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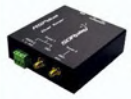

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per metre	£4.30	price per 102m drum	£429
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N type connector (part: 7392)			£6.95
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FLAGSHIP RADIO with Bluetooth

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- All mode reception incl. SSB
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£259.95

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ICOM

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- Modes: AM, FM, WFM
- 1300 memories
- High Speed Scan 100 channels/second
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.....£22.95

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Digital Audio Noise Filter

- Improve reception
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- Makes voices more clear and intelligible

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- Receives 25-1300MHz (with gaps)
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- Store Scan lists
- EZ Scan PC software
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- Spectrum Sweeper

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- Covers DMR, MotoTRBO - and more!
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- Store Scan lists
- EZ Scan PC software
- IF/discriminator output
- Record & save to Windows
- Clock & Calendar function
- Spectrum Sweeper

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Desktop Scanner with cutting edge technology

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- 25-1300MHz (with gaps)
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Advanced unit suitable for all your batteries

- Charge from: 1 to 4 AA or AAA niMH/NicD
- 4 modes: Charge, Discharge, Refresh, Analyse
- Displays: Capacity, Voltage, time & rate

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ALBRECHT

Albrecht AE355M
Wideband Base Scanner

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

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ALBRECHT

Albrecht AE125H
500 Channel AM/FM Scanner

- 5-960MHz (w/gaps)
- Civil/Military Air bands
- Close Call feature
- Hyper search -300/sec
- CTCSS & DCS
- Supplied c/w: Mini USB lead, 2 x AA 2,300 mAh NiMH Batteries

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ALBRECHT

Albrecht AE75H
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EASY TO USE!

- Airband/Marine/Amateur
- 25-512MHz (w/gaps)
- Close Call
- CTCSS & DCS
- Supplied c/w: Mini USB lead, 2 x AA 2,300 mAh NiMH Batteries

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XT-70 Adventurer
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RadioUser

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Cover Story

Welcome

A Radio TARDIS & Timeless Classics

Georg Wiessala
wiessala@hotmail.com

Hello and a warm welcome to the September edition of *RadioUser*. As we move, ever so slowly, from very hot summer into uncertain autumn, here is another diverse mix of radio-related weather for you to experience.

There is, perhaps, a slight flavour of 'vintage' in this issue; not because of the age of the editor but on account of both Scott Caldwell and I taking into our sights some amazing gear of the past. You will all know the Lowe HF225, but have you ever come across the Philips D2999 world band radio? What a find.

Find out more in the pages that follow.

Our main feature this month is a review of the long-awaited new loop aerial from Wellbrook Communications, and Keith Rawlings offers the first UK assessment of this piece of kit, which comes with high expectations since previous Wellbrooks have become timeless classics. See what Keith found.

You can win one too, in our competition this month.

And talking about 'timeless classics', radio has always had a key role to play in the history of time and timekeeping. This month and next, I would cordially like to invite you to accompany me on a journey into the past, present and future of time signal stations, looking at their background first and then showing how to best receive them, and what to get out of them.

And, if I am your overall Time Lord this month, each one among our team of writers has brought their own radio TARDIS with them. Take a look at the fascinating history of Satellite Radio, for instance, explore Electronic Warfare and prepare to receive maritime DSC.

Elsewhere, you might wish to delve more into the vast pool of International Radio or learn about the mesmerizing audio productions of the *BBC Radiophonic Workshop*. Talking about the BBC, Keith and Garry have reached the New Millennium in their Celebration of the State Broadcaster, and Tim Kirby goes slightly *Sputnik*, remembering a time of high-flying Space-jinks and down-to-Earth Cold Wars by proxy – including the role of radio comms in all of that.

Last, but never least, we have a shack full of new products to report on this time, as well as the comprehensive and up-to-date compilations of radio rallies, air shows, European private short wave stations and recommended books that we are so justly famous for – excuse the slight editorial boast.

More seriously though, I do hope that you will derive much enjoyment from this issue and that you will continue to contact me on all matters *RadioUser*.

