were partially or completely damaged by the extreme weather.

Community Green Radio started in 2014 in Kiboga, Uganda, backed by the National Association of Professional Environmentalists. The station promotes natural resource management processes in the eco-sensitive Bunyoro and Buganda regions. The station's other station objectives are, to my mind, examples of good practice that you would hope any radio station would adhere to: To provide the community with accurate information in different languages; To promote awareness about environmental issues, health issues, education issues and communities' rights; To create a platform for debate on sustainable development; To promote active community participation through Radio Committee, Listeners' Clubs, an annual meeting open to all listeners; and to empower women and to promote gender equality in decision-making

As well as broadcasting on 103.0MHz FM, Community Green Radio can also be heard on an Android app (Community Green Radio/Kiboga FM).

<https://tinyurl.com/yavan2os>

www.greenradio.ug

www.nape.or.ug

UK Climate Crisis Radio

The Covid-19 pandemic has proven that Ofcom can move quickly and set up radio stations where needed. At least eight community stations were issued with RSLs at short notice to deal with the Covid-19 crisis. These were based in cities and towns: Birmingham, Bradford on Avon, Chandlers Ford, Cheadle, Colwyn Bay, Leeds, Leicester and Portaferry.

Ofcom is reducing the waiting period for temporary radio licences. Now, to aid with social distancing, some stations with temporary broadcasts for drive-in films, gigs and even religious attendance are being put in place. This makes me ponder whether UK environmental crisis radio stations will be coming soon? I can see a need for vital information to be gained from



a sole reputable source in, for instance, times of floods and panic.

In this age of fake news (from the mainstream media, as well as being pushed by dubious individuals and organisations on social media), a national station that has regional outlets ready to broadcast at short notice, would help. Yes, we have BBC Five Live and BBC local radio in place, and they provide a useful service in uncertain times.

However, they already have more than enough news events and disasters to cover on a day-to-day basis.

The River Severn has decimated parts of Worcestershire this year, and there have been major floods in the West Midlands, Cumbria, Lancashire and Yorkshire (Fig. 1). Floods in the UK have become commonplace this century, caused by climate change, deforestation, intense farming and the short-sighted building of housing on flood plains. Successive governments have also failed on promises to help protect towns and communities.

Local radio gives coverage of floods, for instance, on BBC Shropshire phone-ins and coverage from Sunshine Radio in Ludlow. However, can a specialist, public information station be established, licensed to spring into action with life-saving tips and advice on resolving damage to property?

Community radio stations do play a role in these situations. However, most stations are volunteer-led and run on a shoestring. Also, it seems to me that their main *raison*

d'être is to entertain with a highly localised angle: music shows, interacting with local creatives, guides to village fairs and other events. I know that in uncertain times, these stations also provide a lifeline, but I think a service that is more focused purely on impending and ongoing crises is also required.

I call for a purpose-built, UK Emergency Radio station to be set up. It would be government-funded, staffed with professional broadcasters and also call on freelance community radio volunteers and activists. Emergency Radio would broadcast live online (website and social media), on medium wave, FM and DAB, with local and regional outlets giving specific localised information on, for instance, expected storms and the ensuing damage, rivers bursting their banks, places to seek refuge when your house is flooded, details of helplines and any other information needs that arise.

A station like this could be hand for other national emergencies as well, from pandemics to the consequences of a no-deal Brexit. My Emergency Radio station would include updates from the Meteorological Service and the Environment Agency. Besides, it would broadcast panel discussions and talks from specialists.

These could be drawn from the green movement and cover issues, such as combating climate change, encouraging people to develop community allotments, and forming some self-help groups.

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

Review: Hytera PNC380 Network Radio

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The old adage of 'waiting for a bus and then two come along at once' might just as easily be applied to this month's *Network Radios* column.

As I was putting the finishing touches to my piece about the Boxchip S900A for last month's issue, another device came through for review.

And thanks to Andrew Clark of G6 Global, who has kindly provided it, you can win this very review radio as a special prize, in a forthcoming *RadioUser* competition. Watch this space!

<https://www.g6-global.co.uk>

Hello Hytera!

The new Hytera PNC380 stands at the opposite end of the spectrum from last month's offering (Fig. 1).

<https://tinyurl.com/yafjso5r>

While the large Boxchip S900 crams pretty much everything in one unit (phone, FM radio, DMR radio, Network Radio and even bridging across modes), the new, tiny (by comparison) PNC380 is equally a beautiful piece of hardware, but only performs a subset of what the Boxchip can do.

The Hytera is aimed fair and square at the business PoC market, and it is set up totally for that purpose. It is the joint lowest entry point into PoC for Hytera, along with its earlier cousin, the PNC370.

<https://tinyurl.com/y7l3v2t3>

The company has a number of higher-end (and commensurately higher-priced) units available in its full range, including the PDC550 a nice-looking piece of kit that I would not mind taking a closer look at.

<https://tinyurl.com/y76g5qzz>

A Useful Upgrade

The PNC380 is set up for business, so to use it for hobby use, we need to employ a few 'get-arounds'. And to muddy the waters further, there is no touchscreen on this device. You need to be prepared to tinker a

Chris Rolinson offers an in-depth review of the new Hytera PNC380 network radio, looking at its specifications, differences from previous models, serviceability, and 'app-friendliness'.



little to get the best out of it.

Nonetheless, I will say up front that I am very taken with this radio – it fits in my hand like a proverbial glove, and I am glad to see it in the hobby, especially as it follows on from its successful predecessor.

I liked the PNC370 so much, that I parted with cash some years ago to own one. And now that the PNC380 is here, we have something to compare the earlier unit to and see what Hytera have done to improve it.

The Specifications

So, what's different on the specs sheet?

Firstly, be aware that there are two versions of this device – the 'Basic' and the 'Pro' models.

Here, I am reviewing the higher-end Pro model.

The Pro has additional features over the Basic, notably NFC capability, more inbuilt memory and a rear camera, topped off with fast-charging – all worth having in my opinion.

The Basic model thus represents less of an upgrade over the PNC370, but I believe that it still represents an improvement ergonomically and it is, of course, more affordable.

How do the PNC380 and its predecessor match up?

PNC380 v PNC370 – Physical Differences

The PNC380 is slightly smaller than the PNC370, but it is a little deeper (to accommodate the new battery). It is also slightly heavier (by 23g) than its predecessor.

I doubt you would notice any difference in both cases (Fig. 2).

A 5MP camera with a flash, which can double as a torch, adorns the rear of the device – it is 720p and capable of streaming live video.

The screen remains unchanged at 2 inches, as is its resolution of 320 x 240 pixels.

However, the screen 'viewability' seems vastly improved to me – everything seems sharper in focus and the ability to change font sizes helps too!

There is an LED above the Hytera name on the screen. Like so many PoC devices running Android, this seems to have a mind of its own. However, I say this coming from

a PTT radio background.

Doubtless, it is programmable somehow, but not from the radio itself, as far as I can see.

Both the PNC370 and PNC380 meet the MIL-STD-810G standard and can withstand a drop of 1.2 meters. Unsurprisingly, I didn't test that! The PNC380 is additionally certified to IP67 standard (an improvement on the IP55 of its predecessor) meaning it is fully protected from dust, as well as waterproof up to 1m depth for up to 30 minutes, should you want to use it in the bath!

The new model sports a handy physical keypad, which enhances the use of this radio as a phone. It has old-style physical green and red buttons for phone up and phone down. There are two hardware buttons under the screen to help navigate around. The right-hand one acts as the standard Android 'back' button. The dual-mic system which gave such excellent audio in the PNC370 has been retained in the upgraded model.

Finally, Hytera has decided to change the belt-clip system. The PNC380 jettisons the standard HT-style for an altogether larger and (hopefully!) sturdier snap-in cradle type (Fig. 3).

Internal Differences

The PNC380 runs Android 7.1.2 (Nougat) rather than the 5.1.1 (Lollipop) on the PNC370 and internal memory size has doubled - ROM to 8GB, and RAM to 1GB. Note though that the Basic model remains at 4GB ROM and 512MB RAM, representing no change from the PNC370. You can now though expand the PNC380's storage - this is achieved via Micro SD card, and you can use sizes of up to 32GB.

Running a CPU test program, I found that the processor appears not to have been upgraded - this is surprising, as the new unit feels 'snappier' in use. However, this could be due to an upgraded graphics chip, the extra RAM, or even optimised coding. Positioning capability now benefits from Assisted GPS in addition to the GPS, GLONASS & BDS found in the PNC370.

Very usefully, WLAN now accommodates the 5GHz band (the old unit only handled 2.4GHz). You can also set up Wi-Fi access points inside the radio - without the external Windows software Hytera provided for the PNC370. Both units employ Bluetooth 4.1 - no upgrade there.

Enthusiasts will be pleased to note that many more worldwide cellular bands are supported in the new model, including Band



20, which will make O2 users in the UK especially happy.

Power Up and First impressions

One thing all users benefit from is longer talk-time. This is down to the PNC380's battery, which has a capacity of 4Ah - almost 25% more than the old model. Before PNC370 owners ask though, the batteries are not interchangeable - no quick upgrade, I'm afraid. Hytera claims that it can last for 24 hours of 'standard' use. But as the battery is user-removable, you can always carry a spare.

As I hinted at above, the PNC380 fits in the hand like it was just meant to be there. To many others though, it may look a little like a throwback to the days of Nokia 'dumb'-phones, with its non-touch tiny screen, phone-like keypad, 'D-Pad' selection pad and hardware buttons for taking and making calls.

Your non-radio friends will also wonder about the antenna protrusion on the top right which is the main distinguishing feature as to this device being more 'radio-like'. I am not sure if this is a cellular or GPS antenna, but what I can report is that my SIM card (on the 3 Network) in the PNC380 gave much-increased signal reports than it does even in my iPhone 11.

On the left-hand side (Fig. 4) you will find the PTT, tastefully enhanced in orange, so that you can see it better in dim light. I found the PTT to feel a little 'loose' for my liking. To me, it felt as though it might not always make contact, especially if you hit it on the edge - however, in real use, there was no problem. Perhaps I am just too fussy, or



Fig. 1: The PNC380 and the home screen.

