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- New 10m repeater
- Summer on CB
- SOTA Activity
- PMR446



PROFILE

The Story of PanAm Radio

History of the private US long-distance operational control facility serving the needs of international aviation



HISTORY

Lockerbie Disaster

The role of communications and RAYNET before and after the '88 terrorist attack



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- Powered by 18650 Lithium battery
- Bluetooth connectivity
- Optional USB mains supply.....£9.95

£259.95



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LW/MW/FM-Stereo/SW (with SSB) and Airband

- 1000 station memories
- Signal Attenuator
- Dual timer alarm
- Wide/narrow filters
- 1000 station memories
- Dual alarm clock function
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- Rotary Antenna: MW/LW

£299.95



Tecsun S8800 GM SSB Shortwave Radio

- FM, SW, MW, LW • SSB with LSB/USB
- 650 station memories
- Deluxe Gun Metal Tuning knob
- Remote control, Alarm & sleep/timer
- DX/Local antenna gain control
- Built-in battery charging feature
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BEARCAT



UBC-125XLT 500 Channel AM/FM scanner

Easy to use scanner - our most popular for Civil/Military Airband

- 25-960MHz (w/gaps)
- Includes civil/Military Airbands
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Popular 'Airshow' scanner

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- Modes: AM/FM
- 300 channels
- Close Call

£99.95



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Compact handheld - easy to use!

- Covers: 78 MHz-512MHz (w/gaps)
- PMR, Marine, Aircraft, FM, etc.

£64.95



UBC-370CLT

500 channel AM/FM scanner

- Includes VHF FM broadcast radio
- Covers: 25 - 960MHz (w/gaps)
- Listen to PMR, Marine, Air, CB, Amateur

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HEADPHONES



Yaesu STA77

Lightweight Stereo headphones - as used by our boss!

£79.95

JIM M75



Wide Band pre-amp

Low noise pre-amp with 3 band pass filters

- 24-2150MHz
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ANTENNAS

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21 Element LPA
• 50-1300MHz
• Gain: 10-12dBi

£379.95



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• 105-1300MHz
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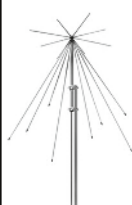
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- SY50-5.....5 el 50MHz 10.5dBi.....£129.95
- SY68-3.....3 el 70MHz 7.0 dBi.....£79.95
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ICOM



Icom AH-8000

Professional Discone Antenna Suitable for both Transmit and Receive

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

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RSPdx

SDR in metal case

Covers: 1kHz-2GHz

Now with Improved:

- Performance below 2MHz
- Plus more!

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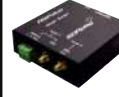
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Wideband Budget SDR

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- Software upgradable
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N type connector (part: 7367)..... £6.50

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

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N type connector (part: 7392)..... £5.25

Aircell 5 per metre.....£2.75 price per 102m drum..... £259

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New Firmware - gives TETRA decoding and more!
Decodes virtually ALL popular digital modes: DMR, D-STAR, Yaesu Fusion and lots more!

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Optional BC-194 Drop-in charger stand
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- Band scope
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- Alpha-numeric tagging feature
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Supplied with:
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BEARCAT



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Standard Version (licence required to activate DMR, NXDN)

£599.95

Activated Version (DMR, NXDN already activated)

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BEARCAT



Bearcat SDS-200E Digital Scanning Receiver

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- Covers: 25 - 512MHz, 806 - 960MHz, 1240 - 1300MHz
- Too many features to list here - visit our web site for more details!

£779.99

BEARCAT



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

- Receives: 25-1300MHz
- SD card slot

£425

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

£479.95

ALBRECHT



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- Covers 25-960MHz (w/gaps)
- Step sizes: 5/6.25/8.33/10/12.5/20kHz
- Turbo search (180 steps/sec)
- 300 memories, Clock Display, Skip feature, c/w Mains adaptor, Car adaptor, Antenna, Mounting bracket

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ALBRECHT



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- 5-960MHz (w/gaps)
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- Hyper search -300/sec
- CTCSS & DCS
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Whistler Digital Scanners

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- Upgradable CPU, DSP, and library
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Whistler TRX-1
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Whistler TRX-2
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Cover Story

57 PTT: Two-Way Radio

Tim Kirby visits the world of PMR446 enthusiasts, reports on the *Freestar* Network, disseminates news on repeaters and investigates the fascinating phenomenon of trans-equatorial propagation.

22 European Short Wave Stations

Hot off the press this month, we bring you Stig Hartvig Nielsen's latest survey of private short wave broadcasters, including hints and tips on how and when to listen in and enjoy them.

23 Airshows

David Smith presents our most recent guide to the 2021 crop of Airshows, and displays with an aeronautical or historical flavour, including some very special 'themed' summer events.

24 The Fading Phenomenon (Pt II)

In the second chapter of this mini-series, Nils Schiffhauer explains how you can analyse a wealth of specific propagation events, to improve your monitoring and DXing activities.

28 In the Editor's Shack: VLF Reception with the Reuter RLA3

The editor puts an unusual Reuter Electronics magnetic indoor directional loop aerial to good use in the basement band, with some surprising results.

31 Rallies and Events

Many rally organisers are still wary about returning to the public, but several events are now taking place in late summer and autumn; here is our list. Please always check before you set out.

6 Subscriptions Page

Do you like to be on our wavelength? Then take out a monthly subscription to your favourite radio magazine. Never miss a feature or review again and stay *au fait* with the latest radio news.

7 News and Products

Hilberling, Belka DX and the Lab5999 Discovery TX-500; a new version of WSJT-X, the GQ EMF-390 multi-function meter, and a wealth of news from the national and global radio scenes. (See also pp. 38, 45, 49, 53, and 56)

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Take a look at the 'ups and downs' of a reader with a truly 'towering' story to tell.

13 Bookstore | Archive CDs

The *RadioUser* bookshop is our readers' one-stop resource for all categories of radio books, from history and biographies to radio station portraits, technical and antenna titles. Be sure to visit.

14 Emerging Issues in Radio

Chrissy Brand leaves room to expand the very concept of what constitutes a 'radio station', and she sheds some light on the present and future of community radio station fundraising.

18 Book Review

David Harris reviews two new titles on the subjects of radio operations behind enemy lines and signals analysis in World War II. These books are highlighting the role of women in this field.

20 Airband News

David Smith discusses some aeronautical weather reports, offers updates on remote towers, checks up on drone testing and emergency landing processes, and details communications at RAF Valley.



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Welcome

Summer Vibes



34 The Story of PanAm Radio

Mark Allen brings you the story of PanAm Global Radio, a US Long-Distance Operational Control (LDOC) facility in private hands, looking after international aviation across a vast geographical area.

39 TV & Radio Past & Present

Keith Hamer and Garry Smith beam back to the times of Marconi and early radio, wrap up their mini-series about graphic design in TV and Westward Television and point to the latest DX-TV & FM News (online).

42 Digital Radio

Kevin Ryan reviews the Starwaves DRM SoftRadio App, offers guidance on fake SDRs, reports on the new GB News channel and brings us the latest developments in local, small-scale, DAB radio.

46 International Radio

Chrissy Brand enjoys classical music, on the bands and online, and she shares her tips for the best in international radio listening this month, across both traditional and online radio formats.

49 New Radio Publications

In this new, occasional, feature, we present a curated selection of interesting club newsletters, bulletins, books and articles that have come to our attention this month.

50 The Lockerbie Bombing

Scott Caldwell explains the role and impact of communications and radio at the time of the Lockerbie Disaster of 21 December 1988 and reviews the input from groups such as RAYNET.

54 Aerials Now

Keith Rawlings tests a Wellgood Loop aerial, considers Loop-on-Ground (LOG) antennas and shares some reader feedback on Uniden scanners and the MINI1300 aerial analysing device.

60 Maritime Matters

Robert Connolly showcases climate protection innovation in the maritime world, achieves good results with Pskov NDB software and shares some key tips for seasonal maritime listening.

Georg Wiessala
wiessala@hotmail.com

Hello and welcome to the August 2021 issue of *RadioUser*. Hopefully, by the time you are reading this, things will have become a bit more manageable, Covid-wise, and some outdoor events may even go ahead. We have listed what we know about current *Air Shows* and *Radio Rallies* in this issue, but the usual caveats apply.

Stig Hartvig Nielsen's list of *European Private Shortwave Stations* makes another appearance too, as does a new mini-feature, an occasional survey of radio resources worth checking out.

The key features in this issue range from the story of PanAm Radio, by Mark Allen, to Part Two of Nils Schiffhauer's article on fading, and my own short contribution on VLF matters.

In our other articles, Scott Caldwell casts light on a very dark chapter in history: the bombing of PanAm flight 103 in December 1988, through a radio communications lens.

Tim Kirby visits the PMR446 scene and sets the tone for a somewhat stronger future focus in RU on radio science; he does so, by examining the ins and outs of the phenomenon of trans-equatorial propagation, from the points of view of both amateur radio operators and DXers.

On the High Seas, meanwhile, things are changing fast, and Robert Connolly looks at how new technology can address climate change, both in terms of radio communications and in some much wider areas.

Small-scale DAB and community radio feature a little more prominently this month, both in Chrissy Brand's column on *Emerging Issues* and throughout Kevin Ryan's *Digital Radio* section. Some say that the future of



radio lies in the locality of content and a community of purpose. I think I would agree with that.

In our other regular columns this month, check out what Kevin Ryan has to say about the Starwaves DRM Soft Radio App, take a good look at Keith Rawlings's work with a Wellgood Loop and be amazed at what Robert Connolly was able to do with the popular Pskov software suite.

Furthermore, you might choose to discover more on aeronautical communications and weather forecasting, remote towers, Marconi and early radio, the brilliant Martin Lambie-Nairn, and the new *GB News* channel.

Last but not least, one correction, with my apologies: on the cover of last month's issue, the new Icom maritime transceiver shown carried the model designation IC-N94DE. The correct number is IC-M94DE.

My apologies to Icom UK and Ian Lockyer. By the way, we will review this radio in one of the next issues.

Whatever your interests in radio, I do hope that you will find something for you in the pages that follow.

Enjoy the magazine, stay safe and do not forget to stay in touch.

Georg Wiessala

Editor, *Radio User 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 wliessala@hotmail.com

Belka DX Receiver News

RadioUser
STOP PRESS!

The BELKA-DX was reviewed in *RadioUser*, June 2021 (cover page and 24-26). Here is an opportunity to hear it. Quote: "Immediately when this BELKA-DX (shortwave receiver) jumped out at me I thought spy radio, clandestine radio, part like a Cold War numbers station listening in Berlin; crazy that you would hide in some kind of device to be able to receive messages and what not..." For a complete video 'live' review, check out this URL/YouTube video:

www.tinyurl.com/belka-dx-ru



AUDIO CONTENT FUND: The Audio Content Fund has released its second *Annual Report*, which shows it gave out £1.7m to 90 public service radio projects in 2020-21. The report outlines how the fund, which is financed by the UK Government, supported 64 different UK independent production companies, to produce 420 hours of content, for broadcast on 320 different commercial and community radio stations. An audience of 14.5m listeners is expected to hear the content, which covers factual, drama,

comedy, live discussion, children's, sport and current affairs material. ACF funding has created unique opportunities for 'indies' to work with commercial and community radio, with 67 out of the year's 90 projects representing new business relationships between suppliers and broadcasters. Three-quarters of the funded projects were produced outside of London, with content created for broadcast in all four nations of the UK, and 20% of the projects were primarily focused on BAME, LGBT, or disabled narratives and perspectives. The report outlines how the year's grant budget was increased from £1m to £1.7m, as additional funds were provided by the government to support audiences during the coronavirus pandemic. More than 60 projects are profiled in detail, with a further 30 projects still to be produced.

(SOURCE: ACF | RadioToday)

<https://tinyurl.com/vdxmzjv>



WSJT-X Software Suite: Latest Version

A new version of WSJT-X, the software suite that includes FT8 and other digital protocols, has introduced a new mode, Q65. According to the release notes, it is designed to accommodate fast-fading signals and paths with Doppler shifts of more than a few Hertz. "Q65 is particularly effective," the notes say, "for tropospheric scatter, rain scatter, ionospheric scatter, TEP (trans-equatorial propagation) and EME (Earth-Moon-Earth) on VHF and higher bands." It uses the same message formats and sequencing as those used in FST4, FT4, FT8, and MSK144. Q65 is one of 11 total modes included in the latest WSJT-X package. For more information or to download the free software, check out the homepage below.

(SOURCE: C. Butler | ICQ Amateur / Ham Radio Podcast)

<https://tinyurl.com/u9nrkhvb>

<https://tinyurl.com/28k4njzh>

<https://tinyurl.com/er6248rb>

ANNUAL REPORTS & ACCOUNTS 2020/21

FROM OFCOM: Ofcom has published its Annual Report and Accounts for the period 1st April 2020 to 31st March 2021. It has also published its Section 400 Accounts, with details of receipts from licence fee payments and financial penalties over the year (Source: Ofcom | ICQ Amateur / Ham Radio Podcast | RSGB).

<https://tinyurl.com/wkn5tfvp>

<https://tinyurl.com/337xd22e>

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Aluminium-Ion Battery Development

The Graphene Manufacturing Group in Brisbane, Australia, together with the University of Queensland, have, according to the GMG website, developed a Graphene Aluminium-Ion Battery energy storage technology that has up to three times the capacity of a lithium-ion battery and can charge up to sixty times faster. The battery was created by inserting aluminium atoms into perforations made in graphene planes. The company claims that because the batteries lack an upper ampère limit that would otherwise cause spontaneous overheating; the batteries are also safer. The stable base materials also facilitate their recycling later. The company hopes to bring these cells to market by the end of 2021 or early 2022.

(Source: ICQ Amateur / Ham Radio Podcast, June 2021)

<https://tinyurl.com/ykswnhjh>
<https://graphenemg.com>

BBC DOWN UNDER: The BBC has agreed on a deal with Southern Cross Austereo in Australia to make its content available via SCA's LiSTNR app from 23 June 2021.

The partnership is the first time the majority of the BBC content selected by SCA will be available in Australia. LiSTNR is a curated and personalised free app, offering radio, podcasts, music, and news, similar to BBC Sounds. It houses more than 100 premium original local, national and global podcasts, live radio streams, radio podcasts and digital music stations, 15 linear music live streaming channels, four weekly music podcasts and an on-demand audio News and Info service. The BBC content includes programmes from Sir David Attenborough and Tim Harford, plus Radio 1's Essential Mix, BBC Radio 2's Desert Island Discs, and Radio 3's *In Concert* [...]. The BBC content will be available on the LiSTNR app from 23 June 2021. Southern Cross Austereo (SCA) is one of Australia's leading media companies reaching more than 95% of the Australian population through its radio, television, and digital assets. Under the Triple M and Hit network brands. SCA owns 99 radio stations across FM, AM, and DAB+ including the Triple M and Hit network brands and provides national sales representation for 34 regional radio stations.

(SOURCE: RadioToday)

<https://tinyurl.com/4yz65383>



GQ EMF-390 Multi-function Digital EMF Meter

The EMF-390 multi-function digital EMF meter is designed to be a portable device. It can be used for industrial and commercial maintenance, research, evaluation, simulation and other analytical or scientific applications in areas such as industrial plants, public utilities, universities, laboratories, and electronic repair shops. The device integrated testing features include three-axis Electromagnetic Fields, Electric Field, Radio Frequency and Radio Spectrum Power Analyser. The meter can identify the common source from EMF measured, such as Power Line, Wi-Fi etc. It also comes with a built-in audible and visual alarm. It can be used for EMF, EF, RF and 5G network detection and monitoring both indoor and outdoor (protected), as well as in other similar environments. It can continually monitor the radiation. When connecting the device to a PC, PC software can download the radiation data to the computer, and the user can analyse those later. The device also offers a high contrast black/white LCD module and one front-LED indicator. The built-in electronic gyroscope allows the user to read data from upside down to view it easily. The EMF-390 has onboard flash memory, for data

logging and saving. The data can be logged every second and can be downloaded into .csv format file with free software *EMF-PRO*. GQ RF Browser is specifically designed for the radiation monitoring of amateur radio equipment, smartphones, phone towers, smart meters, Wi-Fi connections. A safety suggestion indicator provides a simple and easy way to understand overall radiation risk. The device is equipped with a USB port, utilised for communication and external power supply and charging of the internal rechargeable Li-Ion 3.6V/3.7V battery. The GQ EMF-390 internal rechargeable battery can be charged with a standard USB port, USB charger or via a computer USB port. On external power, continuous data monitoring is possible. Using either power adapter you will not have to worry about the batteries charge condition or any data loss. The EMF-390 also has a real-time clock on board for time-related data measurement. The meter has multiple sensors to ensure maximum scale/range measurement and provides measurements of the highest accuracy.

[This device was reviewed by Don in *Practical Wireless*, August 2021: 10-13 – Ed.]

<https://tinyurl.com/9278s9f8>

250 BROADCAST LICENCES LEAVE THE UK:

250 broadcasting licences migrated from the United Kingdom to European countries, due to Brexit. Half of the channels available in Europe outside their country of origin fell under the jurisdiction of the UK in 2018, declining to 10% at the end of 2020. London was the major international hub for broadcasters in Europe, operating under licences from the UK regulator Ofcom. Broadcasting licences relocated from the United

Kingdom included transnational networks such as Discovery, Disney, NBC, NENT, Sony, SPI International, Turner and Viacom, as well as the internationally targeted versions of BBC and Sky channels. The Netherlands is now the main European hub, with 27% of these channels, followed by Luxembourg with 19% and Spain with 15%. The UK now ranks fourth, with 10%. (SOURCE: e-MWN, July/Aug 2021 Volume 67 No. 03: p. 6).

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RadioUser
STOP PRESS!



Hilberling Names Martin Lynch & Sons As Their Only Factory-appointed Dealer

This news just in from Martin: "During a visit to the Friedrichshafen Radio Show in Germany back in 2006, I came across a new manufacturer that I'd never heard of. I doubt most Hams haven't either, as the company designs and manufactures products at the extreme end of the spectrum, not just for Ham Radio but commercial applications too. When I say the 'extreme' end, I am not referring to GHz. I'm referring to build quality and performance. Some of you know that I served my electronic apprenticeship in the early seventies with Racal-BCC in Wembley, finishing in the Quality Control department as their senior Quality Auditor. Having spent four years working my way around most of the departments I chose 'QA' because I appreciated high levels of quality and procedures. They seem to go hand in hand and still do to this day. Wandering through

the Hilberling stand I witnessed the newly introduced Hilberling PT-8000A HF-6m transceiver and was taken aback. The 'Big Three', Yaesu, Icom & Kenwood produce some magnificent base stations; but, in my opinion, Hilberling is in a one-horse race all by itself. After almost 16 years of talking and negotiating with the factory in Germany, I am very proud to announce my company is the very first dealer in the world directly appointed by Hilberling for the sale of the PT-8000A transceiver and HPA-8000B 1kW HF-70Mhz linear amplifier. To experience the performance and quality for yourself, I do have a demonstrator (that is actually my own station so silk gloves please!) set up in the store and will be available for you to try towards the end of June."

www.HamRadio.co.uk/Hilberling

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Radio News



THE PRINCE OF WALES: His Royal Highness The Prince of Wales, recorded a special programme to say thank you to members of hospital, health and wellbeing radio stations for their work in keeping communities connected and patients entertained during the Coronavirus pandemic. The programme, *Music & Memories with HRH The Prince of Wales*, which was broadcast across member stations of the Hospital Broadcasting Association on Sunday 4th July 2021 at noon featured some of The Prince's favourite tracks, from artists including The Three Degrees; Diana Ross; Barbara Streisand and Edith Piaf. In the programme, The Prince of Wales highlighted the work volunteers from HBA members have done over the last year, explaining that the role of hospital radio has been even more important during these current times, providing an invaluable service to patients, staff and families and reminisces on key life memories where music plays a significant role.

(SOURCE: Hospital Radio Association)

<https://tinyurl.com/nfwxyz88>

BOLTON FM AND COVID-19: Bolton FM recently teamed up with the town's public health team to present a *Covid Special*, after Bolton found itself with an infection rate almost 17 times the national average. The Assistant Director of Public Health, Lynn Donkin, co-presented *Drivetime on Bolton FM* with presenter and chairman Andrew Dickson. There were also contributions from doctors, local businesses, volunteers and others charged with reducing the rate and rolling out vaccination centres.

Lynn gave Andrew a lateral flow test live on air (negative, thankfully) and explained the process to listeners. Councillor David Greenhalgh, the leader of the council also appeared, responding to the news earlier in the week that Bolton was on the 'secret' government list of areas to avoid. The station, which just celebrated twelve years on air, has also been running a series of Covid public service announcements, including short-notice information about where new vaccination centres have been set up rapidly to respond to the surge.

(SOURCE: Bolton FM | RadioToday)

<https://www.boltonfm.com>



Lab5999 Discovery TX-500 Transceiver at Nevada/W&S

Nevada and Waters and Stanton have been appointed UK Distributors of this prestigious new radio. The first shipment of the exciting new Lab5999 Discovery TX-500 is due in September; you can reserve yours now at Nevada and Waters and Stanton, with a £100.00 deposit. The price of the TX-500 will be £899.00. The radio's main features are advertised as follows:

- Splash-proof & Dust-proof Portable Software-Defined Radio
- 160-6-meter ham bands
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- I/Q Output
- Tailored for adventure, for extremes, for using in places unattainable before, with no sacrifice of performance or features.

<https://tinyurl.com/5a9x3er7>

<https://tinyurl.com/4fnr8h2v>

<https://lab5999.com>

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For more information go to
www.thevictoryshow.co.uk



Feedback

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

A Life of Ups and Downs: Working on the Microwave Network

It was 1964, and as a recently promoted Post Office engineer, I was assigned to Engineering HQ at Gresham Street, in the heart of the City of London. The city may have been concerned with money, but we were concerned with traffic - not that sort - telecommunications - across the nation. The demand for telephones in the home and at work was increasing and the existing wire network was not capable of expanding. At that time, the General Post Office (GPO) was a government department with a monopoly on the provision of telephones and postal services. The cross-town telephone network was wire-strung on poles or underground. For longer distances, underground cables were laid with valve amplifiers provided in small brick buildings. Microwave bands - typically 4 and 6GHz provided much greater bandwidth, typically 600 voice channels, and were therefore capable of greater telephone capacity than the 'hard-wired' system. Some were parabolic dishes, others were horn-shaped, but both were designed to receive or transmit a microwave signal in a narrow beam. Such a network already existed to distribute the BBC 405-line monochrome TV-to-VHF transmitters. Further pressure on the GPO to provide a high-capacity telecommunications network was the introduction of BBC 625-line monochrome television and the creation of ITV in 1955. By 1962, ITV had expanded to 14 UK regions.

The heart of the microwave network was centred in London at the Post Office Tower (now the BT Tower) begun in 1961 and completed in 1964. The tower not only provided a high point for antennas but a switching centre for ITV. Regional companies provided programmes to other regions, so a viewer may see the evening news from London, followed by a programme from East Anglia, and then another from the north and so on. The viewing gallery and the rotating restaurant were, of course, better known to the general public. My first task was to see if the antenna parts would fit in the lift of the Post Office Tower. A strange request, given that the prime purpose of the tower was to support the numerous antennas at a good height. The means of getting them there should have been incorporat-



The Llanddona transmitting station, situated near Beaumaris, on the Isle of Anglesey.

ed in the tower design. However, that had not been the case. The antennas were made in sections and bolted together when installed. I researched the dimensions, visited the lift and yes, the parts *would* fit! On the flat roof of the Tower was another tower, about 10m high, but upside down, that is the wide base was at the top (think: Eiffel, Blackpool). On top of that was, and still is, a weather radar. Standing on the flat roof there was no sense of height, and the London smog limited the view. I did not walk near the edge, for there was no safety barrier, and the ground was 580 ft (177m) below. I only had a sense of height when I climbed halfway up the inverted tower. I say halfway because it was then I felt scared and climbed down. My new job was to supervise the installation of additional antennas from the PO tower to relays across Wales, ending at Blaen Plwyf, the TV transmitter serving Aberystwyth and the Cardigan Bay area. The range of a microwave transmitter/receiver was line-of-sight; about 30 miles. Four relay sites with their antennas were needed from the Tower to reach Purdown, about 10 miles southwest of Bristol. At Purdown, one set of antennas pointed to the West Country, Bristol and beyond, and the others across the Severn Estuary to Wales.

My responsibilities started at the Wenallt, just north of Cardiff. The next station was at Werfa, a hill 1864ft (568m) high, where I was called out to supervise a rigging gang

installing extra stays to stop the antennas moving in the stormy winds. Both horn and parabolic dish antennas have narrow beams. Any misalignment can cause a loss of signal. The weather was fearsome, but what was so surprising was the calm in the valley below. No one would have imagined the turmoil above their heads! The end of the line (literally!) for me was the mast at Blaen Plwyf near Aberystwyth, which provided TV services for mid-Wales. The crew had installed two parabolic dishes at about 330ft (100m) up the mast, I felt it my duty to climb the mast and examine their work. After my experience on the top of the PO Tower, one might think that this was the wrong job for me, but most of the structures I was responsible for had their antennas around 100ft (30m) above ground level. Their ability to 'see' a long way came from being on a high hill or mountain top. But this was different: It was high and to be approached by climbing a ladder attached to the outside of the mast. The only protection was a series of metal hoops - known as 'Board-of-Trade-Hoops'. You could lean back on one if you felt tired. However, if you slipped and fell, they provided no protection, perhaps knocking you unconscious as you fell to your death. The fact that I am writing this shows that my inspection was successful. Modern climbers are fitted with a fall-arrest system. This consists of a safety harness that connects to a sliding arrest device slotted into a rail fitted to the ladder. If you slip and fall you remain hanging at a great height until rescued. Once the microwave network was completed I moved on to other work connected with underground cables. Many years later, long after I had retired and the GPO had metamorphosed into BT, I read a reader's letter in a technical magazine. It was from a BT employee describing how he had been asked to measure the inside of the BT Tower to see if the dismantled antennas would fit! Strange and somewhat sad to come from the 'high life' of the sixties to the ground. A journey of ups and downs indeed. *Sic vita!*

Bob Harry
r.harry1471@btinternet.com

[Many thanks for sharing this, Bob. Thank you also to Keith Hamer and Garry Smith, for contributing the photograph. - Ed.]

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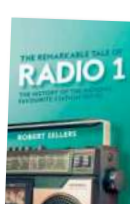
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Chrissy Brand
chrissyLB@hotmail.co.uk

We have all become used to hearing in-store radio stations over the past few decades. There is no hiding that they are

there to try and create an atmosphere in which the shopper purchases more goods or services. Mimicking a typical commercial radio station, pleasant-sounding DJs play upbeat tunes.

However, from *Sunshine on a Rainy Day* to the latest song by Little Mix, it is all a little subtle.

Whilst it is probably an improvement on the *elevator-muzak* used by supermarkets in the past to beguile customers, it could be better. Asda, Superdrug and a couple of banks are amongst the high street names whose in-store radio stations I have heard in the past few weeks.

It is inoffensive to the ears, but this type of radio station is uninspiring and leaves me cold. I have yet to buy an insurance policy or garden furniture despite adverts on these stations urging me to do so. I do understand that listeners who are shopping are only going to be in a store

In-Store Radio & Radio Teppanyaki

Chrissy Brand examines how the very concept of a 'radio station' can be expanded and how broadcasting practice can accommodate ground-breaking change. She also explores the future of community radio financing.

for a limited amount of time, so there is a need to maximise that window to create an atmosphere of positivity and to sell wares.

However, this is often the case for commercial radio as well.

Rockwater Radio

So far this summer, I have especially enjoyed one in-house radio station: Rockwater is a beachside restaurant in Hove that opened last year. Rejuvenating a tired old building into a quality space, specialising in great food and with a

fantastic atmosphere, I am sure the place will be a roaring success.

Rockwater is integrating well with a certain demographic of the local community; by hosting yoga lessons on the beach, mental health awareness exercises – and its own radio station (Fig. 1).

Rockwater Radio encapsulates the identity of the place very well, curating a blend of Balearic beats and other chill vibes. It would not be out of place on the Mediterranean, Florida or Californian coasts.

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



Fig. 1: Rockwater Radio, where good food meets beachside music in Hove. Fig. 2: KOOP's spring membership drive culminated in a 'wrap-party'. Fig. 3: Leah Manners has presented *Hip Hop Hooray* on KOOP since 2006. Fig. 4: Alli Bolt's *Country Rock Show* premiered on Hastings Rock in May 2021. Fig. 5: Federal FM has taken a brave stance against the Myanmar military.



Programmes include *Soul Casserole*, *Holidaying at Hove*, *Poolside*, *Burnt-Toast Radio*, *Reach for the Beach*, *Blonde Ambition*, *Flow with me*, and *Music to Yoga to*. The station's output is underpinned by, "a collaboration of wonderful DJs - bringing a selection of Balearic, blissed-out, feel-good mixes to provide the soundtrack to your walk, working from home, the school drop off, your weekend and anything else - providing a place for escapism and nothing but good vibes. These DJs will then be playing sun-drenched beachside sets, parties on the roof and musical supper club delights when we can - the light is in sight." Unsurprisingly, you can also listen online, at Mixcloud.

www.mixcloud.com/RockwaterRadio

Strong Synergies

This kind of radio elevates in-house audio experiences to a new level. I enjoyed it as much as listening to local, linear FM radio in oceanside locations in San Diego and Los Angeles a couple of years ago.

Closer to home, a beach café in St. Leonards-on-Sea, Goat Ledge, has a versatile playlist, where you hear an eclectic mix of klezmer, dub, lo-fi and even music by a group called Tinariwen. They are a nomadic Tuareg desert rock band who will

be playing at *The End of the Road Festival* in Dorset in September.

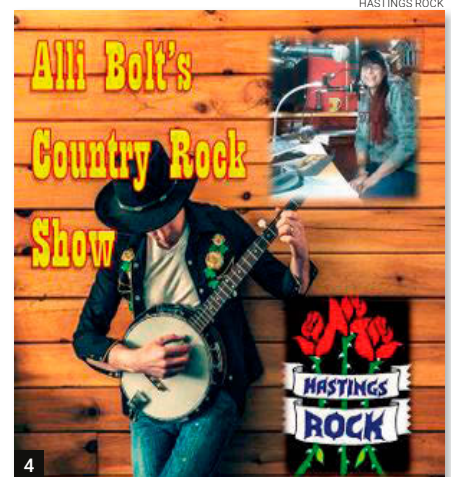
These are all genres that are rarely heard on the UK airwaves but, when played in this setting, help create a congenial and relaxed atmosphere.

As we know, most genres of music are underrepresented or ignored on most linear radio stations. That is why many of us turn to internet-only and international stations to seek out sounds we desire. This is, of course, why pirate radio first emerged, to fill the gaps, and still does today, to an extent.

It seems that in 2021, playlists, DJ sets and radio stations can all overlap seamlessly. There is certainly a stronger synergy than ever between all three; perhaps this is due to a shared common interest in promoting music and audio. Most listeners are loyal to certain presenters, radio stations or venues, but there is always the potential to reach out to capture the hearts and minds of new audiences.

People listening to a different radio station or enjoying a new piece of music in a café or retail setting is all part of the cyclical nature of exposure and success – for the musicians and radio stations alike.

After all, along with entertainment and information, isn't a key element of most



music radio programmes simply about creating a positive mood?

The Heart Beat

The radio industry continually evolves, producing fresh ideas and bringing newcomers into the field. There is room for the traditional, linear, style of radio to sit comfortably aside the latest trends and developments.