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

YOUR 132-PAGE SOUVENIR SPECIAL ISSUE

Commemorating 80 years since the start of the Blitz, this special edition magazine contains over 180 colourised images which brings to life this widely remembered chapter of WWII.

Download the digital edition
https://pktmags.com/blitz_ru

Order a printed edition
https://militaria.ma/Blitz_ru

Radio Currents

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

Moonraker: RFinder P7

The RFinder P7 is a hardened tablet Android radio offering 136-174 and 400-490MHz, and DMR/FM. Its main features are currently specified as follows:

- PTT; POC - push to talk over cellular/Wi-Fi network; Programmable keys
- Navigation - GPS/BEIDOU/GLONASS
- Battery type: built-in; 5V3A (fast-charging)
- Mic Noise Reduction – dual-mic design, effectively suppress environmental noise
- IP rating: IP67; Sensors: Accelerometer, Geomagnetic, Distance, Light sensor, Gyro (optional)
- Sensor type: CMOS; Flashlight LED torch
- NFC; 2W Speaker.

You can find out more on both the Moonraker and RFinder websites:

https://tinyurl.com/59wz2uuy
https://rfinder.shop

Icom AH-730 Automatic Antenna Tuner

The AH-730 is a new outdoor-mounted Automatic Antenna Tuner from Icom. The AH-730 covers a wide frequency range from 1.8 to 50MHz, providing amateur radio operators with the opportunity of working on multiple frequency bands.

With a 7 m (23 ft) or longer wire element, all band matching is possible from the 1.8MHz (160 m) band to the 50MHz (6 m) band (Ground connection is required). The AH-730 emits only 0.3W of RF output from the antenna during tuning operation.

The low power minimises the risk of interference to other stations while matching the antenna.

The body of the AH-730 is made up of an IPX4 waterproof, high-strength resin.

It can be safely installed in a variety of outdoor locations. Additionally, coaxial and control cables can be connected without opening the case. In addition, automatic high-speed tuning in about 2 to 3 seconds is possible.

Up to 45 matching states can be stored, and when the same frequency is re-tuned, the matching can be completed in about one second.

The AH-730 Automatic Antenna Tuner is now available to order from Icom Authorised Amateur Radio dealer with a suggested retail price of £570.00 (inc. VAT). The AH-730 is compatible with the Icom IC-718, IC-7100, IC-7300, and IC-7610 transceivers.

(SOURCE: ICOM UK | Ian Lockyer)

https://tinyurl.com/42yxvrna

British Podcast Awards

All the winners have been announced at the 2022 British Podcast Awards in London's Kennington Park. One of the biggest awards of the night, the Podcast Champion, went to You, Me and the Big C. The award honoured the work of Dame Deborah James, Rachel Bland, Lauren Mahon and their entire team, whose podcast has contributed hugely to public awareness and perception of cancer and cancer treatment but has also been a source of solace for so many. The only award voted for by the public, The Listeners' Choice Award, saw over 60,000 votes cast. The top spot this year was won by *RedHanded* for a second time. The true-crime podcast offers a weekly dose of murder, wit and 'WTFs', hosted by Hannah Maguire and Suruthi Bala. Elis James and John Robins hosted the event, alongside Pandora Sykes, Jamie Laing & Sophie Haboo, Sabrina Elba, Poppy Jay, Jon Sopel, RedHanded, The Receipts' Tolani Shoneye, Dr Rupy, and many others. The full list of winners can be accessed at the UR (below):

(SOURCE: BPA | RadioToday)

https://tinyurl.com/4nxbuu79

RadioUser STOP PRESS!

Tecsun Q3D Radio/Recorder

The Tecsun Q3 FM Pocket Radio/ Recorder MP3 makes for a great shack accessory. It receives FM between 76-108MHz and works with the MP3 / WMA / WAV music formats. There are ATS and Memory functions, and the Micro-SD card slot supports MP3, WMA and WAV playing functions.

A notable feature is direct radio recording, line-in recording and voice recording via a built-in microphone.

Link it up to your receiver and catch that elusive RX.