Fig. 2: The PNC370 and PNC380 models compared.

Fig. 3: Differing belt clip configurations.

maybe the PTT is a little happier if you hit it centrally? No deal-breaker for me.

Below the PTT, you will find the up and down volume buttons, and above it is the programmable button. This can be set by digging into the device settings. There are a limited number of uses for this button; taking a photo or video, recording audio, locking and unlocking the screen (which I preferred) or a customisable option.

However, this latter option most likely uses the Hytera external software and does not seem available to hobby users at the moment, sadly.

Along the top, there is an orange SOS-style button, which again does nothing out of the box but is probably programmable for business use. On the right-hand side, you will find a 3.5mm accessory jack for external earpieces, headsets and other accessories.

The rear of the unit comprises the battery cover, the 5MP camera and the flash/torch. Removing said cover reveals the BP4006 4Ah capacity Li-ion Polymer battery. Underneath that, there are the compartments for Micro-SIM and SD cards. There is also an orange gasket to enhance the water resistance of the unit - that's reassuring (Fig. 5).

The bottom of the unit has a MicroUSB slot for charging and connection to a PC. Moreover, there are slots in the unit's lower sides for what I assume to be an optional desktop charging accessory (Fig. 6).



4



5



6

Switch-on, Setup and Apps

After turn-on, you are greeted with 6 screen icons, including phone and messaging. Yes, this device will handle both, and in a similar way to the old Nokia phones of yore.

If you need a basic phone (maybe not so much text) capability, the PNC380 will work fine.

Setting up Wi-Fi is the first job, via the Settings icon. This is where you might first encounter Hytera's slightly quirky text-entry system. Like an old mobile phone, you have to press keypad letters but instead of multiple presses, the choice of letters available appears at the bottom of the screen.

You then swap to upper or lower case or numerals by pressing the # key when the on-screen options will change. It's a little old-fashioned, but it works and you quickly get the hang of it. You can, perhaps, understand now why, as a text device, the PNC380 would be a little slow.

The photograph in Fig. 7 shows how this works.

The next job is to enable cellular data if you wish to use that, again from settings. Then you are good to go, and you will, of course, need some apps.

Do be aware that, as a device aimed at business, the Google Play Store is not available on this device, so your purchases will usually not work. Hytera provides their bespoke 'SmartMDM' software for their business users, but hobbyists have to find a workaround.

The only way to get apps on board is by installing each Android Application Package File individually – such apps are designated with the suffix .apk.

Thankfully, it is fairly easy to obtain these – some companies, Zello for example, provide downloads of their .apk files.

www.zello.com/android

Besides, I discovered a useful Chrome Extension called *APK Downloader*.

<https://tinyurl.com/yxaoofbb>

You can paste the URL of any free app on the Google Play Store, and it enables you to download it directly as an .apk file. Note that it won't work with paid apps though, even if you have bought them legitimately.

This route meant I could try out lots of free apps on the PNC380 – and I will give you a heads up here; most of them only work in part! There are often problems a) with not having a touchscreen for input and b) screen resolution not being supported. There can be other issues too.

However, have a play! I even tried the Chrome browser on there and managed to get some Web SDRs to listen to, which was fun!

Along with Zello, Peanut works fine. Other apps, like Echolink, work enough so you can use them, even if the user interface can be frustrating at times.

Apps, Zello & Drawbacks

So how do you get Apps onto the PNC380? With assistance from one of my Android-expert friends, I have set out a beginner's guide in Table 1.

You can use your PC keyboard to enter text, but the PNC380's hardware rules apply if you want to change to Caps or Numerals; in other words, you have to use the # key on the actual radio to toggle the selection.

Since Zello is likely to be the most used

Fig. 4: The PNC380: Left-hand side profile.

Fig. 5: The PNC380: Rear, battery & card slots.

Fig. 6: The charging socket and side slots.

Fig. 7: A typical PNC380 text-entry screen.

Fig. 8: The useable areas of PNC380 with Zello.

app on this device, it is worth spending a little time explaining what does and doesn't work.

Simply put, anything that sits on the top-most line will not be accessible from the radio. However, it is still accessible from 'scrcpy' (Table 1). The rule to follow is to set up as much as you can of Zello via your PC.

You will then be able to fine-tune things on the radio when out and about.

The following items are inaccessible from the radio:

- a) the contacts list,
- b) the previous message playback list, and
- c) the 3 dot menu (in other words, *Status, Options, Replay, Sign out and Exit*)

Anything else on the screen can be selected by the D-pad selector in conjunction with the back button. I did find setting Status to 'Solo' and leaving it works OK.

So changing and selecting from 'Recents', 'Contacts' or 'Channels' is all fine. While on the PTT screen, you can still select the camera icon, the channel-off icon, the speaker-output icon, the connection quality and lower right 'hamburger' menu.

The image in Fig. 8 shows which areas of the screen are accessible from the device – anything inside the red rectangles is fine, outside of that you will need *scrcpy* and your PC.

In other words, you can access enough of what is on the screen to make the PNC380

very usable. Anything else you need, just think ahead and program it in advance.

One final tip – although you cannot exit Zello properly on the radio, you can still ‘force-stop’ it – go to *Settings>Apps*, select the app you want to stop with the D-Pad and then choose *Force Stop* from the contextual menu. This works with all third-party apps you choose to install on the radio.

What Do Others Think? The Belgian View

As you may know, I like to get others’ opinions on any review radio. This month, I have asked two users who have already purchased the device to give their thoughts.

Firstly, Android and NR enthusiast Filip Everaert was very complimentary about the build quality: Since Hytera has a good reputation for this, it is almost to be expected. Fil went as far as to say it felt “*much more professional*” than most NRs he owns (and he has a few).

Filip also noted that his battery life was ‘exceptional’ and he commented positively about the device’s speed of operation. He was especially grateful for the extra storage space, both internally and on the SD card.

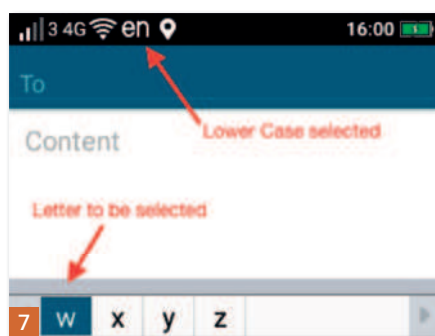
Like me, he was not so happy with the lack of compatibility of applications, but thankfully he disagreed with me about the PTT, which he found to be fine and no different to his PNC370.

A 4x4 Responder’s Thoughts

I was very pleased to hear from Gareth Batchelor, who offered his opinions of the radio: Interestingly, Gareth is not a network radio user in the usual sense but uses PoC in his work as a volunteer with Leicestershire & Rutland 4x4 Response. So he comes to the radio with a slightly different viewpoint. His group uses Broadnet, rather than Zello, and the radios are set up slightly differently.

Gareth’s impressions are that the PNC380 is a very solid and well-built handset, made with good quality materials. The feel and look are professional. His conclusion after a few weeks of use is that the PNC380 is a “*very good handset*”. He particularly drew my attention to the brightness of the screen which he says is “*easy to read, even in bright sunlight*”.

And as for the audio? “*Fantastic. I usually have to have the handset on minimum volume when inside, as it is so loud. Outdoors it only has to be up to about half for it to be easy to hear. The volume buttons on the side and the PTT are very instinctively placed and easy to reach with*



one hand. The customisable key is a very neat addition too, although I have not used it for anything specific yet.”

However, Gareth also found some niggles. “*When I first got the handset, I found it very frustrating that it would not key up when the screen was blank. If you wish to initiate a call, you have to unlock the screen first. No great issue as any key except the PTT or volume keys will unlock it, but I did find that a little annoying.*

“*Now, however, I am used to it and it’s a nice feature; an option to disable/enable it would be appreciated though.*” Gareth had some thoughts about the built-in mic: “*The mic I have found is great - so great, it’s almost too sensitive! When outside in a very slight breeze, the wind noise is horrendous.*”

He wonders whether the mic might benefit from reduced sensitivity as an option. Gareth agreed with my assessment of the feel of the PTT button though – so maybe I’m not so paranoid after all?

Summary

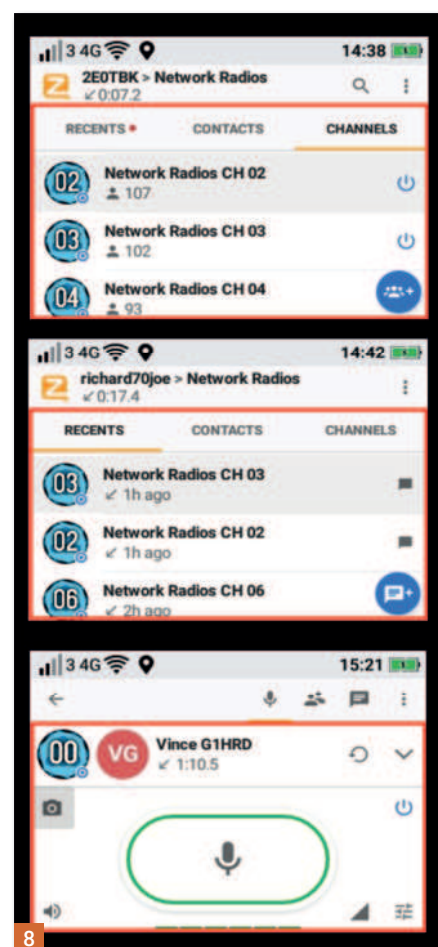
The Hytera PNC380 is a superb little unit. For business use, it will doubtless be very popular, especially as it can be heavily customised. For hobby use, it works very well, providing you understand its slight limitations and you are prepared to implement the straightforward workarounds that are available in the community.

The ultimate accolade is that I will be sad to see it go, though one lucky reader will be picking it up as a prize in this month’s competition! I suppose I am just going to have to get in touch with Andrew Clark at G6 Global, who donated the radio for both the review and the prize, to see if I can buy one for myself!