In May, it was announced that the social media video-sharing app, *TikTok*, was launching a radio station in Australia. Running over three months, in partnership



with iHeartRadio, ‘influencers’ and artists pre-record their shows for the station. iHeart local Content Director, Brett Nossiter stated, *“I’m going to break every single radio station rule in history. We’re going to have pre-recorded shows with some creators, and they’ll be creating shows in four-hour chunks, and then we’re creating radio teppanyaki. So basically we’re going to cook up the dish, then we’re going to chop it up and we’re going to let it fly up all across the schedule. It’s going to be short, hard, fast, compelling. It will be one hour, it will be one host playing all their music, songs that they’ve chosen – it might be a song that they’ve recorded, they might be talking to another creator... And then next hour, new host, next hour, new host”*.

Personally, I am not sure if this move sounds particularly novel or different. However, if it means that radio as a concept is to be brought to wider audiences, through a youthful cohort of *TikTok* users, it can only be a good thing.

<https://tinyurl.com/nuk8jhbr>

A Pot of Gold

Community Radio in the UK has been a great success, producing and nurturing new talent throughout each of the many stations: engineers, production teams, presenters and the marketing and sales teams. People of all ages and backgrounds have been able to find volunteer roles to help develop their radio skills and expertise. Local communities have also benefitted as a result, with relevant and targeted programme content.

There is a useful, regularly updated, list of all UK community radio stations, with links to each one, at the Ofcom website.

<https://tinyurl.com/vj6s2bn7>

The current Covid-19 pandemic has,

inevitably, affected this sector of the radio industry. Many community radio stations are dependent on sponsorship and advertisements from local businesses. In addition, some stations hold gigs, auctions and other events to help boost the coffers. Running a community radio station is a complex and expensive process, costing thousands of pounds a year, even when it is staffed by volunteers. Costs that need to be met include the rental, or purchase, of premises, office and broadcasting equipment, utility bills, software, licence fees and insurance policies.

<https://tinyurl.com/3275jths>

As well as on the health and wellbeing front, Covid-19 has hit the average business and family hard on a financial level. As a result, ensuring that the funds are in place has become that little bit harder for some community stations. This begs the question of whether membership drives be required to sustain UK community radio, as per the model used for public radio in the USA?

KOOP Radio, in Austin, Texas, is probably typical in the way it derives additional funding. Spring and autumn seem to be peak times for many US public radio stations to run fundraisers and ‘radiothons’. In return, station merchandise is given or sold to listeners, including bags, tee-shirts and mugs. A week-long membership drive on the air for pledges and membership fees is usually topped off by a party at the end, to celebrate a station raising enough finances to continue operations (Fig. 2).

Modern Membership Drives

This hand-to-mouth existence is, of course, a sad state of affairs but, with so many community radio stations on the airwaves, I can see that it is a sensible method to

keep a station going. A dedicated local population can also feel a big part of something special and have a stake in a station’s philosophy, mission and strategy. This can then reflect in the programme content that is played on the air.

For example, back in 2006, hip hop was an under-represented musical genre on Austin’s radio stations. Bearing this in mind, KOOP programmer Leah Manners (Fig. 3), proposed a programme called *Hip Hop Hooray*. She stated, *“There was one local hip hop show, and it was a public affairs show with more interviews than music. But the city needed hip hop because it’s among the most popular music in the world. So I proposed a show and it’s still on the air in 2021!”*

As we are now in the summer, maybe community stations in the UK could follow another example of KOOP FM’s membership drive. The station organised a drive-in movie, where the 1978 cult comedy *FM* was shown.

Another model I have noted this year is from an exciting Munich online radio station, Radio 80000. It has different levels of membership for listeners to help fund the station. Much like the format of a radio station that I mentioned earlier, Radio 80000 content comes from a mix of DJs, artists and music enthusiasts. It is a non-commercial online radio station founded in April 2015, that, *“functions as a platform, promoting collaboration and cultural expression through music, dialogue and events throughout Germany.”*

www.radio80k.de

The longest-running UK community radio station is Hastings Rock (*RadioUser*, August 2019: 44-46). Usually, it takes to the FM airwaves, with a restricted service licence, during May each year.

However, due to the pandemic, it did not take up its licence in either 2020 or 2021. Instead, it broadcast online and also squeezed in an additional month of online-only broadcasts, last autumn.

One reason for this was financial, with the knowledge that regular sponsors and potential new advertisers were local businesses who had suffered a loss in income, due to the pandemic. There were concerns that the costs of running the station – mostly payments for the licence and electricity – could not be met.

Another huge factor was that of health concerns. Understandably, Hastings Rock was concerned about its presenters all using the one regular radio studio. Instead, the team of DJs all operated from home studios.

Hastings Rock, in non-pandemic times, holds fund-raising gigs at the local Rockers' Pub and a Biker's Café on the A21, north of the town. These are lively affairs, which are fun to attend.

Listener interaction is key to every radio station. Hastings Rock specialises in new and old rock music, but the DJ roster

is dominated by an older, white, male demographic. However, to try and introduce a little diversity this year, a Country Rock Music programme was introduced, which for me was the best show of the month-long broadcast (Fig. 4).

Guitarist Alli Bolt presented a range of country and southern rock music which included Reba McEntire singing *Turn on The Radio*, plus tracks from musicians such as Sheryl Crow, Jimmy Buffet, Creedence Clearwater Revival, Elle King and Willow Hill. It can be heard online.

<https://tinyurl.com/4zwja8ut>

Radio For All

James Cridland gave a presentation at *The Radio Festival* in India, as part of this year's *World Radio Day* events. He moderated a panel about radio's approach to the pandemic and was also asked for a short talk about the future of radio. You can view a packed 10 minutes of this self-styled 'radio futurologist', at his *YouTube* channel.

<https://tinyurl.com/jpty6vx8>

James spoke about radio's long-standing, unique point of difference and

also mentioned a 1922 book called *Radio For All*, written by Luxembourg-born Hugo Gernsbach (1884 to 1967). Gernsbach was an inventor, writer and publisher, and is also known as the father of science fiction. Indeed, in his honour, annual awards presented at the *World Science Fiction Convention* are named the 'Hugos'. In *Radio For All*, he predicted and imagined a world that was run by radio, complete with drones, wireless charging, e-mail, the internet and microwave ovens. Not bad guesses, considering they were made 99 years ago! His inspirational book is available to purchase or read online.

<https://tinyurl.com/bnwbefm6>

To end with, an example of the power of radio that is currently taking place in Myanmar. The military junta disrupted all opposition media but, to counteract this, a pirate radio station called Federal FM was launched. It broadcasts on 90.2MHz in Yangon and to parts of Myanmar. It is also on *Soundcloud*, in Burmese, and has a Facebook page.

<https://soundcloud.com/federal-fm-radio>
www.facebook.com/federalfmradio

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David Harris
mydogisfinn@gmail.com

David Harris has had a look at two new books concerned with signals intelligence, radio monitoring and code-breaking in the various theatres of the Second World War (1939-1945).

Covert Radio Agents

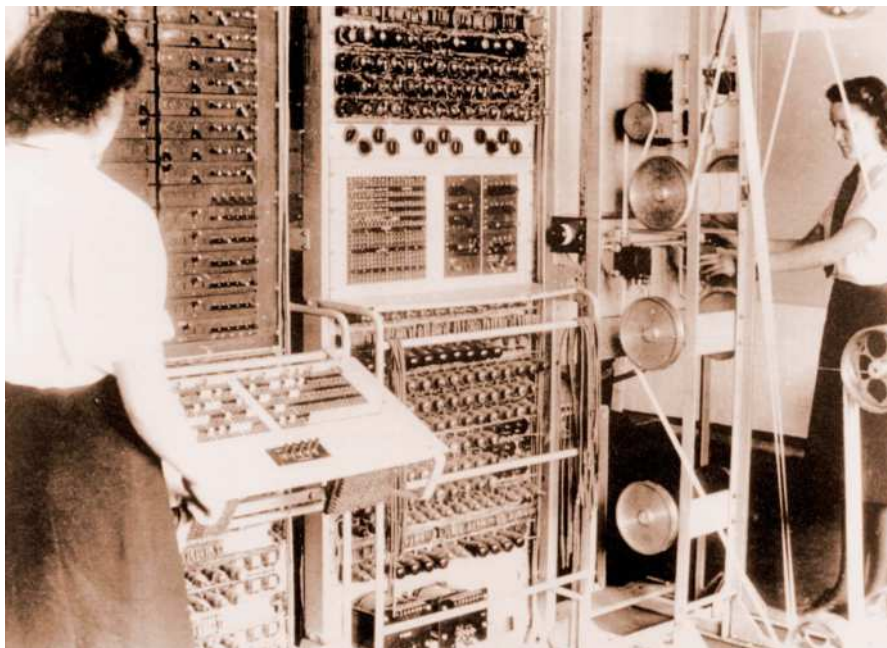
We are rather familiar with the idea of secret agents being parachuted into France during the Second World War to liaise with the French *Resistance* and to radio back information to England. This new book goes into much detail about the lives and operations of such agents and also looks at the use of agents in other theatres of the Second World War, including Norway and the Solomon Islands.

The author declares that, "This book is an expression of admiration for the young men and women who travelled to war in the dead of night". He estimates that the life expectancy of these operators was only around six weeks. Every time they transmitted the enemy were aware of their signals and used Direction Finding (DF) equipment to try to track them down. In addition to this, they had to blend in with the local population, which is why many were of French or Norwegian parentage and spoke the language fluently.

Agents were picked from a variety of sources and included those who had joined the British Armed Forces. Fluency in a foreign language and completion of basic military training were some of the skills sought by the recruiters. Once selected, the agents underwent training in Morse code, radio operation and cryptography. All communications from agents in the field to the UK were in the form of coded messages sent in Morse. The training was intense; agents needed to be able to send and receive Morse at 20 words per minute.

German forces invaded Norway in April 1940 and held the country until the Nazi surrender in May 1945. Some 190 different agents were sent to Norway from the UK to operate around 100 different radio stations. These agents were often based on remote islands with a good view of the main shipping channels. They reported on the movement of German warships and cargo vessels.

This enabled Allied forces to sink some of these ships. The agents were conveyed to Norway by fishing vessels known as the *Shetland Bus*. This would sail from Shetland to the Norwegian coast where the agents would be dropped off from small boats and



Covert Operators and the Y-Service

would make their way ashore. The boats were also used to bring agents back to the UK. The Germans maintained a large garrison in Norway, right up until the end of the war, and agents were involved in the sabotage of the *Norland Railway* from Bodo to Trondheim. The Allies feared that it would be used to transport German soldiers from northern Norway back to Germany to defend the country in 1945.

If you have bought the *World Radio TV Handbook 2021*, then you will have read the article about 'Coastwatchers in the Pacific War', by Dr Martin Hadlow (pp. 34-36). The piece focuses on how the *AWA Teleradio 3BZ* was used by agents and local defence forces in the Solomon Islands to report on Japanese naval and aircraft movements. David Hebditch writes a compelling 44-page chapter about this little-known area of the Pacific War. In it, he explains how local people and European settlers set up observation stations on high ground, which enabled them to monitor Japanese movements. Although the Japanese had captured the islands, the interiors were relatively safe, since the Japanese troops did not want to get bogged down in jungle warfare.

The 3BZ consisted of a receiver (C6770), transmitter (J50062), an aerial tuner and a

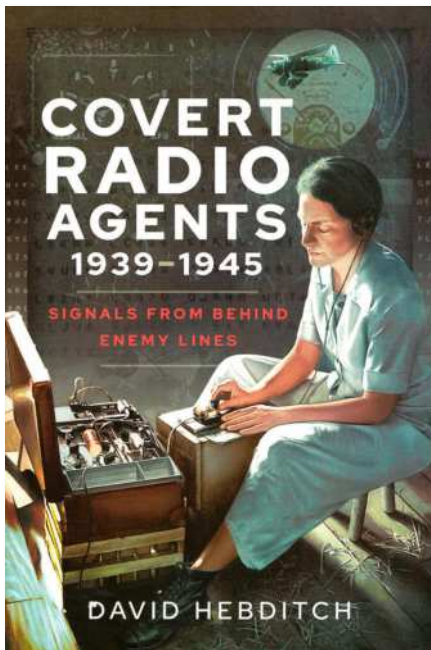
loudspeaker. The whole setup weighed over 100 kg. The radio also needed a large battery, and – in remote locations – a generator to charge the battery.

The use of agents in France is well covered with detailed accounts of the exploits of Georges Bégue, who has the distinction of being the first agent to be dropped into France in 1941. The same chapter also covers the life of Nancy Wake, one of the few female agents to be deployed in an occupied country.

The book has a lengthy chapter entitled, *Technical Briefings*. Its purpose is to acquaint the non-technical reader with some of the basics of radio transmission, aeri-als, Morse code and cryptography. The explanations of how messages were coded using 'Book' codes, 'Poem' codes, and one-time-pads are some of the clearest that I have read on the subject.

Overall, the author brings to life the lives of those very brave people whose observations and radio reports helped the Allied cause in many different fields of war.

What is more, the book is superbly illustrated with photos of many of the agents, maps, diagrams, and photos of radios equipment. There are comprehensive notes, a full bibliography and a useful index.



Covert Radio Agents 1939-1945. Signals from Behind Enemy Lines
by David Hebditch (2021)
Published by Pen & Sword
301 pp. Hbk. £25.
ISBN 978152679449
www.pen-and-sword.co.uk

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See page 13

This book is highly recommended to anyone with an interest in the Second World War.

Bletchley Park's Secret Source

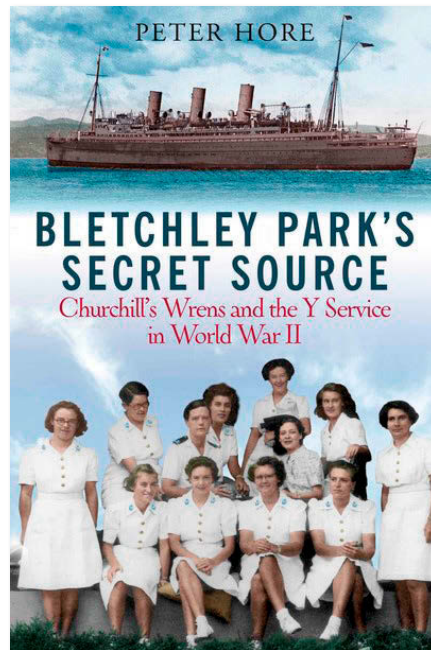
The focus of this book is on the members of the *Women's Royal Naval Service (WRNS)* who monitored German military radio transmissions during World War II. Their transcriptions of German codes were sent to Bletchley Park for decipherment and played a significant part in the Allied victory.

There have been a lot of books, films and TV programmes about the (mainly civilian) codebreakers, such as Alan Turing, whose portrait now graces the new £50 banknote.

In *Radio User*, April 2020: 18, I reviewed David Abrutat's *Radio War*, which tells the story of the Radio Security Service (RSS), a body of civilians, military and volunteers who monitored German military transmissions.

Peter Hore's new book is the hidden history of a few hundred specially chosen women who joined the highly secretive *Y Service* of the WRNS.

Many of the 'Wrens' were chosen because they spoke fluent German, and some were language graduates. Much of the monitoring was of Morse transmissions which were sent in code. The Wrens were trained in



Bletchley Park's Secret Source. Churchill's Wrens and the Y Service in World War II
by Peter Hore (2021)
Published by Greenhill Books (Pen & Sword)
210 pp. Hbk. £19.99
ISBN 9781784385811
www.greenhillbooks.com

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See page 13

radio operation and Morse. They formed an elite group who were sworn to secrecy; even senior naval officers were often unaware of their role. One aspect of radio monitoring that has not been covered in other books is that of voice traffic on VHF frequencies. German aircraft and patrol boats used 30-50MHz for voice transmissions in plain language. The German-speaking Wrens were, therefore, able to pass intelligence about enemy movements. They also had direction finding (DF) equipment which helped them locate German patrol boats.

The Wrens did not serve on board ships but were based in monitoring stations mainly on the east and south coast of England. They worked shifts in often very cramped conditions with many of the stations in remote areas. Those who worked in the Dover area were within range of German shelling from the French coast.

The author makes the point that these women were just as brave and exposed to harsh conditions as the men who served in the armed forces. Indeed, his book is a tribute to these women who could not tell anyone what they were doing and whose service went largely unrecognised until recent times.

Hore attributes the *Y Service* to helping

to win the Battle of the Narrow Seas in the English Channel and the North Sea. These areas were being harassed by the German fast motorboats known as E Boats (*Schnellboote*). The *Y Service* personnel were able to track these boats, which operated mainly off the Kent, Essex and Suffolk coasts in the early stages of the war.

Although women did not serve in combat during the war, the author stresses that many *Y Service* Wrens were posted abroad where they carried out valuable intercept work. Some went to Singapore to monitor Japanese communications and had to be evacuated to Ceylon (Sri Lanka) and then Kenya when the Japanese began to invade the Malayan peninsula and threaten India. The *Y Service* is also credited for proving the intelligence that enabled the allies to triumph in the Battle of Cape Matapan (March 1941), which resulted in the loss of many Italian warships.

One aspect of monitoring that *Y Service* staff carried out is the concept of 'radio fingerprinting'. This is where the signal of a particular ship is analysed using an oscilloscope. These traces were filmed and used as a way of identifying particular ships. The Wrens were also able to identify specific radio operators by their Morse technique.

Although the Wrens did not serve on the frontline, some 22 of them were killed when the *SS Aguila* was torpedoed by *U201* in 1941 on its way to Gibraltar. *Aguila* was a small cargo-passenger ship; it was part of a convoy that was attacked in the Atlantic. Only ten crew out of the 160 people on board were rescued.

The 22 *Y Service* Wrens were cypher officers and radio operators who were going to carry out monitoring duties in Gibraltar.

Another incident was the sinking of the *Empress of Canada* in 1943. This passenger ship was en-route from Durban, South Africa to Takoradi (Ghana) when she was torpedoed by an Italian submarine. Of the 1,800 people on board some 392 died, but the six *Y Service* Wrens on board were saved after spending several harrowing days drifting in lifeboats.

This book is written by a former Captain in the Royal Navy. The author is highly respectful to the lives of the few hundred *Y Service* Wrens whose work was so important in the war effort. The book also offers information about the recruitment, training, uniforms and management of the personnel.

Last but not least, there are 16 pages of photos, comprehensive notes, and a reassuringly lengthy bibliography, to round off this volume.

David Smith

dj.daviator@btinternet.com

Further to my description of London City Airport's digital control tower in the July issue (*RadioUser*, July 2021: 30-31), there is more news about how the system handles weather.

The airport project manager summarises this as follows: "For the London City Digital Tower Project, we needed to see and document a variety of weather events at the airport, and the weather did not always play ball; clear sunny days were not what we needed. We needed snow, hail, fog, rain, the lot. Over many months, using recordings from the camera systems and data from the weather logs, we compiled case studies of all the met events the CAA and Met Office required.

"We then spent many hours studying these to assess the performance of the system and collate training material. The met observations had to be done day and night, so we could show that observing the weather using cameras was the same, or better than would have been seen if at the airport. As well as the case studies, we also conducted simultaneous observations, having Met Office auditors at the conventional tower and the digital tower in real-time.

"We spent many evenings with the Met Authority and Met Office in the digital tower reviewing the case studies and observing the weather on the screens. This work was part of my wider system optimisation tasks, to make sure the image on the screens allowed us to do the met assurance observations and provide the ATC service. We spent a lot of time fine-tuning the image, and after a lot of work, we gained approval for providing met and the ATC service remotely.

"The digital tower brings advantages to observing weather; the compressed panoramic view – with a 360-degree view compressed into 225 degrees makes it easy to see all the cloud cover at the airport, which you wouldn't see without turning your head in a conventional tower. We can use the pan tilt zoom cameras to zoom into puddles to view rain, just as we would with binoculars in the towers, but it is slicker with a click! We also introduced a 'Met' scan on the pan tilt zoom cameras which allows you to see clouds you would not normally see at night. The culmination of this work has helped NATS to achieve assurance that the

Remote Weather, Emergency Descents & Runway Selection

David Smith examines weather reports from London City Airport's remote control tower, has news on drone testing, runway selection and emergency descents, and presents a profile of RAF Valley ATC.

qualified personnel making airport weather observations can continue to provide high-quality observations even when physically remote from an airport."

Temporary Danger Area at Llanbedr Airfield, North Wales

Until 13 September 2021, an Unmanned Aerial Vehicle (UAV) is operating in the vicinity of Llanbedr, carrying out test flights to develop new aircraft technology and operational procedures. The UAV type is a semi-rigid airship with an overall length of 16 metres.

Since the aircraft will be operating Beyond Visual Line of Sight (BVLOS) and has no Detect and Avoid capability, a Temporary Danger Area (TDA) has been established to allow safe operations.

The TDA may be activated for up to a maximum period of 12 hours at any time of day or night, but only for the minimum required duration to minimise the impact on other airspace users.

The area covered is a semi-circle of about 5 miles radius over the sea to the west of Llanbedr, up to 2,000ft AMSL (Above Mean Sea Level).

Advice on activity is available from Llanbedr Information on 118.930MHz.

Runway Selection Advice

The Civil Aviation Authority (CAA) has recently issued a *Circular* providing advice to pilots, ATC staff and aerodrome operators concerning the selection of 'Runway-in-Use' and operational limitations.

It reminds pilots that, irrespective of the runway direction selected by ATC, or notified by Flight Information Service Operators (FISOs) and Air/Ground (A/G)

radio station operators, it remains the pilot's responsibility to obtain the latest weather and aerodrome information and to decide whether or not their skill, overall experience, and recent flying experience on the particular type of aircraft will enable a safe take-off or landing to be accomplished in the prevailing wind and runway surface conditions.

The runway-in-use will normally be that most closely aligned to the surface wind direction but may vary because of local operational restrictions or procedures. ATC staff at aerodromes can assist pilots of aircraft, particularly light aeroplanes and gliders, by offering, whenever possible, the runway most into the wind for take-off and landing if this is not the runway in use.

A pilot who is unable to accept the runway-in-use should advise ATC or another operator that the crosswind (or tailwind) on that runway is outside his or her limits and request the use of a more suitable runway. Use of an alternative runway may entail some delay while aircraft movements for the runway-in-use are reorganised by the ATC unit, or a suitable break in other traffic occurs at aerodromes where Flight Information Service (FIS) or Air-to-Ground Service are provided.

Pilots should recognise that, in some circumstances, the only suitable alternative runway may be at another aerodrome.

<https://tinyurl.com/298txvke>

Emergency Descents in UK Airspace

Another recent CAA *Circular* highlights the factors involved in an emergency descent. The aim is to remind pilots, controllers

and their training organisations of the procedures to be adopted.

International regulations state that, when an aircraft receiving an ATC service experiences sudden decompression or a malfunction requiring an emergency descent, the aircraft shall, if they can:

- Initiate a turn away from the assigned route or track before commencing the emergency descent;
- Advise the appropriate ATC unit as soon as possible;
- Set transponder to Code 7700 and select the Emergency Mode on ADS-B or controller-pilot data link;
- Turn on the aircraft's exterior lights;
- Watch for conflicting traffic both visually and by reference to Traffic Collision Avoidance System (TCAS) if equipped; and
- Coordinate further intentions with the appropriate ATC unit.
- The aircraft should not descend below 10,000ft above Mean Sea Level or Minimum Safe Altitude, whichever is the higher. However, since UK controlled airspace is complex and congested, turning off-route could be dangerous. Therefore, if able, pilots should remain on the assigned route or track whilst carrying out the emergency descent unless to do otherwise would endanger the aircraft. In busy, highly-sectorised airspace, controllers may adjust their radar displays to filter out aircraft in adjacent sectors, which will be separated vertically or horizontally from aircraft in their own sector.

Emergency Codes

This is done to prevent distracting clutter on the controller's display. Selection of the emergency code 7700 will override the display filter and highlight to all controllers the emergency state of the aircraft, whether or not the aircraft is in their sector (including vertically). This function allows controllers to act quickly in providing separation from an aircraft in emergency descent as it passes through their sector. Thus, the prompt selection of 7700 is of paramount importance. Upon hearing an emergency broadcast, made by a pilot or controller, pilots of other aircraft must maintain radio silence and listen for further ATC instructions, maintain a good visual lookout and respond to TCAS as directed. Initial controller procedures will include prompting a crew to select the 7700 code if they have not already done so.

RAF ATC Profiles 4: RAF Valley

ICAO Code: EGOV IATA Code: VLY

Frequencies	(MHz)
Valley Approach/Radar	266.125; 125.225; 269.100
Valley Director	363.650; 123.300*
Valley Talkdown	313.550; 123.300*
Valley Tower	389.275; 122.100*
Valley Ground	369.500

- * NATO Common Frequency available on request only. Low-level frequency for helicopters operating low level in the mountains for *Ops Normal* calls: 362.300.

ATIS

Valley Information	120.725
Nav aids	ILS/DME CAT I Runway 13 TACAN VYL 108.400

Runways	13 (2290 x 45m)
	31 (2290 x 45m)
	01 (1572 x 45m)
	19 (1572 x 45m)

NOTES (A-Z)

Helicopter Operations

Helicopter movements should call ATC on 125,225MHz. If no contact, call Valley Approach on 266.125. Visiting helicopters are to enter and leave the circuit at a maximum 250ft QFE via Runway 19, 31 or disused 08 threshold (QFE = atmospheric pressure at aerodrome elevation / runway threshold).

Holding

Point Alpha 219 radial from VYL TACAN at 14 DME (North-west of Nefyn).

Noise Abatement Procedures

Avoid local area villages where possible. In particular Valley, Rhosneigr and Lake Maeog. Visiting aircraft are to break level at 1,000ft and reheat must only be used when operationally essential. Flypasts will only be permitted with the prior approval of the Station Commander or Officer Commanding Ops Wing. On departure, aircraft are to maintain runway heading until passing 500ft QFE (1,000ft QFE Runway 13) before turning onto their pre-notified heading.

Standard Instrument Departures

East and South SIDs.

Use of Runways

Military jet aircraft needing to land on Runway 13/31, when this is not the duty-runway, will normally be cleared for a run-in and level break at 1,000ft (local aircraft using other runways will orbit at 1500ft until the visiting aircraft has landed). Alternatively, a straight-in, instrument or visual approach will normally be approved on request. Visual circuits are not permitted except following a baulked approach/landing.

Visiting Aircraft Acceptance.

The primary operational task at this airfield is high intensity flying training. Visiting aircraft require prior permission and 15 mins holding fuel due to the high-intensity operations. Minimum break height 1,000ft. No low-level circuits. Visiting aircraft are only accepted on the following conditions: During Flying Training School (FTS) day-flying periods (Mon-Fri 0800-1800); During FTS night flying periods no visiting aircraft are normally accepted.

Warnings

High-intensity fixed-wing flying training in progress Mon - Fri with regular helicopter movements within a 10nm radius, and the possibility of simultaneous two-runway operations. Helicopter movements on the airfield below 300 ft will not be notified to circuit traffic. There are regular helicopter movements in Holyhead harbour and around the cliffs to the west and north of Valley. The use of reheat when aircraft is static may damage the runway surface. Saturday, Sunday and Public Holidays only. Model aircraft flying will take place within a half-mile radius, centered on the disused Runway 26 threshold, up to 1,500ft.

Pilots will be wearing their emergency oxygen masks and communications will be difficult, often with excessive noise on the frequency when the pilot transmits. The next priority is to provide separation from all conflicting traffic on the emergency aircraft's track, issuing avoiding action and traffic information as appropriate. Co-ordination with adjacent sectors is essential.

Once the aircraft reaches 10,000ft and is separated from other traffic, it will be guided to a safe landing following the normal procedures for handling emergencies.

N.B.: I inadvertently missed out on the important Brize Norton Approach Initial Contact Frequency 124.275MHz in my column in the May issue. My thanks to reader James Wright for pointing this out.

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

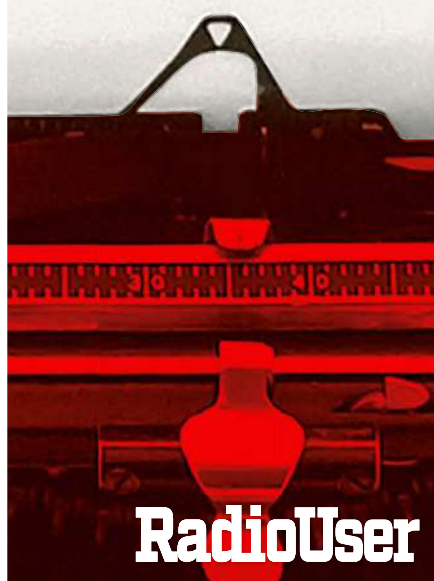
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You love your regular monthly radio magazine. Could you also write for us? The editor is looking for new authors to join our team in 2021, potentially in the following areas:

- Internet Radio
- Radio-Related Software
- Propagation and Ionosphere
- Products and Reviews
- Personal Experience

If you would like to share your expertise and enthusiasm with our readers, and if you enjoy testing equipment and software, then please drop me a line. Previous experience in writing for publication is an advantage but not a prerequisite.

Georg Wiessala
wiessala@hotmail.com



European Private Shortwave Stations

July 6th 2021

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

kHz	Country	Name	Transmitter site	Schedule (UTC)
3920	NL	Radio Piepzender	Zwolle	Irr.
3955	D	Radio Channel 292	Rohrbach Waal	24/7
3975	D	Shortwave Radio	Winsen	Daily 1500-2200
3985	D	Shortwaveservice	Kall-Krekel	Daily 1400-2200
3995	D	HCJB	Weenermoor	24/7
5895	NOR	Radio Northern Star	Bergen	Daily 0329-2210
5920	D	HCJB	Weenermoor	Daily 0600-1600
5930	DNK	World Music Radio	Bramming	24/7
5940	NL	Radio Jong Europa	Alphen a/d Rijn	Irr.
5955	NL	Radio Piepzender	Zwolle	Alternative to 6185
5970	DNK	Radio208	Hvidovre	24/7
5980	DNK	Radio OZ-Viola	Hillerød	We 2100-2200, Sa-Su 1100-1300
5980	FIN	Scandinavian Weekend Radio	Virrat	1st Sa of the month (not in September)
6005	D	Shortwaveservice	Kall-Krekel	Daily 0800-1600
6005	NL	Radio Delta International	Elburg	Sa 2000-2100 & 2200-0100
6020	NL	Radio Delta International	Elburg	Su 0600-1800
6055	DNK	Radio OZ-Viola	Hillerød	Alternative to 5980
6070	D	Radio Channel 292	Rohrbach Waal	24/7
6085	D	Shortwaveservice	Kall-Krekel	Daily 0700-1700 (Radio MiAmigo Int'l)
6115	D	Radio SE-TA 2	Hartenstein	Inactive
6140	NL	Radio Onda, Belgium	Borculo, NL	Weekends only. F.pl.: Daily 0630-1900
6150	D	Europa 24	Datteln	Daily 0800-1600
6160	D	Shortwave Radio	Winsen	Mo-Sa 10-16, Su 08-16 & 18-22
6170	FIN	Scandinavian Weekend Radio	Virrat	1st Sa of the month (not in September)
6185	NL	Radio Piepzender	Zwolle	Irr.
7215	NL	Rockpower	Nijmegen	Irr.
7275	NL	Rockpower	Nijmegen	F.pl.
7365	D	HCJB	Weenermoor	0800-1300
9530	NL	Radio Onda, Belgium	Borculo, NL	F.pl.: From July or August
9670	D	Radio Channel 292	Rohrbach Waal	24/7
11690	FIN	Scandinavian Weekend Radio	Virrat	1st Sa of the month (not in September)
11720	FIN	Scandinavian Weekend Radio	Virrat	1st Sa of the month (not in September)
15270	NL	Rockpower	Nijmegen	F.pl.
15790	DNK	World Music Radio	Randers	Sa-Su 0700-2000 + irr. at other times
17515	NL	Rockpower	Nijmegen	F.pl.
25800	DNK	World Music Radio	Mårslet, Aarhus	24/7

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

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

Summer Air Shows

David Smith

dj.daviator@btinternet.com

July 30th to August 1st
(Friday to Sunday)

OLD BUCKENHAM AIR SHOW: Old Buckenham, Norfolk NR17 1PU. A mix of warbirds and civilian aircraft, along with classic and military vehicles on this historic former USAAF bomber base.