Other features of this small and colourful radio include:

- Max. 128 Kbps MP3 recording format, approx. 15 hours for 1GB memory
- Use the earphones to monitor the Mic recording, allowing to hear and record at the same time
- Direct keypad for FM frequency or song selection
- LED digital display
- A-B repeat | Line-in jack functions as a speaker
- Built-in charging function, with 5V mini-USB DC jack
- Power sources: 1 x BL-5B lithium battery
- Weight: Approx. 120g | Size: 103 x 62 x 25 mm
- Color: Black / White / Blue / Red / Yellow / Green.
- Cost: ca. £40 (Amazon).

(SOURCE: Tecsun | Industry Press | Amazon).

https://tinyurl.com/5y3ekwcs
http://www.tecsun-radios.com/product/tecsun-q3-mp3-radio

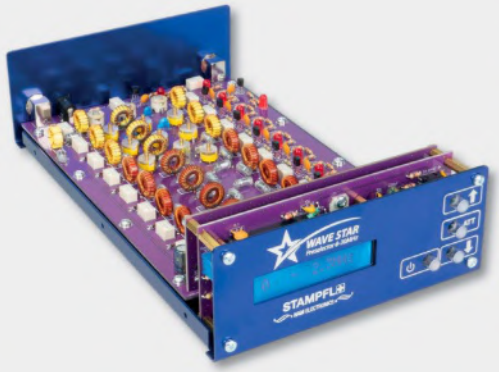
Enter our competitions at www.radioenthusiast.co.uk/competitions

RadioUser STOP PRESS!

New from Stampfl Ham Electronics

The Stampfl 'Wave Star' preselector, for frequencies up to 30MHz, comes as a kit for an 8-speed device. It can be used universally for self-construction projects, inexpensive SDRs or receivers. Development team: Hardware Heinz Stampfl, HB9KOC; Software: Ernst Kirschbaum, DL2EBV, and Rolf Hasler, HB9QN. On the board, there is a low-pass filter for the frequency range up to 41 MHz as well as a switchable LC band and 3rd order low-pass filters for different sub-bands. The filter is selected electronically using buttons on the front panel. The preselector has a bypass function but is only suitable for reception purposes.
(SOURCE: Industry Press | Heinz Stampfl).

https://www.heinzstampfl.ch/en
https://tinyurl.com/5ehxk8wf



Limited-Edition Radio Caroline Turntables

Radio Caroline recently gave away some very special Ross Revenge turntables as prizes. The station teamed up with *Rega Research*, designers and manufacturers of hi-fi equipment, to produce limited edition Radio Caroline turntables for a listener competition this summer.
The turntable features a *Ross Revenge* Red gloss plinth, a matt black Radio Caroline logo, and a slip mat with an image of Caroline's radio ship *Ross Revenge* on its mooring on the River Blackwater, Essex.
Rega Research marketing manager Simon Webster said, *"We are delighted to partner with the iconic team at Radio Caroline. We have worked closely together over the past couple of months to create something very special, combining two of our best-selling turntable designs to create a unique and fully customised Radio Caroline Rega turntable. Like all Rega, products, the turntable is hand-built in the UK, engineered to the very highest standards."*
Only three have been produced, and *Radio Caroline* gave them away in a free listener competition from Monday 25 July 2022.
(SOURCE: Radio Caroline | RadioToday)
https://www.radiocaroline.co.uk
https://tinyurl.com/2p9ana2m