On that note, the PNC380 comes in at £250

<https://tinyurl.com/y84stcpm>

I think that is a reasonable price-point for such a super little device. Register as a member on G6 Global’s website and you can get a further 10% off.



- Download and install ‘scrcpy’ (stands for screen copy) from here: <https://github.com/Genymobile/scrcpy> (read the page first – it is available for Windows, Linux and Mac; follow the instructions carefully).
- Using the Windows version as an example, unzip the files to a directory – I put mine in a ‘scrcpy’ directory on my C: drive.
- Connect your PNC380 to your computer via USB – when the screen comes up on the radio, choose ‘Only charge this device’.
- Double-click on scrcpy.exe and permit for it to run (or ‘install’ as Windows sometimes calls it).
- You should now see a small-ish window with a copy of your device screen on your computer screen. From here you can access any screen buttons that you cannot use on the device itself by clicking on them (think touchscreen replacement).
- To install any .apk files, drag them from Windows Explorer file manager and drop them on the virtual PNC380 screen.
- Wait until the console tells you that the install has finished.

Table 1: Installing Apps on the PNC370/PNC380.

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Sorting Demons

Georg Wiessala sketches the life and work of James Clerk Maxwell, the often overlooked 19th-century Scottish scientist, and his essential contributions to the creation of the 21st-Century hyper-technological age.

Georg Wiessala

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For Heinrich Hertz, he was simply 'Maestro Maxwell'. But beyond labels, there are, perhaps, three things which most biographers of James Clerk Maxwell (1831-1879) broadly agree on in terms of what made the man.

First, the astonishing precociousness of the inquisitive boy, who had his first youthful academic paper (on ellipses) published at 14 years of age, at the Royal Society of Edinburgh (Clegg, 2019: 14).

Second, an environment conducive to scientific curiosity, in what was termed the 'Scottish Enlightenment' from the early 1800s. And third – resulting from this – an indebtedness to great men such as André-Marie Ampère (1775-1836), Hans-Christian Ørsted (1777-1851), Michael Faraday (1791-1867, *RadioUser*, March 2017: 54; January 2019: 46-47), Joseph Henry (1797-1878, Mahon, 2004: 116), and Immanuel Kant (1724-1804).

Table 1 places Maxwell's life and work, in the wider context of electricity and radio pioneers before and after.

Maxwell's key publications, such as *On Faraday's Lines of Force* (1856), *On Physical Lines of Force* (1862), *Dynamical Theory of the Electromagnetic Field* (1865, Hurd, D.L. and Kipling, J.J.: 242-253), *Treatise on Electricity and Magnetism* (1873), and *Electrical Researches* (1879) became renowned landmarks, and his equations (*Maxwell's Equations*) demonstrated the symmetrical relationship between electrical and magnetic effects, unifying and synthesising the work of his predecessors.

From his scientific predecessors, Maxwell took the ideas of *forces acting in space*, and of the convertibility of electromagnetic into mechanical

energy, and from Kant the more general concept that *nothing could be known about any object, except by its relation to other objects*.

In other words, *all knowledge is relational* (Forbes & Mahon, 2014: 136, 161).

Maxwell's Demon

He is, perhaps, best known to the history of science because of the famous 'Demon': *Maxwell's Demon* was an early 'thought-experiment' of the kind made so popular much later by Albert Einstein (1879-1955). Laura Otis, exploring the



Fig.1: Maxwell's famous equations.

Fig. 2: Maxwell's equations, chalked up in some classroom every day.

fertile exchange and common vocabulary of 19th Century scientists and novelists, explains this further. In her view, Maxwell deliberately took a literary, visual, approach. He, "explaining a key exception to the *Second Law of Thermodynamics*, he asked readers, "to conceive a being who opened a door between compartments, allowing fast-moving particles to enter a chamber of higher temperature [...] Maxwell was telling a story, and the story needed a protagonist" – the demon (Otis, 2002/09: xxii, xxv, 72/3).

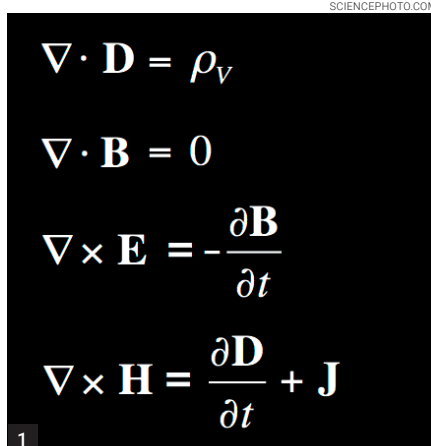
Mahon (2004: 138) further elaborates on the notion of a laboratory setup involving two sections of a container filled with hot and cold gas, and connected by a hole, which the 'demon' controls: However, "the demon is making heat flow from a colder gas on the right to the hotter gas on the left, thus defying the *Second Law of Thermodynamics*, which says that heat cannot flow from a colder to a hotter body"

Maxwell's achievement lay in the fact that he explained *why* this could not happen.

Brian Clegg (2019: 125-129) offers a much more exhaustive explanation of the literary tool of the 'demon-image'.

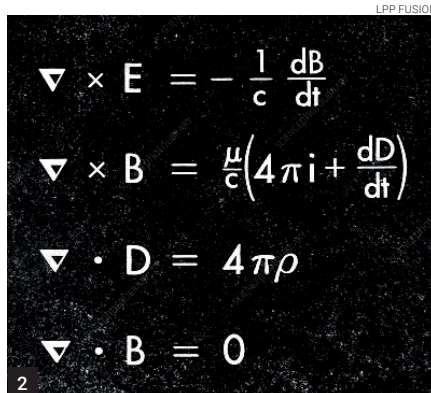
In addition to this, Maxwell was a prolific reader, writer and experimenter. He excelled at his studies and posts at Cambridge, London and Aberdeen Universities, translating the genius of his scientific forebears into a mathematical language and a theory of electromagnetism. His abilities earned him the coveted *Rumford Medal* in 1860.

Last but by no means least, the great man remained connected to his Scottish estate at Glenlair (near Dumfries) and the people there. He seems to have been a lifelong proponent, not only of a wide-ranging, non-elitist, approach to education but also of a commitment to assist students in thinking for themselves and in acquiring knowledge by intuitive means. The scope of his work ranged from a focus on colours and polarised light to the rings of Saturn, from thermodynamics and fluid dynamics to gases and kinetic theory (Clegg, 2019: 97; 107ff), and from magnetism to electricity. On the way, Maxwell also made the world's first colour photograph. He revealed a coloured image of a tartan ribbon (what else?) to an audience of scientists at the Royal



SCIENCEPHOTO.COM

$$\begin{aligned}\nabla \cdot \mathbf{D} &= \rho_v \\ \nabla \cdot \mathbf{B} &= 0 \\ \nabla \times \mathbf{E} &= -\frac{\partial \mathbf{B}}{\partial t} \\ \nabla \times \mathbf{H} &= \frac{\partial \mathbf{D}}{\partial t} + \mathbf{J}\end{aligned}$$



LPP FUSION

$$\begin{aligned}\nabla \times \mathbf{E} &= -\frac{1}{c} \frac{d\mathbf{B}}{dt} \\ \nabla \times \mathbf{B} &= \frac{\mu}{c} \left(4\pi \mathbf{i} + \frac{d\mathbf{D}}{dt} \right) \\ \nabla \cdot \mathbf{D} &= 4\pi \rho \\ \nabla \cdot \mathbf{B} &= 0\end{aligned}$$

Institution in London in 1861. He and photographer Thomas Sutton had worked together to create it, using red, blue and green light filters.

Furthermore, he discovered the fish-eye lens.

However, and more generally, in the 20th Century, three major new developments grew out of Maxwell's findings – wireless transmission by radio, the theory of relativity, and quantum theory.

Fields of Force: Electromagnetism

It was against this backdrop that Maxwell focussed the work at the peak of his career on the study of electromagnetic forces. Forbes and Mahon (2014: 183) concisely summarise Maxwell's key achievement in toppling the prevailing view of the universe, based on Newtonian mechanics. He had, "shown that the known formulas for static and magnetic fields did not depend on the orthodox assumption that forces resulted from material bodies acting on one another at a distance; they could be derived equally well from Faraday's idea of lines of force in space." It is easy to overlook how revolutionary this kind of new conceptual understanding was at the time (Mahon, 2004: 57-60; Clegg, 2019: 47/8).

Consequently, magnetic and electric energy were inextricably connected. At the centre of Maxwell's work was his crucial discovery (Verschuur, 1993: 120): 'the key to understanding electricity and magnetism was recognised to be the nature of changing phenomena'. An electric current could produce a magnetic field, and a varying field could produce a current. What was more, these changes were transmitted through space at the speed of light'.

Therefore, Maxwell's life achievement lay in the fact that he constructed the mathematical model – the scaffolding – to model and explain the relationship. He also predicted entirely new phenomena (Forbes and Mahon, 2014: 204) such as displacement currents, the transmission of electromagnetic waves (which Hertz found in 1887, a year before Oliver Lodge, 1851-1940) and the idea that light too, is an electromagnetic wave. Maxwell found that the speed of an electromagnetic wave is, in fact, equal to the speed of light (ca. 186,282 miles per second).

The speed of light was first measured in 1849/ 50 by Hippolyte Fizeau (1819-1896) and Léon Foucault (1819-1868; Think: *Foucault's Pendulum*, and Umberto Eco).

In publications such as *A Dynamical Theory of the Electromagnetic Field* (1865), Maxwell distilled and focussed the essence of his thinking (Forbes & Mahon, 2014: 209): "[...] some of nature's workings in the physical world not only do not need a mechanical model, but they cannot be explained in a mechanical way." This represented a paradigm shift of the highest order, with far-reaching consequences: Maxwell recognised that the foundations of our physical world can be described *mathematically*, but that they are *imperceptible* to our senses.