01953 860806

<https://tinyurl.com/3rw2rnks>

August 1st (Sunday)

NEED FOR SPEED FAMILY AIRSHOW:

At Old Warden, Biggleswade, Bedfordshire SG18 9EP. Vintage aircraft on the ground and in the air.

01767 627927

www.shuttleworth.org

August 4th (Wednesday)

DUXFORD FLYING DAY: At Duxford, Cambs CB22 4QR. A themed show, ('Squadron 19 Heroes').

01223 835000

www.iwm.org/airshows

August 7th (Saturday)

EAST KIRKBY AIRSHOW: At Lincolnshire Aviation Heritage Centre, East Kirkby, Lincs PE23 4DE. Three hours of flying, Lancaster and Mosquito taxi runs, plus lots more.

1790 763207

www.lincsviaation.co.uk

August 7th (Saturday)

BATTLE PROMS: At Ragley Hall, Alcester, Warwickshire B49 5NJ. A two-hour orchestral programme featuring a Spitfire display and parachute drops.

www.battleproms.com

August 7th

(Saturday)

CLASSIC CAR SHOW & VINTAGE FLY-IN: Popham Airfield, Coxford Down, Winchester SO21 3BD. Normally attracts over 800 classic cars and more than 50 vintage aircraft.

www.popham-airfield.co.uk

August 7th and 8th

(Saturday and Sunday)

COMBINED OPS: At Headcorn Airfield, Nr Maidstone, Kent TN27 9HX. Vintage and modern aircraft as well as military vehicles.

www.headcornevents.co.uk

August 11th

(Wednesday)

DUXFORD FLYING DAY: Duxford, Cambs CB22 4QR. Another themed show, this time with younger enthusiasts in mind.

www.iwm.org/airshows

01223 835000

August 14th

(Saturday)

SHUTTLEWORTH FLYING CIRCUS:

Old Warden, Biggleswade, Bedfordshire SG18 9EP. An evening airshow with pyrotechnics.

www.shuttleworth.org

01767 627927

August 14th and 15th

(Saturday and Sunday)

WINGS AND WHEELS: At Wolverhampton Halfpenny Green Airport, Bobbington, Stourbridge, West Midlands DY7 5DY. No air display as such but numerous aircraft movements during this airport open day and family day out.

www.wolverhamptonairport.co.uk

August 19th

(Thursday)

DUXFORD FLYING DAY: Duxford, Cambs CB22 4QR. A themed show ('Young Aviators').

01223 835000

www.iwm.org/airshows

August 21st to 23rd

(Saturday to Monday)

WHITBY REGATTA: Whitby, North Yorkshire. There are generally air displays on two of the days

www.whitbyregatta.co.uk

August 25th to 28th

(Wednesday to Saturday)

PORT OF DARTMOUTH ROYAL REGATTA: Dartmouth, Devon TQ6 9PS. Usually includes some air displays.

www.dartmouthregatta.co.uk

August 26th and 27th

(Thursday and Friday)

CLACTON AIR SHOW: West Green-sward, Clacton seafront, Clacton-on-Sea, Essex CO15 1NW. Limited flying this year, including flypasts by the Red Arrows and Battle of Britain Memorial Flight.

01255 686633

www.clactonairshow.com



DAVID SMITH

A three-quarter rear view of a PITTS Sloop.

August 27th (Friday)

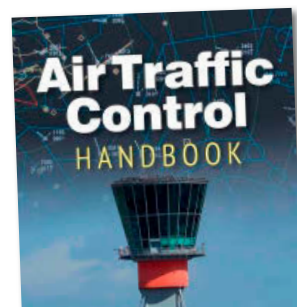
SIDMOUTH AIR DISPLAY: Sidmouth, Devon EX2 4DR. Includes Red Arrows.

www.visitdevon.co.uk

August 28th (Saturday)

WINGS AND WHEELS: Henstridge Airfield, Henstridge Marsh, Somerset BA8 0TA. Vintage and classic aircraft fly in to this wartime Fleet Air Arm training airfield.

www.wingsandwheelshenstridge.com



August 29th (Sunday)

LITTLE GRANSDEN AIR AND CAR SHOW: At Fullers Hill Farm, Little Gransden, Cambs SG19 3BP. Over three and a half of flying is planned, along with classic cars and much else on the ground.

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Air Traffic Control Handbook

by David J Smith

OUT ON 29th OCTOBER 2021

First published in 1986 as Air Band Radio Handbook, David J Smith's Air Traffic Control Handbook is now into its 11th edition. From its original publication, the book was acknowledged as the essential reference for ground-based airband listeners, as well as student and private pilots and those with an interest in Air Traffic Control. This new edition has been fully updated with changes in procedure, radio frequencies and call signs, and is illustrated in colour, making the book an incredible source of information for all those interested in the subject and all those contemplating a career in ATC. Retired Air Traffic controller David J Smith's accessible and comprehensive text explains the intricacies of air traffic control and its jargon, enabling the reader to locate and interpret what is going on in the airways overhead. This fully revised new edition is a book that no one with an interest in the subject can afford not to have on his or her shelves.

<http://www.crecy.co.uk/air-traffic-control-handbook-11th-edition>

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In Part One of this article (*RadioUser*, July 2021: 24-29), I introduced the concept of fading, including its attendant phenomena, such as 'fade-in', 'fade-out', and 'plateauing'. I also looked at how you can observe and measure these phenomena – and various stations' attempts to deal with them – with the appropriate hard- and software, and using techniques like smoothing, recording and displaying of your collected data.

In this second, and final, part, I aim to expand a little on how broadcasters adjust to fading and attempt to minimise its effects, and what exactly it is that you can measure.

We have already touched on observing the switching (on and off) of transmitters in last month's article.

The image in Fig. 20 shows another common method of adjustment – switching the beam of the transmitting antenna. Here, FEBC uses the Bocaue/Philippines transmitter on 15580kHz with antenna type HRS 2/4/.5.

This is one of the usual 'curtain' antennas, which is slewable. For the half-hour mission broadcasts in the Indonesian regional languages Makassarese and Buginese, as well as Sundanese and Sasak, the beam is directed at the corresponding areas of the island archipelago: first towards 185° in eastern Sulawesi; and during the following hour at 215° in western Java. The change of the antenna pattern has a visible effect on the signal strength in Europe. The short switching pause, naturally, is also clearly visible.

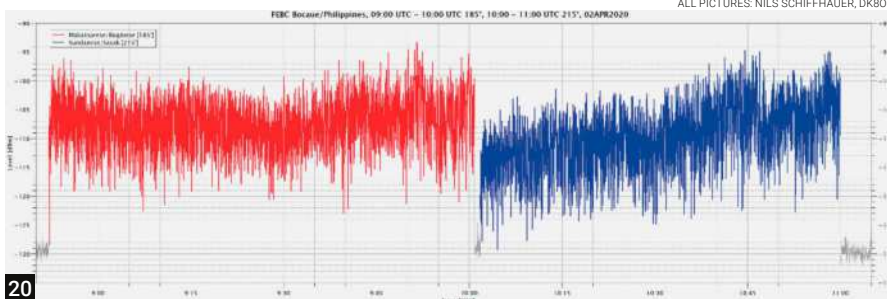
However, some changes of direction have too little effect to be determined reliably in the diagram. Radio Thailand, for example, switches to 9920kHz from 313° (Thai, towards Europe) at 19:00 UTC to 321°, which mainly marks the switching pause (Fig. 21).

Similarities – One Location, Several Frequencies

You may wonder how you might best use the tools described in this article, and the previous one.

Here is just one example: I examined 11 frequencies of Radio Xinjiang in different languages from two closely neighbouring transmission sites near Urumqi (Hutubi and Changji). Broadcasts were radiated, in two transmission power classes (50 and 100kW), from similar antennas over 24 hours (Fig. 22 shows their morning broadcast).

These level representations are smoothed over 300 seconds to show the larger struc-



Fading: How to Monitor and Evaluate Signal Strength (Part II)

In Part Two of his investigation of the phenomenon of fading, **Nils Schiffhauer DK8OK** shows you how to investigate, log and measure a range of fascinating propagation patterns and phenomena.

tures. As a result, a minor flaw emerges – the ends of the transmission times are skewed.

Fig. 23 determines the different switch-off times of four transmitters, down to the second.

There is a striking similarity between the signal paths. This is not surprising, considering the close proximity of the transmitter locations (about 20 km, compared to a distance of about 5,500 km to my location).

The transmission in Kazakh on 4850kHz proves to be the strongest channel, closely followed by 3990, 5960, and 6015kHz. The frequency of 7310kHz marks the 'midfield', while 5060kHz comes last.

In this detailed example, two groups can be distinguished. One is marked by 3990kHz, the other by 5060kHz. It is interesting to check again and again whether another transmitter has 'cheated' on the frequency. This is the case at 5960kHz; here, shortly before Xinjiang switches off, the Voice of Turkey switches on, with a signal that is a good 20dB stronger. The evening broadcast – with switch-on time and interesting fade-in visible – offers a similar finding.

The image in Fig. 24 shows six channels only, for the sake of clarity.

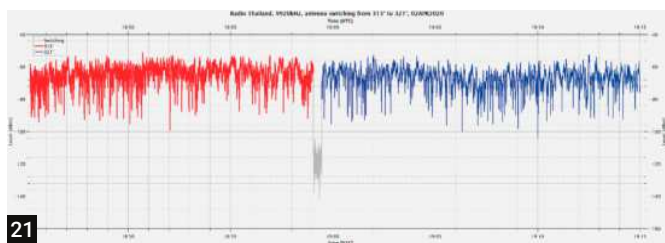
Correlations and Repeat Patterns

What we have just learned in the visual comparison above is called 'correlation'. This term describes the similarities between two phenomena through the correlation between them. Correlation exists in many different forms: Cross-Correlation, for instance, displays patterns between two signals. These can either run in parallel over time, or one signal can have a time lag. Autocorrelation shows repeating patterns within the same signal.

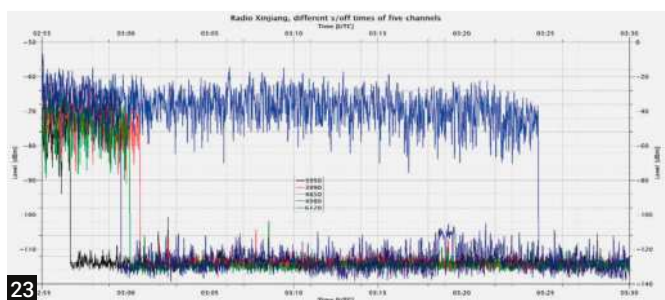
Overall, correlation is a *statistical* quantity. It makes no statement about cause and effect – as the famous example of the arrival of storks in spring and the high birth rate shows. Although the correlation is high, each one has its very own cause. In a practical explanation of cross-correlation, let us consider a comparison of two signals:

The upper part of Fig. 25 shows the noise level on the ELAD FDM-S3 SDR receiver. Its antenna connector has been connected to a dummy load on two frequencies at around 20MHz, at about 100kHz intervals for ten minutes. The time resolution is one second; this corresponds to 600 values each.

The untrained eye can hardly detect any dif-

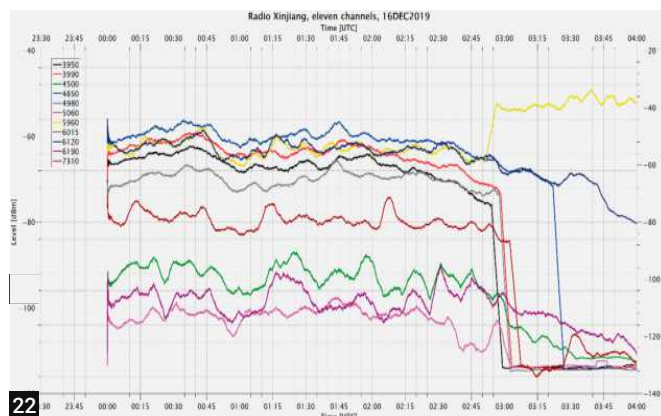


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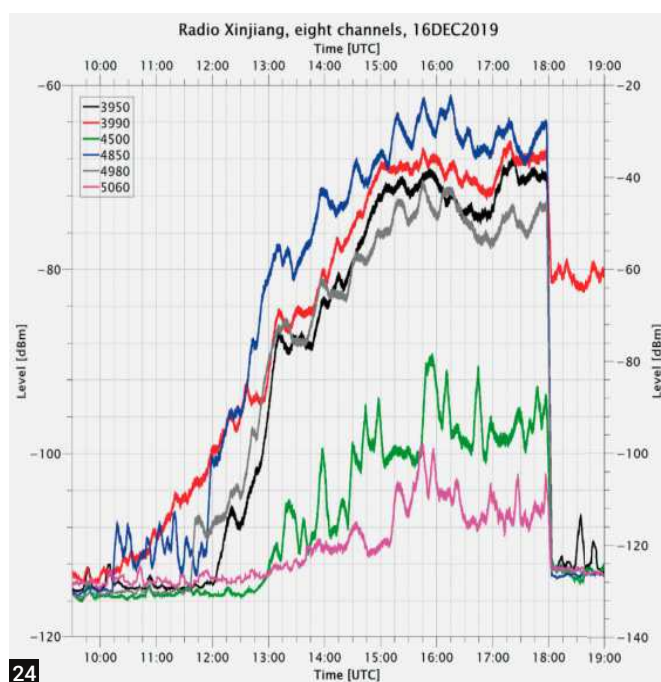


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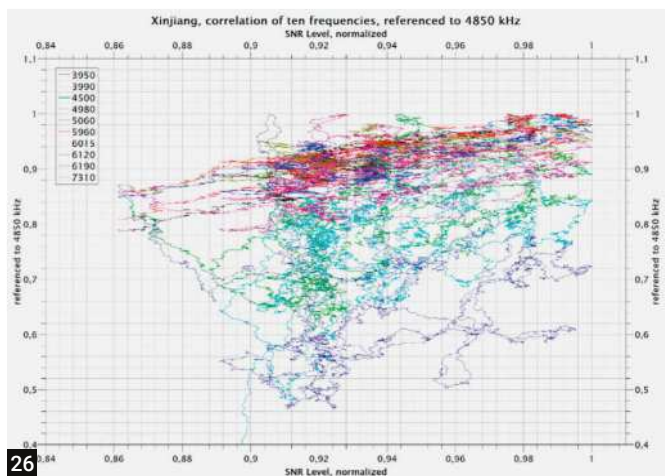
Fig. 20: Switching antenna direction at FEBC Bocaue/Philippines on 15580kHz – note the short ‘changeover-pause’. Fig. 21: Switchover at the Thai transmitter Udon Thani towards Europe, from 313° to 321°. Note the pause shortly before 19:00 UTC. Fig. 22: Level development of the morning broadcast of 11 channels of Radio Xinjiang. Smoothing is over 300 seconds Fig. 23: The different switch-off times of some individual frequencies can be detected to the individual second. Fig. 24: Both switch on (11:30 and 12:00 UTC) and fade-in are seen here on six channels.



22

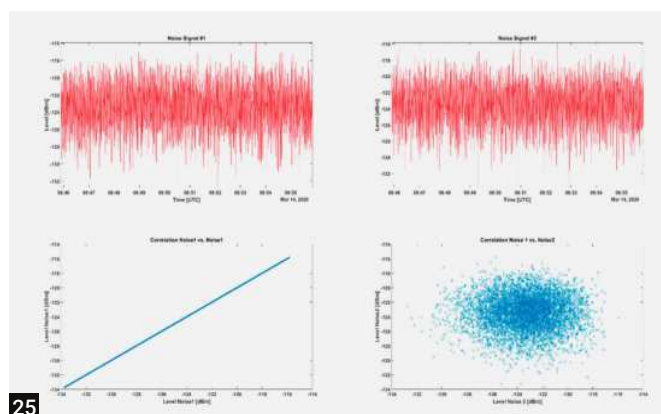


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26

Fig. 25: The upper row shows two noise signals at different frequencies, the levels of which are randomly distributed over time. The lower level shows the correlation of a signal with itself (coefficient = 1) on the left and the correlation of signal 1 with signal 2 (coefficient = 0.0052) on the right. In a square coordinate system, this ‘point-cloud’ shape would be circular. Fig. 26: Comparing 10 channels with the SNR curve of the reference channel (4850kHz) reveals some interesting similarities.



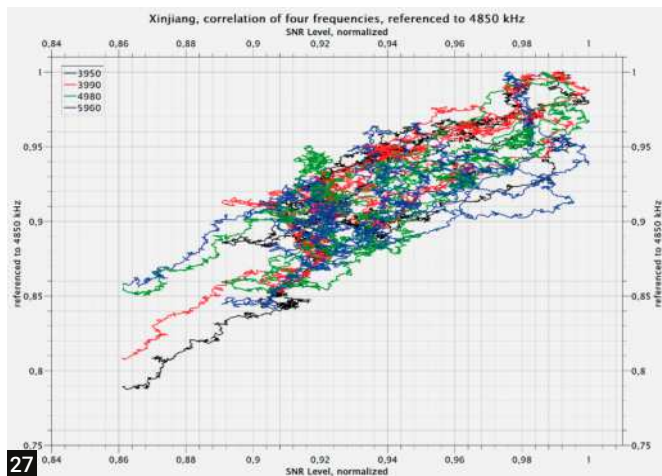
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ferences. If you correlate signal #1 with itself, there is, of course, a complete match, which is shown by the angle bisector in the illustration (bottom left). But if one compares signal #1 with signal #2, the straight line breaks up into a ‘point cloud’; the noise is random so that two signals with white noise are not correlat-

ed with each other. The correlation coefficient for the lower-left figure is 1 (complete match), and that for the lower right figure is 0.0052, which is practically zero, corresponding to almost complete inequality. Why is the value not exactly zero? At some points, even independent random values coincide at random.

Another example can be seen if you go back to in Fig. 22: Here, I want to find out how those level curves are related, which have been converted into signal/noise ratios, separately for each frequency?

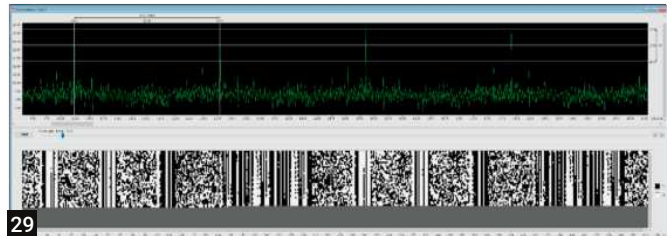
The example shows the visual cross-correlation of the normalized SNR values of ten



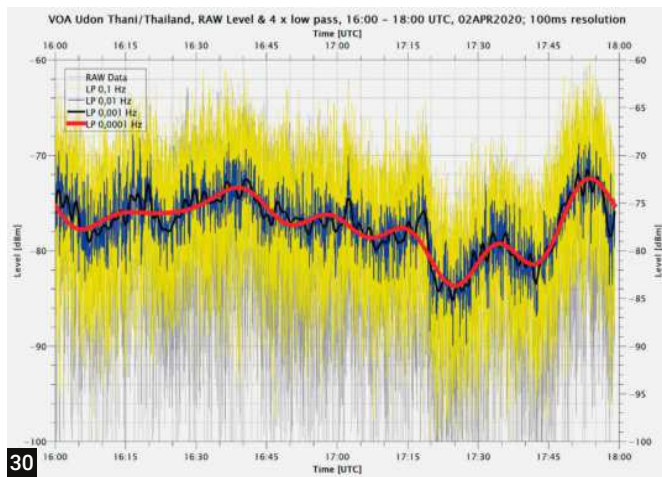
27

	3950 kHz	3990 kHz	4500 kHz	4850 kHz	4980 kHz	5060 kHz	5960 kHz	6015 kHz	6120 kHz	6190 kHz	7310 kHz
3950 kHz		0.9677	0.4102	0.8373	0.9576	0.5008	0.3102	0.4991	0.3815	-0.0968	0.3679
3990 kHz	0.9677		0.4184	0.8704	0.9571	0.5103	0.3116	0.5144	0.406	-0.0704	0.3908
4500 kHz	0.4102	0.4184		0.9535	0.3186	0.2386	0.191	0.5313	0.4534	0.7571	0.3034
4850 kHz	0.8373	0.8704	0.9535		0.7535	0.6311	0.855	0.6281	0.536	1.358	0.4038
4980 kHz	0.9576	0.9571	0.3186	0.7535		0.9311	0.608	0.4778	0.5377	-0.0001	0.2118
5060 kHz	0.5008	0.5103	0.2386	0.6311	0.9311		0.3969	0.4397	0.3073	0.0154	0.2439
5960 kHz	0.3102	0.3116	0.191	0.5313	0.608	0.3969		0.8944	0.8877	0.4573	0.913
6015 kHz	0.4991	0.5144	0.5313	0.6281	0.4778	0.4397	0.8944		0.8725	0.5372	0.4385
6120 kHz	0.3815	0.406	0.4534	0.536	0.3073	0.3073	0.8877	0.8725		0.5109	0.3572
6190 kHz	-0.0968	-0.0704	0.7571	0.1358	-0.0001	0.0154	0.4573	0.5372	0.5109		0.2972
7310 kHz	0.3679	0.3908	0.3034	0.4038	0.2118	0.2439	0.913	0.4385	0.3572	0.2972	

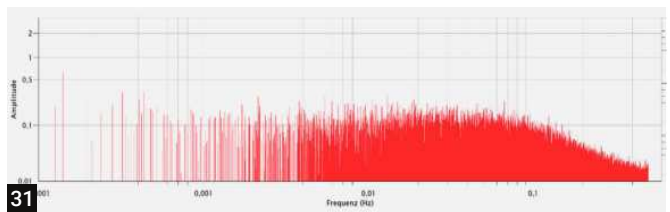
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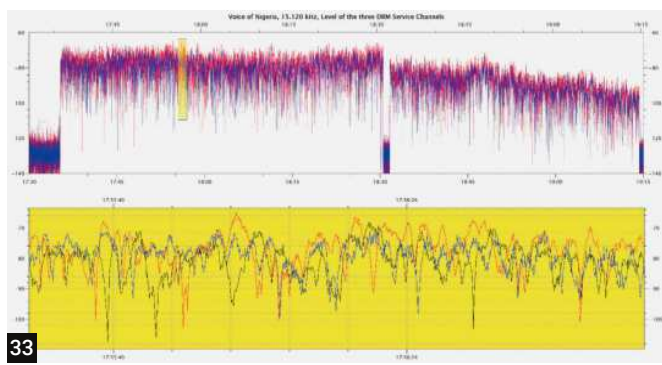
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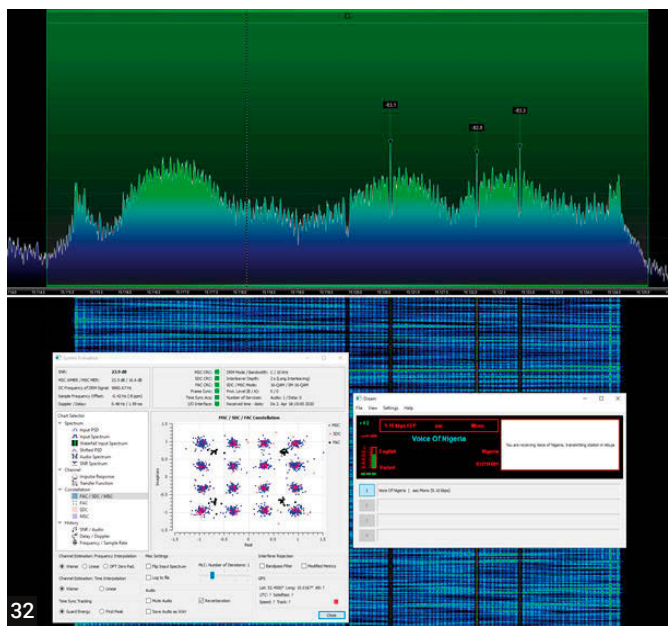
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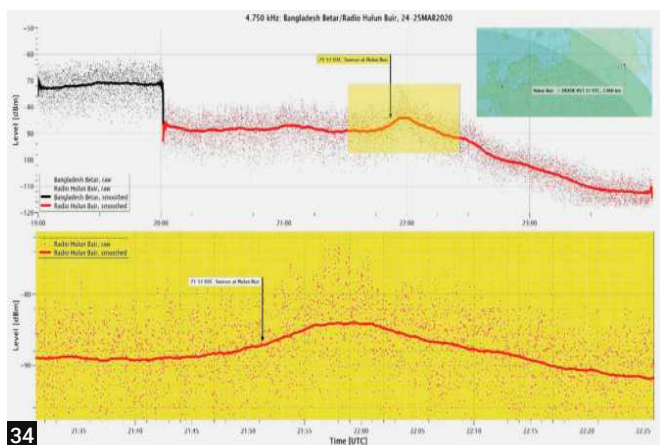
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Fig. 27: The similarities shown in Fig. 26 have been enlarged here. Note the scale in the vertical plane, which is almost halved, compared to the previous figure (Fig. 26). Fig. 28: The correlation coefficients of the morning broadcast of 11 Xinjiang frequencies mark both differences and similarities (see text). Fig. 29: The block length of a STANAG-4528 data signal is 256 bits. This results in a repetition rate of 106.67 milliseconds at 2,400 bits/s. Autocorrelation marks the beginning of each block as a 'peak', where the 'distance' of 256 bits can be read at the top, while the bit representation below shows two blocks (512 bits) next to each other. Fig. 30: Fading of VOA Udon Thani/Thailand, 12055kHz (16:00 to 18:00 UTC, on 2 April 2020); the temporal resolution is 100 ms. Fig. 31: The FFT analysis of the level curve from Fig. 30 allows for a numerical determination of the individual frequency components. Fig. 32: The Voice of Nigeria/Abuja in DRM30. The three service channels are marked at the top of the spectrum by the 'peak' function of the V3 software. Without the influence of the ionosphere, the signal, with its OFDM carriers, would look more like a 'brick'. Fig. 33: The three carriers of the service channels of the signal shown in Fig. 32 have a completely different level response, which is particularly evident in the lower zoom view. Selective fading through multipath-propagation is the cause of this.

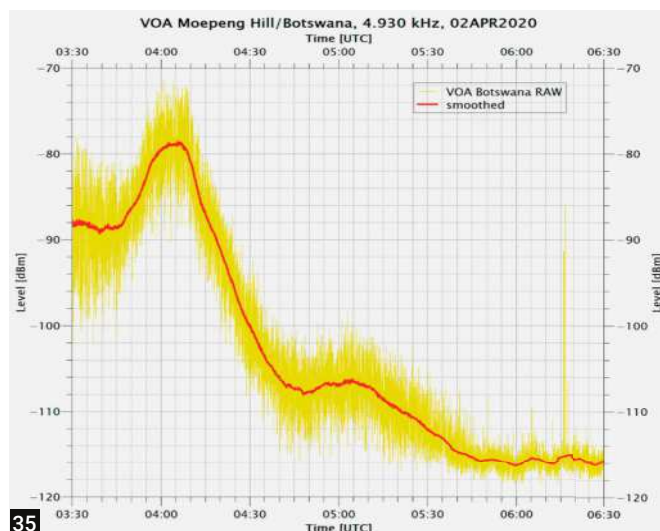
Xinjiang frequencies, all related to the strongest channel 4850kHz
 In this context, Fig. 26 shows a strong correlation of many – but not all – of the channels.
 The channels shown in Fig. 27 are largely consistent with 4850kHz.
 A value indicating 'similarity' is provided by the correlation coefficient, which can take a value between -1 and 1.
 With 0, there is no similarity. A value of 1 indicates that both measurements are identical, and a measurement of -1 means exactly the opposite. A correlation coefficient of, say,



34



36



35

Fig. 34: The signal of the 10 kW transmitter Hulun Buir in what the Chinese call 'Inner Mongolia' rises by up to about 5 dB to 4750kHz shortly before sunrise. **Fig. 35:** Sunrise at Moepeng Hill is 04:15 UTC. This coincides exactly with the peak at the fade-out of the VOA. The almost 10 dB are brought about by some short but powerful greyline-enhancement. **Fig. 36:** New Zealand Volmet on 6679kHz on a winter morning offers a good signal-to-noise ratio. The recording of the signal levels in this SSB transmission cannot be based on a carrier but uses the low-frequency speech constituents of the spoken weather report.

0.8 is called a 'strong positive correlation', a value of 0.5 is considered 'medium', and a value of 0.3 is considered only a weak correlation.

Fig. 28 shows the correlation matrix, which is marked in the appropriate colours. Here, a strong correlation exists within these two 'clusters':

3950, 3990, and 4850kHz; and
5960, 6015, 6120, and 6190 kHz.

Looking at these frequencies, it is noticeable that they are rather closely related – similar frequencies from the same location propagate similarly. What sounds banal, given the available data, becomes highly exciting when the signal path of a transmitter with a *known* location is checked against that of a transmitter with an *unknown* location.

In this case, this method becomes a tool for collecting some fascinating clues: There are still a lot of discoveries to be made in propagation science!

Autocorrelation is otherwise mainly used in signal analysis, to detect mode-typical repetitions such as synchronization blocks (Fig. 29 is an example).

Frequency measurement is also a type of autocorrelation, although here the Fast Fourier Transform (FFT) is preferred. This allows us to determine the repetition rates of fading.

Fig. 30 shows the low-pass method we already knew from the 'smoothing' method (see also: Part One, Fig. 8).

Fig. 31 illustrates the numerical method FFT.

Moreover, I wanted to investigate at least three different frequencies within one channel. For this purpose, I used the three channels MSC, FAC and SDC of the DRM30 signal of the Voice of Nigeria/Abuja on nominal 15120kHz (Fig. 32).

For this, Fig. 33 shows (especially in the lower, zoomed-in section) the (frequently) completely different levels of the channels at a distance of +600Hz, +2.100Hz, and +2.860Hz from the centre frequency.

The reason for this is multipath-propagation, which can be easily observed in the analysis module of the decoder software *DREAM* (Go to System Evaluation -> Impulse Response).

The Twilight Effect: Decisive Minutes for DXers

The twilight effect is defined as a brief signal rise that occurs around sunrise or sunset at the location of the transmitter and/or receiver. At frequencies below about 10MHz, the following happens at sunrise: while the high-lying and highly reflective ionospheric F2 layer can already build-up, the formation of the underlying, attenuating, D-layer is

slightly delayed. At sunset, the D-layer decays faster than the F2-layer. For a short time, this results in a signal increase of several dB. Fig. 34 shows this, using the example of the Hulun Buir transmitter at 4750kHz. This 10kW transmitter in north-western China, almost sandwiched between Mongolia and Russia, becomes audible after Radio Bangladesh Betar (100kW) is switched off at about 19:58 UTC. Until about 21:45 UTC, its signal strength remains at this level, then increases by up to 5 dB in the run-up to sunrise there, then drops off flat and changes to the familiar fade-out. Smoothing makes this process impressively visible.