THE RADIO AMATEUR OLD TIMERS' ASSOCIATION: David Reynolds writes: "The Autumn 2022 issue of the RAOTA quarterly magazine (*OTNews*) has been sent to the printers, and also (for those with limited vision) to the reader of the audio version. The aim is that printed and audio versions arrive with members at the same time, shortly. The issue contains the annual reports from President, Treasurer, and Sales Officer. W3WEG continues his series 'Antenna Chronicles' series and G4KRN explains Baluns, UnUns, and Ferrites. G4GQL shows us yet another Morse key design, built entirely from *Meccano*. G0TUD wonders if he was a TV repairman or radio amateur, and G4KRN recalls his 'early days and early radios'. This issue has details of three get-togethers that have taken place this year – RAOTA is a national club with no central HQ and members spread across the whole of the British Isles (and increasingly overseas too) so we try to arrange local gatherings for members to share a meal and have a chat. GM4FZH tests our remaining brain cells with a quiz (with answers at the back of the magazine), while G4GHU cheers us up with another cartoon. Meanwhile, G3ZPF debates whether or not a 'balanced feeder' actually exists. There are a couple of articles from RAOTA (our equivalent organisation in VK), submitted by VK6CSW. One is about memories of Eindhoven and the other is mysteriously titled 'From Big Things, Little Things Grow' [...]."
(SOURCE: RAOTA | David Reynolds).
www.raota.org

C.Crane FM Transmitter 3 USA

C.Crane have shared the following information about their new device: "Send Near Broadcast Quality Audio from your Mobile Phone or any Audio Device to any Nearby FM Radio! The FM Transmitter 3 is a great way to deliver near-broadcast audio from any digital audio device to a traditional radio.

A good example would be using the transmitter with a CC Wi-Fi 3 to broadcast streaming audio to all the traditional radios in a house. Use the attached cable to connect to a headphone jack on your smart speaker, smartphone, or television to send near-broadcast quality audio to any nearby radio or stereo system.

You can resolve audio delivery problems by using it with your iPhone®, Alexa® type device, Wi-Fi internet radio, or satellite radio. Other customers have told us how they use it with their televisions, guitars, portable DVD players or iPod® (a lot of fun in cars) and even other radios.

We use it regularly for listening to training videos at our company meetings. It has a thumbwheel that allows you to adjust the input for perfect audio quality and a two-level LED indicator to help set an optimal signal level.

It broadcasts high-fidelity stereo audio. The maximum distance is about the line of sight with no obstructions. Broadcast distance will vary depending on your location. AC adapter included or runs on two 'AA' batteries (not included). FCC compliant. Choose any FM frequency between 87.5 and 108 MHz.

Portable, fits in the palm of your hand. US$ 69.99. (Patent # US D483,024S). FCC-Compliant." (SOURCE: C.Crane | SWLing Post | via 'Ron' | Ken Reitz | TSM).

www.ccrane.com/fmtransmitter

Reuter sPocket SDR

We have covered some products from our friends at *Reuter Elektronik* here before, both aerials and SDRs. Now a new portable receiver from the Reuter stable is here. The *sPocket* is a freely configurable SW receiver/transceiver with optional VHF / 2 m reception and transceiver operation.

A removable tablet serving as a bright and large display with touch screen operation allows for battery operation and a variety of combinations.

The device consists of a highly stable aluminium milled housing and a 'dynamically-dockable' tablet as a display/touch screen.

The *sPocket* is fully operable via the tablet, including audio output. A connection via Wi-Fi allows the wireless separation of the control panel and *sPocket*. The docking of both parts is purely magnetic and adjustable in different positions. This results in a highly dynamic setup and operation. The high-quality rotary encoder utilized as a "scroll wheel" as well as two powerful speakers, together with the 10" display (25.4 cm) diagonal in full HD resolution makes working with the *sPocket* a pleasure. The *sPocket* contains the spectrum-based RDR technology of the latest generation, with a full 2.5 Hz resolution. FM module (FM broadcast, extended 2 m range, DAB and DAB+) and various transmitter modules (high-quality exciter, polar modulator) can be installed.

The equipment with up to four 16-bit ADC for absolute peak reception power is possible.

The *sPocket* user interface and features are similar to that of the other RDRs. However, the high resolution of the tablet allows for a wider spectrum display (1024 lines without interpolation), a waterfall display, additional control elements such as a virtual scroll wheel, and so on.

The *sPocket* is in full production and available with a delivery time of a few days depending on the ordered version.