Telegraphs and Equations

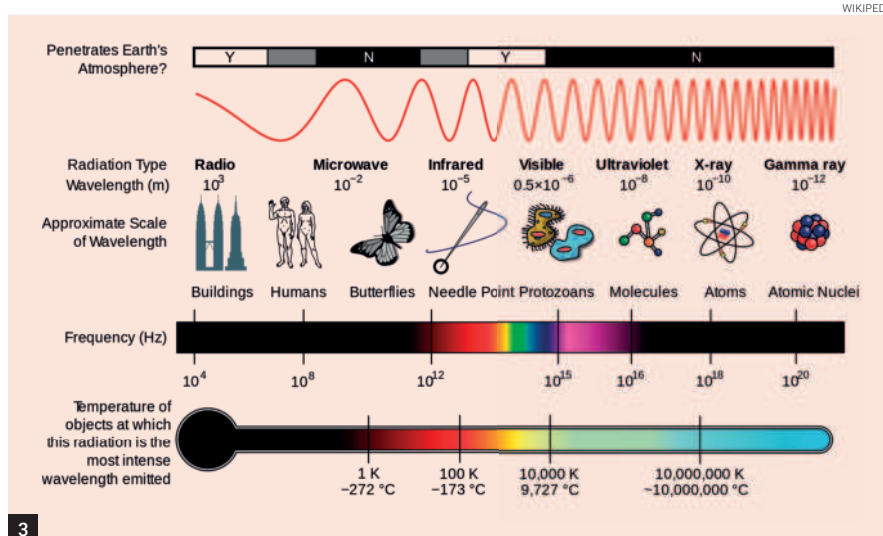
However, next to a rootedness in his Scottish home soil and an aptitude for a mathematical theory, Maxwell also displayed a very practical bent. This is apparent through his involvement with the telegraph industry at the time, which suffered many setbacks and false starts. Pinkerton (2019: 59/60) and Clegg (2019: 180) ascribe these to electromagnetic distortion (retardation, resistance) which severely affected the long-range communication over wires.

More generally, of course, Maxwell stands out today due to his famous four equations: As Gillian Turner has

- **Petrus van Musschenbroek (1692-1761)**
Capacitor ('Leyden Jar')
- **Jean-Antoine Nollet (Abbé Nollet (1700-1770)**
Osmosis
- **Benjamin Franklin (1706-1790)**
Positive and Negative Electric Charge
- **Charles Augustus Coulomb (1736-1806)**
Electrostatic force of attraction and repulsion.
- **Luigi Galvani 1737-1798)**
Animal Electricity, Medical Electricity
- **Alessandro Volta (1745-1827)**
Electric Battery (Voltaic Pile)
- **Hans Christian Ørsted (1777-1851)**
Electromagnetism
- **Michael Faraday (1791-1867)**
Mutual Induction, Electric Motor, Magnetic Field
- **Joseph Henry (1797-1878)**
Induction, Electro-Magnets
- **Heinrich Rühmkorff (1803-1877)**
Induction Coils (The Rühmkorff-Coil)
- **Heinrich Geissler (1814-1879)**
Gas Discharge Tube
- **Mahlon Loomis (1826-1886)**
Aerial Telegraph (Radio Transmission)
- **James Clerk Maxwell (1831-1879)**
Theory of Radio Waves
- **Édouard Branly (1844-1940)**
Radio Conductor/ Coherer
- **Oliver Lodge (1851-1940)**
Electromagnetic Waves
- **Joseph John Thomson (1856-1940)**
Electron
- **Nikola Tesla (1856-1943)**
AC Motor, Tesla Coil, Radio Transmission
- **Heinrich Hertz (1857-1894)**
Radio Transmission
- **Jagadish Chandra Bose (1858-1937)**
Microwave Radiation, Semiconductors, Crystal Detector
- **Alexander Popov (1859-1906)**
Radio Transmission
- **Reginald Fessenden (1866-1932)**
Radio, voice transmission, sonar
- **Guglielmo Marconi (1874-1937)**
Radio Transmission
- **Ernst Alexanderson (1878-1975)**
Alexanderson Alternator/ VLF Transmitter

Table 1: A Selective 'Radio-Pioneers' Timeline.

elegantly summarised (2011: 98), James Clerk Maxwell's famous *Four Equations* (from 1873, Figs. 1 and 2), "incorporated Coulomb's electrostatic magnetostatic force laws, Ørsted's magnetic effect of a current-carrying wire, Ampère's results on the magnetic interaction between current-carrying wires, Faraday's force on a current-carrying wire in a magnetic field, and his law of electromagnetic induction".



Maxwell equations theoretically connect space and time. There is a direct line from them to Einstein, who found that space and time are anything but static. Maxwell's Equations describe the behaviour of electric and magnetic fields and determine how they react to charges and currents (Blundell, 2012: 456; Goldsmith, 2018: 26; Mitchell, 2018: 149).

The first equation declares that every electric field line goes *from a positive to a negative charge*. The second one states that, in magnetism, there is no equivalent to an electric *charge* – magnetic field lines run in 'loops', not into, or away from, something. The third and fourth equations describe the *movement* of these loops.

The third equation states that the circulation of an *electric* field produces a changing *magnetic* one (Faraday's 'induction'), and the fourth one describes how a circulating *magnetic* field results in an *electric* current. A self-sustaining wave of electric and magnetic fields thus travels into space, *ad infinitum*. Because it is the changes in each field that generate the other one, the fields *cannot* stop moving (Forbes and Mahon, 2014: 207; Goldsmith, 2018: 27).

There are several other key terms Maxwell used to show just how electricity and magnetism are related. If you are interested in more detail, Verschuur (1993: 113-116), for example, comprehensively examines the five more general scientific/mathematical concepts underlying Maxwell's thinking – *potential*, *vector*, *gradient*, *divergence*, and *circulation*.

Moreover, in his new book about the Sun, Judge (2020: 7) recently clarified that, "Maxwell's theory is entirely symmetric, with regard to electric and magnetic fields,

with just one exception: it contains no magnetic charges".

Simple? Well, not really. Enormously complex actually. However, keep in mind that the oscillating current that started it all is essentially a *radio transmitter* (Blundell, 2012: 47).

Revolutionary Legacy and Radio Waves

James Clerk Maxwell stood out because he gave a mathematical treatment to Ørsted's and Faraday's theories of magnetic and electrical forces. Heilbron (2018: 97) depicts his equations as a scaffold, on which, 'he raised the edifice of an enduring electrodynamics, as a set of relations linking electric and magnetic forces and their sources.'

Some major consequences of James Clerk Maxwell's work began to emerge in his lifetime.

For example – as Goldsmith (2018: 27) and Clegg (2019: 192) have pointed out – in 1881, Heinrich Hertz (1857-1894) demonstrated that Maxwell was correct when he (Hertz) generated and detected what we now call *radio waves*.

These waves have wavelengths down to around 10 cm. Apart from those, the electromagnetic spectrum (Fig. 3) contains six other kinds of radiation: *microwaves*, *infrared*, *light*, *ultraviolet*, *X-Rays*, and *gamma rays*.

Maxwell's work, not fully understood in his lifetime, came to fruition under later scientists, such as Oliver Heaviside and other 'Maxwellians', among them Charles Wheatstone (1802-1875) and William Fothergill Cooke (1806-1879), the inventors of the telegraph.

Moreover, the *International Electrical*

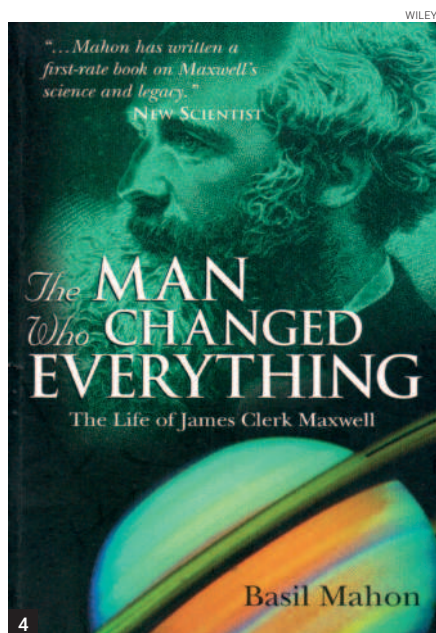
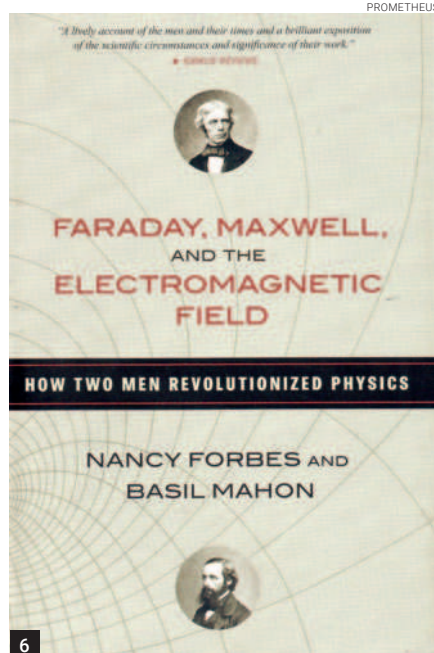
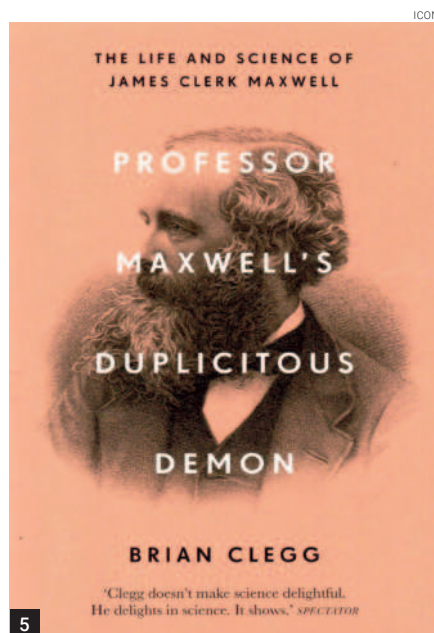


Fig. 3: The electromagnetic spectrum.
Fig. 4: Basil Mahon's Maxwell biography.
Fig. 5: Brian Clegg's 2019 biographical update.
Fig. 6: A joint-biog of Maxwell and Faraday.