The duration and strength of this effect depend on the length of the twilight zone between transmitter and receiver. On north-south lines, it is therefore quite short at the respective equinoxes.

The image in Fig. 35 shows the VOA relay station in north-eastern Botswana as an example.

Finally, a suggestion for SSB station reception: Fig. 36 graphs the reception of the New Zealand aeronautical radio station Auckland VOLMET on 6679kHz, as it comes in between 05:50 UTC and 08:50 UTC, mainly via the 'long path'. The 2 x 5 minutes of the transmission schedule are also marked.

The broadcast at 07:15 UTC is from Honolulu VOLMET.

Georg Wiessala

wiessala@hotmail.com

Some months ago, I was looking through the *Radio Kurier*, a members-only magazine published by the ADDX e.V. (*Arbeitsgemeinschaft Deutscher DXer*, Association of German DXers. The acronym 'e.V.' means 'eingetragener Verein', an association 'officially registered' in Law. Well, this is Germany...).

redaktion@radio-kurier.de

Somewhere in the small ads of that particular issue, I spotted someone selling an RLA3A indoor crossed loop magnetic aerial made by *Reuter Elektronik*. Reuter is a small company offering high-quality HF receivers and aeri- als. All the RLA models are broad- band, non-tuned, receiving antennas for the LW to SW range, based on the magnetic-loop principle (Figs. 1-4).

<https://tinyurl.com/ffhks3kj>

It was sold, second-hand, and at a very good price, so I treated myself. We did after all review another, more recent, Reuter product, the RLA4E, not too long ago (*RadioUser*, May 2020: 18-20; Fig. 5).

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

<https://tinyurl.com/advares9>

You can never have enough aeri- als, can you?

Well, for a while, I used this antenna for short wave and medium wave broadcast Dxing, up here in the Northwest of the UK, with good results. Then I lent it to former editor and friend Andy Thomsett for some experimentation with NDB Dxing, before I got it back, re-assembled it (Figs. 1-3, 4) and had a go myself.

Re-reading **Keith Rawlings'** review from 2020, I agreed with him, that, if you do not have space for a large outdoor aerial, or if you are in a caravan, on holiday or otherwise mobile, the Reuter does a surprisingly good job. The best feature, in my view, is the optional *RSW3B Control Unit* (Fig. 6). It provides power and permits you to have directional control over the unit, rotating it electronically, as it were, in 45° steps, through 0-180°.

In the Basement Band

The RLA3's receiving specs indicate coverage of 50kHz-54MHz 'solid' (with 're-



Going VLF with the Reuter RLA

The editor returns to his interest in the Very Low Frequency (VLF) Band, putting an unusual magnetic indoor directional loop antenna to the test in this area.

duced-level coverage' from 20kHz-71MHz. Therefore, I was wondering how my little German friend would perform at the very low end of the spectrum, in the VLF sector.

Connection to the PC was with a sound card offering a 192kHz sampling rate. Mine was from *Maplin* (remember?) bought some time ago (Fig. 7), but many VLF observers swear by something a little more 'professional', such as the Behringer U-PHORIA UMC202HD 24 Bit/192 kHz USB Audio Interface.

The results were quite respectable, given that I am not exactly in an electrically quiet situation at home, not even here in a small village. Fig. 8 shows some signals in the 10-80kHz range, with VLF transmissions to the world's navies on the left and RAF Inskip blasting in at 81kHz; I live less than 10 miles away from this transmitter.

I 'rotated' the antenna with the control unit, finding that some signals grew weaker or dropped put altogether, and some new ones would disappear.

The screenshot in Fig. 9 reveals the MSF

60kHz time signal station – I switched the aerial through all four directions while receiving this, and you can discern the small variations in signals strengths.

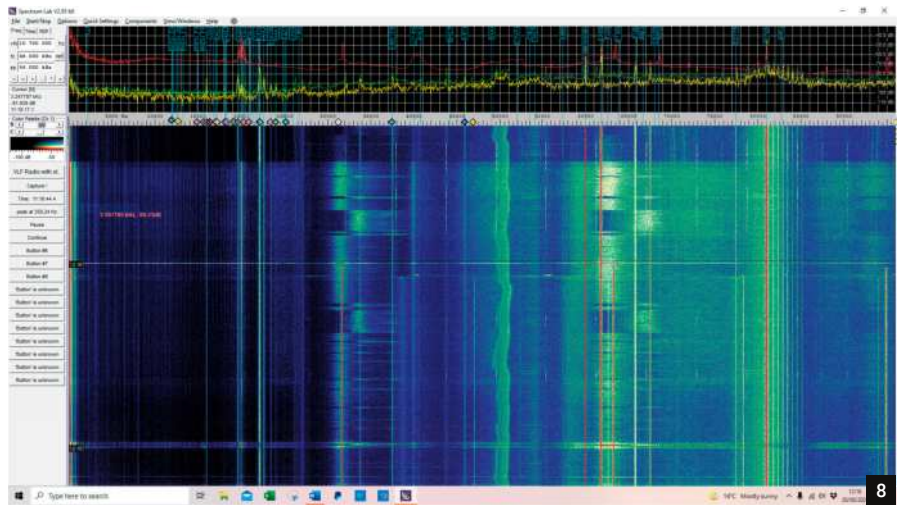
Fig. 10 is a screenshot of (most of the) VLF range I can receive here; about halfway through the waterfall, I switched in a *Bonito G17000* galvanic antenna isolator, with the modest results shown in the upper half of the screen. Fig. 11 displays the best overall result I could get on the day of observation (20 June 2021). You can spot some weak signals and some interference here and there.

By comparison, the image in Fig. 12 displays the same range, antenna direction and settings but this time with my custom-made VLF antenna, my *BAZ Ferrite Bar LFM/S1-N* (15-70kHz by //C : 20pF-1.6nF; Fig. 13).

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

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

Fig. 1: The Reuter RLA3 in its pre-assembly state.
 Fig. 2: The RLA3A aerial, RLA 3 control unit, and fixed loop.
 Fig. 3: Close-up of the loop and control units (see also: Fig. 6).
 Fig. 4: The specially-coated loop blades.
 Fig. 5: Our review of the successor model, the Reuter RLA4, in *RadioUser*, May 2020: 18-20.



Aerials Now

The Reuter RLA4 Wide Band Active Magnetic Crossed Loop Aerial

Keith Rawlings reviews an exciting new high-quality indoor loop aerial from the Reuter stable, looking at the aerial's build-quality, some reception results, and specific features and accessories.

Keith Rawlings
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Welcome to this month's column. It seems we are having a bit of a loop and present. This month I am pleased to say that our friend from Germany, Burkhard Reuter has sent me an RLA4 model for us to look at. Readers may remember that I reviewed the excellent Reuter Product CR-620 transceiver in the May 2018 edition of *RU* (RadioUser, May 2018: 8). That radio impressed me with its innovative design, overall build quality and fast rate performance. <https://www.radioenthusiast.co.uk>

Basic Description of the RLA4
 A few weeks on, the new RLA4 is an active broadband receiving loop, covering the range of 50kHz to 71MHz. It is intended for indoor or temporary outdoor use (Fig. 1).
 The two elements on the RLA4, which are made from etched FR4 PCB, are arranged at an angle of 90 degrees to each other and are remarkably small, measuring a mere 350mm high, and with the same dimensions across. They have been designed to give a symmetrical and low impedance feed to the differential amplifier used in the loop. These elements sit on top of a smart anodized aluminium case, which houses the amplifier. This is also small, measuring just 100 x 120 x 25mm (Fig. 2).
 There are two connectors fitted to the case, a BNC socket for the lead to the receiver, and a 2.5mm DC socket for power. The unit may be powered from the DC connector or, in addition to this, via the RF cable, a very useful feature, as we will see.
 The assembly of the loop was easy enough. As I began the review, I had no documentation (do not let us simply look at the supplied parts, cross-referencing this with the photos on the Reuter website), I began to lightly score the supplied parts into place. Once in position, they were 'topped-up' using a Torx driver. I found that once the aerial was assembled, it was physically stable and also looked quite smart!

The SW/SB Control Unit
 Also supplied for the review was the SW/SB (Fig. 3). This unit is designed to operate the RLA4 remotely, providing control of mode and directional switching. It is built into the same type of case as the RLA4.
 With the SW/SB the RLA4 can be powered through the feeder.
 On the front panel, there is a single rotary encoder and a nice clear OLED display.
 On this display, information is given regarding the current draw of the amplifier (in mA), the nominal loop direction of 0°/180°, and a position indicator (fully left to 0° and fully right to 180°).
 The encoder is used to shut down the RLA4 by rotating fully to the left. When turned to the right towards maximum, the SW/SB gives directional control of the loop through 0-180°.
 The control unit works in this way: when the control is set to read '0°/180°', only loop 1 is in operation, and, when set to '90°/270°', only loop 2 is in operation. At '45°/225°' (or 135°/315°) settings, both loops are active and have the same gain. When the loop is in a direction that is between these main receiving directions, the loops (or their respective amplifiers) are varied with different gains and phase delays.
 The control unit is also equipped with WiFi. A Windows app enables the SW/SB to be remotely controlled over a network, and as I told that on Android and Linux, the APP will follow (Fig. 4).
 Unfortunately at the time of the review, I was unable to try out the WiFi feature. However, it will add to the versatility of the RLA4/SW/SB combination.

The Loop to Use
 First off, I received the RLA4 loop on a cabinet in my shack and placed the SW/SB control unit next to my keyboard. I connected up a 12V supply and linked the aerial output of the control unit to a switch so that I could make comparisons to other aerials.
 The first receiver I used was my RSP2. Already being a VLFer, to the 20m amateur band I started there.
 With a 2MHz bandwidth, I could see plenty of signals over the span between 55.14kHz, as much so that I had to check to make sure I had not mistakenly switched to the 60kHz and ended up as

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 RadioUser 10p, 2020

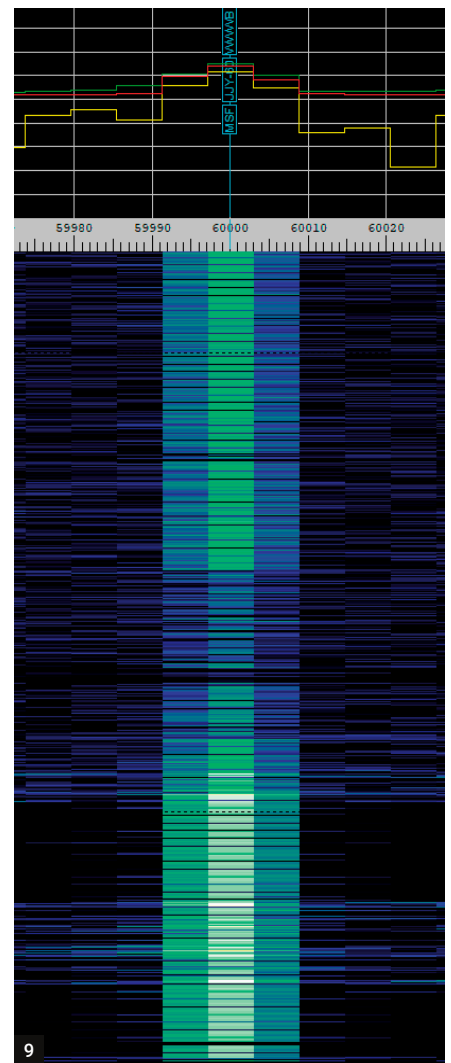
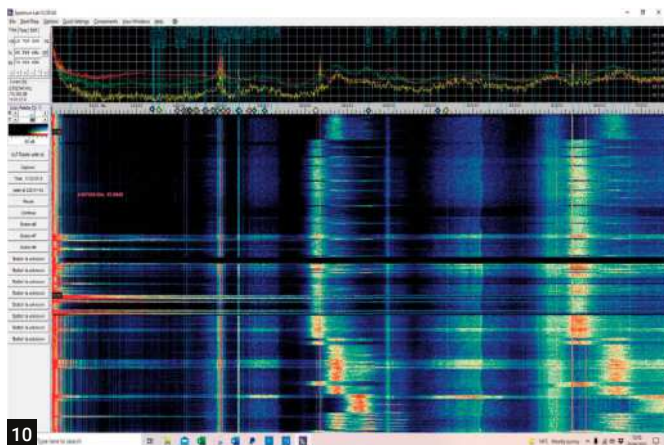
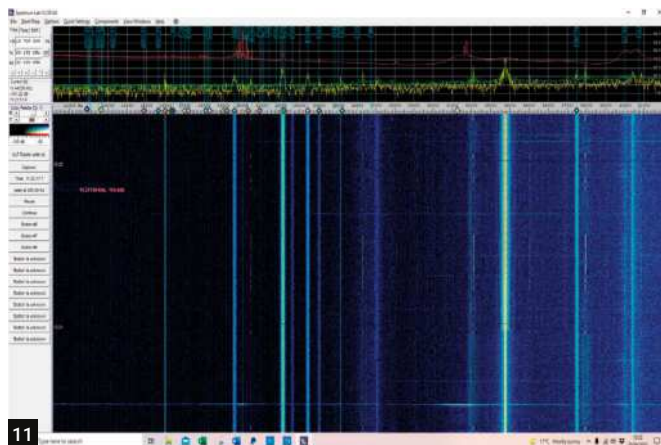


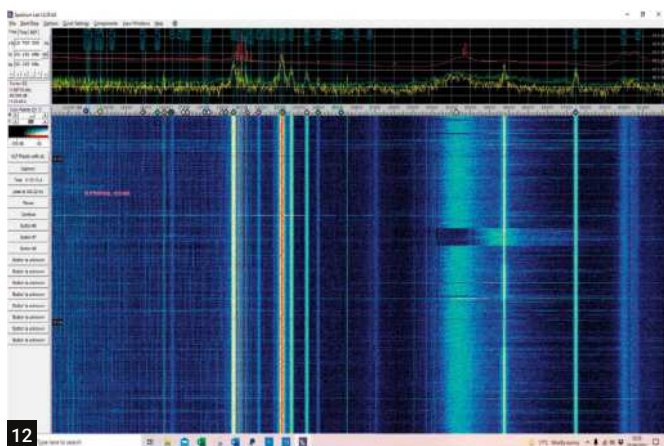
Fig. 6: The control unit (bottom).
 Fig. 7: My simple 192kHz-resolution rate sound card provides a spectrum of up to 96kHz.
 Fig. 8: A selection of military (Navy) signals on VLF. Fig. 9: MSF time signal station at 60kHz (enlarged, and with aerial rotated progressively).



10



11



12

Fig. 10: The VLF range, with a Bonito G1000 galvanic antenna isolator, switched in halfway through. Fig. 11: My best result in mid-June 2021. Fig. 12: The same signal range with my BAZ Ferrite Bar LFM/S1-N.



14



13



15

Fig. 13: Close-up of the BAZ aerial. Fig. 14: It makes sense to run an aerial like the Reuter RLA3 with a Lithium-ion battery (Model YB1203000-USB). Fig. 15: The versatile Bonito G1000 galvanic antenna isolator.

Some Conclusions

I have had much fun with this little weekend experiment. And, while the BAZ remains my main 'go-to' aerial for directional VLF reception from home, I was very impressed with the Reuter RLA3, especially when away from the house and the attendant higher noise levels.

For VLF enthusiasts, this is certainly a good performer. It is highly portable and lends itself to some experimentation with directionality if you are using the powered control unit.

It is recommended to always use the latter with a portable, rechargeable, battery; mine was the *TalentCell* Lithium-ion battery

model YB1203000-USB (Fig. 14).

Fig. 15 shows the Bonito G1000 galvanic antenna isolator, which I have found useful in matters VLF before.

www.talentcell.com
<https://tinyurl.com/7r5myzha>

Rallies & Events

Due to the Coronavirus situation, the Rallies calendar remains dynamic at the moment, and there will be more cancellations and postponements. All information published here reflects the situation up to and including **13th July 2021**. Readers are advised to check carefully with the organisers of any rally or event, before setting out for a visit. The Radio Enthusiast website will have updates, please check here regularly: www.radioenthusiast.co.uk To get your rally or event onto this list, please, e-mail full details as early as possible, to: wiessala@hotmail.com

1 August

WILTSHIRE RADIO AND CAR BOOT

SALE: Kington Langley Village Hall and Playing Field, Kington Langley, Wiltshire SN15 5NJ. 9 am to 1 pm. Traders welcome.

Chairman@Chippenhamradio.club

1 August

THE 31ST KLARC GREAT EASTERN

RADIO RALLY: Gaywood Community Centre (off Gayton Rd.), King's Lynn PE30 4EL (NGR - TF638 203). 9 am to 2 pm. Admission £3.

01553 768 701

Mob.: 0794 683 8656

Rally.klarc@gmail.com

<https://tinyurl.com/dznc7aa8>

15 August

DARTMOOR RADIO RALLY: The rally will take place in the Yelverton War Memorial Hall, Meavy Lane, Yelverton, Devon, PL20 6AL. CR|FP|BB|TS. Doors open at 10 am. Admission is £2.50.

Roger: Tel: 07854 088 882

2e0rph@gmail.com

<https://dartmoorradioclub.uk>

21-22 August

BATC CONVENTION FOR AMATEUR

TV 2021: Midland Air Museum, Rowley Road, Coventry CV3 4FR. AGC is Sunday afternoon. Test facilities available for 5.6GHz/Portsdown/Miniouner/Ryde/power amplifiers/preamps).

<http://www.midlandairmuseum.co.uk>

22 August

GRAND FIELD DAY OUT:

Willesborough Windmill, Ashford, just off junction 10 of M20. Gates open from 10 am to 4 pm. Free event. Various bands in operation, portable working at its best. Explore different modes and share tips and ideas. Natter with friends you have not seen for a while or bring along things to sell from your table or car boot. All interested parties wishing to set up a station, please contact the e-mail below. Set-up is from 9 am, and clear-away from 4-5 pm. To have free access, we need to ensure all food/drink on site is purchased from the Trust's Cafe/BBQ.

g0gcq@yahoo.co.uk



29 August

TORBAY ANNUAL COMMUNICA-

TIONS FAIR: Newton Abbot Racecourse, Devon TQ12 3AF. 10 am (9 am D). Admission: £2. (BB|CR|FP|RSGB)

Pete: G4VTO Tel: 01803 864 528

Mike: G1TUU Tel: 01803 557 941

rally@tars.org.uk

30 August

HUNTINGDONSHIRE ARS (HARS) ANNUAL BANK HOLIDAY MONDAY

RALLY: Ernulf Academy, St Neots PE19 2SH. Open 7 am (traders), 9 am (public). Stalls available. (FP|BB|CR)

Malcolm M00LG: Tel: 01480 214 282

www.hunts-hams.co.uk

events@hunts-hams.co.uk

5 September

THE TELFORD HAMFEST:

Harper Adams University Campus TF10 8NB

Martyn G3UKV: 01952 255 416

John M0JZH: 07824 737716

www.telfordhamfest.org.uk

12 September

CAISTER LIFEBOAT RALLY: Caister Lifeboat Station, Tan Lane, Caister-on-Sea, Norfolk NR30 5DJ. 9.30 am (8 am for sellers); easy parking; access via car park in Beach Road. Raffle. The museum will be open. (CR|TI|22)

Zane M1BFI: 0771 121 4790

12 September

EXETER RADIO AND ELECTRONICS RALLY: America Hall, De la Rue Way, Pinhoe, Exeter EX4 8PW.

Pete G3ZVI Tel: 07714 198 374

g3zvi@yahoo.co.uk

19 September

CAMBRIDGE REPEATER GROUP RALLY: Foxton Village Hall, Harman Road, Foxton, Cambridge CB22 6RN. Open 9.30 am (7.30 traders) Admission £3. (BB|CR|RSGB)

Lawrence M0LCM: 07994 197 2724

rally2021@cambridgerepeaters.net

www.cambridgerepeaters.net

26 September

BRITISH VINTAGE WIRELESS

SOCIETY RETROTECHUK: RetrotechUK 2021 will take place at the Warwickshire Event Centre. RetrotechUK is the new name and image for the National Vintage Communications Fair, (NVCF) established in 1992. Since then, the event has evolved and outgrown its previous title!

<https://www.retrotechuk.com>

26 September

WESTON SUPER MARE RADIO SOCIETY 6TH RADIO & ELECTRONICS RALLY:

The Campus Community Centre, Worle, Weston-super-Mare BS24 7DX. Opens 10 am (visitors [D: 9.30]) and 7 am (traders).

Dave G4CXQ: 07871 034 206.

g4cxq@btinternet.com

October

RSGB CONVENTION: (Online, TBA)

<https://tinyurl.com/2xtre867>

BB Bring & Buy CBS Card Boot Sale CR Catering/Refreshments D Disabled visitors FP Free Parking L Lectures RSGB (RSGB) Book Stall SIG Special-Interest Groups TI Talk-In (Channel) TS Trade Stalls.

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



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E-mail sales@moonrakeronline.com   

www.moonrakeronline.com

Moonraker (UK) Ltd, Cranfield Road, Woburn Sands, Bucks MK17 8UR

WHISTLER

TRX-1 Leather case

Keep your treasured TRX-1 safe with this high quality leather case

£29.95

MRW-TRX3 Antenna Pack

Three compatible antennas in this great pack

£39.95

TRX SD cards

A genuine replacement for the Whistler TRX-1 SD card

£19.99



WHISTLER

TRX-1E Digital Handheld Scanner

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

Buy the TRX-1E for just

£419.95



419 WATTS

WHISTLER

WS1065 Desktop Radio Scanner



The Whistler WS1065 employs cutting edge technology to bring a high level of performance and innovative features. This model clearly raises the bar in the area of advanced trunking scanners.

Buy the WS1065 for just

£299.95

299 WATTS

WHISTLER

WS1025 Desktop Radio Scanner



This 200-channel scanner can be categorized into 10 separate memory banks. Plus one-touch searches of marine, air and ham Frequency Range: 29-54 VHF Low Band. 87.3-107.9 FM Broadcast Band. 108-137 Civil Aircraft Band Includes 833 kHz steps. 137-144 VHF. 144-148 Amateur Band 2 Meters 148-174 VHF High Band

Buy the WS1025 for just

£89.95

89 WATTS

WHISTLER



TRX-2E Digital Desktop Scanner

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

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

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

Buy the TRX-2E for just

£479.95

479 WATTS

Key Specifications

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

WHISTLER

WS1010 Handheld Scanner

This 200-channel scanner lets you listen to FM radio bands and can be categorized into 10 separate memory banks. Also, it offers the convenience of one-touch searches of marine, air and ham

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

Buy the WS1010 for just

£89.99



89 WATTS

WHISTLER

WS1040 Handheld Scanner

The WS1040 scans most common trunked radio system signalling formats, including Motorola, EDACS, LTR and P25 trunked radio networks. Talk group and individual call monitoring is supported. When monitoring P25 digital systems, the exclusive Automatic Adaptive Digital Tracking instantly adapts the digital decoder to the digital modulation format of the transmitted signal, then analyses the signal over 50 times each second and adapts to any subtle changes caused by multipath or fading. No cumbersome manual adjustments are required.

Buy the WS1040 for just

£299.95



299 WATTS

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Uniden

SDS100E Digital Handheld Scanner

Uniden creates another first with the SDS100 True I/Q Scanner, the first scanner to incorporate Software Defined Radio technology to provide incredible digital performance in even the most challenging RF environments. The SDS100's digital performance is better than any other scanner in both simulcast and weak-signal environments. It is also the first scanner that allows you to decide what to display, where, and in what colour. Custom fields put the information important to you right where you need it.

Buy the SDS100E for just
£579.95



579 WATTS

Uniden

SDS200 Digital Desktop Scanner



The Uniden SDS200 mobile scanner has the same features as the handheld version SDS100, plus some extra enhancements. Uniden's SDS200 incorporates the latest True I/Q receiver technology, which provides the best digital decode performance in the industry.

Buy the SDS200 for just
£749.95

749 WATTS

Uniden

Bearcat UBCE-3600XLT Digital Handheld Scanner

This is a new digital Truck Tracker V Professional Scanner Receiver, covers 25 - 1300MHz wideband frequencies. The Truck Tracker V operation allows this scanner to scan APCO 25 Phase 1 and Phase 2, DMR, Motorola, EDACS, LTR Trucked Systems, NXDN as well as conventional analogue and P25 digital channels. With features such as close call RF capture, 4GB memory, location based scanning, range control, multi-site trunking, audio recording and multi-colour LED alert, this is must have equipment for all the professional users out there!

Buy the UBCE-3600XLT for just
£479.95



479 WATTS

Uniden

UBC-125XLT Handheld Scanner

A best selling Handheld scanner with great performance at a budget price! Uniden UBC 125XLT is a quality handheld scanner in a stylish compact design that is made from robust materials. Uniden UBC 125XLT is designed for indoor and outdoor activities in the professional world. The programmed channels are grouped into 10 Banks with 50 channels in each. In this way Uniden UBC125XLT is very easy to use once the interesting frequencies are programmed. Uniden UBC 125XLT has Close Call and 10 preset frequency bands.

Buy the UBC-125XLT for just
£129.95



129 WATTS

UK's Best Seller

Uniden

UBC-370CLT Desktop Scanner



A quality desk top scanner. It is designed for home use, with a big speaker for excellent sound. Included: 12VDC power supply, Telescopic antenna, 500 Channels in 10 banks FM & broadcast (Store & search upto 30 Preset FM broadcast channels)

Buy the UBC-370CLT for just
£119.95

119 WATTS

Uniden

UBC-75XLT Handheld Scanner

The UBC-75XLT's Main features include 300 memory programmable channels, close call RF capture with Do-Not-Disturb, automatic close call detection and tune into nearby transmission, 10 pre-programmed service searches, 10 custom search ranges, channel priority with Do-Not-Disturb, temporary lockout, PC programming, battery save and low battery alert, scan/search delay/resume options, quick and turbo search facility, triple conversation circuit, key confirmation tones, three power options and many more.

Buy the UBC-75XLT for just
£99.95



99 WATTS

Uniden

UBC-355CLT Desktop Scanner



Uniden UBC 355CLT is a quality base and mobile scanner in an elegant cabinet. It is designed for home and mobile use, with a large speaker for excellent sound. The fixed channels are placed in eight banks, where seven are pre-programmed for known frequencies.

Buy the UBC-355CLT for just
£89.95

89 WATTS

Uniden

EZI-33XLT PLUS Handheld Scanner

Uniden EZI 33XLT Plus is a handheld scanner in a compact design. New! Includes Rechargeable NiMH Batteries and USB Charging Cable. The small size of the Uniden EZI 33XLT Plus makes it easy for the user to take it out in the field by attaching it to the belt or carrying it in a pocket. The scanner is made from robust materials. The fixed channels are placed in nine banks, one for each frequency band. Thus allowing for a very easy access to all the interesting, pre-programmed frequencies.

Buy the EZI-33XLT PLUS for just
£74.95

74 WATTS



Uniden

Bearcat BCT-15X Mobile Scanner



With Uniden exclusive features like Advanced Dynamic Memory System, Close Call RF Capture Technology and GPS compatibility. The Close Call Technology instantly locks onto nearby radio transmissions even if you haven't programmed them into the scanner and then conveniently scans those Close Call Hits so you can stay up to date even after leaving the Close Call range.

Buy the BCT-15X for just
£249.95

249 WATTS



1

Mark Allen
mallen@hfcom.world

HF radio has been a part of aviation almost since the beginning. Today, many people – pilots and non-pilots alike – do not realize that HF radio is still a vital part of aviation. Most people incorrectly assume all aircraft communications take place on VHF and satellite in 2021.

A lot of communications do indeed take place on these media, but HF radio still has a place.

How then is one of the earliest elements of radio technology applicable in 2021?

As with many tools, it must be used for its correct and intended purpose. First, one must understand that there is very little VHF coverage more than 90 km from any land because most VHF communication is line-of-sight. While many airlines today utilize satellite communications, the cost is prohibitive, and the equipment still has reliability issues.

The Story Behind PanAm Global Radio

Mark Allen, Vice President of Engineering, introduces us to PanAm Global Radio, a private US Long-Distance Operational Control (LDOC) facility serving the needs of international aviation.

Aircraft that utilize HF radio generally fall into three main categories: airlines, corporate aviation, and military and government users.

ATC and Operational Control

HF communications are further subdivided into two main categories. First, Air Traffic Control (ATC); this type of communications

relays, to and from the aircraft, information required for the safe conduct of any flight.

The second main category is communications related to what is broadly termed 'Operational Control'. HF radio stations are utilized for ATC purposes. In some cases, the infrastructure is owned and operated by the government. In other cases, it is operated by

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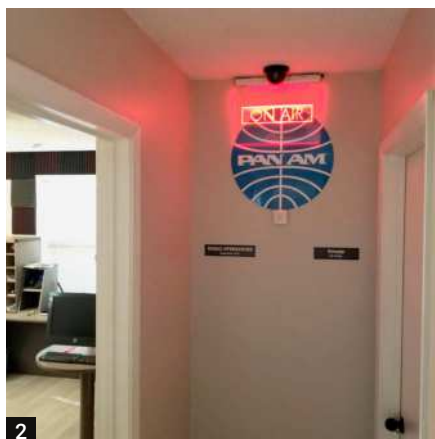


Fig. 1: The remote receiver system: All SDR, with analogue backup. **Fig. 2:** The entrance to the 'ON AIR' studio. **Fig. 3:** This is the open wire feed line to a 600-metre skywave loop antenna.

Fig. 4: The primary log-periodic antenna array.

private contractors, with operating agreements in place with the appropriate air-traffic control facilities.

Operational control facilities, on the other hand, are generally privately owned and operated. Pan Am Radio is an example of this latter type of facility.

Pan Am is what is known as a Long-Distance Operational Control (LDOC) facility. LDOCs operate on internationally-allocated HF frequencies and are licensed by the country in which they are based (Table 1). In the case of Pan Am Radio, based in the United States, the license is issued by the Federal Communications Commission (FCC).

<https://www.fcc.gov>

Cleared to The Next Fix

It seems pretty clear what air-traffic control communications are all about, but what about long-distance operational control? First, one should understand there are a lot of things that need to happen in order to have a successful flight, other than those related to air traffic control. Depending on whether or not it is an airline or corporate flight, there are many details to be handled. These include such things as ordering fuel, handling of the passengers by customs and immigration, en route changes, maintenance issues, scheduling for the crew, and details for the next flight.

Additionally, many unanticipated difficulties may arise from time to time, such as passengers or crews will become ill, serious maintenance issues that need in-flight attention, or in-flight security issues, typically caused by passengers.

By their very nature, many of these things have to be handled on a near-real-time basis.



2890	Nighttime
5511	Early Morning / Dawn
9210	Daytime (Guarded 24 hours)
10033	Daytime (Guarded 24 hours)
17901	Daytime Long-Range
21955	Daytime Long-Range

Table 1: PanAm Radio's frequencies (kHz).

This means the flight crew must talk to somebody. LDOC facilities enable communications between the aircraft and a ground station, typically the owner of the aircraft or their representative. With an airline, this is operations control, and in the case of corporate flights many times it is a designated person in management.

That's the Why, Here's the How:

So how do these communications take place between the aircraft and a ground station? This is where the LDOC comes into the picture. The ground stations nearly always have phone patch capability in order to connect the aircraft in flight to an appropriate ground station. The ground station in turn places a telephone call to the proper air carrier or corporate office and gets the party on the line. At that point, the aircraft and the ground party are connected, and communication takes place.

These can last from a minute or so to 30 minutes, depending on the complexity of the issue. Once the matter is resolved, the phone patch is terminated. Our experience is that in many cases if there is a complex issue, several follow-up calls over the remaining duration of the flight can take place. Operators on the ground place special emphasis on aircraft in these situations and carefully monitor their progress, in the event, additional communication services are required.