(SOURCES: Reuter Elektronik; *Practical Wireless*, August 22: 7-8; *Funkamateur* 4/20: 316 [in easy German]).

https://reuter-elektronik.com/index.html

The Nextube retro Nixie Clock USA

The *SWLing Post* reports: "I've just received this *Rotrics NexTube* after a year of waiting. It was a *KickStarter* project and suffered numerous delays, and it is just now shipping. It's beautiful – real walnut wood, glass tubes and brass fixtures. It appears at first glance to be yet another imitation Nixie tube clock but it's much more than that. Each tube is a high-res IPS display that can display almost anything, including photos. It's highly configurable, uses Wi-Fi to connect to the Internet, and has a (yet undocumented) open API. Being a ham and SWLer, I can envision someone much smarter than I programming this device to show real-time propagation data from beacons, propagation forecasts, or other information of interest to those of us in the hobby. Imagine each of the six tubes graphically showing real-time band conditions on six different ham bands. It can already be used as a GMT clock. A set of three touch buttons allows app switching and user interaction. With your infinite access to members of our hobby, I thought maybe you could find a way to expose this to those who might have an interest and expertise to create such an application for this amazing little device. I believe that its potential is almost unlimited, in ways the creators haven't imagined." (SOURCE: *SWLing Post* | via Al Hearn WA4GKQ).

https://tinyurl.com/734y6b6r
https://rotrics.com/products/nextube

Scott Caldwell
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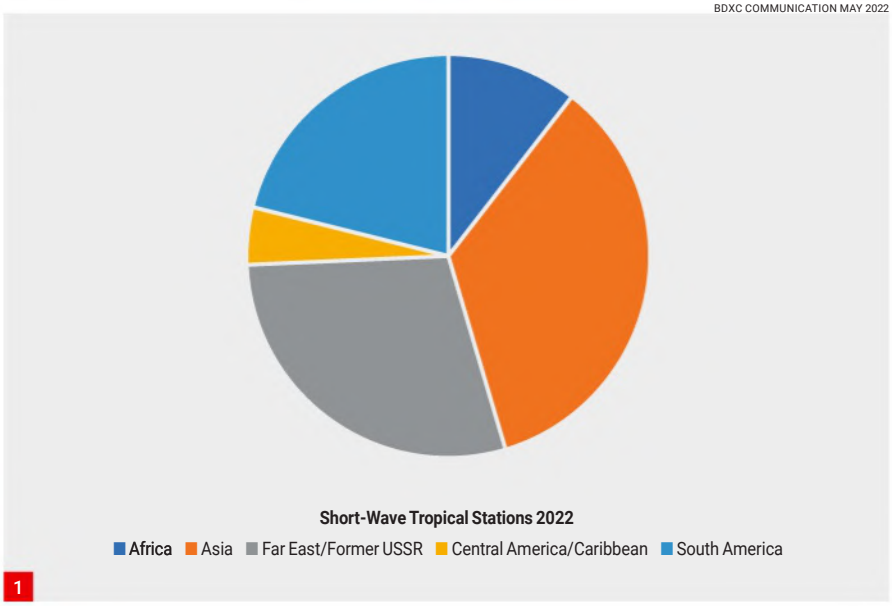

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Tropical Bands and Classic Receivers

This month, **Scott Caldwell** focuses on Tropical Band HF broadcasting, the the Lowe HF 150 & 225 communication receivers, Radio New Zealand International, Medium Wave News, and the British DX Club.

There are currently only 66 stations still broadcasting in what is known as the Tropical Band (2300 to 5060 kHz). The vast majority of those are located in Asia and South America (Fig. 1). It is estimated that around 80% of all active tropical band stations are still received in Europe under the right propagation conditions.

However, the dependency on radio as the primary broadcast medium is still apparent in developing countries and those with issues such as unequal internet access and connectivity, and digital illiteracy. My colleague Martin Butera has written about this for the case of Brazil in this magazine.

Another example is Nigeria: Here, the population is estimated at 130 million, who have access to 24 million radio sets but only 7 million television sets. Despite many rather gloomy predictions (Table 1) tropical band broadcasting is still a valued function for millions of listeners across the globe!

By contrast, the Tropical Band stations listed in Table 2 ceased broadcasting in 2020 and 2021.