Congress, which took place at the *Paris Electrical Exhibition* of 1881 (Mahon, 2004: 200) agreed to accept the definition of the unit of electrical resistance, the Ohm (Ω). It had been proposed by the *British Association for the Advancement of Science* at the time. This was not just in honour of German physicist Georg Wilhelm Ohm (1789-1854): The proposal was based on the experiments conducted by Maxwell and his successors at the famous *Cavendish Laboratory* in Cambridge (Rhys Morus, 2019: 77).

In 1887, Albert A. Michelson (1852-1931) and Edward W. Morley (1838-1923) – as finally illustrated by Albert Einstein in 1905 – filled in the final piece of the electromagnetic puzzle by doing away with the 'luminiferous aether', the 'medium' which had been assumed since the days of Isaac Newton and Michael Faraday to have been necessary for waves to travel through (Verschuur, 1993: 117/8; Turner, 2011: 97; Mitchell, 2018: 149; Pinkerton, 2019: 185/6).

The downfall of the 'aether', in turn, paved the way towards photons and quantum physics (Judge, 2020: 16).

In conclusion, it can be argued with Pinkerton (2019: 61) that, "by recognising that light and magnetism were two expressions of the same force, he [Maxwell] conjoined the science of electromagnetics and the science of

light into one expanded understanding of electromagnetism. Just as Sir Isaac Newton produced the first 'Unification in Physics', by conjoining the sciences of physics and astronomy, so Maxwell had produced the 'Second Great Unification'. In doing so, Maxwell laid the foundations for the subsequent development of all wireless communications [...]"

If this article has whetted your appetite for more reading about JCM, then have a look at one or all of the books in Figs. 4-6. All of these, in this writer's humble view, make a great starting point for budding future 'Maxwellians'.

Stay safe and see you next time.

BOOKS AND ARTICLES

- Blundell, S. (2012) *Magnetism – A Very Short Introduction* (OUP)
- Clegg, B. (2019) *Professor Maxwell's Duplicitous Demon* (Icon)
- Dunsheath, P. (1967) *Giants of Electricity* (Ty Crowell Co)
- Everitt, C.W.F. (1975) *James Clerk Maxwell: Physicist and Natural Philosopher* (Scribner)
- Forbes, N. and Mahon, B. (2014) *Faraday, Maxwell and the Electromagnetic Field* (Prometheus)
- Heilbron, J.L. (2018) *The History of Physics. A Very Short Introduction* (OUP)
- Hurd, D.L. and Kipling, J.J. (eds., 1958) *The Origins and Growth of Physical Science* (Penguin/Pelican)
- Mahon, B. (2004) *The Man Who Changed Everything* (Wiley)
- Mitchell, A. (2018) *The Spinning Magnet* (Oneworld)
- Nebeker, F. (2009) *Dawn of the Electronic Age* (IEEE/ Wiley)
- Otis, L. (2002, reissued 2009) *Literature and Science in the Nineteenth Century. An Anthology* (Oxford: OUP)
- Pinkerton, A. (2019) *Radio* (Reaktion Books/ Science Museum London)
- Rhys Morus, I. (2019) *Nikola Tesla and the Electrical Future* (Icon)
- Turner, G. (2011) *North Pole, South Pole* (New York: *The Experiment*)
- Verschuur, G. L. (1993) *Hidden Attraction. The History and Mystery of Magnetism* (OUP)
- Wiessala, G. (2018) 'De-Frankensteining' Electricity: Life and Work of Michael Faraday and Joseph Henry' (*The Spectrum Monitor*, April 2018)
- (2019) Hans-Christian Ørsted (*The Spectrum Monitor*, February 2019)

AUDIO-VISUAL AND ONLINE

BBC Radio 2: Scotland's Einstein

<https://www.bbc.co.uk/programmes/b06rd56j>

BBC Radio 4: *In Our Time*

<https://www.bbc.co.uk/programmes/p005491g>

BBC Radio 4: Science Stories: 'Maxwell's Demon'

<https://www.bbc.co.uk/programmes/b07dm8tb>

BBC Radio 4: *Self-Drive*: 'Maxwell's Equations'

<https://www.bbc.co.uk/programmes/b06rlkwb>

BBC WS: 'Discovery'

<https://www.bbc.co.uk/programmes/p02q2jvw>

James Clerk Maxwell Foundation (Edinburgh)

<http://www.clerkmaxwellfoundation.org/index.html>

Table 2: Suggestions for Further Reading.



Georg Wiessala
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It is, perhaps, fair to say that many amateur radio operators and radio enthusiasts have a healthy interest in the weather in these Isles and beyond. Next to radios and accessories, weather stations, I am reliably informed, are among the bestsellers of many of our radio traders and advertisers.

In my own shack, I have long been the owner of a plethora of simple weather monitoring devices, from thermometers and barometers to several models and predecessors of the Watson W-8686.

In fact, weather-watching is a special theme, here in Georg's radio man-cave. There is hardly a day when I do not listen to the *Shipping Forecast* on BBC 4 long wave (198kHz), or receive radioteletype (RTTY) or facsimile (Fax) weather data from Hamburg, listen to VHF/ HF VOLMET or use software, satellite reception equipment or the internet to download forecast maps and synoptic data.

Our British weather is often the subject of documentaries, and both *Practical Wireless* and *RadioUser* have published numerous articles about it. This has, at

The Watson W-8686 Wi-Fi Weather Station

The editor shows how accessing reliable weather information is both important and interesting for many radio enthusiasts, and he takes an in-depth look at the new Watson W-8686 weather monitor.

times, been in connection with a quest to better understand radio wave propagation (most recently, *From Isobars to Millibars*, in 2019/20); and we saw that even some time signals can carry coded weather information, for instance, DCF77 (77.5kHz, *RadioUser*, April 2020: 31).

The weather plays a significant part in our regular columns too, when there are events to report on, such as the Spring

2020 Floods in 2020: Tim Kirby wrote about this recently (*Signals from Space*, May 2020: 28-30).

On more than one occasion, the emergence of new technologies and products has been the catalyst for weather-radio content in *RadioUser*. One recent example is Robert Connolly's 2018 contribution on *DRM Data-Casting in Maritime Matters* (*RadioUser*, July 2018: 22-24).

Why not visit our new online bookshop at www.radioenthusiast.co.uk/store

There are some weather-and-radio-related posts on the *Radio Enthusiast* website too.

<https://tinyurl.com/y7ldmltf>

Last but not least – and delving into the archives – I find that ‘weather’ forms a recurring thread in the rich annual tapestry of this magazine, as do some other, related, subjects. Overall, the most pertinent one of those seems to be radio wave propagation, space weather conditions, and the state of the ionosphere.

However, the areas of ‘weather’ and ‘radio’ have also overlapped in many of our articles on *Maritime and Space Communications*, *‘Natural’ Radio*, *VLF Studies* and *History*, to name but a few.

Radio Weather Watchers

There are multiple reasons why we all keep an eye out for the weather. If you are a radio fan concerned about climate change, you may have studied the International Telecommunications Union’s *Use of Radio Spectrum for Meteorology*, or similar papers by other pertinent organisations, such as the World Meteorological Organisation (WMO).

<https://www.itu.int/pub/R-HDB-45>

<https://tinyurl.com/ycjyn5nd>

Perhaps closer to home, you might have large aerials, equipment masts or towers in the garden to take care of. Moreover, whether we are radio amateurs or DXers, skippers or flyers, we all need reliable weather information to assess the state of the atmosphere, potential signal paths and propagation conditions.

For those professionals, for instance, in search and rescue, who rely on radio and two-way communications, weather data are simply essential. In general, though, many of us are simply fascinated by the changing weather in itself and like to monitor the changing conditions, locally, regionally, or on a wider scale.

Just check the bands now: How many radio amateurs get on the air and talk about the weather every day? Some even share weather information with other hams via APRS or Network radio APRS.

Some put their ham radio weather stations online too:

<https://www.essexham.co.uk/weather>

A Dedicated Weather Station

There is a plethora of ways and means by which, as a radio enthusiast, to gather weather information (*RadioUser*, April 2020: 31: Table 1; RE website, see above and below).



<https://tinyurl.com/y7ldmltf>

However, having a dedicated weather station in your shack has to be one of the most essential and elegant ones, at least as far as your local weather is concerned.

So it made sense to me – when Nevada and Waters & Stanton told me about the arrival of the new Watson W-8686 Professional Wi-Fi weather station – to have a closer look at it, to see what it could do.

www.hamradiostore.co.uk

Unboxing and First Impressions

The station comes in a large box with everything you need in it, including the tools for the (easy) assembly of the outdoor sensors unit (Figs. 1 to 3). Everything is largely self-explanatory, but having the extensive manual (88-pages, with a useful glossary of weather terminology) helps with details. Just make sure you handle all moveable



Fig. 1: The basic indoor sensor and display tablet.

Fig. 2: The outdoor wind vane, rain collector and wind cups. Fig. 3: Tools, brackets, and outdoor sensor unit. Fig. 4: The assembled outdoor sensor array on the mast. Fig. 5: The indoor sensor. Fig. 6: The display unit is well-designed, attractive and informative.

parts with care, as you would with a radio.

I mounted the outdoor sensor array in the garden, on a reassuringly strong Moonraker tripod I ordinarily use for raising heavier aerials (Fig. 4; SKU: 09-049). The tripod allows you to go up to 13 feet but I only extended it by about half of this height.

<https://tinyurl.com/ybx6qdfp>

The Outdoor Sensor Array

The sturdy outdoor unit of the Watson W-8686 transmits to the indoor console on 433 and 868MHz, depending on location. It is claimed that transmission distance (in

an open field) is up to 100m.

The primary power source for the outdoor unit is the solar panel on top of the casing. Only when solar power is insufficient, will the batteries be used.

The manufacturers recommend that you check/ replace the batteries, clean the rain gauge, and calibrate the UV sensor every three months

Moreover, it is useful to perform a site assessment before you install the station, looking, for example, at such issues as the distance from other structures, possible wind, and rain obstructions, surrounding vegetation and the potential for any EMI and RFI.