Unfortunately, some situations go from bad to worse and require additional action on behalf of the flight crew and the ground stations. Fortunately, these are few and far between.

PanAm Global Radio

Pan Am Radio is one of just a handful of LDOC stations scattered around the planet. While some ATC-related stations are well known, such as New York Radio, Gander Radio, Shanwick Control, and a few others, LDOC stations remain relatively unrecognized but equally as important.

Pan Am Radio makes use of the FCC-authorized spectrum, which has been internationally allocated to aeronautical en-route



stations. The authorized service area for PanAm Radio is the southern US and Mexico Central and South America and adjacent international waters (see the map on our website).

Pan Am Radio started life in service to the marine industry in the 1970s, and as many of you might know, HF radio is no longer viable for overseas marine communications. Therefore, many of the coastal stations have either disappeared or been repurposed. Pan Am Radio comes from that heritage. It is a subsidiary of the *HF Communications Services* company, which is a consultancy in high-frequency radio systems, mainly for government and military operations.

However, Pan Am Radio operates as its own entity.

The name 'PanAm Radio' arose primarily as a result of the geographical area serviced, Central and South America.

The globe style logo is similar to that of the former Pan American Airlines

However, the original PanAm globe is subject to copyright and unavailable for use.

What Does It Take to Operate an LDOC?

So, you want to put your own LDOC on the air. Well, here are the basics: After obtaining the proper license authority, first you need a lot of land for some really big antennas; second, you require some high-power transmit-

ters around the 5,000W mark; next, you must have some really sharp people, knowledgeable in both the technical and operations aspects of this business.

- Our main and receiver facilities cover almost 10 hectares of land.
- We utilize 12 radio towers between 30 and 62 meters high.
- This constitutes a significant financial investment.
- Once all the above is in place, you need to be prepared to operate 24 hours a day seven days a week forever. Aircraft are flying all the time, days nights weekends and holidays, no matter the weather.
- Pan Am Radio's main control point is located in a rural area of Northeast Texas.
- The exact location is confidential due to security concerns.

The Equipment

At Pan Am Radio, we have adopted a split-site system. This is customary for many professional fixed HF installations. The receive site is approximately 20 km from the transmitter site and is interconnected by a private digital microwave line (Fig. 1). The high-frequency radio equipment is mainly manufactured by SUNAIR. The model RT 9000 is generally employed, along with the LP 5000 linear amplifier, which is solid-state.

Additionally, Pan Am relies on its own private remote SDR receivers at several loca-



6



7



8

tions throughout Central and South America. These are back-hauled via satellite to the control point. This effectively increases the receiver footprint exponentially.

The Antennas: We Are Way Beyond Amateur Radio ...

The aerial system is probably the single most important element of a large HF operation. We learned many decades ago that the aerials and transmission line systems either make or break the system and the station. By far the largest capital investment is taken up by the antenna systems.

Additionally – being exposed to Mother Nature – the antennas require the most maintenance. There is a continual list of maintenance tasks for the antennas (Figs. 3-5).

Like most utility HF stations with world-class operations, we deploy several different antenna systems, ranging from small active antennas to large log-periodic arrays.

We also utilize a number of wire antennas, including cut-to-frequency dipoles, and vertical and skywave loop antennas.

The ground counterpoise under our vertical antenna utilizes a kilometre of copper wire alone.

As with the antennas, we work with many different transmission lines, from open wire to large (7.62 cm) air-filled coaxial cables. Our longest run of transmission line is about

150 m, and all of our transmission systems have been designed to handle a nominal 5kW power level.

As you might expect, lightning is a huge problem. Our primary station is located in a very lightning-prone area.

Therefore, we put into practice a number of techniques to keep equipment damage to a minimum. These include lightning gaps and various in-line discharge devices. All ground connections in the system are exothermically bonded.

The grounding system was designed specifically for our installation by a ground (earthing) engineer, specially trained in these matters. We take grounding extremely seriously (Fig. 6).

A single lightning strike can result in tens of thousands of US\$ damage and downtime. In any event, there is little prevention for a direct strike, which unfortunately occurs at least once or twice per year with this much wire & aluminium in the air. We take every possible precaution to guard personnel from the dangers of lightning strikes, including an early warning detection system. Despite that, we have a close call every year or two (Fig. 7).

Fortunately, there have never been any serious injuries. We have learned that lightning discharges as far as 16 km away can have huge, induced, charges at our location, even when thunder is not heard.

Thus, lightning is a very dangerous adver-

Fig. 5: Our 2-30MHz vertical aerial.

Fig. 6: A lightning-gap for an open-wire transmission line.

Fig. 7: A warning on the antenna field.

Fig. 8: Joanne Rouse, our Chief Operator.

sary at a large station like Pan Am Radio. The author has personally witnessed arcs from lightning in the antenna field jumping 10 cm from contacts to earth.

Propagation Issues

Atmospheric propagation plays a huge role at HF frequencies. If propagation is good, you can talk to the world with 25W – if conditions are unfavourable, you cannot talk to the world with 25,000 Watts.

Solar activity runs in 11-year cycles, which are known as solar cycles, and right now we have just entered solar Cycle No. 25. Both amateur radio operators and professionals who use HF radio are looking forward to the improving radio conditions brought forward by Cycle 25. Solar cycle 25 is scheduled to reach its peak in approximately the year 2026. After that, it will be entering a slow decline that will take it to the next solar minimum in around 2036.

How does this activity impact Pan Am Radio? In order to conduct good radio communications, a good signal-to-noise ratio (SNR) is very important. As Cycle 25 impacts radio conditions favourably our circuit quality

will continue to improve too. These upgrades will allow better communications on HF circuits with lower power levels. Everyone in the HF industry, both amateur operators and professionals alike, are eagerly awaiting these better conditions.

Life as A Professional HF Operator

Joanne Rouse, Vice President of Operations and Chief Operator at PanAm Radio (Fig. 8), looks for several key traits when recruiting HF operators: She says, "I need operators who understand both airplanes and radios. At the end of the day, PanAm is in the customer service business, so that must be front and centre with every operator, all the time. Our operators work either eight or 12-hour shifts. They have regular breaks each hour. However, these are still long hours of listening to static on the radio (known as 'guarding the channel'), awaiting that one critical call where somebody needs help.

"It is true, the vast majority of our calls are routine business; but every once in a while, there is a true emergency where the aircraft or someone's life could be at stake. Other traits I look for in a good operator include, accuracy, patience, ability to think on their feet and reliability; and one more thing – the operator must have a clear and pleasant voice that transmits nicely on HF radio..."

QSL Cards and Information for Inquiring Minds

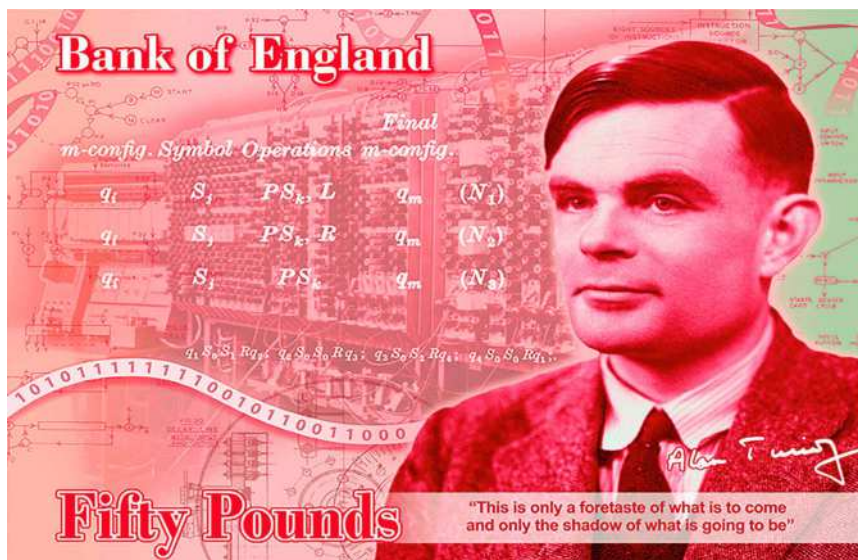
Pan Am Radio acknowledges all QSL card request and reception reports, either electronically or with a paper QSL card from short wave listeners and amateur radio operators. All radio traffic is recorded continuously on digital recorders and archived, so reception reports are easily verified.

Our Future

PanAm Radio believes HF radio will continue to occupy a place in aviation for several more decades. But we are not naïve: Eventually – as equipment reliability, costs and availability improve – HF will go the way that it did in the marine world. In the meantime, we still have human beings monitoring the airwaves with their unique ability to size up situations and handle them like no automation can. Old-world thinking, maybe, but explain that to an airline captain in bad weather, at night, in the middle of nowhere with a problem!

For more information, find PanAm Radio on the web at this URL:

www.panamradio.world



Radio News

ALAN TURING ON £50 NOTE (NPL): Today we take our computers for granted, but it all started with the National Physical Laboratory's ACE and Alan Turing, both of which feature on the new £50 note. On 23rd June 2021, Alan Turing's birthday, the new £50 note entered circulation. The note, featuring the pioneering mathematician, also shows the Automatic Computing Engine (ACE) Pilot Machine, one of the first computers built in the UK, developed at NPL as the trial model of Turing's pioneering ACE design. Whilst best known for his work devising code-breaking machines during WWII, Turing played a pivotal role in the development of early computers, first at NPL and later at the University of Manchester. His ability to see the world differently led to scientific developments that have shaped the modern world, this was likely strongly influenced by the different perspectives he had to those of many of his peers as a member of both the LGBTQ+ and neurodivergent communities and likely shaped and influenced his ability to think outside the box. Work began on the world's first ACE in 1946, with the final version going into service in 1958. Turing was part of a group formed by John Womersley who recognised Turing's genius and employed him for the design and construction and during his time at NPL, he made the first plan of the ACE and carried out a great deal of pioneering work in the design of subroutines. Building the next generation of computer scientists, JH Wilkinson, who joined NPL on the 1st of May 1946, followed by Mike Woodger on 20th May 1946, both worked alongside Turing on the Pilot ACE as did Donald Davies, who briefly worked with Turing and went on to pioneer packet-switching, the technology that underpins the internet. They were inspired by the unique perspectives and innovative approaches that Turing was able to see. As such, when Turing left NPL it ensured the continued development of the ACE, bringing diverse perspectives from other disciplines to improve his initial design. It was soon used for

solving partial differential equations for use in applications including the design of aircraft, ships and electronic apparatus. In 1950, Turing published his Computing Machinery and Intelligence paper, opening with the claim, "I propose to consider the question, 'Can machines think?'" a question that continues to influence the field of artificial intelligence [...]. Read the full article and watch a video on the brilliant NPL website:

(SOURCE: NPL, 23rd June 2021)

<https://tinyurl.com/4xh3cw29>

DON'T THROW AWAY SHORT WAVE: Quote "At some point communication via the Internet will go down whether it be from natural disaster or cyber-attack, and surely it will be restored at some point. But [...] short wave radio is so simple and so easy to use that it will be the saving method of communication when disaster strikes." *HM01 - The Ultimate Radio Mystery*:

(SOURCE: Bob Houlston G4PVB, Volunteer Correspondent)

www.tinyurl.com/9ssmcu8e

<https://tinyurl.com/5c6zvcvr>

FREE PROPAGATION RESOURCES: HF Propagation, the Basics: Perhaps no other topic in Amateur Radio (& SWL) is as intriguing yet confounding to the beginner as propagation - how signals travel from one station to another. Regardless of how you view it, propagation is essential to every QSO we make, be it a stateside rag chew or a rare DX contact. Some basic knowledge of how radio waves travel will go a long way in making your hobby a more interesting and enjoyable one. This older (free PDF) article is good at introducing you to the primary modes of HF propagation. VHF and UHF propagation is an entirely different subject. Moreover, VHF & UHF sporadic-E propagation is explained in depth in the second pdf, from 2001:

(SOURCE: Bob Houlston G4PVB, Volunteer Correspondent)

www.tinyurl.com/hfpropbasics

www.tinyurl.com/sporadicevhuhf

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In the 1920s, the *Marconi Beam System* produced a reliable telegraph service by using reflectors to beam the transmitted waves in the desired direction and to concentrate the signals at the receiving station onto the aerial. The mechanical size of the reflector had to be large in comparison with the wavelength, and for this reason, it was not commercially possible to employ such reflectors on a long wavelength.

This system was introduced following experiments conducted by G. Marconi (1874-1937) and C. S. Franklin (1879-1964). By the mid-1920s, commercial services operated directly from London to Australia, Canada and South Africa. Another service to India began shortly after. In 1888, Heinrich Rudolf Hertz (1857-1894) used reflectors and showed that ether waves could be concentrated into a beam, thus obeying the laws governing the transmission of light as predicted by James Clerk Maxwell (1831-1879) in 1864.

In 1927, a system by *Empire Wireless Telegraphy* made particular use of these principles.

The England-America Service

The England-America wireless telephone service was opened in 1926, by which it was possible to telephone directly from any subscriber's telephone in this country to anyone in the United States.

A valve transmitter of considerable power was used on a wavelength in the order of 3,000 metres, and a method known as 'single-side-band' telephony. The system was pioneered by the *Western Electric Company* in conjunction with the General Post Office.

William Crookes (1832-1919), in foreshadowing wireless communication by means of electromagnetic waves, wrote in 1892: "This is no dream of a visionary philosopher. We may any day expect to hear that it has emerged from the realm of speculation into the realm of sober fact." Indeed, his prediction proved to be correct.

The first successful re-broadcasts in Great Britain of American programmes were carried out on December 28th and 29th, 1923. The actual re-transmission was also picked up and heard very distinctly in South Africa.

In 1926, a special section was formed by the BBC with the object of obtaining the correct balance of musical combinations in the studios both at rehearsals and during perfor-

Marconi's Beam System & Martin Lambie-Nairn

Keith Hamer and Garry Smith revisit the early days of radio, present more on Westward Television, conclude their series about graphic design, and provide the link to their current online column, DX-TV & FM News.

mances. The personnel of the section were representative of the music, engineering and outside broadcast departments, as amplifier control of outstanding musical programmes and outside broadcasts had also to be exercised.

Wow-Factor: Vintage Wireless Equipment

This month's meander through vintage copies of deserted newspapers and magazines has discovered an advertisement for *Marconi Broadcasting Apparatus* (Fig. 1; the text has been left in its original format to reflect the spelling and punctuation of the time).

This is the full description of the equipment featured in the advertisement, dated 1927:

"Marconi's Wireless Telegraph Company, Limited, manufacture broadcasting transmitters to meet all requirements, ranging from small stations for strictly local purposes to high-power stations for the widest ranges, such as the stations at Daventry and Motala.

"The Marconi Company contract for the supply and construction of complete broadcasting stations, including studio equipment, control apparatus, etc.. The microphones they supply are justly famous, for the production of high-quality and purity of tone.

"MARCONI'S WIRELESS TELEGRAPH Co., LTD., MARCONI HOUSE, LONDON, W.C. 2."

The top photograph in the advertisement shows the Marconi high-power broadcasting station installed at Motala in Sweden. The lower picture features the high-power station at Daventry. In the centre is an example of a Marconi microphone for which they were "justly famous, for the production of high-quality and purity of tone".

Remembering Westward Television (Part II)

In our July column (*RadioUser*, July 202: 41-43), we began marking the 60th anniversary of Westward Television, which began on April 29th, 1961. Perhaps not surprisingly – bearing in mind its service area – the station identity

included themes associated with the sea. A ship emblem was used for the on-screen logos.

The first design featured an image of a boat on the water. This was later replaced with a stylised ship in a circle, complete with the Westward TV legend plus 'Channel 9' and 'Channel 12', denoting the Stockland Hill and Caradon Hill transmitters, respectively. The logo was accompanied by a tune of four chimes.

This was replaced in the mid-1960s by a model of the *Golden Hind*, photographed against a black background with a simple 'Westward TV' caption beneath accompanied by some music.

This logo was altered slightly in the late 1960s to incorporate an updated font.

When colour television came to the region on May 22nd, 1971, the *Golden Hind* was re-photographed against a blue background with the caption altered to include an image of a small stylised ship in a box in the lower left-hand corner, followed by an outlined 'Westward TV' caption, with the 'TV' highlighted in red. The tune that accompanied the colour television logo was initially a nautical fanfare on brass instruments, based on the song *Come Landlord Fill the Flowing Bowl*, arranged by Paul Lewis. This formed part of a longer theme tune entitled *An English Overture*, which was used at the start of each day's transmissions.

It was Westward TV's final logo and remained until the end of the franchise.

In addition to these on-screen logos, Westward TV featured a clock inside a shaped box with both analogue and digital displays, alongside the Westward Television stylised ship logo and name. Westward TV were frequent users of in-vision continuity announcers with many of the station's personalities becoming well known in the region.

In South-West England

Although the Independent Broadcasting Authority was not due to extend its new UHF

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network of 625-line combined colour and monochrome transmitters to parts of this area until 1971, the duplicated 405-line service was available from three transmitters: Caradon Hill (Channel 12), Stockland Hill (Channel 9), and Huntshaw Cross (Channel 11). Both Caradon Hill and Stockland Hill were (and still are) high-power main transmitters while Huntshaw Cross was added in 1968 to provide improved service in the Barnstaple and Bideford areas.

The 150-mile long 'wedge-shape' area of Devon, Cornwall and parts of Somerset could not be covered adequately by a single main station on either VHF or UHF. The main VHF transmitters were situated at Caradon Hill (1,211ft above sea level), near Launceston (for Cornwall), and on Stockland Hill (750ft above sea level), near Axminster (for Devon). Both stations used 750ft masts with highly directional aerials to minimise interference with other ITA, and Continental, stations. Careful shaping of the Caradon Hill radiation pattern was also needed to avoid interference to a station in the Dublin area in Éire. Both these stations came into operation in 1961 and provided coverage throughout almost the whole area. One small area around Westward Ho! was later provided with a local relay transmitter at Huntshaw Cross.

The population coverage of the VHF stations in 1969 was: Caradon Hill 730,000, Stockland Hill 915,000, and Huntshaw Cross 82,000.

Transmitters In Detail

Almost six years after ITV first launched in the London area, the commercial service finally arrived in the southwest of England. The transmitters at Stockland Hill and Caradon Hill brought the number of ITV regions into double figures on April 29th, 1961. The authors visited the Stockland Hill transmitter in 2014 (Fig. 2).

Propagation studies of the best method of covering the 150-mile long wedge-shaped area of Devon and Cornwall showed that it was not practical to serve it adequately from a single Band III station centrally situated on the heights of Dartmoor, adjacent to the BBC's station at North Hessary Tor. Government agreement was obtained to build two stations, one in Cornwall and one in South Devon.

The transmitting aerials at Stockland Hill and Caradon Hill employed highly directional polar lobes and were engineered to give the desired grade of service to both areas. Each station needed a 750ft mast to minimise 'shadows' in the hilly terrain.

For Caradon Hill, the requirement was to give a service to the whole of Cornwall, the west of Dartmoor, and reaching to the ex-



1



2



3



4



5

Fig. 1: An advertisement for the *Marconi Broadcasting Apparatus* from 1927.

Fig. 2: The Stockland Hill transmitter in 2014.

Fig. 3: The original 1982 animated logo used by Channel 4.

Fig. 4: This BBC-1 Hot-Air Globe/ Balloon Ident was recorded in Snowdonia.

Fig. 5: This BBC-2 Ident Symbol was first transmitted in October 1992. It was officially called 'Powder'.

tremity of England at Land's End. A power of 200kW ERP (Effective Radiated Power) was beamed in this direction in a tight 'figure-of-eight' pattern. To avoid interfering with RTÉ's Dublin (Kippure) transmissions on Channel H (207.25MHz vision, 213.25MHz sound), the power over an arc of 40° to the northwest was restricted to a mere 10kW. To the south, the radiated power needed to be limited to 25kW to avoid interference with the coastal French Cherbourg station on Channel F12 (212.85MHz vision, 201.70MHz sound) in Brittany.

Studies showed that in order to cover Devon, whilst not overlapping unnecessarily with the existing service area of St. Hilary in South Wales, Stockland Hill should direct its maximum power in two lobes, one north-west towards Barnstaple and the other south-west

towards Dartmouth. The maximum permissible radiated power was 100kW, but this was restricted to 10kW eastwards to prevent interference in the London area, which also used Channel 9. The shape of the aerial radiation pattern thus became that of a boomerang facing westwards.

Despite all the careful planning to avoid interference, one particular dispute soon reared its head. Taunton was at the forefront of a 1962 clash with *Television Wales and the West* (TWW). For three years, viewers in this town had received TWW programmes, but when Westward TV started, their Stockland Hill transmitter was only 14 miles from Taunton, and the area was designated as a primary Westward TV area. Perhaps slightly provocatively, Westward TV representatives toured the town advising viewers that by turning their

aerials, they could receive Westward transmissions. This resulted in an unpleasant and protracted dispute between TWW and Westward Television!

A subsidiary beam of about 50kW directed south-east towards Alderney was also desirable to ensure reliable reception of the Stockland Hill signal on the island to relay the mainland programmes by Post Office microwave link to the Fremont Point station in Jersey for re-broadcasting in the Channel Islands. However, the service area of the existing French station at Bourges had to be protected and the power radiated towards Alderney was restricted to 20kW. Fortunately, in practice, this power was just sufficient for the Stockland Hill signal to be received in Alderney, with a signal-to-noise ratio good enough for re-broadcasting from the Fremont Point station.

Graphic Design Pioneers

This series, detailing the careers of four of the most prolific graphic designers, concludes with Martin Lambie-Nairn (1945-2020). Born in Croydon, Surrey, Martin Lambie-Nairn was a noted English designer who created popular on-screen television graphics for the BBC and Channel 4. He studied at the *Canterbury College of Art* (later known as *Kent Institute of Art & Design*, now the *University for The Creative Arts*) and produced graphics from 1965 until 2020. In 1970, he married Cordelia Summers.

His design consultancy created Channel 4's original 1982 animated logo which resembled garish plastic bricks flying all over the screen, culminating in a colourful '4' (Fig. 3).

He was also responsible for the BBC-1 Hot-Air Globe Balloon Ident used between 1997 and 2001 (Fig. 4).

The balloon was not conjured up using computer-generated graphics; it actually existed and gracefully glided over famous locations throughout the United Kingdom. This particular scene shows the balloon rising up over Snowdonia. The authors also had a part to play in retaining the 'Globe' motif.

His company also produced a series of over 30 memorable Idents for BBC-2. The creation shown in Fig. 5 was first used in October 1992 and features blue-green viridian powder being sprayed across the screen to highlight the stylised '2'.

The original series started being radiated on February 16th, 1991. In 1997, his company was responsible for the corporate re-brand of the whole BBC, and – love them or hate them – the somewhat generic BBC Regional News title sequences in 2008. In conjunction with his agency, he also created 'launch packages' for certain other BBC channels. He was recently seen discussing his work on the BBC-4 programme, *The Sound Of TV*. Lambie-Nairn was one of the first to embrace computer technology to apply branding to screen-based media.

Lambie-Nairn's other credits include the 1980's satirical puppet show *Spitting Image*, which he co-created with John Lloyd, Roger Law and Peter Fluck. Episodes of the original series were recently revived by the streaming service, *BritBox*. His consultancy company, *ML-N*, was active in the brand-design of the bubble logo used for the mobile telephone company, *02*. He was also involved in a *Blue Peter* competition to design the official emblem for the Queen's diamond jubilee in 2012.

Honours and Awards

Martin Lambie-Nairn was a member of the RDI (Royal Designers for Industry), a Fellow of the Royal Television Society, and an ex-president of D&AD (Design & Art Direction). He also received the *D&AD President's Award*, the *Prince Philip Design Prize*, the *Promax Lifetime Achievement Award*, and the *Promax Hall of Fame (USA)* title. He also received a *Gold D&AD* for his work for Channel 4, multiple *Silver D&AD* awards, a *BAFTA (British Academy of Film and Television Arts)* for his work with BBC-2, and multiple *Promax* awards. He held an *Honorary Doctorate of Arts* from the University of Lincoln and was a visiting professor at the Faculty of Art, Architecture and Design. He also held an *Honorary Doctorate of Arts* from the University of Northampton.

Martin John Lambie-Nairn died on December 25th, 2020, aged 75.

Next Month

in the UK's best & only independent amateur radio magazine...



REVIEW: Richard Constantine G3UGF gets hands-on with the Wouxun 2/4m Anniversary Pack.

THE VC999: Tony Jones G7ETW takes a look at a piece of test equipment that might just appeal.

A WIRE DIPOLE: Vince Lear G3TKN offers a design for a dual-band wire dipole for 6 and 4m.

VALVE & VINTAGE: Bernard Nock G4BXD returns with some classic Eddystone sets for the museum.

KITS & MODULES: Geoff Theasby G8BMI recommends some more low-price devices to help and amuse in the shack.

There are all your other regular columns too, including HF Highlights, World of VHF, What Next, Making Waves, Notes from a Small Station, Doing it by Design and Data Modes.

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SEPTEMBER 2021 ISSUE
ON SALE 12TH AUGUST 2021
AT ALL GOOD NEWSAGENTS

The publishers reserve the right to change content according to circumstances.

Kevin Ryan

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There has been a lot of development of digital radio software during the last year. DAB offers plenty of choices. *QIRX* (*RadioUser*, July 2021: 44-47) recently released a new version, as did *qt-dab*, *DABPlayer* and *welle.io*. These apps work on desktop devices or tablets running operating systems such as Windows.

When it comes to real mobile apps *welle.io* is the only DAB decoder that I could make work on Android. The latest release of *welle.io* (v2.3) is available for the Linux, Windows and macOS operating systems, but not for Android since it involves a considerable amount of work to port the code.

I tried another Android app called *DAB-Z* without success. *DAB-Z* moved to version 1.8.105 in April 2021, but it does not support RTL-SDR devices. On my Android tablet, the software tried five times to locate a dongle and then gave up. There is some info on the devices it does support on the officially supported forum.

<https://tinyurl.com/bmavuks>

DRM Decoder Applications

The expansion of the Digital Radio Mondiale (DRM) standard in India spurred on much of the development of more recent DRM decoder apps. I know that a few very able enthusiasts created a *DReaM* version for Android in the past, while others compiled a version to run on a Raspberry Pi. However, this requires technical knowledge that most of us, including myself, do not have.

The DRM Consortium announced plans in the autumn of 2020 (*RadioUser*, November 2020: 46) to make the *Fraunhofer DRM Multimedia Player* software module more widely available, for about £3-5.

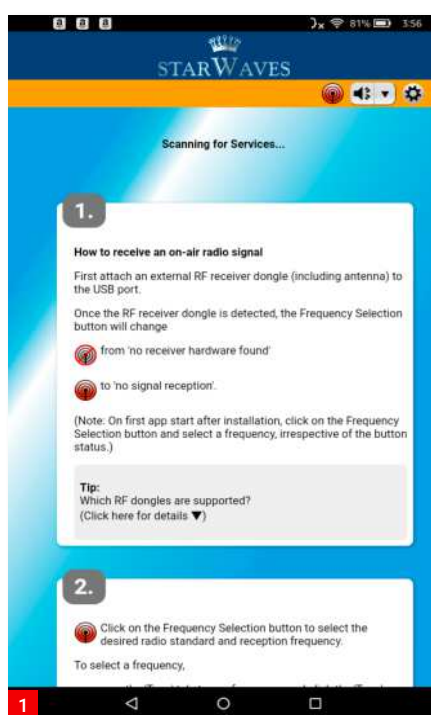
<https://www.drm.org>

The promotion stated that the *Fraunhofer DRM Multimedia Player Radio App* supports all DRM features required for distance learning, including an advanced WiFi-Hotspot option allowing multiple people to share a single DRM receiver through their devices running an HTML5-compliant (i.e. *not Internet Explorer* but *Google, Firefox* and *Edge*) web browser. The app would be available on Windows, Linux, macOS, Android tablets and phones, and for the Raspberry Pi. If you are interested in history, you can get some of the background on this on the web.

At that time, the focus was on DRM in the FM band because that band does not require

Innovative Digital Radio Software

Kevin Ryan gets to grips with the Starwaves DRM SoftRadio App and his Software-Defined Radios, warns of fake SDRs and software and has updates on local small-scale DAB radio and the new GB News channel.



special chips to be implemented in mobile phones. The app developers planned to use the FM front-end receiver chips already available in many modern phones.

The Starwaves DRM SoftRadio App

This app, released in April 2021, is something rather different to what was expected; but I think it is much more useful. Two of the leading players in the DRM consortium joined forces to create the app under the *Starwaves* brand. Much, if not all, of the decoding software, was provided by Fraunhofer, whom I have featured regularly in this column.

Getting the App

The app is available on the *Google Play Store* and the *Amazon App Store* for around £4, but not on Apple. The most welcome



feature is that the app uses external SDRs and covers both AM and FM. Getting the app should be easy, but it may not be shown available for your Android device using *Google Play*. I assumed that the version of Android would be the key factor, and I tried to get the app for my mobile phone (Android 8), but it was not listed in the *Google Play Store*. Accessing the store via a browser, I was informed that the app was not available for my device. I have a tablet with Android 7 but decided that there was little point trying to use it. The app is available on the *Amazon App Store*, and it installed on my Amazon Fire 7 without any issues. I do not think, however, that all Fire devices are supported.

Supported SDRs

The app will connect to three types of SDR: SDRplay devices, the AirSpy HF+ family

Fig. 1: The homepage is a quick introduction to using the *SoftRadio* app, and I found it very helpful. Fig. 2: The frequency input keypad on the *Tune* screen is straightforward to use but it is easy to forget the 'kHz' or 'MHz' option. Fig. 3: The *Advanced* screen shows signal level, SNR, a spectrum display, and the additional controls. Fig. 4: Switching off the AGC options enables the manual gain controls; these vary with the SDR connected to the device. Fig. 5: Receiving Kuwait with an RTL-SDR on a 10" tablet in 'landscape' mode. Fig. 6: The *DRM+ SDR* app from *AlgorKorea* showed high SNR levels for long periods but never maintained a lock on the DRM signal.

and the RTL-SDR family of devices. I found that not all RTL-SDRs are equal; it is only the 'V3' type that will work down on the AM bands. Older types need apps where users input a frequency offset to tune the device below its normal lower limit of about 24MHz. All types will work at VHF, but there are no DRM transmissions in the UK here, and almost none worldwide, apart from the occasional test transmission in places like Indonesia and Pakistan. There is a technical *wiki* on the Starwaves website with plenty of information.

<https://tinyurl.com/543knxek>

Warning: More Fake SDRs

Beware: There are many fake RTL-SDR V3 devices on the internet. If you do plan to purchase one check the advice on this website.