My garden setup is temporary, and eventually, I will mount the outdoor unit somewhere higher up where I can still reach it to periodically change the (two AA-size) batteries.

The Indoor Unit

The indoor (temperature-humidity-pressure) sensor (Fig. 5) requires two (AA-size) batteries, and on this occasion – as with the outdoor array – I'd not go for rechargeable batteries. The manual recommends *alkaline* batteries for use in between -10 °C and 60 °C, and *lithium* batteries for conditions in between -40 °C and -10 °C.

You can get an (optional) multi-channel sensor, allowing you to manage up to eight additional sensor units (WH31) viewable on the display tablet or over the Internet. These can be optional temperature and humidity sensors (WH31), soil moisture sensors (WH51) or PM2.5 air quality sensors (WH41).

The Display Console

The display console is, in my opinion, one of the best I have seen, combining, as it does, a high degree of informative content with clarity, and very pleasing design and style. The tablet offers data on every weather parameter you could wish for.

In the top half of the screen – the brightness of which you can adjust – you'll see four main, colour-coded, circles with information on outdoor temperature (present, and recent minima and maxima), wind strength and direction (including ten-minute average), indoor temperature and indoor humidity (Fig. 6).

Secondary values, such as dew point, feels-like factor, outdoor humidity, and wind gusts/ averages are below that. I particularly liked the representation of the Sun's daily path in the bottom-left, with

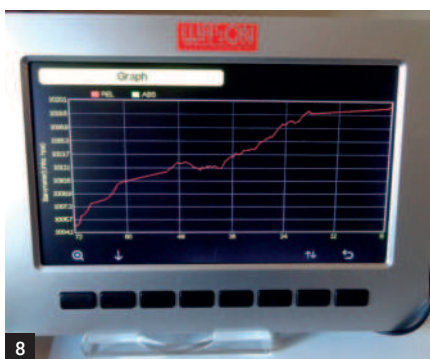


Fig. 7: Tracing the daily progress of the Sun. Fig. 8: The History screen. Fig. 9: The Graph screen. Fig. 10: Connect a portable battery and roam about. Fig. 11: A stylish addition to the radio shack.

sunrise and sunset times, light level values and the UV index (Fig. 7).

The rain values are on the right-hand side of the screen, which never looks cluttered. You get daily rainfall and a range of more long-term values, plus a 'raindrop' colour ring illustrating hourly rainfall at a glance.

At the bottom-right of the screen, you will find the sections for barometric pressure and trend; there is a forecast icon at the extreme bottom-right, which, today gave for sunshine and clouds.

There are eight buttons at the bottom of the tablet, enabling users to control screen brightness, backlight, backgrounds (white or black), pressure display (for relative or absolute pressure), multi-channel mode, data history and a wide range of general settings, like your geodata – longitude and latitude.

There is also a 'calibration' feature under 'settings' to enable you to calibrate key values such as soil moisture in all your sensor units.

In *History* mode, you can adjust maximum/ minimum values for all parameters (1st press), view a table (2nd press) or graphical representation (3rd press) of key weather data such as



barometric pressure (for up to 72 hours maximum), and manage the settings for your other sensors in the (up to) eight channels (Figs. 8 and 9).

Summary and Conclusions

The Watson W-8686 is a great weather station to have in your shack, and it has been a joy to use over the last few weeks. It is easily installed and set up. Readings are accurate and reliable, and it would be hard to better the indoor console display, in terms of its resolution and clarity. The transmission range is more than sufficient for any ordinary house

Radio Round-up

and garden situation, and the unit offers many opportunities to adapt the device to your requirements. The history and graph section display are informative and crisp, and the station readout is stylish and simply looks the part in your shack.

There are, arguably, some minor things that could be improved in the Watson W-8686 weather station, to make it even more professional and user-friendly: The display console needs liberating, by giving it a rechargeable battery inside. The USB port should be upgraded, so users can download data from the console to their PCs, to analyse it later with a piece of dedicated software. The SD card stores past data, it would be nice to add a 'screenshot' function to the device, and facility to store screengrabs on the SD card.

Remember, though, you can send data from the station to Internet-based weather services, such as *Ecowitt Weather*, *Weather Underground*, *WOW*, *Weather Cloud*, or your customised website. For this purpose, you will need to perform a Wi-Fi scan first and link up to your Wi-Fi network.

While the display console is 'tethered' to the PSU, there is a simple way to change this, using a few USB charging cables off eBay and a portable battery (Fig. 10). The USB port, remember, is not a charging port.

Overall, however, these are very minor niggles. The Watson W-8686 is a fantastic shack accessory, which will give you more useful local weather data than you could ever need, and which will look professional in your radio room – a true Shackmate (Fig. 11).

My thanks go to Peter Waters, Mike Devereux, and Matthew Twyman at Waters & Stanton / Nevada, for the kind loan of the review unit and for answering my additional questions.

(Further Reading: 'Weather Watching and Radio: A Natural Fit' *The Spectrum Monitor*, June 2020: 12-15).

I will be having a look at another Watson weather station useful for your shack (the Watson WS-8683) in one of the forthcoming issues of *RadioUser*.

Websites

Amateur Radio Weather Stations:

<https://tinyurl.com/ycqjkat>

Ham Radio and Weather:

<https://tinyurl.com/y8n8am4l>

Nevada:

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

Waters & Stanton:

<https://hamradiostore.co.uk>

FORMER PIRATE GOES LEGAL WITH DAB+ LICENCE:

Former pirate station Release FM has started broadcasting legally on DAB digital radio. Release Radio, now holders of an Ofcom licence can be heard in parts of London, Surrey and Berkshire. The station says it is the best and most progressive radio station on the web. "Release believe in showcasing the very best upfront, forthcoming and classic dance music, tailored towards the clued up and musically intelligent listener, who crave something that isn't being covered by mainstream stations." A spokesperson said, "We have received lots of positive feedback over the past three months and we even launched during the COVID Lockdown. Can I also just stress that we were originally a pirate radio station and not only did we manage to turn it around but we managed to obtain a license from Ofcom." The studios are located in Bracknell and the station has a full schedule of programmes and presenters, also available online via its website since April 3rd. (Source: *RadioToday*, *Release FM*, *Radioworld*)

<https://tinyurl.com/y8ntj4wd>

<https://www.releaseradio.net>

AUSTRALIAN AMATEUR RADIO MAGAZINE:

The Radio Amateur Society of Australia has announced the release of a new E-magazine for Amateur Radio in Australia. The magazine, QTC, named after the Q-code "I have a message for you" will be published every two months. In this first issue of QTC, we have news and updates about regulations, and information on our 60m submission in response to the ACMA's consultation paper. There's a "Getting started" regular column, with this issue covering HF DX-ing. There's also a regular column on how you can deal with QRM and RFI in your shack. This month's feature technical article is on 3-Phase Power Converters.

(Source: Colin Butler, ICQ Podcast, 24th June 2020)

<https://vkradioamateurs.org/qtc-e-magazine>

BBC LOCAL RADIO TO CUT 139 JOBS IN ENGLAND:

BBC local radio stations in England will lose 139 jobs as the network keeps the simplified schedules it created in March and adds a new all-England late show. Helen Thomas held an all-staff virtual meeting on Thursday morning to communicate the changes with staff. She said the BBC needed to 'refresh, reinvent and reinvigorate' as a result of recent events. She told staff the new schedules have brought 'a new clarity' to audiences across England with three, four hour shows in daytime and that there will also be restructuring in engineering and special features. BBC England needs to save £25m in operational costs before 2022.

In total, 450 equivalent full-time roles across radio, TV and online in the nations and regions will be cut, from a staff of around 3,000. Across BBC Local Radio programmes will be hosted by a single presenter – with no more double-headed shows. As well as the standardised shows 6-10 am, 10 am-2 pm and 2-6 pm seven days a week, there will be a new all-England Weekday and Weekend Late Show and shared regional programming between 6 pm and 10 pm on Sundays. Unions say Band B (Journalist Co-ordinators) and Band C (Journalist) roles will be formally placed "at-risk" of redundancy. Although Band D and above will not be 'in scope', management anticipates interest at these grades through voluntary redundancy. GNS, which provides national news content to BBC Local Radio, will be replaced by a new 'Central News Service' and move to Salford, resulting in job losses. Cuts are also being made in television and online news operations, and the BBC will continue to look at saving costs with its buildings portfolio. In regional TV, the evening news programmes will be presented by a single host rather than being double-headed. Information shared by the BBC with unions – and seen by *RadioToday* – shows a proposed reduction of 325 jobs as a result of restructuring across BBC England's TV, radio and online services, with a further 125 posts to be lost through voluntary redundancy. The proposals show 8 posts being lost in the Central Engineering Team, 7 through the changes to GNS and 139 from the simplified Local Radio schedules. The total number of jobs lost from BBC Local Radio could be higher than 139 if voluntary redundancies are also accepted. Helen Thomas, the Director of BBC England, said: "I'm proud people have turned to us for trusted news and information in huge numbers during COVID-19, proving the importance of our local and regional services. But those services were created more than 50 years ago, have changed very little and need significant reinvention. That has meant making some difficult decisions. *"We are in the age of the Facebook community group and the WhatsApp neighbourhood chat. We must adapt to better reflect how people live their lives, how they get their news and what content they want. We're going to modernise our offer to audiences in England by making digital a central part of everything we do. We'll take forward lessons from COVID-19 that will make us more agile and more in touch with communities while also ensuring we're as efficient as we can be. I'm confident we can evolve our local and regional services while improving our impact and better serve our audiences."*

(Source: *RadioToday*)

<https://tinyurl.com/y83qehaz>

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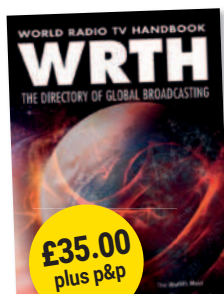
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World Radio TV Handbook 2020



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NDB DXing (Part II/2020)

Robert Connolly hunts cluster beacons, responds to reader feedback and brings you Part Two of this year's overview of the NDB DXing scene.

It is once again time to have a look at what has been happening in the world of NDB DXing over the last few months. As regular readers will be aware, I now not only have my trusty NRD 525 general coverage receiver but also an SDRplay RSP1A.

Both receivers are connected to my PA0RDT MiniWhip antenna and are selectable using an antenna switch so that I can quickly move between receivers if required. I found that not only was the RSP1A just as good as my NRD 525 for receiving NDBs, I can now also schedule late-night recordings of the beacon band, which I can then study at my leisure, saving on late-night 'live' listening sessions.

In my May column (*RadioUser*, May 2020: 37-39) I mentioned Russian 'cluster-beacons'. This is an area of NDB listening across the HF bands that I have neglected for a long time. Recently, I have been exploring the reception of these. Just what are Russian 'cluster' beacons, sometimes also referred to as 'channel-markers'?

Cluster Beacons

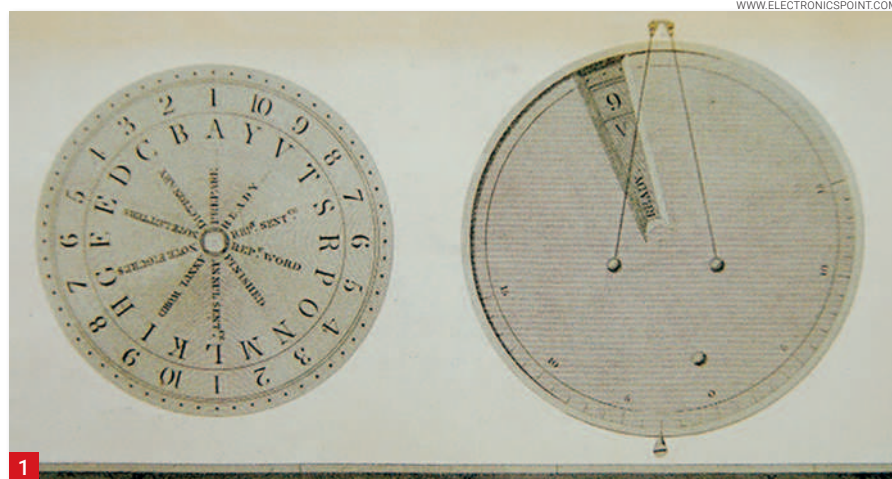
Cluster beacons can be found on the various HF bands (3, 4, 5, 7, 8, 10, 13, 16, and 20MHz). They normally consist of up to nine different stations transmitting a separate Morse code identification. Each one is separated by 100Hz, for example, between 5153.7 and 5154.4kHz.

What is their purpose? While nobody knows for definite, it is believed that they are operated by the Russian Navy and have been in existence since the 1960s. It is also believed that they are possibly used as propagation beacons for Russian naval vessels, to determine the best frequency band to contact a certain base on. They seem to rarely carry any actual radio traffic.

Each station in the cluster has its identification letter, and, through the work of various amateur radio DXers, it is believed that they comprise of the following. Sevastopol 'D' xxxx.7kHz, Kaliningrad 'P' xxxx.8kHz, Severomorsk 'S' xxxx.9kHz, Moscow 'C' xxxx.0kHz, Astrakhan 'A' xxxx.1kHz, Vladivostok 'F' xxxx.2kHz, Petropavlovsk Kamchatskiy 'K' xxxx.3kHz, and Magadan 'M' xxxx.4kHz.

Also, some standalone channel markers are operating on their own frequencies, for instance, Saint Petersburg 'L', Khiva 'V' and Izhevsk 'R'.

Table 1 shows the station and frequency



details for these beacons. Frequencies in bold have been received in Europe since 2019, other frequencies date back to 2000 and may no longer be active. They are much easier to receive compared to normal navigation NDBs because they use much higher power.

The St. Petersburg, station identification 'L', operates on slightly higher frequencies compared to the other stations. I suspect that this is due to St. Petersburg becoming the command base for the Russian Northern Fleet some years ago.

If you scan through the HF bands you will come across several other channel markers, for example, SVO Olympia Radio Greece on 2624, 8766 and kTAH 12603.5 kHz; Istanbul Radio Turkey on 4126, 8812 and 12654 kHz, and XSQ Guangzhou Radio China on 8435 and 12613 kHz.

These maritime coast stations use CW transmissions combined with SITOR bursts, to ensure that the channel is kept free for their scheduled transmissions.

Conditions and Reminiscences

By the time you read this column, it will be almost mid-summer, not the best time of year for DXing NDBs, due to atmospheric conditions. However, some interesting beacon reception from Europe will be possible.

It is also time to check your antennas, mast (including clamps) and cables to ensure that they will survive the next winter storms. A little maintenance now can save a lot of heart-

Fig. 1: The alphanumeric dial for transmitting messages designed by Francis Ronalds in 1816.

Fig. 2: A screenshot of Andy Thomsett's recent NDB loggings. Fig. 3: Pressure tendency chart for my NDB band scheduled recording in early May 2020. Fig. 4: The semi-submersible crane vessel Sleipnir.

aches later, including potential property damage when winter storms bring your assembly crashing down and you are forced to carry out a salvage operation in dangerous conditions. Believe me, it can, and does, happen.

Reader Geoffrey Powell kindly sent me an e-mail regarding a visit that he had to the former Lichfield NDB (LIC 545 kHz) in the 1970s: "Looking back as you do, a friend of mine raised the issue of the NDBs; being in the medical profession, and visiting patients for forty-six years on my travels, I came across the LIC Lichfield NDB that has now been removed, I noticed an engineer making his way to it and I followed him and he invited me in having shown my authenticity in way of my pilot's licence.

"I remember the fellow lifting the lid off this beautiful Mahogany box, lined with green baize material like snooker table material, 9x9 inches, and this beautiful shiny brass disc revolving inside with the word 'NATS' stamped on it, it was geared, of course. It was so beautiful, I was transfixed by this spring-loaded tiny contact falling into the cutouts. The disc had slots cut out to indicate the letter-spacing 180 degrees one side and the same the other. It was fascinating and so simple.

A Astrakhan	C Moscow	D Sevastopol	F Vladivostok	K Petropavlovsk Kamchatskiy	L Saint Petersburg	M Magadan	P Kaliningrad	S Severomorsk	V Khiva, Uzbekistan
3594.1	3594.0	3592.7	3594.2	3594.3	3.165.5	3594.4	3593.8	3593.9	3658.0 4031.0 4338.0
4558.1 5154.1	4558.0 5154.0	4557.7 5153.7	4558.2 5154.2	4558.3 5154.3	5156.8	4558.4 5154.4	4557.8 5153.8	4557.9 5153.9	5055.0 5094.0 5405.0 5446.0 6391.2 6928.0
7509.1 8495.1 10872.1 13528.1 16332.1 20048.1	7509.0 8495.0 10872.0 13528.0 16332.0 20048.0	7508.7 8494.7 10871.7 13527.7 16331.7 20047.7	7039.2 7509.2 8495.2 10872.2 13528.2 16332.2 20048.2	7039.3 8495.3 10872.3 13528.3 16332.3 20048.3	6917.5 7041.8 8497.8	7039.4 8495.4 10872.4 13528.4 16332.4 20048.4	7508.8 8494.8 10871.8 13527.8 16331.8 20047.8	7508.9 8494.9 10871.9 13527.9 16331.9 20047.9	

Table 1: Some Station and Frequency Details for Cluster Beacons. Note: All frequencies in kHz; frequencies in bold have been heard since January 2019.

"I was very fortunate, now looking back from today's technology, it was going round clicking: DID DAH DID DID/, DI DI, / DAH DID DAH DID....Lichfield.. and this unassuming fellow lifting the lid off this beautiful wooden box that seemed so lonely amongst the other apparatus, I should say 'remote'; two wires came out the rear, and the buzz of a geared motor was music to my ears. I was there for about half an hour. I was truly fascinated as I have always been interested in mechanics and physics.

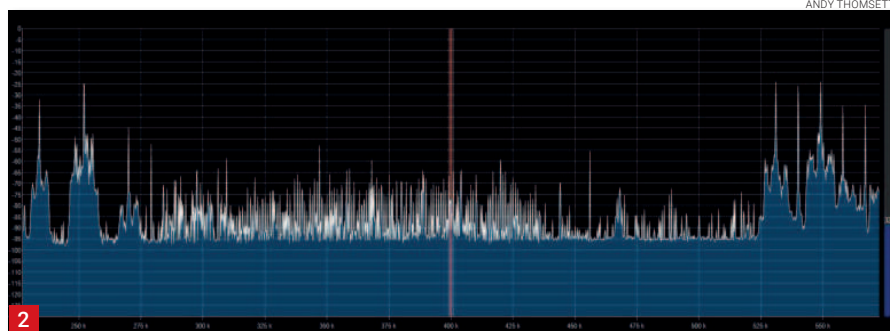
"I wonder what sort of equipment this was called, and I am trying to obtain a photo of it. I have thought about this episode of visiting the NDB at Lichfield in the 1970s and feel very fortunate to have seen such a Heath Robinson affair, I am searching for a picture as Lichfield cannot be the only NDB station with this design."

Geoffrey kindly attached an image of the closest object he has found so far – an alpha-numeric dial for transmitting messages designed by Francis Ronalds in 1816 (Fig. 1). As the dial (left) turns at a constant rate, a single segment is visible through a stationary cover plate (right). When the dial is used as part of an electric telegraph, the electric signal tells the message recipient when to read the information on the dial.

Similar dials were the basis for numerous subsequent alphanumeric and printing telegraphs and even early telephone systems. At the bottom of the figure, is a detailed illustration of the insulated telegraph wire and sleeved expansion joint, which allows the glass insulation to thermally expand and contract.

If any reader can provide the information requested by Geoffrey please contact me and I will pass it on.

Being the 1970s, this pre-dates the electronics and solid-state circuits used in to-



day's equipment, and I would suspect that many NDBs of that era would have used the same technology.