<https://tinyurl.com/4wx8njff>

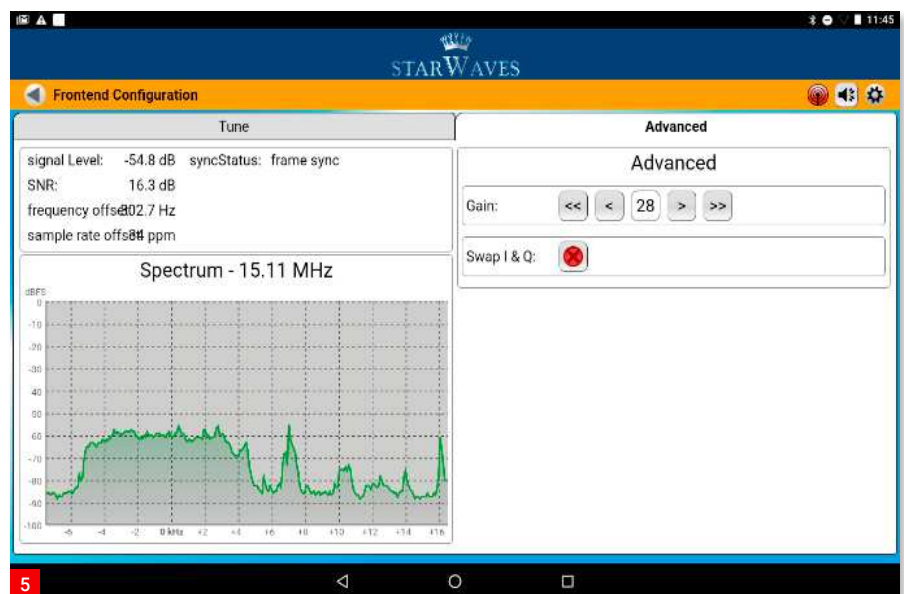
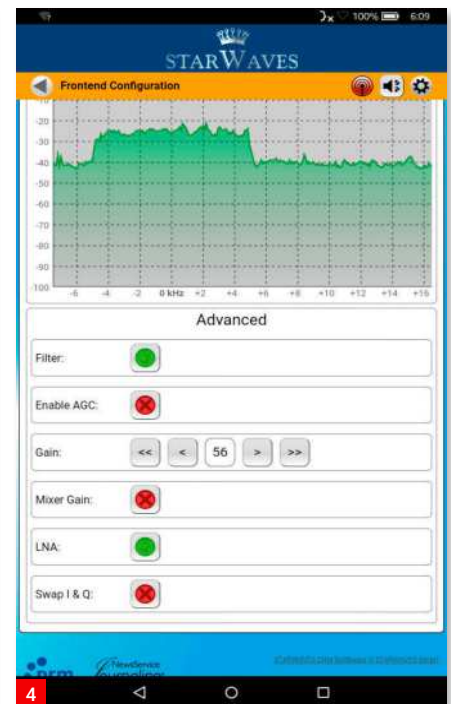
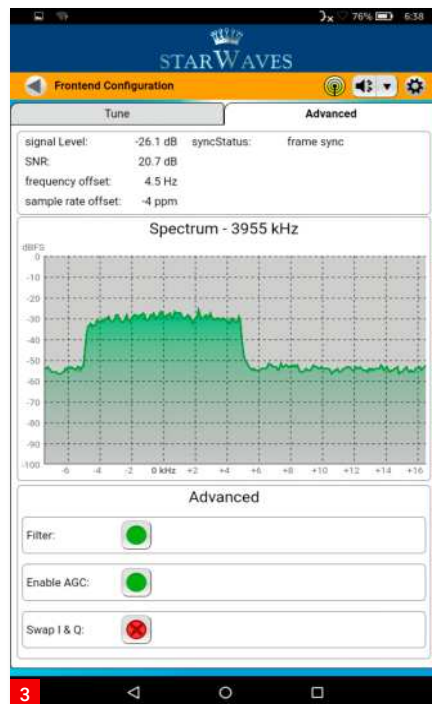
Also please note that there are also fake SDRplay devices out there.

<https://tinyurl.com/5cju2kvu>

[see also our News & Products section last month: pp. 7 and 11 – Ed.].

Amazon Fire Testing

I tried connecting my RSP 1A directly to the USB port and also using an OTG cable. An 'OTG' or 'on-the-go' adapter (sometimes also called an OTG cable, or OTG connector) is designed to connect things like a full-sized USB flash drive or USB A cable to a phone or tablet, through the Micro USB or USB-C charging port on the device). I purchased the latter previously, mainly for use with an Android tablet, and to power the dongle directly. However, neither method worked, and the Starwaves app could not detect the SDR. I decided that I had no option but to purchase an OTG cable compatible with the Amazon Fire. The OTG connectors are not expensive, but I like the supplier to clearly state that it is compatible with a particular device.



Connecting the RSP1A

I found that it was best to start the Starwaves *SoftRadio* app first; it displays a warning that no dongle is connected. I also made sure that I fully changed the Fire before starting the test. The apps open with the *Frontend Configuration* screen (Fig. 1) that doubles up as a help screen on getting the dongle and the app connected. The signal reception indicator (a colour circle with waves 'radiating' from an antenna) will be red with a slanted line through it, indicating that *no receiver hardware has been found*. Connecting the RSP1A to the USB port through the Fire-

compatible OTG adapter should make the reception indicator change to red with no slanted line. If it does not change status, it is worth unplugging the RSP1A, waiting a few seconds – and starting the sequence again.

Receiving Radio Kuwait

I tuned in Radio Kuwait's DRM service to Europe (15110kHz from 1045 to 1525 BST) and got fair (to good) decoding of their Arabic service. I accessed the *Tune/Advanced* screen (Fig. 2) by tapping the coloured circle. A link can also be found in the *Settings* menu. Tuning a frequency is

via a soft keypad in either kHz or MHz. The *Advanced* tab has a spectrum display that I found essential. The signal indicator now changed yellow. I was very pleased with that result, but my objective was to try it out on the BBC World Service transmission (3955 kHz at 0600 BST), carrying the *Journaline* text service. The only other DRM transmission to Europe that carries slides or files is a low-powered one from Issoudun in France; it is difficult to receive at my location.

Receiving BBC WS in DRM

The BBC World Service transmission to Europe is from Woofferton (Fig. 3). I tested the app for about a week with varying success each day. Overall, I have found that *Journaline* needs a good quality signal, together with solid coding to receive the data structure. There is a *Journaline Settings* screen on which I changed some options; however, it is best to use the default settings; otherwise, the app will 'wait' until it receives every piece of data (called 'objects'). It is then virtually impossible to reset it. The audio was usually good, with just a few dropouts. On one day I only managed to get the very top of the text information, which consists of three sections. I managed a better result on another day, capturing all the BBC news for Europe.

Some Other Features

The *Advanced* screen (Fig. 4) also has three options under the spectrum display called *Filter*, *AGC* and *Swap I/Q*. This will be either a green circle with a tick, meaning an option is available or a red circle with an X, meaning that it is not.

The *Filter* option is a simple toggle-switch to apply a bandpass filter. Tapping the *AGC* button turns off the *AGC* and opens three new alternatives. These set the gain control manually and switch the mixer gain or the LNA on and off.

The *Swap I/Q* function is also a toggle switch. These options can change depending on the attached dongle. This block diagram of the RSP1A from the *Arctic DX Club* helps explain where these gain control points are in the receiving chain.

<https://tinyurl.com/wth7xkzk>

I have mentioned the *Journaline* service under the *Settings* menu, and there are other options about the layout of the screen in landscape mode and the handling of any images or slides received in the transmission. The *Audio* tab has options to control which announcements can override the programme



being listened to, as well as setting the maximum audio volume and the default mode for the audio decoder.

Using an RTL-SDR

The Amazon app store lists the *RTL-SDR driver*. This is the same software also available on *Google Play Store*. I tried the SDR with the Fire-compatible OTG cable, but the driver app did not find the dongle. I then used the other OTG cable with a separate power feed; the driver reported that it had detected one device. After a few attempts, the *Starwaves SoftRadio* app connected to the RTL-SDR. However, it was on one of those days when the Radio Kuwait DRM signal was not available. The RTL-SDR draws more power than the SDRplay RSP1A. This may be the reason why the Fire tablet will not use it. Out of curiosity, I plugged the RSP1A into the powered OTG cable, and this time it worked. I am not sure why, but it is worth persevering with an existing OTG for longer than I did.

Using the App on Android

To my surprise, the *SoftRadio* app was available for an Android 7 device, and it works from Android 4 upwards. The *Starwaves* technical wiki has a lot of information on getting the app to work with an RTL-SDR dongle. First of all, I tried to use the RSP1A as the SDR Dongle. There is an experimental driver on the *Google Play Store* that looks very much like the RTL-SDR driver. I enabled the stream to

the PC. It started successfully but then died immediately. The app received its last update in February 2019, so this was a long shot. My mistake was to assume that the RTL-SDR driver worked like a Windows driver, attaching itself to the device 'correctly'. However, using it with *SoftRadio*, you will need to open the driver app and use the *Advanced* mode to start the USB stream on the port that the app is 'listening' on. The process can be hit-and-miss. Sometimes, I needed a few attempts to get the connection to work. I think allowing a bit of time between changes helps. The details are in the *Starwaves wiki*. Once again, I decoded the Arabic service of Radio Kuwait (Fig. 5), which usually puts a strong signal into Europe.

Conclusions

I am very enthusiastic about this app, mainly driven by the fact that I got it to work with both the SDRplay RSP1A and my RTL-SDR V3 dongles on my Amazon Fire, and with just the RTL-SDR on an Android tablet. The app is very stable, and this only minor weakness is establishing the initial connection to the dongle.

The one thing that I would love the app to have is the ability to read a file containing an I/Q signal. Some of the earlier promotional screenshots showed this option, and it was probably very useful during testing. This would hopefully mean that I can use the KiwiSDR network to record stations like KTWR and Radio Marti and decode them through to the app to test it fully.

AlgorKorea DRM app

I have shared my lack of success in getting the *AlgorKorea DRM+ SDR App* working on my Android equipment although I have seen pictures of it working on Samsung mobiles (*RadioUser*, May 2020: 47). Knowing now how to control the RTL-SDR driver, I tried the same process on this app. After many attempts, the app would briefly display the 'drm_radio_kuwait' station ID. I changed the available options on the I/Q signal, but I gave up in the end (Fig. 6).

KiwiSDR app

During my various searches on *Google Play*, I found an app that accesses the KiwiSDR network of remote receivers. You need a 10" tablet to use this app successfully, although – with persistence – it is possible on a mobile phone.

The KiwiSDR network has a basic DRM decoder producing audio.

Local Small-Scale DAB

I am usually able to catch snatches of audio from both the trial DAB services in London and Aldershot. London has been more consistent. However, recently I have been unable to hear it, whereas the Aldershot and Woking multiplex is much stronger. I have a predicted coverage map from 2016 that includes the second transmitter added in November to cover Aldershot. The latest transmitter list from Ofcom shows just two DAB transmitters. I guess the coverage pattern of the Aldershot antenna may have been adjusted to extend the signal to nearby Sandhurst and Arborfield.

GB News Radio

GB News launched their TV service on the 13th of June and just a few days before they announced that *GBNews Radio* on the D1 multiplex would carry a simulcast of the TV audio from July. I think this is the first time we have had a regular service like this in the UK.

<https://www.gbnews.uk>

Digital News Down Under

The June 2021 bulletin from the *Australian Radio DX Club* referenced an article, written by Alan Hughes, on the plans by both the Australian Broadcasting Corporation (ABC) and SBS to change the DAB+ digital radio quality.

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

<https://www.sbs.com.au>

<https://www.facebook.com/ARDXC.Inc>

The article also presented ideas on how to reduce the cost of regional broadcasting by using DRM. I may be misunderstanding the content, but the author seems to be suggesting that DRM might be used both on AM and FM (he calculates 206 Band I channels) because there are many more channels available than the 8 available for DAB+.

Alan also stated that there are single-chip digital receivers able to decode both DAB+ and DRM on the overseas market. This statement is (sort of) correct, in that several chips exist, which decode most digital radio standards. However, manufacturers tend to unlock a single standard.

For example, the same physical receiver may be used in the same model of car in both India and the USA, but one will tune in DRM and the other HD Radio.

To my knowledge, the only receiver that decoded both DAB and DRM was the Morphy Richards 20724.

You can read the original article at this URL: <https://tinyurl.com/z64zvyzd>

Radio News



DIGITAL RADIO UK: The new campaign, which is themed *Don't miss a thing with DAB+*, will be broadcast across participating commercial radio stations, and supported by social media activity. The campaign highlights that DAB+ is an upgrade for digital radio, which provides access to even more stations, bringing listeners familiar favourites alongside a host of new stations to discover. The 40-second radio spot encourages listeners who are considering buying a new radio to upgrade to a DAB+ digital radio and to look for the *Digital Tick Mark* to ensure their new device will receive all the available DAB and DAB+ stations. Including GB News Radio, broadcasting in DAB+ on the national *Digital One* network, there will be 26 national DAB+ stations, 60 DAB+ stations in parts of London, and (including those on small-scale DAB multiplexes) collectively a total of more than 180 DAB+ stations in the UK [...]. Currently, although the majority of new digital radios available at retail are DAB+ compatible, industry estimates that only 30-40% of DAB digital radios in homes will receive DAB+ stations, highlighting the need to communicate that there are now many stations available that can only be heard with DAB+ compatible radios, or by listening online or on a smart speaker. DAB digital radios fitted in new cars typically are all DAB+ compatible [...].

The campaign launches on air this week across participating commercial stations and will play for four weeks, supported by social media activity in London where there are over 60 stations available in DAB+. As many of us will be in our cars making long journeys for 'staycations' or local day trips, rather than holidaying abroad this summer, the campaign encourages listeners to ensure they have the perfect driving soundtrack by upgrading to digital radio in the car – either with a DAB replacement radio/adaptor or integrating their smartphone.

yvette.dore@digitalradiouk.com

<https://tinyurl.com/4ka222xd>

DAB+ RADIO 'ALMOST STANDARD' IN NEW EUROPEAN CARS:

In the second half of 2020, over 80% of new cars in key European markets came with DAB+ radio as standard – a dramatic increase compared with the same period in 2019. This step-change reflects the impact of the *European Electronic Communications Code (EECC)*, which, from December 2020, requires all new car radios in the EU to be capable of receiving digital terrestrial radio. These figures were revealed in the latest *WorldDAB* market report, published to coincide with the organisation's annual Automotive Conference [...].

The *WorldDAB Report* also highlighted that, by the end of Q4 2020, nearly 100 million consumer and automotive DAB/DAB+ receivers had been sold in Europe and the Asia Pacific – up from 92 million 6 months year earlier. In Germany, France and Switzerland, preparations are ongoing to switch off FM in 2022-2023.

The UK, Switzerland and Norway have 97-100% DAB+ as standard, and in Italy, The Netherlands, Belgium, France and Germany over 80% of new cars sold have DAB+ fitted as standard. In Australia, 77% of new cars sold now have DAB+ fitted as standard (up from 60% in 2018).

The growth in receiver sales has been driven also by market forces: France will launch national DAB+ services in October 2021, Germany launched a second national DAB+ multiplex for commercial radio in October 2020, and the UK has seen DAB listening overtake FM for the first time. Several EU countries (including Germany, France, the United Kingdom, and Italy) have already introduced regulations to implement the EECC Directive into national legislation, while other countries (including The Netherlands, Belgium, Denmark, Sweden, Austria, Greece, Czech Republic, Poland, Spain, Slovakia, and Malta) have initiated procedures to implement the EECC into national legislation. Other highlights from the *WorldDAB Report* include:

- In France, 82% of new cars were sold with DAB+ as standard in H2 2020 compared to 38% in H2 2019

- In Germany, 80% of new cars were sold with DAB+ as standard in H2 2020 compared to 22% in H2 2019

- In Switzerland, 73% of all radio listening is via digital platforms, and 41% of all listening is on DAB+. Switzerland has confirmed FM will be switched off by January 2023

- In Italy, sales of consumer DAB+ receivers more than doubled in 2020 (up 126%) following the introduction of rules requiring all receivers to have DAB+ from 1st January 2020.

(SOURCES: *World DAB Report* | RadioToday-WORLD)

<https://tinyurl.com/nzvnjem>

<https://radio.today/4188167>

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



Chrissy Brand
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When it comes to free (or pirate) radio, personally I prefer the dynamism and freshness of FM stations to most of those on short wave. The FM free radio scene has always concentrated on playing current-day and up-and-coming music, whereas much of today's short wave free radio broadcasts seem to prefer airing music from decades ago. I understand that this usually reflects the sounds and artists prevalent in the DJs' youth and formative years.

However – as much as I enjoy the many styles of music from the past – I can listen to them from my CD and vinyl collections. When it comes to free radio on the airwaves, I would rather move with the times, as it were, and be kept abreast of current-day sounds and styles of contemporary music.

Pirate Enjoyment

In this context, the best pirate station I have heard so far this year goes by the name of UK Bass (Fig. 1).

I logged it on the East and West Sussex border, broadcasting right at the bottom of the dial, on 87.5MHz.

Tune in for house and garage music with JJ Binks on Wednesday mornings, plus a very enjoyable programme called *Roots Rebellion* on Wednesday afternoon drive time. Other programmes include the *Fun and Bass Show*.

Old-school music is also aired, although the very definition of 'old-school music' is dependent on what your age is! Free radio FM broadcasts understandably tend

A Classical Calling & Some Essential Radio Resources

Chrissy Brand pumps up the bass, seeks out the delights of classical music radio for everyone and highlights some useful and fun resources to help augment your radio listening experience.

to be intermittent, but UK Bass Radio's programmes are also aired live on the station's Twitch and Facebook pages.

I am soon to be the proud wearer of a UK Bass T-shirt, one of several items of merchandise available at the station's online shop.

www.ukbassradio.com
www.twitch.tv/ukbassr
www.facebook.com/ukbassradio

Meanwhile, the short wave free radio scene is as busy as ever, particularly on Sundays, when a host of Dutch broadcasters can be heard, such as Radio Casablanca on 1640kHz and Radio Classic Sunday on 4895kHz.

A pick of some of the other regulars includes Radio Merlin International on 6305 and Charleston Radio International on 5140kHz. Radio Pamela (Fig. 2) is a UK station that was active back in the 1980s and 1990s and returned in 2018. It

has been heard on 5044, 6319, 7570, and 7605kHz in recent months, between 1000 and 1400 UTC. Terry Phillips and Steve Most play a selection of classic rock and blues music. Radio Pamela can be followed on Twitter @shyboy2020

Back in the day, the station QSL card stated that Radio Pamela Worldwide was "the rock of Europe on short wave, medium wave and FM".

<https://tinyurl.com/fd6ps33x>

On the subject of FM free radio, all five series of the BBC Three mockumentary, *People Just Do Nothing*, set at the fictional west London station, Kurupt FM, are available to watch on BBC iPlayer.

www.bbc.co.uk/sounds/play/m000w54f

The Kurupt FM also crew staged a takeover of BBC Radio 1's *Rickie, Melvin and Charlie Show*, on 20 May (available on *BBC Sounds*), to present 90 minutes of "choons" and banter.



Fig. 1: UK Bass, the sound of today's free radio on FM. Fig. 2: Radio Pamela, a pirate with a long pedigree, can be heard on short wave. Fig. 4: Virtual Community Radio unpicks the mysteries of classical music. Fig. 5: Haywards Heath is home to hospital radio station Mid Downs Radio. Fig. 6: *Foxes Afloat*, swapping a radio career for podcasting on the waterways.

Classical Choices

There is no need to feel daunted by the sometimes intellectual label that is worn by classical music. With a little effort from the listener, it can be egalitarian rather than elitist. This month, in my themed selection, I look at a few classical music radio stations, programmes and podcasts.

Starting at Virtual Community Radio, which is a streaming service available in the UK, US and Canada (Fig. 3). It specialises in Light Classical music, while also airing Baroque, Early Music, Soundtracks and Lounge/Easy Listening.

I have learned about Renaissance choral works, traditional English folk songs and Donna McKeivitt's haunting settings of Derek Jarman's poetry.

Listening live one morning, a selection of classical music included *Sea And Sky* by Michel Legrand, *Mediterranean Cruise* by Billy Mayerl and *Cold Lazarus*, performed by the BBC Philharmonic Orchestra.

Virtual Community Radio also streams live, and it offers recorded readings, radio drama and other spoken-word material. Amongst these are *Tarot at Teatime*,



presented by Willow Moon and Honey Heart, and a travel programme, *Where've You Been?* Each episode of the travel show is broadcast at 0000 UTC on Wednesdays and Saturdays for two weeks, whilst *Tarot at Teatime* (teatime Stateside, that is!) is on Thursdays and Sundays.

Past episodes of both programmes can also be heard on the Virtual Community Radio *Mixcloud* channel.

<https://vcradio.org>
<http://main.vcradio.org>
<https://tinyurl.com/3p6m2ka7>
<https://tinyurl.com/39e7xu5v>

New York City's WQXR covers classical music well, broadcasting on 105.9MHz in New York City, or listen on the website. I often ease into the day by listening to *Mornings with Jeff Spurgeon* (0930 to 1400 UTC), with music by the likes of Louise Farrenc and Niccolo Piccini.

Aria Code is a WQXR podcast that

gives insight into famous arias in opera history and, "explores how and why these brief musical moments have imprinted themselves in our collective consciousness." It is hosted by Grammy Award-winner, Rhiannon Giddens.

WQXR's recent *Comfort and Hope* project included three days of special programmes on the air, where listeners celebrated the resilience and restorative power that music has given during the pandemic.

One feature of the project was six artists choosing the music that had mattered the most to them. These included flautist Brandon Patrick George, who chose *Piano Trio In C Minor, Op. 66* by Felix Mendelssohn.

Mezzo-soprano Kara Dugan picked *Appalachian Spring* by Aaron Copland; while cellist Jay Campbell went for *The Art Of Fugue* by Johann Sebastian Bach.

www.wqxr.org
<https://tinyurl.com/39szscr5j>

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Date	Time (UTC)	Station	Programme	Podcast	URL/ Stream/ Frequency
Daily	1630 to 1900	Voice of Nigeria	News, features (Youth Forum, African Safari etc.)	Google and other podcast apps	https://von.gov.ng 11770kHz and 15120kHz DRM
Wednesday	1906 to 1930 1232 to 1300 0806 to 0830	BBC World Service	The Compass, society, politics, environment.	BBC Sounds app	www.bbc.co.uk/programmes/p035w97h DAB and short wave
Thursday	0200 to 0300	RAE Argentina to the World	English Service, news, culture, music	www.radionacional.com.ar/welcome	www.radionacional.com.ar and 5800, 7780kHz via WRMI
Saturday	2200 to 2300	WBAI, New York City	Working Class Heroes Radio	www.workingclassheroespodcast.com https://wchradio.org	www.wbai.org and 99.5 MHz
Fourth Sunday	2000 to 2300	Radio Reverb, Brighton	Tales From a Coldean Woodshed, monologues, poetry	https://tinyurl.com/3s8nskkm https://tinyurl.com/kb35shen	www.radioreverb.com/listen-again and 97.2 MHz
Sunday Thursday	1200 to 1400 2300 to 0100	Cabin FM, Herne Bay	The Light Programme with Steve Wood	www.LightProgramme.net	https://cabin.fm station app and 94.6 MHz

Table 1. Chrissy's Top listening tips for the month ahead in international radio.

Several Austrian stations cover classical music well. Try streaming *Radio Klassik Stefansdom* for concerts, a CD of the day, and, if you understand a little German, a whole lot more, with a strong focus on Christianity.

<https://radioklassik.at>

<https://tinyurl.com/56xmu35x>

<https://radioklassik.at/programm/podcast>

They Do Exist is a podcast series that examines the works of female composers and conductors, who are too often overlooked. Presented by Emilia DiCola, my only criticism is that the podcasts do not come out regularly; the six episodes in Season One have spanned a couple of years.

<https://theydoexistpodcast.podbean.com>

That Classical Podcast is put together by a trio of young enthusiasts who work in the business. Spotify's Kelly Harlock, Classic FM's Sascha Kelly and the London Symphony Orchestra's Chris Bland. They talk about classical music whilst making you laugh and learn. Recent episodes include "Murder Clowns and Boffin Cocktails" and "Music Shanks and Power Suits".

www.thatclassicalpodcast.com

In Brisbane, Australia, 4MBS went on the air in the late 1970s as a community classical music radio station. The organisation has grown to become one of, "Australia's premier community radio stations, producing three different radio services. We also produce festivals, plays and concerts, and provide arts and educational services." Have a listen to the three services: 4MBS Classic FM 103.7, MBS Light Digital, and Silver Memories.

www.4mbs.com.au

Sticky Notes is a classical music podcast with interviews, "in-depth looks at pieces in the repertoire, and both basic and deep



dives into every era of music. *Classical music is absolutely for everyone, so let's start listening!* Perhaps start with Season 7, Episode 1, "History of Classical Music in 60 Minutes". Previous seasons of the podcasts are being enhanced and will return online at some point.

<https://stickynotespodcast.libsyn.com>

On short wave, Brice Avery in Scotland hosts *Encore*. This is an hour of classical music, aired on Radio Tumbril via Channel 292. Check the website for the latest schedules.

www.tumbril.co.uk

The Opera for Sleep podcast features soprano Galina Averina, helping you fall asleep while narrating some "labyrinthine synopses" from famous (and some obscure) operas. Aided by pianist Maria Levandovskaya, the first episode, in March, invited you, "to visit Ancient Egypt, where you can follow the synopsis of Mozart's opera *Die Zauberflöte* (Magic Flute). Featuring Pamina's aria (*Ach ich fühl's*). Let's embark on this sleepy operatic journey together. Fasten your imaginary seatbelts; the next stop is dreamland."

<https://beacons.page/operaforsleep>

Last but not least, listen in to Maureen Little's *A Little Classical Music*, each Sunday from 4-6 pm on Lancashire local community radio station Ribble FM.

<https://tinyurl.com/w5fy4mmt>

Radio Resources

My selection of resources in the form of websites and other materials indicates that radio in its traditional, analogue, audio-only format is very much alive.

Alan Roe's *Guide to Music Programmes on Short Wave* is a treasure trove that lists more quality content than you will probably ever find time to hear. The updated A21 version is on the BCXC website, along with many other interesting guides and articles. Another BDXC member, Tony Rogers, produced guides in May, including *Americas on Shortwave*, *Asia-Pacific on Shortwave* and *Europe on LW, MW & SW*. Tony also produces resources for the radio community on his very own website.

www.bdx.org.uk/articles.html

www.dxguides.info

Glenn Hauser has been producing programmes and bulletins about international broadcasting, with an emphasis on short wave, for over half a century now. Based in Enid in the US state of Oklahoma, his weekly logs and observations are supplemented by a team of DX contributors worldwide.

This detailed gathering of radio ongoings, from Antarctica to Vanuatu always stretches my mind and is a welcome reminder that the roots of radio are still strong and producing perennial healthy fruit!

www.worldofradio.com/Hauserlogs.html

Bob Padula recently reposted an article at his blog that first appeared in *The World of Shortwave Listening* column of *The Spectrum Monitor* magazine in August 2017. *The Use and Abuse of SINPO* is a fascinating look at the history of the SINPO codes and their variations.

<https://tinyurl.com/ytxv2u25>

Sisters With Transistors is the best film I have seen this year. It features women pioneers in the field of electronic music, featuring the works of Delia Derbyshire (BBC Radiophonic Workshop), Laurie Spiedel, Daphne Oram and others.

It is summed up nicely by Owen Richards of the Art Desk, who wrote, "*Sisters With Transistors* is more than a music documentary. It's a long-overdue tribute to the women that broke barriers in music, technology, and society as a whole. This is not a retrospective, it's a new beginning. Who knows how many future maestros will be inspired by this film?"

<https://sisterswithtransistors.com>

Mid Downs Radio is a hospital radio station in Haywards Heath, West Sussex (Fig 4). In July, its 1350kHz broadcasts were picked up 995 miles away in Sweden. Kevin Payne's *Motown Magic* programme was logged by DXer Göte Lindström.

Unsurprisingly, it is not the first time a DXer has heard Mid Downs Radio. Paul Barnett, station chair, said, "We do get these messages from radio hams [sic] all round Europe from time to time. But it's good to know that in these days of internet streaming they're still out there."

<https://tinyurl.com/ykzpb6h>

www.mdr.org.uk

What are your options after quitting a job in radio? Colin Dobson-Fox is a former radio presenter who was on Yorkshire stations Trax FM and Rother FM. He gave his career up a few years ago for a simpler, more rewarding life. Colin now travels the UK waterways on a 57ft narrowboat called *Silver Fox*, with his husband, Shaun, and dog, Otis (Fig 5). Those broadcasting skills are still put to good use, with a vlog every Friday, *Foxes Afloat*. It details the couple's latest adventures along the canals.

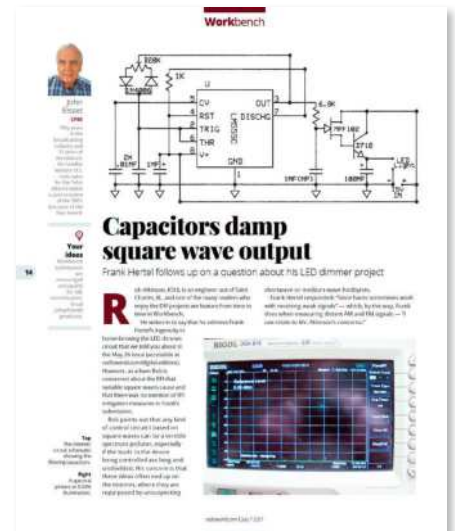
Episode 153 saw them use the Anderton Boatlift, which is an incredible feat of late 19th Century engineering. At other times they meander along the waterways, campaigning for mental health issues, observing wildlife, and giving off a slightly 'zen-like' vibe that a life like this can bring. There is also a website and a podcast to follow.

www.foxesafloat.com

<https://youtube.com/c/FoxesAfloat>

<https://foxesafloat.buzzsprout.com>

Publications & Resources



RADIOWORLD (ENGINEERING EXTRA) NEWSLETTER:
<https://tinyurl.com/7b3fdbua>

RADIOWORLD (JULY 2021):
<https://tinyurl.com/5y47naj3>

RSGB MEMBERS' HANDBOOK:
<https://tinyurl.com/yejf7zdc>

DARC:
(Deutscher Amateur Radio Club)
<https://darcverlag.de>

E-MEDIUM WAVE NEWS:
(MWN) July/Aug 2021 Volume 67 No. 03
[Check out the great material on beacons, beverage antennas and DXing – Ed.]
<https://mwcircle.org>

BDXC COMMUNICATION:
No. 559/ June 2021 (Note the articles about 'Calling the Antarctic' and 'Cherry Ripe' – Ed.)
<http://bdxc.org.uk>
<https://darcverlag.de>
<https://www.darc.de/nachrichten/radio-darc>

SILICON CHIP MAGAZINE:
(Review of the Tecsun PL-990)
[via *Tecsun Australia* – Ed.]
<https://bit.ly/3duS8TJ>

MONITOR (ISWL):
June 2021 (Volume 70 Number 6)
[article on home-made radio – Ed.]
<https://www.iswl.org.uk>

RADIO-KURIER (IN GERMAN):
7/2021 [Great article about Enigma, p. 20 – Ed.]

Follow us on Facebook @radioenthusiasts and Twitter @REnthusiasts



Scott Caldwell

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The *Maid of the Seas* (Pan American World Airways Flight 103, Fig. 1) had been in service since February 1970, and despite its age, the flight crew still had

full confidence in its operational capability. Its service record totalled 16,497 flights that equated to 72,646 flight hours, seen as a 'workhorse' of the Pan Am fleet (Fig. 1).

The tragedy of 21st December 1988 (Fig. 2) began as just another routine trans-Atlantic flight, from Frankfurt to Detroit (via LHR and NY). Many passengers were returning home to spend Christmas 1988 with their loved ones. On that day, 243 passengers and 16 flight crew were on board.

The crew were very experienced: Captain Jim MacQuarrie had accomplished more than 4,000 flying hours, and First Officer Ray Wagner had accumulated over 5,000. Flight Engineer Jerry Don Avritt, aged 46, had amassed more than 8,000 hours of flying experience. He had joined Pan Am through the 1980 merger with National Airlines. The cockpit crew was based at JFK New York.

At 18:25, Pan Am Flight 103 received permission from the control tower at London Heathrow to take off.

Radio and the Lockerbie Tragedy

Scott Caldwell investigates the role of communications during and after the Lockerbie Disaster of 21 December 1988, looking at the subsequent investigation and the vital role played by organisations, such as RAYNET.

Final Communications

Captain MacQuarrie:

"Good evening, Scottish Clipper on Zero Three! We are level at three one zero".

Prestwick Air Traffic Control – Alan Topp: *"Route direct to 9 five-nine, north, one zero west".*

Alan Topp was closely monitoring the aircraft's progress as it moved steadily across his radar screen before he would hand Flight 103 over to colleagues at Shanwick ATC.

At 18:58, Pan AM 103 established two-way radio contact with Shanwick Oceanic

Area Control in Ireland on a frequency of 123.95MHz.

<https://tinyurl.com/mjc5xhub>

OAC assigned flight corridors to aircraft flying across the North Atlantic, to minimise the likelihood of collisions. At 19:02 the clearance delivery officer at Shanwick transmitted to the aircraft its ocean route clearance: *'Clipper 103 should take 59 north 10 west to Kennedy'.*

The aircraft did not acknowledge this message and made no subsequent transmissions. Topp at Prestwick remained glued to the monitor as Pan AM 103 suddenly

Fig. 1: The *Maid of the Seas*: The 'workhorse' of the former Pan Am fleet. Fig. 2: The destroyed cockpit of *Pan Flight 103*. Fig. 3: A basic map of the general Lockerbie area. Fig. 4: The flight path and the Atlantic Ocean Area. Fig. 5: One of several books published after the Bombing.

Manchester Area Control Centre (MACC)

North of England, the Midlands, and North Wales from 2,500 ft up to 28,500 ft.

Scottish Area Control Centre (ScACC):

Scotland, Northern Ireland, Northern England, and the North Sea from 2,500 ft to 66,000 ft.

Oceanic Area Control Centre (OACC):

The eastern half of the North Atlantic from the Azores (45 degrees) to a boundary with Iceland (61 degrees north).

<https://tinyurl.com/2fepd3d7>

<https://tinyurl.com/6rwhxhnt>

Table 1: National Air Traffic Control.

transformed itself from one green blip into a somewhat 'mixed-up' display. He later recalled at the inquest: "I had never seen anything like this happen before. Nobody had". Alarmed, he called over to his supervisor Adrian Ford, who acted almost immediately and reported to search and rescue teams that Clipper 103 was missing. A KLM aircraft on a nearby flight path assisted by making repeated calls for *Clipper 103* to contact ATC Prestwick (Table 1) – without any success.

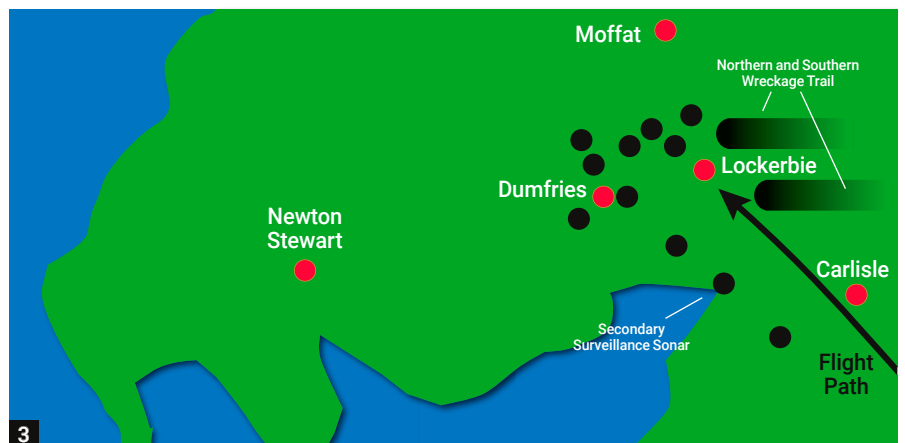
Finding the Wreckage

On December 22nd, 1988 (at approximately 10:00) Stuart and Robbie Dodd were assisting in the search for the wreckage. They suddenly spotted a long piece of metal with a box attached to it. On closer inspection, it read *Data Reproducer 1972*. This was subsequently identified as the Digital Flight Data Recorder (DFDR) and the Cockpit Voice Recorder (CVR) of *Pan AM 103*.

The flight deck recorder captured the distinct sound of the cockpit section breaking away (Fig. 2). It hit the starboard wing, smashing off the engines, before colliding with the tail section. Initial analysis of the flight data recorder revealed that the crew did not transmit any distress signals before the crash.

The cockpit was located near Tundergarth, 4 km east of Lockerbie (Figs. 3 and 4). Considering the extreme forces of the explosion, descent, and the impact with the ground, it was in a remarkable state of preservation.

Investigators could easily read the instruments, which also revealed that the crew had



not transmitted any distress signals. The Scottish Air Traffic Control (ATC) frequency tape recordings were analysed from 19:02 to 19:05 to determine if any unexplained sounds would indicate the possible transmission of a distress signal. However, none were subsequently heard.

The bomb was set to detonate over the Atlantic Ocean so that any evidence would be destroyed and put beyond the reach of the search and recovery operation (Fig. 4).

The flight data system consisted of a Lockheed Model 209 DFDR that received real-time data from a Teledyne Controls Flight Data Acquisition Unit (FDAU). The system recorded the functions of 22 parameters and 27 discrete events parameters.

Inspection and Investigation

Internal inspection of the DFDR indicated that there had been considerable disruption to the electronic control circuits. The record-

ing tape had been detached from its guide-rollers and had become tangled within the tape spools. There was also no tension in the negator springs.

This damage was consistent with a catastrophic event. The tape had most likely moved since electrical power was detached from the recording/ playback units.

A detailed photographic record was made of its condition before further analysis. The position of the tape-loop, in relation to the record/replay heads, was marked with splicing tape to determine its movement.

Furthermore, in order to preserve the evidence, the negator springs were cut to separate the upper and lower tape reels. Systematic decoding and reduction also tallied with the ATC taping recordings as no abnormal behaviour of the sensors were identified. The analysis concluded that the recording had abruptly stopped at 19:02:50.

Radar information obtained from four sites

- Channel 1** Flight Engineer RFT
- Channel 2** Co-Pilot's RFT
- Channel 3** Pilot's RFT
- Channel 4** Cockpit Area Microphone.

Table 2: Comms covered by the four-track Fairchild Cockpit Voice Recorder (CVR).

confirmed the evidence from ATC to the effect that the flight had progressed in a normal manner until the Secondary Surveillance Radar (SSR) signal was lost. The British Geological Survey analysed several seismic monitoring stations in Southern Scotland.

The stations in closest proximity to Lockerbie recorded a seismic event that measured 1.6 on the Richter scale. A series of calculations that factored the time-lapse of the waves reaching the sensors indicated a time frame of 19:03:36.5 (1 second).

The Cockpit Voice Recorder was the standard four-track Fairchild Model (Table 2).

On two occasions, the crew had had difficulties in understanding ATC transmissions, suggesting the presence of high noise levels on the flight deck. This also hindered the subsequent analysis of the cockpit voice recorder. It was determined that it was an irregular low-frequency sound. However, the source of this interference could not be positively identified. It was inferred by the investigation that its source could have been either acoustic or electrical.

An Unfolding Emergency Response

A chronology of the responses by the emergency services is provided below:

19:03: Radio message from Police patrol in Lockerbie to Dumfries and Galloway Constabulary reporting an aircraft crash in Lockerbie.

19:04: Emergency call to Dumfries and Galloway Fire Brigade. A total of 15 firefighting appliances were deployed from multiple brigades.

19:37: First ambulances radio that they are leaving for Dumfries and Galloway Royal Infirmary with injured residents (2 serious; 3 minor).

19:40: Police radio reports that Sherwood Park and Sherwood Crescent residents have been evacuated to Lockerbie Town Hall.

20:25: Police radio reports that the cockpit section of Pan Am Flight 103 has been discovered at Tundergarth.

22:09: Fire Master transmits a Status Report: A series of fires, exceeding one mile in extent, had broken out in the area.

Further Reading

- Ian Dron: *A News Reporter at Lockerbie* (2016): <https://tinyurl.com/y2d44ye4>
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A Deadly Bomb

The lethal bomb had been contained in a Toshiba *BomBeat* radio cassette player. Placed inside were 450 grams of Semtex plastic explosives, connected to a timer. The device was positioned only 25 inches from the skin of the 747's fuselage. A fragment of printed circuit board was found in a grey shirt made by *Slalom*, and forensic scientists concluded that "This fragment represents the only recovered piece of modification in the Toshiba radio which would have been necessary to convert it into a delayed-action bomb".

The Roles of RAYNET UK

RAYNET UK is the national voluntary communications service provided for the community by licensed radio amateurs. It was established in 1953, following severe east coast flooding, and it has continued to serve in times of national disasters, most notably the Zeebrugge Ferry Disaster 1987 and the Lockerbie bombing in 1988. RAYNET has evolved into a very active organisation with more than 2,000 members. It is viewed as a professional support organisation by both the statutory and volunteer emergency services.

The search area for victims and wreckage accounted for a large area (approximately 850 square miles/ 2,200 km²). During the SAR, 18,209 individual items of property were recovered, which included 90% of the destroyed aircraft's structure. The debris accounted for 211 tons weight of passengers, crew, cargo, mail, and aircraft components.

Pan Am 103 Flight Path



4

RAYNET

THE LOCKERBIE BOMBING

THE SEARCH FOR JUSTICE

KENNY MACASKILL



5

These would provide vital evidence for the subsequent inquiries into the disaster.

The communications link established by RAYNET facilitated a computer database of approximately 1,200 significant items of wreckage. It contained vital intelligence for the pending investigation, detailing a brief description of the item and the location of where it was recovered from. The database was also analysed to populate a map of the wreckage. It revealed that the wreckage was distributed into two separate trails, known as the 'northern' and 'southern' trails. The official investigation commended the role of RAYNET and concluded: "The facilitates and

cooperation of the RAYNET teams were essential to the management of the emergency and its search and recovery operations”.

The world’s press and media added to the communications problem as they descended on Lockerbie and proceeded to tie up all the available lines, both mobile and landline networks. To maintain accessible telephone lines to their editors, many reporters remained on the phone lines 24/7.

RAYNET provided a solution to this issue: during the peak of the search and recovery operation, a minimum of 80 and a maximum of 130 operators were on duty, providing a continuous radio communications network.

Today, the chair of RAYNET Cathy Clark stresses its continuing relevance to modern society: “Despite advances in communication technology, the network is needed more than ever. With our current unpredictable climate and the high risk of failure of modern communication networks. RAYNET volunteers can make a crucial difference”.

<https://www.raynet-uk.net>

Further Media Coverage

Alan Dron should not have been on duty on the night of December 21st, 1988; he had swapped shifts with a colleague who wanted to attend a concert. Dron was preparing

to cover an impending strike at a Clydeside shipyard, which represented mundane, local, news reporting.

He was suddenly approached by the duty Glasgow editor who broke the monotony with the following conversation: “We’re getting reports of an explosion in Lockerbie. There is a suggestion an aircraft may have crashed. Can you check it out? Maybe just get in the car and get down there”.

Dron initially decided to call the ‘crash-cell’ a small Royal Air Force (RAF) detachment at Prestwick Airport, located approximately 35 miles southwest of Glasgow. The RAF personnel were invariably helpful in providing information relating to any breaking aviation incident. The conversation was very unusual from the start of the call, as somebody answered on the first ring:

“Duty officer, please”.
“He’s a bit tied up at the moment, Sir. Can you call back later?”

Dron’s growing suspicion was that two RAF aircraft had collided over Lockerbie. It was well known that Lockerbie was in a zone for ultra-low military flight training. Garbled radio reports of multiple firers that were now coming into the newsroom added some credence to this view. Driving down the motorway, he

tuned the car radio to the BBC news. Just before the programme ended it was abruptly cut off and an announcer broke in “And now, before our next programme we are going across to the BBC newsroom. A Boeing 747 of Pan AM has crashed near the Scottish border town of Lockerbie”. He subsequently floored the accelerator in his race to Lockerbie, whilst avoiding the surrounding police roadblocks.

Conclusion

It was conclusively established by the inquiry that Pan AM Flight 103 had been destroyed by an Improvised Explosive Device (IED). The IED was concealed in a Toshiba radio cassette recorder, model number RTF16.

Pan Am Flight 103 has a notorious place in aviation history. It is the worst air disaster in British history and the highest fatality aviation incident in American history.

Pan AM survived for another three years before the company filed for bankruptcy in 1991.

Fig. 5 shows the cover of one of the many books written after the Lockerbie Disaster.

[Dedicated to the victims of the Lockerbie Air Disaster; see also our feature about PanAm Radio, elsewhere in this issue – **SC/Ed.**]

Radio News

JAPAN – AM TO FM: 44 of the 47 commercial AM radio stations across Japan plan to switch to FM broadcasting by the autumn of 2028. It is hoped that this will improve business performance by reducing the cost of operating both AM and FM broadcasting services. The move to FM broadcasting will be made by all AM radio stations except those in Hokkaido and Akita Prefectures in northern Japan. AM broadcasting services are scheduled to start being suspended as early as 2023 as part of the Ministry of Internal Affairs and Communications test of switching to FM. This means that AM broadcasting services will shrink in phases from 2023 onwards. Though AM broadcasting has a longer range, it has faced challenges, such as requiring large-scale facilities, including an antenna at least 100 meters tall and high maintenance costs as they age. Furthermore, AM and FM radio channels broadcast the same programs through FM complement broadcasting, known as Wide FM, as part of disaster prevention measures, causing overlapping facility costs. As advertising revenue has been falling among commercial AM broadcasters, they asked the

Communications Ministry in 2019 to begin a system reform that would allow them to switch to lower-cost FM broadcasting; the Ministry has approved this reform. Tokyo-based *TBS Radio Inc. Nippon Cultural Broadcasting Inc.* and *Nippon Broadcasting System Inc.* have announced they will halt AM broadcasting in the autumn of 2028 at the earliest. (SOURCE: via Chrissy Brand; Japanese original by Tomofumi Inagaki and Yuka Matsubara) <https://tinyurl.com/5b4zrwmb>

JUNO DETECTS JUPITER’S HIGHEST-ENERGY IONS: Trapped ions discovered at mid-latitudes can have energies exceeding 100 megaelectron volts per nucleon. Their detection adds to our understanding of the powerful radiation environment around Jupiter. Jupiter’s planetary radiation environment is the most intense in the solar system. NASA’s *Juno* spacecraft has been orbiting the planet closer than any previous mission since 2016, investigating its innermost radiation belts from a unique polar orbit. The spacecraft’s orbit has enabled the first complete latitudinal and longitudinal study of Jupiter’s radiation belts. Becker (*et al*) leveraged this capability to report the discovery of a new population of heavy, high-energy ions trapped at Jupiter’s mid-

latitudes. The authors applied a novel technique for detecting this population; rather than using a particle detector or spectrometer to observe and quantify the ions, they used *Juno*’s star-tracking camera system. Star trackers, or stellar reference units (SRUs), are high-resolution navigational cameras whose primary mission is using observations of the sky to compute the spacecraft’s precise orientation. The SRU on board the *Juno* spacecraft is among the most heavily-shielded components, affording 6 times more radiation protection than the spacecraft’s other systems in its radiation vault. (SOURCE: AGU: *EoS Science News*; citation: Rehnberg, M. (2021) ‘Juno Detects Jupiter’s Highest-Energy Ions’; *Eos*, 102).

<https://doi.org/10.1029/2021E0159839>;
<https://tinyurl.com/yupkfsmm>

SHORTWAVE BULLETIN NOW ONLINE: All issues of this former publication from Sweden are now online, for those interested in radio and DXing history. This publishing venture originated in a 1961 meeting of the *Malmö Kortvagsklubb*. John Ekwall has now digitised the newsletters from 1961 to 1999 Nos. 1-1406). (SOURCE: *Radio Kurier*, 7/2021: 10)

<https://tinyurl.com/8wj4favr>
<http://www.hard-core-dx.com/swb/archive.htm>

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Keith Rawlings

Keith.g4miu@gmail.com

I had a pleasant e-mail exchange recently with Frank K4FMH regarding the Mini1300 0.1-1300MHz antenna analyser. The model that Frank owns does not have a functioning USB-PC-USB port. I commented that, in my recent review, I stated that I had been unable to test the port. I did not explain this further, for reasons of space. However, I can now reveal that the only suitable USB lead I had, and which would fit the Mini1300, was from my *Amazon Kindle*; it was faulty! I had ordered a replacement but, as is the way with eBay, it seems that the replacement, while listed as UK stock, actually came from the Far East and took too long to get here, arriving after the print deadline was due.

As we were in lockdown at the time I did not venture out to find one. When the lead did arrive I found that the USB port was not functioning, but this info was too late to include in the review. Frank informed me that Chris Taylor at Moonraker had confirmed that the USB port was non-functioning.

There has been a thread running on the *IO Group* for the analyser, discussing how the port can be made usable. It seems that the analyser firmware needs to be upgraded, and Frank relayed the following information from Gyula HA3HZ: "EU1KY-managed firmware v1.04 can be upgraded via the Discovery mini USB port with the STM32 ST-Link utility."

<https://tinyurl.com/4ec4r25c>

<https://tinyurl.com/j2afj7w4>

The *STM32 ST-Link* utility is a programming tool for the *STM 32* processor which is fitted to the analyser board. A hardware interface is required, and I found some on a certain online auction site for about £7.

Here are some further links:

<https://tinyurl.com/3drmj5z>

<https://tinyurl.com/2f2jy8e>

<https://tinyurl.com/kn8vyh58>

<https://tinyurl.com/chx4tmsx>

Uniden Bearcat UB325P2

While not strictly aerial-related, reader Mark contacted me regarding my March 2021 review of the above scanner (*RadioUser*, March 2021: 24-26) asking if its sensitivity and audio quality were as good as the UBC125XLT, which I roughly compared it with at the time. Sensitivity-wise I could detect little if any, difference between the two. The audio quality was likewise very similar.

Mark also asked about the procedure for

Antenna Analysers, the Wellgood Loop, and some Loop-on-Ground Experiments

Keith Rawlings reacts to reader feedback on the MINI 1300 0.1-1300MHz antenna analyser and the Uniden Bearcat UB325P2 scanner, tests the Wellgood Loop and examines a Loop-on-Ground

getting the *DMR/NDXN Upgrade*. As I was not the owner of the 325 I tested, I had to ask my friend what the procedure was. He purchased the 325 *without* the upgrade; once it had arrived, he bought the upgrade online from an American dealer.

A couple of details taken from the scanners 'INFO' page were sent to the dealer, who supplied the upgrade code. This was manually entered into the scanner.

Once installed, the upgrade stays in place even if the scanner is reset.

I hope this helps any other prospective purchasers of the 325.

<https://tinyurl.com/ebe245d7>

The Wellgood Loop

Back in the December 2020 issue (*RadioUser*, December 2020: 53-55) I described the construction of my Wellgood Loop. This aerial was based on the reverse-engineered Wellbrook Loop published on the internet by George Smart M1GEO.

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

After having problems cooking the PN2222 transistors I substituted 2N5109 devices in my amplifier and used a battered piece of 8mm-diameter tube as the loop element. I said at the time that I thought the design may be a 'keeper' and that I would build another amplifier using matched transistors of the same type specified by George and make improvements to the loop element. I also said that I would report back on how I got on with it. Well, I have not yet got round to finishing the amplifier or loop element on my new version!

I have, however, used the Wellgood Loop referred to in the column, extensively on the LF and HF bands. I can report back that it has

worked almost flawlessly.

It is a year since I constructed the loop and amplifier, and it has performed well. I have noticed no signs of the devices overheating, even during very hot days, and the amp has remained stable but for one exception.

This exception occurred during an experiment with a two-wire 'Yagi Beam' for 50MHz, built on a wooden frame. After tuning the beam with my FA-VA5 analyser I connected it to my FT857 and put out a call running 25W. Returning to receiving mode, I noticed the noise floor had risen to well over S9.

Checking on my main station radio, which is fed by a doublet, I could see that the upper HF spectrum noise floor was S8 or more as well. Going to receivers which could be fed, in turn, by switching my receiving 66ft Inverted L PA0RDT Mini Whip and the Wellgood Loop, the raised noise floor was apparent on the Inverted L and Mini Whip; however, when I switched to the Wellgood the noise dropped!

An RF Issue

I tried to replicate this again, but I could not manage to do so. However, a few days later, when making more alterations to the beam, the same thing happened again. Clearly, RF was getting into the Wellgood amplifier and sending it into self-oscillation with the loop element possibly acting as a good radiator.

The beam was mounted at about 15 ft for testing and was about 25 ft away from the loop.

The amplifier input has back-to-back diodes for protection, which should stop damage caused by high RF levels. It is possible that some RF had entered the amplifier directly, via the element or by the coax line back at the receiver. I have not noticed any

ALL PICTURES: KEITH RAWLINGS

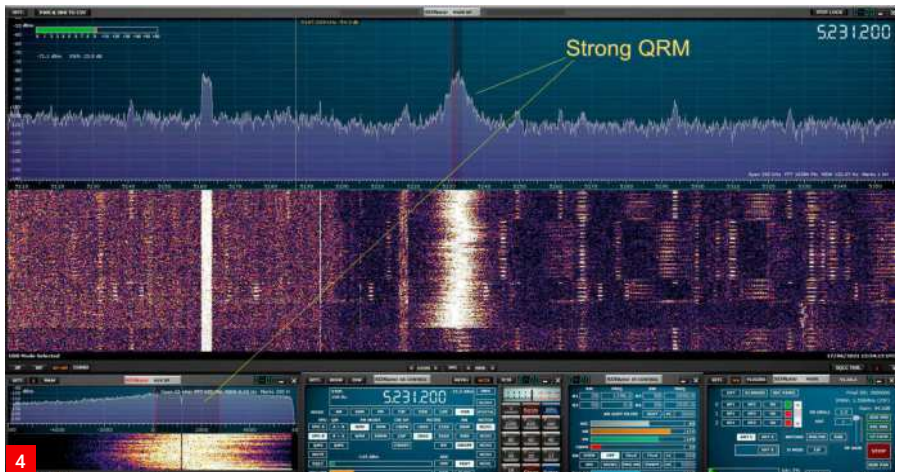
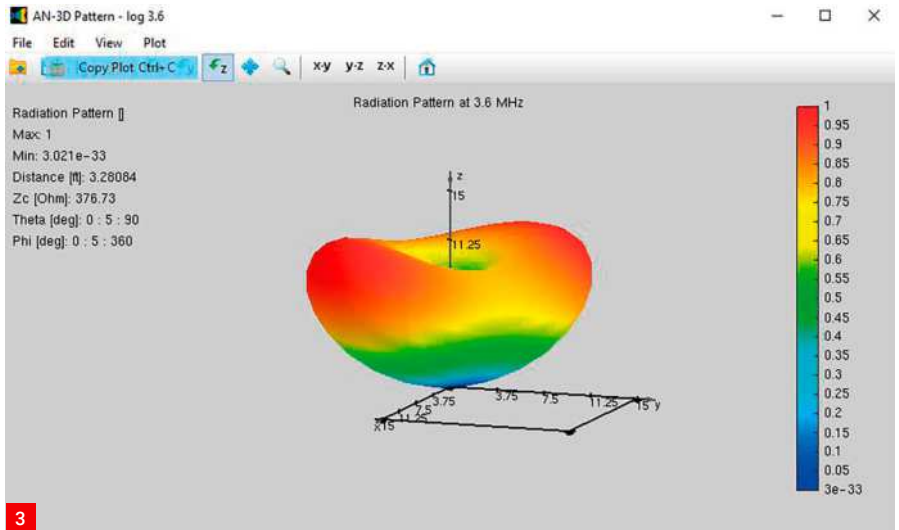
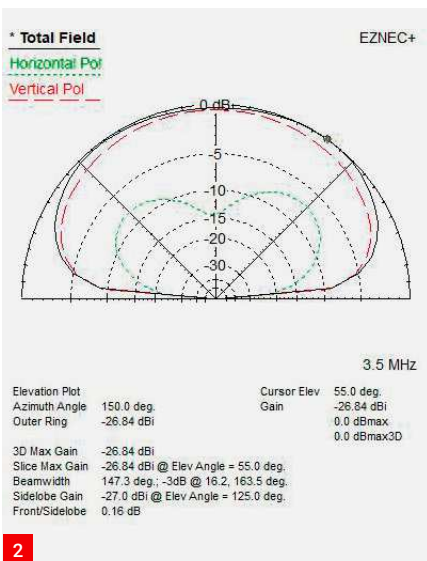
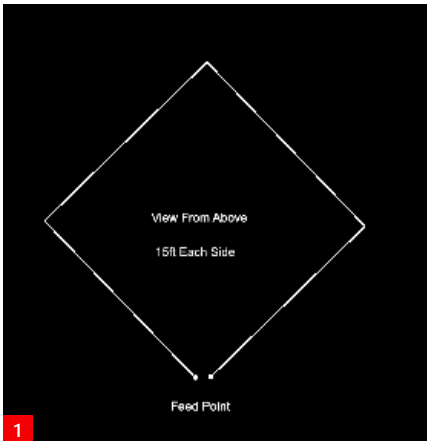


Fig. 1: Loop Diagram for the KK5JY HF LOG. Fig. 2: Predicted EZNEC plot for a LOG at 3.5MHz. Fig. 3: Predicted AN-SOF V6 plot of a LOG at 3.6MHz. Fig. 4: SDRplay Screenshot, showing QRM. Fig. 5: SDRplay Screenshot with noise cancelling. Fig. 6: KK5JY matching transformer, as specified (2t x 6t ft73 ferrite core).

problems while transmitting on other bands, so I just make sure that the DC supply to the loop is disconnected if I ever operate on 50MHz.

That problem aside, the loop has returned some excellent results, especially at LF where the overall reduction in noise and directivity make it a good aerial for NDBs.

It also worked well on the Medium Wave Band where it is often possible to pick stations out by turning the loop slightly. On HF the directional properties have been useful for reducing local interference where turning the loop slightly can reduce various noise sources to a more manageable level.

I have noticed no spurious responses generated by the loop.

The only negative comment I now have is some very recent QRM that swamps part of the NDB band and can only be slightly reduced by turning the loop. This same noise was picked up at a much lower level - and narrower bandwidth - on the Inverted L and not at all on the Mini Whip.

The loop is now mounted at about 8ft at the centre and about 10 ft from the Mini Whip with the latter up at about 15 ft.

This is something to be investigated further, so watch this space.

The KK5JY HF LOG (Loop-On-Ground)

As the noise levels here are now very bad, I thought it worth experimenting to see if I could make some reductions by experimenting with a receiving aerial system that will improve the Signal to Noise Ratio (SNR).

My experience has shown that, quite often, a reduction in SNR leads to a reduction in signal strength.

For example, when noise cancelling units are used, the wanted signal can often be 10-

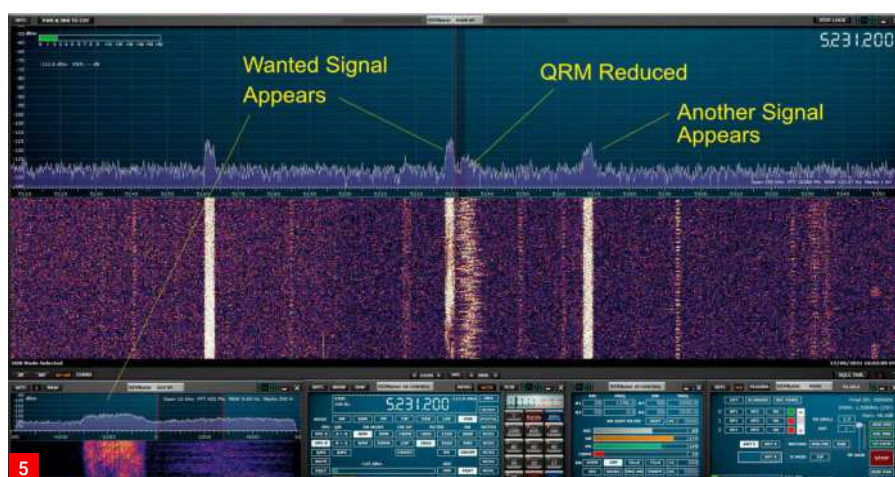
15 dB (or more) down, but the wanted signal can then be heard without difficulty, albeit at a lower level.

One aerial that is claimed to provide a reduction in noise at a noisy location is a Loop-on-Ground or LOG (Fig. 1). Matt KK5JY has a good web page, describing a LOG-type in great detail.

<http://www.kk5jy.net/LoG>

The only thing I would be cautious of on the site is the EZNEC modelling plots as, unless I have missed something, EZNEC+ has been used which uses the NEC2 modelling engine. This has limitations on modelling wires on or below ground. You may find that the directions of the polar plots of a 'real' LOG are slightly different (Figs. 2 and 3).

However, KK5JY has constructed a LOG and shared it with us. It has just 15ft sides - it is quite small. It lies directly on the ground and uses a small and simple matching unit to connect the aerial to the coaxial cable run back to the receiver. A loop with 60 feet overall length is claimed to be a good compromise for the 160 to 40m bands and would



seem to be useful for those with small gardens and in an urban area, prone to local noise.

To make one, I simply cut off a 60ft length of stranded hook-up wire and at 15, 30, and 45ft made a small loop in the wire so that I could peg the wire down at these points.

I laid the loop out on the ground in an approximate diamond shape; to save time, rather than construct the matching transformer as suggested by KK5JY, I disconnected my Inverted L and its earth connection and used the matching transformer from that to wire up both ends of the loop.

This took all of 10 minutes!

The downside was that I would be unable to compare the LOG with my Inverted L, as it used the same cable run. I was, however, able to compare it with both the PA0RDT Mini Whip and mainly, the Wellgood Loop, which is already a quiet aerial.

I started listening on the 20m amateur band, where I noted signals were well down compared to the Wellgood. Some signals that were S7-8 on the Wellgood were barely S3 on the LOG; the noise floor was S6 to S3 respectively, and there was little, if any, SNR improvement.

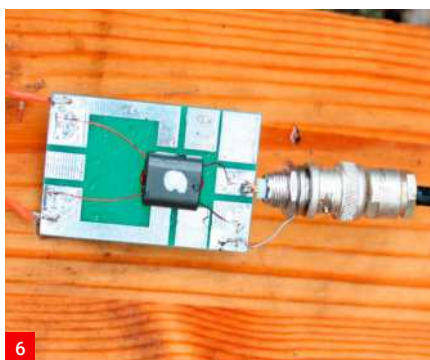
However, on 17m an S7 noise floor could be reduced to S1 and wanted signals were only around S3 down, compared to the Wellgood aerial. On 30m, the LOG worked very well indeed, as it did on 40m, with signals only being slightly down compared to the Wellgood. There was a noticeable improvement in SNR on some signals.

I had similar/good results down to about 2.5MHz, where the performance of the loop fell right off.

On 160m, it was very poor.

A Noise Cancelling Advantage

I found that the Loop-on-Ground type was good for noise-cancelling when the main



aerial had plenty of noise on it (Fig. 4). Here we had a very strong local noise source, possibly from a switch-mode power supply on stand-by. On the LOG, it had a level of S5; on the Wellgood, this was at S9. With the Wellgood aerial providing a good signal on the noise, I was able to use my noise-cancelling unit to phase out the noise to reveal what looked like a weak STANAG 4285 signal underneath (Fig. 5).

I also noted that, while the LOG was poor on the MW bands, when using a noise-cancelling unit, and by combining either the Wellgood or Mini Whip, I was able to 'juggle' the controls to increase signal strength and keep the noise to a minimum.