Greenside Scalp

Some of you may recall my column from a previous issue (*RadioUser*, December 2019: 20-23) concerning an antenna mast located on the south bank of the River Tay, facing Dundee on the north side, at a spot called Greenside Scalp. At the time, I was able to rule out it being an NDB and felt that it may have been a navaid for the nearby RAF base.

Thanks to reader Mike Troon, further information regarding this site has now been forthcoming. Mike tells me that he has always understood that this transmitter (1161 kHz) beams out Tay 2, the medium wave service of Radio Tay. To confirm whether he was still right or out-of-date in his recollections, he had to look up the 2018 *WRTH* and the 2019 *Radio Listener's Guide* and was surprised to find no mention of Tay 2 in the MW lists in the latter. However, the mast was mentioned as being used by Greatest Hits Scotland.

Lockdown Loggings

When Andy Thomsett kindly sent me his recent NDB logs, he told me that in January and February, he had very limited opportunity for

NDB DXing. The few sessions he did manage were frustrating.

In fact, at one point, he wondered if his PA0RTD Mini-Whip had gone faulty.

However, more recently, he had another go and, very much to his surprise, he found the band to be stacked full of carriers – see the attached screenshot (Fig. 2).

He also advised that there was very little noise and that he had been able to log a bumper bundle of mainly European beacons, including quite few he had not heard for six or seven years. There were 29 new ones for Andy – all from a 12-minute recording made using his Airspy HF+ and SDR#.

For processing, in addition to the excellent notch and asymmetric filtering afforded by the SDR# IF processor plug-in, he fed the audio output from his PC to his Timewave DSP-599zx.

He will probably continue to use this combination in future.

A 'live' session I had during late April – beginning at around 2245 UTC – proved to be very frustrating and hard on the ears, due to local external QRM combined with quite a severe summer static. No beacons could be heard through all the noise. Since then, I have used my RSP1A with SDR Console software to record a 500kHz frequency segment, cov-

ering the NDB band for a 10 to 15-minute session after one o'clock local time, when much of the local QRM has subsided. I can then study this at a later time.

Keith Rawlings kindly sent me his recent logs. Like many of us, Keith used our hobby to relieve the boredom of the Covid-19 lockdown. Keith tells me that he mainly uses his RSP2 for NDBs. Kevin got used to looking at the waterfall to pick out signals as they come in and out of the noise.

Keith generally sets SDRuno to 'low IF', with a Decimation of 8, sometimes 16. USB is selected, along with a narrow bandwidth of 500Hz. RF gain is usually set to mid-way, but this does depend on the aerial being used. Typically, he uses a 'Zoom' of 10kHz waterfall bandwidth and then homes in a bit more if needed. With the waterfall at maximum speed, he can often pick out the Morse characters to help assist with decoding.

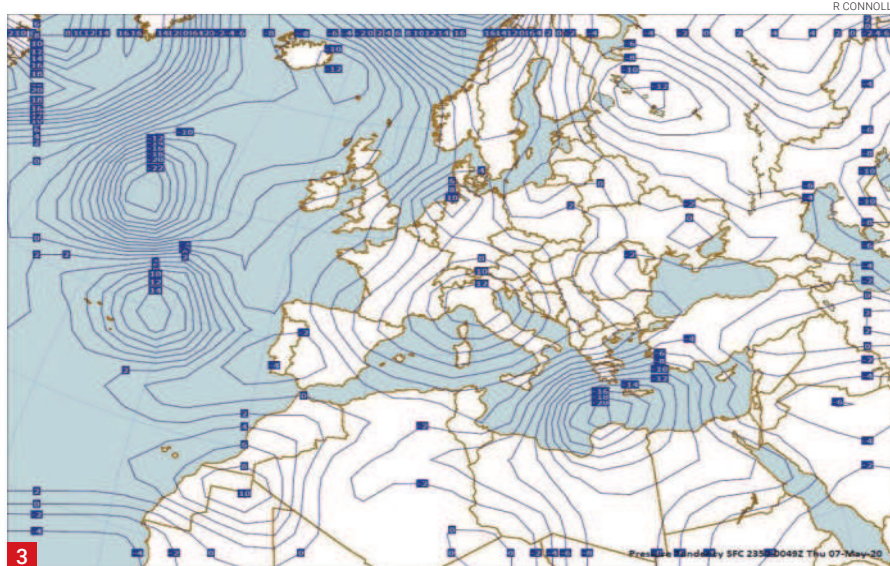
www.radioenthusiast.co.uk

Solar Minimum

We are currently at the minimum between Solar Cycles 24 and 25. This was expected to occur in April 2020 (+/- 6 months). The current forecast for Solar Cycle 25 is that it will be similar to Cycle 24, with a peak around July 2025. In good weather, the propagation of NDB signals can show some enhancement. During the good spell of weather we enjoyed during the national Covid-19 lockdown, I ran several midday checks of the NDB band but found no sign of any propagation enhancement. I received just my usual 'daylight' beacons.

There are times when enhanced daylight propagation can make beacon transmissions from the south of England and Northern France possible at my location. The chart in Fig. 3 shows the pressure tendency chart for one of the NDB band scheduled recordings I made in early May 2020.

My thanks to Richard Ware who kindly alerted me to the fact that the table of received logs in the April edition was, initially, not read-



R CONNOLLY



KEVIN HEWITT

ly accessible on the *Radio Enthusiast* website. The problem was quickly resolved. However, just in case the same problem happens again I will duplicate the list on my website.

The image in Fig. 4 is of the semi-submers-

ible crane vessel *Sleipnir*, photographed by Kev Hewitt in Gibraltar.

[The list of NDB logs for Q2/2020 is on the *Radio Enthusiast* website – Ed.]

www.radioenthusiast.co.uk

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AOR AR-DV1

Communications Receiver



Covers 100kHz to 1300MHz in traditional analogue modes (SSB, CW, AM, FM, S-FM, W-FM) as well as various digital modes. In fact, we know of no other radio in this category that can decode Icom's D-STAR mode, Yaesu's new C4FM mode, Alinco's digital mode, NXDN (note: 6.25kHz only), P25 Phase 1, etc. Plus lots of interesting features! www.HamRadio.co.uk/ardv1

ML&S: £1199.95

SDR RADIO

SDRPLAY RSPdx

New Mid-range SDRplay Radio.



Complete redesign of the popular mid-range RSP2pro 1kHz-2GHz.

ML&S: £194.95

Multiple antenna selection, Improved pre-selection filters, Even more software, Selectable attenuation steps, Special HDR (High Dynamic Range) mode for reception at frequencies below 2MHz. Designed and made in Britain.

SDRPLAY RSP1a

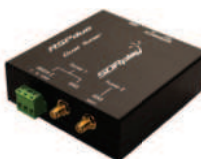


Brand new design, the RSP1a is a major upgrade to the popular RSP1

ML&S: £94.95

Offering a powerful wideband full featured SDR covering 1kHz to 2GHz & up to 10MHz visible bandwidth. Better still, it's "Built & Designed in Britain"!!

RSPduo DUAL TUNER 14-BIT SDR



Dual-Tuner wideband full feature 14-bit SDR, 1kHz to 2GHz, 10MHz of spectrum visibility.

ML&S: £239.95

Simultaneously monitor 2 separate 2MHz bands of spectrum between 1kHz and 2GHz. 3 software selectable antenna inputs, & clocking features ideally suited to industrial, scientific, Ham & educational applications. Windows 10.

FUNcube Dongle Pro+

Wideband SDR Receiver. 150kHz-1.9GHz incl SAW Filters.



ML&S: £149.95

Expert Electronics

Colibri DDC

Small-size receiver covering the HF frequency band 0.09MHz to 55MHz, and also (with the help of external filters) to receive frequencies up to 800MHz whilst working together with a PC.



ML&S: £339.95

Colibri Nano

14-bit ADC, up to 3 MHz sample rate. A 0.5ppm local oscillator. The ColibriNANO is compatible with every popular HAM software such as HSDR, SDRSharp and ExpertSDR2.



ML&S: £249.95

DIGITAL & ANALOGUE

UNIDEN UBCD3600XLT

New digital TruckTracker V Professional Scanner Receiver, covers 25-1300MHz wideband frequencies.

The TruckTracker V operation allows this scanner to scan APCO 25 Phase 1 and Phase 2, DMR, Motorola, EDACS, LTR Tracked Systems as well as conventional analog and P25 digital channels.



ML&S: £449.95

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

The ULTIMATE all mode all band scanner.

100kHz-1300MHz Analogue & Digital Modes.



ML&S: £939.95

ICOM IC-R30 SCANNER

The Icom IC-R30 has extremely wide coverage and supports all of the usual analogue modes (FM, AM, SSB, CW) as well as a few digital modes including NXDN, P25, DPMR and DSTAR. A worthy upgrade over the older IC-R20.



ML&S: £569.95

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ANTENNAS

BONITO RANGE AT ML&S THE ANTENNA JET



A USB powered antenna splitter designed to work between 9kHz and 300MHz. Now you can use your one antenna with up to 3 receivers simultaneously. Finally, you can listen to marine band traffic, The Archers on Radio 4 and the air band at the same time (provided your antenna will cover it all!)

ML&S ONLY: £234.95

ANTENNA JET ASM-300



A USB controlled antenna switch and mixer. It can be used as a simple switch, or can be used to switch in more than one antenna, to aid receiving to an optimum performance.

ML&S ONLY: £189.95

BONI-WHIP (PSU needed)

The active antenna that is raved about. Covering 20kHz to 300MHz and ideal for times when you can't erect a wire antenna. For home, for travelling and for DX camps. And despite the whip being only 4 inches long, it actually works!



ML&S ONLY: £109.95

GigActiv GA3005



A portable active antenna capable of covering 9kHz to 3GHz. Perfect if you are say on holiday and want to have a listen to the bands. You'll need to provide it with 5V via a USB cable (included) and some coax but it is just ready to go.

ML&S ONLY: £386.95

You can order from ML&S for delivery on a Saturday or Sunday! Order before 2.00pm as late as Friday.

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