The performance of a LOG will depend on your local environment, soil type, moisture and several other factors. It is, I think, worthy of more experimentation.

Will a larger loop work better on MF and below, and how will this affect performance on the higher frequencies? I will research this further, using the correct matching transformer (Fig. 6) and report back to you. In the meantime, if you try a LOG, let me know how you get on.

I think that this type of aerial does hold some promise for noisy environments.

That's all for this time – do take care everyone and see you all again next month.

STAYCATIONS BENEFIT COMMERCIAL

RADIO SALES: With barriers to most international travel still in place, the Summer of 2021 looks set to be the 'summer of staycations', day trips and meals out for many consumers, as they make the most of restrictions being lifted, according to research commissioned by *Radiocentre*. With the freedom to travel within the UK, many people surveyed said they were still nervous about using public transport and would prefer to take the car, creating opportunities for brands to engage with these audiences through in-car radio advertising as they head out for their time away from home with friends and family. To study how the end of lockdown could affect consumer behaviour and spending, *Radiocentre* appointed research company DRG to conduct a survey. The Road Ahead study also showed that 46% of respondents saved money during the pandemic and were eager to spend it on leisure time. Some 79% of respondents said they were looking forward to days out after lockdown rules are relaxed, while 69% said they were excited by the thought of visiting friends and families in different areas. While these findings point to an increase in car journeys over the summer, commercial radio listeners are planning to upgrade to a more environmentally friendly vehicle, with 11.4% planning to buy or lease a hybrid or electric car in the next 3 months – Commercial radio listeners are highly responsive to radio advertising, according to the Road Ahead survey. Some 40% agreed that radio gave them new information about products and services they were already considering buying. And 31% said they often searched for more information about goods and services they had heard advertised on the radio. This is *Radiocentre's* sixth Covid audience study since the start of the pandemic and a marked feature of all of them has been a rise in commercial radio listening, as people work from home and have been told to stay indoors. For The Road Ahead, 37% of respondents said they were still listening to more or a lot more radio than before the pandemic. Commercial radio listeners who do listen more are still tuning in for an extra 1 hour 39 minutes each day suggesting that new habits have formed over lockdown, with radio being an essential part of people's daily routine. A study in August last year showed that 58% of commercial radio listeners said they listened to the radio in the car. In the Road Ahead research, this figure has leapt to 65%. "

(SOURCES: Radiocentre | RadioToday)

<https://tinyurl.com/yw28ty9h>
<https://radiotravelnews.com>

Tim Kirby
tim@livingland.wales

It was great to hear from Ed Spicer living near Brighton. Ed has a full amateur radio licence and is also a keen PMR446 enthusiast. Ed wrote, "I like the band a lot, and the low legal power is an enjoyable challenge! There is a great video on YouTube from May 2020 showing a contact with 500mW at both ends between Brighton and Utah Beach in France":

<https://tinyurl.com/fk2cans3>

"It is worth noting that both stations were on the coast. The saying "height is might" is certainly true, but if conditions are right then it is possible to achieve some very long-distance contacts using legal PMR446 equipment if you can transmit very close to the sea. For example, I have had several contacts with French stations, 80 miles distant or more, while standing on the beach. Incidentally, very few of the French PMR446 enthusiasts seem to speak English to any extent. So, it would be worth learning a few basic French phrases if you are hoping for contacts across the channel. There is no official band plan because PMR446 was never designed for DXing, but channel 8 (446.09375MHz) seems to have become the de facto calling channel.

"Some people advocate using a CTCSS tone of 88.5Hz (tone number 8) but I would not recommend putting that on receive! I suppose transmitting it could help distinguish a radio enthusiast from a "normal" user in a weak/noisy signal environment. Channel 14 seems to be a popular choice around here for radio enthusiasts; maybe this is a nod to CB (Fig. 2)? It used to be extremely unusual to hear "normal" users on channels 9 to 16.

"That started to change a couple of years ago with the advent of the very popular and cheap (£15 approx) Floureon FC-200 (Fig. 1), which covered all 16 channels. Sadly, the Floureon seems to have all but disappeared from e-Bay since the start of 2021, for some reason or other. However, since 'lockdown' started, the number of "normal" users between channels 9 and 16 has increased dramatically, although the original eight channels are still in the lead in terms of popularity.

Ed made another interesting contact at the end of May, from Rottingdean in East Sussex to Fécamp in Normandy. Ed was running his Floureon FC-200 (legal PMR446 specification radio, Fig. 1)

He said that conditions were 'lifty', rather than wide-open, and that he had called CQ repeatedly on Channel 8 without any replies. However, he heard a three-way net taking



PMR446 Fun, SOTA, and Trans-equatorial Propagation

This month **Tim Kirby** looks at some interesting contacts on PMR446, hears about a new 10m repeater, looks at trans-equatorial propagation and investigates the Freestar network

place on Channel 11, with one station being noticeably stronger than the others. Ed asked to join the QSO and was called in shortly afterwards. Ed says that this was one of the times when 'searching the band' worked better than calling CQ and once again, French language skills really helped.

Ed has set up a *YouTube* channel for all things PMR446:

<https://tinyurl.com/ws7u6rst>

It will be good to hear from other readers about PMR446 in your area.

Amateur Radio in the Worthing Area

Ed also mentioned that a group of amateurs in the Worthing area have decided to make 10m FM their band/mode of choice for 2021,

so they will be monitoring the band and in particular, the 10m FM calling frequency, 29.600MHz for contacts near and far. There's also a daily net, in the Worthing area on 70.475MHz in the 4m band from 2 pm local time.

There is some more exciting news: A new 10m repeater, GB3CQ is now on the air from near Worthing. It was switched on for the first time on 10th June and was very quickly heard, via Sporadic-E in Germany by DL7JV. The person behind the project is Roy G4WTV. Because cavity filters for 10m would be very large and very expensive, the repeater is to use separate transmit and receive sites with an internet link connecting the two. Although the sites are reasonably close together, the transmitter does not de-sense the receiver.

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

The repeater will be available throughout the year and not just for the Es season. During flat conditions, the coverage is expected to extend along the West Sussex coast, but probably not very far to the north, because of the South Downs. The repeater will use an 88.5Hz CTCSS tone. It will be great to hear more about the project as it progresses. Hopefully, there will be plenty of activity – the majority of rigs have 10m capability now – but of course, it's easy enough to use one of the multi-norm CB sets for such activity. Many thanks to Ed for all the information!

Summits on the Air (SOTA)

In keeping with the introductory remit of this column, I thought readers might be interested in the *Summits on the Air* scheme, which is, in my opinion, a glorious combination of the outdoors and radio (Fig. 3).

You can read much more of the background at the Summits on the Air (SOTA) website:

<http://www.sota.org.uk>.

As an introduction, the website states, "SOTA has been carefully designed to make participation possible for all Radio Amateurs and Shortwave Listeners - this is not just for mountaineers!" There are awards for activators (those who ascend to the summits) and chasers (who either operate from home, a local hilltop or are even activators on other summits). SOTA is fully operational in nearly 100 countries across the world.

Each country has its own association, which defines the recognised SOTA summits within that group. Each summit earns the activators and chasers a 'score' which is related to the height of the summit. Certificates are available for various scores, leading to the prestigious *Mountain Goat* and *Shack Sloth* trophies.

Many SOTA operations take place from the qualifying summits (based on the 'Marilyn' summits, which will be well known to hill-walkers), using simple FM radio equipment in the 4m, 2m, 70cm, and sometimes 23cm amateur bands, as well as on HF.

I recently spoke, on 4m FM, to Allan Jones GW4VPX, from the summit of Foel Cwmceryn, in the Preseli Hills (Fig. 4). Allan is a keen SOTA operator and holds the *Mountain Goat* award. He enjoyed earning it so much, he's doing it all over again. You can read about Allan's adventures at this URL:

<http://gw4vpx.blogspot.com>.

If you are in, or close to, a hilly or mountainous area, you will probably hear frequent activity from SOTA stations, who usually initially call on 145.500MHz. The



SOTA website provides links so that you can see any upcoming activity and know who to listen out for.

Summer Conditions on CB

We have been enjoying the summer conditions for a few weeks now, with the short skip bringing in signals from all over Europe on 27MHz. If you enjoy listening to signals from far-off places and perhaps even having contacts with them, this is great – of course, some people may view it as interference! When the Maximum Useable Frequency (MUF) gets very high, the skip distance (i.e. the 'hop' between the transmitting station and the receiving station, with the signal going up to the ionosphere and back down again) can become quite short.

I often say to people that short skip on CB or 10m is a very good indicator of interesting propagation on the 50, 70 and sometimes, 144MHz bands.

If you're a CB operator though, there are some interesting contacts to be had, which would be difficult to make at other times. A very short skip distance the other week provided some operators in the Channel 35 *London and South East* group with the opportunity to work into the south-west of England, with some nice contacts being made into Devon.

Slightly further afield, Kev from Gibraltar was listening to the UK (27/81) CB band during one of his trips to the top of the Rock of Gibraltar. He sent me a recording of a minute or two of the UK's Channel 19 as

Fig. 1: The Floureon PMR446 set used by Ed Spicer for contacts across the English Channel (*La Manche*). Fig. 2: A converted CB rig like this one will work very well on 10 metres. Fig. 3: A typical 'SOTA-view'. Fig. 4: An aerial and mast; both can easily be carried to the top of a summit – this is ideal for SOTA activity.

heard in Gibraltar – there are plenty of people coming through – I could hear operators from the north of England down to South Wales. It just goes to show one of the things that I love about radio – you never know where your signals may be reaching or who might be listening.

This reminds me a little of listening to the US Super Bowl Channel on 27.025MHz AM during good conditions. A whole gamut of stations can be heard across a considerable area of the USA (depending on conditions, of course). If you're easily offended, it's probably best not to dwell there too long, but it can be quite entertaining and perhaps gives an insight into CB Culture in the US. With many of the stations running high power, it does not take too much for them to reach Europe!

Trans-equatorial Propagation

Perhaps it is slightly stretching the scope of this column to introduce this topic, but it is an interesting area, so why not? Trans-equatorial propagation (TEP) occurs, as you might expect, across the equator and largely in a north-south direction. Generally speaking, the propagation occurs around the equinoxes, i.e. February to April and

ALLAN JONES



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September to November. The two stations making the contact need to be around the same distance from the *geomagnetic* equator (this is not quite the same as the *geographical* equator!). If you are 2,000 miles north of the geomagnetic equator, your best chance of using this propagation will be to make a contact with someone around two thousand miles *south* of the geomagnetic equator. The signals are reflected back to Earth by the F2 layer. Although a fair amount of ionisation is required in the F2 layer, Solar Flux figures do not necessarily need to be enormously high for these contacts to take place and work well.

TEP was first noticed in the 1940s by military operators and radio amateurs – paths from the Mediterranean into Africa were some of the first to be discovered, but there are other well-known paths such as Japan to Australia and the Caribbean to South America. Although the propagation was initially discovered around 28MHz, it is well known at 50 and 144MHz and has even been noticed as high as 432MHz. You might be interested to read a report about TEP written by a pioneer of the mode, the late Ray Cracknell. Ray spent considerable time in Rhodesia and then, after independence, Zimbabwe before returning to the UK.

<https://www.dxmaps.com/tepze2jv.html>

Radio amateurs have exploited this mode of propagation widely, but I am equally sure that CB operators in particular parts of the world will have made contacts using TEP as well. It would be fun to hear about them.

Freestar via Network Radio

Many thanks to Richard Nosworthy from Cardiff who wrote to mention the Freestar network, for radio amateurs. The Freestar network can be accessed in several different ways; *Echolink*, *Allstar*, *Simplex gateways*, *FM repeaters*, *System Fusion*, *DMR*, and *D-STAR*. You can read much more about it on the website. It offers details about the best way for you to connect, depending on the equipment that you might have available.

<http://freestar.network>

The Freestar network has many nets including a *Newly licenced/M7* net on a Sunday evening at 2030 local time. Every other Saturday night at 2100 UK time there's the *Top Talk* net with Oscar Wood 2E1HWE. The format of this net is that Oscar invites a guest onto the net, asks the guest a few questions and then invites other participants in the net to ask a question or two of the guest. As it happens, I had the pleasure of being 'interviewed' by Oscar and the net participants a few weeks ago – and very enjoyable it was too.

Alternating with the *Top Talk* net, there's the *Worldwide Digital Analogue* net, hosted by Chris Andrews 2E0UKH of *YouTube* fame. There are some other nets to look out for, an *IRN Multimode* net and a very new one at the time of writing is the *Raspberry Pi* net held on a Sunday evening at 2200 local time, and hosted by Dave Phillips GW8SZZ and John Derycke W2JLD.

Richard also mentioned that you can listen to the activity, without a licence, using



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the *Network Radios Events (EV)* channel on Zello. Richard also enjoys Network Radio and mentions using it on a camping trip to Pembrokeshire last summer. It is a great way of keeping in touch in situations like this.

That is we have space for this time! Thanks to everyone who has been in touch, and it would be great to hear from other radio users, be it CB, PMR446, Network Radio or Amateur Radio.

Please do get in touch and I will be pleased to feature you here in this column.

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

Robert Connolly
gi7ivx@btinternet.com

In recent years, technology in maritime communications has developed in leaps and bounds, leading to the current state-of-the-art radio communications systems and electronic navigation systems, along with auto-pilots and collision avoidance using AIS. While new systems are always being developed and experimented on, given the current focus on shipping, the main focus is now probably the development of systems to make ships more environmentally friendly.

In days of old, vessels were propelled by sails; there was no pollution; losses and damage to ships were high when they encountered severe storms. Then came the use of coal-driven steam engines. These required crew members to shovel coal into the furnaces that generated the steam in the boilers. This was hot and very dirty work for the crew members concerned, and it also carried an element of danger.

Coal-powered steam engines generated large amounts of pollution, although environmental considerations were not important in those days. However, if the ship's hull was breached, and water entered the vessel in the boiler rooms, it would often generate a severe explosion, not only causing the vessel to sink rapidly, but also killing any crew who were working in the boiler room.

Then the heavy fuel oil arrived, which powered motor vessels for many years. This required far fewer crew because it eliminated the need for boiler-stokers. However, the fuel oil produced exhaust gases and particulates that were emitted into the air via the ship's funnel.

Global Warming and Shipping

Over the last few decades, the world has become much more aware of global warming caused by emissions from engines such as marine, motor and heating systems. As a result, we now see governments push for electric vehicles and lower emissions into the atmosphere. The maritime world is working hard to clean up its act and become more environmentally friendly, to meet legal requirements laid down by the International Maritime Organisation (IMO).

<https://www.imo.org>

Many existing ships are now fitted with exhaust scrubbers to remove particulates. Marine engines are developed or adapted to run on less polluting fuels, for example, Liquid Natural Gas (LNG), Liquid Petroleum Gas (LPG), hydrogen, biofuel, and so forth.



Flettner Rotors and Staycation-Scanning

Robert Connolly considers how traditional ideas in new guises can address global warming, offers seasonal communications tips, succeeds with the Pskov NDB software and presents his latest quarterly NDB Survey.

Interestingly, some shipping companies are looking at the use of old technology – sails – to reduce fuel use and its associated emissions.

Now, I am not talking about the masts and large canvas areas of traditional sails that you would have seen on a *Barque* or *Brigantine* sailing vessel but a sail technology that was trailed in the 1920s in the form of rotor sails, or *Flettner Rotors* as they were called after their inventor Anton Flettner (1885-1961).

<https://tinyurl.com/b652kyyk>

A Delayed Success

At the time, these types of sails did not take off, due to the increasing popularity

and low cost of diesel fuel. Today they are becoming more popular on commercial vessels; not as the main propulsion system but as a *secondary* system to reduce engine power for propulsion while at sea. They offer zero emissions and are relatively low maintenance.

Unlike traditional sails that have to be raised, lowered or 'reefed-in' during storms and require an expert sail repairer to mend any damage sustained to the sailcloth while at sea, the rotor sail is a permanent fixture on the vessel. Some vessels will be fitted with more than one of these sails (Fig. 1).

The rotor sail assembly can range from three to five metres in diameter, and from twenty to forty metres above the deck of a

Fig. 1: Rotor-sails of the *Flettner* type.
 Fig. 2: The pressure tendency chart for my NDB monitoring session on 5 June 2021. Fig. 3: NDB Hunting with *Pskov* NDB. Fig. 4: Different signal strengths were in evidence in this recording.

ship. They are rated to survive intact up to a Force 12 wind (135 knots).

If you have a 30-metre plus high rotator sail assembly mounted on your deck, this could create problems entering some ports where the vessel is required to pass under a bridge.

To accommodate this scenario, some rotor sail manufacturers have now designed a 'tiltable' version of these sails. More information on rotor sails may be found at these URLs:

- www.norsepower.com
- www.anemoimarine.com

Staycation Precautions

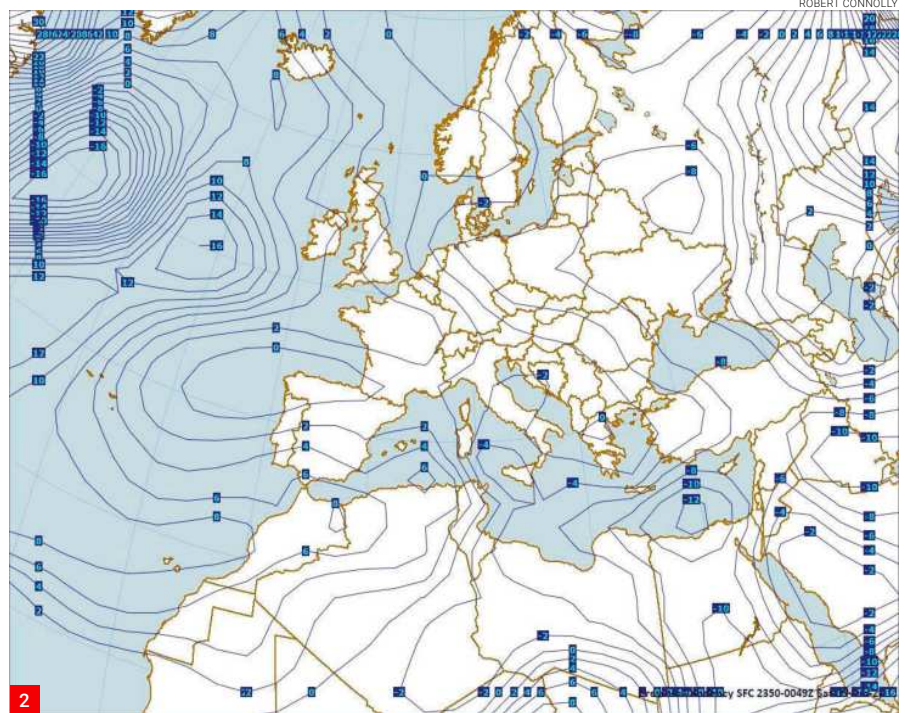
With 'staycations' likely to be the main holiday type enjoyed this year, owing to problems and costs associated with the ongoing Covid-19 pandemic, some of you may be considering heading to one of the many coastal resorts in the British Isles. If this is the case, you might well be thinking of bringing your scanner along to listen to marine radio traffic in the area that you plan to holiday in. It may also be your first visit to a coastal resort.

If that is the case, a good channel to leave your scanner switched on to is CH 16 156.800MHz, the calling and distress channel. If a craft has a situation where a person's life is in immediate danger, a *Mayday* call would be issued. You will also hear which channels are in use in the area you are staying in, by means of the Coastguard's Maritime Safety Information Broadcasts (MSIB).

Before each scheduled broadcast, the Coastguard announces the channels that will be used. CH 67 (156.375MHz) may well be used for communications with small craft, for example, yachts and dayboats.

Channel 0 (156.000MHz) is a private coastguard channel for communications between its local teams on the ground, and also for communications with the Royal National Lifeboat Institution (RNLI) lifeboat.
<https://tinyurl.com/wsk78ccr>
<https://coastguardsafety.campaign.gov.uk>
<https://rnli.org>

Channel 0 is also in use by the UK Coastguard rescue helicopters. In Northern Ireland, many SAR tasks are carried out by helicopters from the Irish coastguard based at Dublin and Sligo. These helicopters are



also equipped with CH 0 for use with the coastguard in Northern Ireland but not in the Republic of Ireland.

Pan-Pan and Mayday

For those of you not used to maritime radio communication procedures, there is a specific format for issuing a distress call.

This is the procedure to be followed:

MAYDAY-MAYDAY-MAYDAY.

- This is **** (the name of the vessel [three times])
- The radio callsign and MMSI number
- Followed by: Mayday.
- Then again, the vessel name ****
- Call sign and MMSI number
- The vessel's position is (latitude and longitude, or concerning its location vis-à-vis a well-known geographical location)
- The nature of distress (this must be an immediately life-threatening incident, for example, man overboard or vessel sinking)
- Followed by the words "require immediate assistance"
- Information on the number of persons on board and any other important information
- The word "OVER".

Another type of emergency call that you might occasionally hear is *Pan-Pan-Pan*. This is similar to Mayday (see the previous paragraph) but is used for serious emergencies when life is *not* in imminent danger.

The format of a Pan call is similar to the *Mayday* with the phrase *Pan-Pan* replacing *Mayday*.

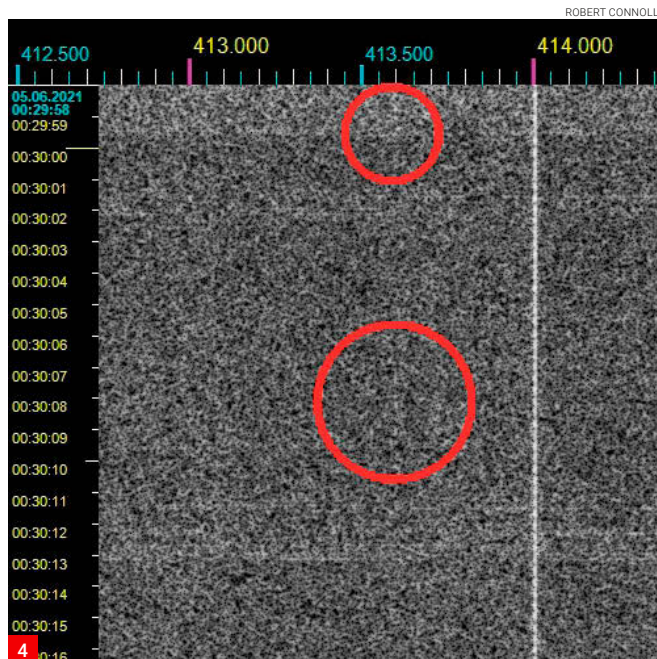
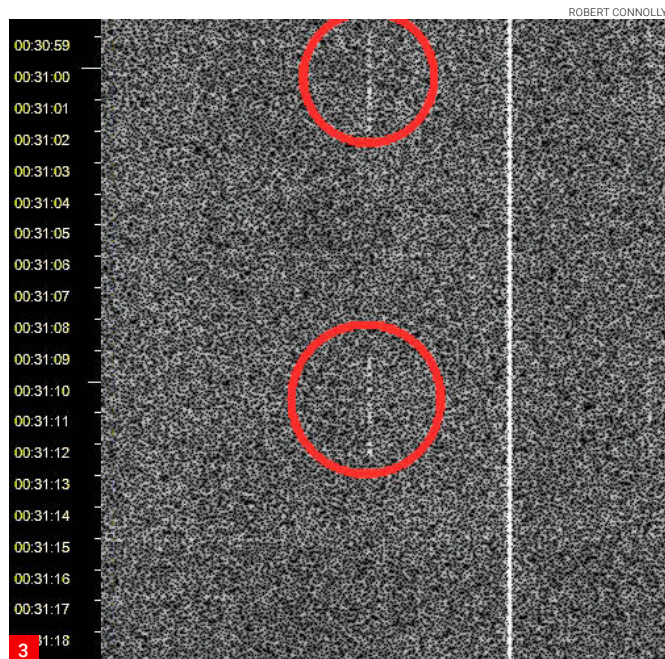
Vital Air Support

If you are visiting the seaside, please be aware of the dangers. Two of the most common reasons for call outs for lifeboats and coastguards are children's inflatable boats and air beds getting carried out to sea with children on board and coastal walkers getting trapped by rising tides. Children's inflatable beach toys, of the type sold by seaside shops, should be used with extreme caution. They are very light and very easily carried out to sea by the wind and tidal currents. Many believe their use should be banned due to the dangers.

If you go coastal walking do not get trapped by incoming tides. It is worth talking to locals regarding tide times, local currents and danger spots. You will want to enjoy your holiday and listen to your scanner without you or your family members becoming the casualty.

In addition to its rescue helicopters, the UK Coastguard also has two fixed-wing aircraft available, equipped with state-of-the-art sensors, which enable the aircraft crew to spot a person in the water up to 40 miles away. They can also drop emergency locator beacons, and communications and first aid equipment, to those in danger. The two aircraft, a *Beech King Air* and a *Piper Navajo* are operated by *2Excel's Special Missions Division*, based at Doncaster-Sheffield Airport in South Yorkshire.

The *Beech King Air 200* is fitted with a state-of-the-art, multi-spectral, surveillance suite and coordinated through an integrat-



ed mission control system. Equipment includes the latest *Leonardo* radar system, HD Electro-Optical sensor turret, IR/UV line scanner, and a Search and Rescue (SAR) direction finder. The aircraft will also support the Coastguard's counter-pollution activities, fishing and law enforcement in the waters around the UK.

Non-Directional Beacon Survey (Summer 2021)

It is time again to look at the world of Non-Directional Beacons (NDB), this time covering the period from March to June 2021. In late February I took the plunge and purchased an SDRplay RSPdx. Regular readers will recall that just over a year ago I purchased an RSP1A but found its performance on the NDB band was not just as good as my JRC NRD 525 general coverage receiver.

As a result of lockdown, there has been a substantial increase in man-made noise (QRM), most likely caused by many more people watching television or using internet devices to help pass the time during furlough. Some of you will also recall my ongoing problem with a neighbour's sodium security floodlight that was not switching off until one o'clock local time. As a result, I have become much more dependent on recording the NDB section of the band after the pesky light has switched off. I just listened to the recording later. I believed that purchasing the RSPdx would improve the results, and that certainly seems to have happened.

Summer is never a great time for DXing NDBs. The long hours of daylight reduce potential DX reception; in addition, there is nor-

mally an increase in natural noise (QRN) from thunderstorms and their associated static crashes (Natural Radio). In addition, I found that propagation conditions have been generally poor as the pressure tendency chart for my last session on 5 June demonstrates (Fig. 2).

Andy Thomsett also remarked that conditions were quite poor during his session in late May 2021.

Using Pskov NDB

You may recall that the April issue of *Radio User* (*RadioUser*, April 2021: 10-12 carried a review of the *PskovNDB* software.

Andy advised me that – as he still had his copy of that software – he decided to use it for logging NDB, received during his recorded session.

Prompted by this, I decided to use *Pskov NDB* for some recordings that I had not processed using the normal playback via *SDR Console*. In addition, I had one recording I had processed by ear, and I was able to use this to compare the results with those obtained through the use of *PskovNDB*.

While using *PskovNDB* to see the IDs of NDBs received, it struck me that a combination of an SDR receiver and *PskovNDB* software would allow those with hearing difficulties to monitor NDBs. Over the years, quite a few listeners told me that they had to give up NDB DXing due to hearing problems, often in the form of tinnitus, or hearing loss. However, using this combination, you do not need to listen to any audio, the recording is converted by the spectrum builder and displayed in *PskovNDB* visually. After looking at the logs

received, both Andy and I managed to catch several NDBs heard for the first time.

This was a great result, especially for somebody who has been DXing NDBs for as long as I have.

By default, *PskovNDB* has a v-zoom of '64'. However, both Andy and I find it much easier to see the received NDB IDs by changing the v-zoom to either '2' or '4'. Other settings I found suited me better were visible bandwidth set to 10kHz, and contrast set to '36'. Something to remember is the fact that *PskovNDB* will display the full recording time for each frequency in the recorded selection.

For example, I normally set a 12-minute recording for the NDB band in the *SDR Console* software package. Using the settings above and scrolling down will display the full 12 minutes of the recorded frequencies. This can prove useful for two reasons. First – if you have an ID that is hard to determine – scrolling down the time may allow you to see a clearer ID later in the recording time, as signals do fade in and out.

Second, this permits you to check quickly for any other IDs that may have been received later in the recording as conditions will have changed.

Figs. 3 and Fig 4 show the differences between IDs received for one frequency at different times of the recording.

The next *Quarterly NDB Review* is scheduled for the December issue, and I welcome your NDB logs (to be with me by not later than 5 October).

As usual, all NDB logs will be available on the *Radio Enthusiast* website.

Until next time "Fair Finds"

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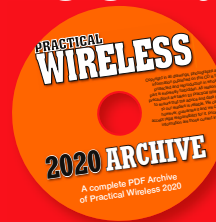
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The Battle of Britain

IN COLOUR

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THE BATTLE OF BRITAIN IN COLOUR



The Battle Looms

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

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

On 10 May 1940, German forces launched their attack on France and the Low Countries and what followed in Belgium, the Netherlands etc, was the complete collapse of these countries under the overwhelming might of German military power. Across France, German forces rolled inexorably towards the English Channel and while the French and British tried desperately to stem the advance, the situation made it impossible to hold a further right-line covering formation of light squadrons west across the Channel, urged on by desperate appeals from the French Prime Minister, Paul Reynaud. Dowling says his reviewers 'flipping away like'

BACKGROUND TO BATTLE

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



THE RAF FIGHTER PILOT



was not afraid that they were either low on fuel, however, a sudden jangling of the high-toned rattle from overhead. Other times, in intense combat, the pilot would be alerted by the sound of a Hurricane's engine. The pilot would be alerted by the sound of a Hurricane's engine. The pilot would be alerted by the sound of a Hurricane's engine.

In this time, the start button was pushed after a lightning-up from the fire, who caught the starter under emergency lighting. In the other plane, the pilot and riggers exchanged thumbs up signals, the riggers slapping his pilot on the shoulder to convey reassurance and good luck as he lunged from the wing. As he jumped the aircraft was already rolling, and the riggers dashed out of the way of the tail fin, buffeted by the slipstream which was being up and over and gone. Carrying out the riggers, the riggers were not looking back and the riggers were not looking back and the riggers were not looking back.

What if they were investigating it may have been an instruction along the lines of 'WATER SQUADRON, 50121'. 'WATER' was three-eyes, 'Fifty Plus'. '50121' indicated in the other plane could interpret these coded instructions as 'Squadron to check in at once if a fighter controller, 'Training to Post' (TFC) or 'Maintenance' (M) or 'Maintenance' (M) or 'Maintenance' (M).

Mentally and Physically Draining
Setting up the aircraft, the pilot automatically did into sections under the perfect weather formation. Meanwhile, the CO or flight commander was in talking to the Sector Operations Room and gathering instructions as to heading, altitude and

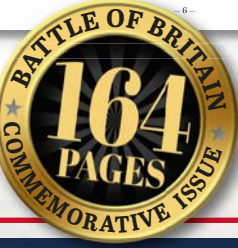
THE RAF FIGHTER PILOT



the pilot concentrated on what he was doing on the cockpit of the Hurricane. The pilot concentrated on what he was doing on the cockpit of the Hurricane. The pilot concentrated on what he was doing on the cockpit of the Hurricane.

hating of suddenly upwards or downwards, the rest of the squadron was in formation and the pilot was in formation and the pilot was in formation.

Facing up Although posed for a camera, the Hurricane fighter is seen in flight over the English Channel. The Hurricane fighter is seen in flight over the English Channel. The Hurricane fighter is seen in flight over the English Channel.



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