Tropical DX Survival

That notwithstanding, there are still many interesting DX catches to be had from the Tropical Band, as they are from elsewhere. A personal favourite is the Canadian time station CHU, which transmits from Ottawa (at 45° 17' 47" N, 75° 45' 22" W) on 3330, 7850, and 14670kHz.

CHU is operated by the National Research Council (NRC). It commenced broadcasting in 1938 to disseminate official time across Canada and the world when ionospheric conditions permit. The transmissions ceased, due to storm damage, on 21st May 2022.

I regularly received CHU on 3330 kHz in the United Kingdom during the North Hemisphere winter DX season. The official time reference is UTC (Universal Coordinated Time) which represents the world time that DXers utilise in their reception reports.

The 'digitised' voices were first introduced in 1990 the English voice is provided by former CBC announcer Harry Mannis and the French voice is that of Simon Durivage of Radio Canada.

The list in Table 3 shows my general Short Wave logs for this month.

A Design Classic: The Lowe HF225

The Lowe HF150 followed the success of the earlier HF225. Both radios soon became perennial favourites amongst radio enthusiasts and SW listeners, and the modifications, display lights and 'colour' versions *Fenu Radio* came up with were, indeed, stunning (Fig. 2).

https://tinyurl.com/568uetbw

One of the acknowledged major strengths of both the HF225 and HF150 models was that – in crowded broadcast bands – these radios would clearly separate those weaker signals from more robust signals local to the listener. Moreover, the ergonomic, user-friendly, design of the Lowe HF225 was ever attractive; it still is, I think.

It came with some great accessories, such as the PR-150 Preselector and the SP-150 Speaker in its own rack (Fig. 3). I am sure you will agree that this system was, indeed, eye-catching.

It also delivered an excellent performance for the then retail price.

The HF150 manual at the time advised against connecting large antennas. It is suggested that with the 20dB internal attenuator switched on, the active antenna was delivering signals that the receiver might not process.

However, I have not had a similar experience when connecting my Wellbrook ALA 1530 and listening to the crowded European Medium Wave broadcast band.

Maybe a more practical solution would be to connect a 10m long wire or dipole; this might deliver good DX results, depending on the prevailing propagation conditions, the time of the year, and other factors.

The Lowe HF225 originally retailed at £499, and a plug-in keypad was priced at £44.95. The present-day second-hand market price is approximately £220 for a unit in good condition.

The keypad is still much sort after and often increases the price to around £250. Demand for a good Lowe HF225 is still high; it is a classic receiver that is effective and simplistic to operate. It strongly appeals to both new and experienced DXers, who wish to operate a traditional communications receiver.

FERNANDO @ FENU RADIO (FENU@FENU-RADIO.CH)

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Fig. 1: Some of the operational Tropical Band broadcasters in 2022. Fig. 2: An eye-catching *Fenu Radio* modification of the *Lowe HF150*. Fig. 3: The *Lowe HF 150 | SP-150 | PR-150* System: A veritable feast for eyes and ears.

Spain, Radio Caroline and RNZI

It has been reported (in the BDXC *Communication* Newsletter, July 2022 Edition 572) that Radio Nacional de España (RNE) has reduced the power of the following stations:

- 585 Madrid (Majadahonda) from 300kW to 100/150kW
- 621 Santa Cruz de Tenerife (Las Mesas) from 300kW to 75/100kW
- 639 A Coruña (Meson do Vento) from 300kW to 75/100kW
- 684 Sevilla (Los Palacios) from 300kW to 100/150kW
- 738 Barcelona (Palau de Plegamáns) from 300kW to 100/150kW
- 855 Murcia (Torre Cotillas) from 300kW to 75/100kW.

This may make possible the reception of more distant low-power stations because of a reduction in co-channel interference, thus reducing the dominance of the 'Spanish Armada' on the after-dusk UK MW band.

Region	1973	1985	1997	2009	2022
Central Africa	102	76	40	18	2
Southern Africa	57	39	33	20	5
Middle East	9	4	1	0	0
Indian Sub-Continent	62	45	45	29	1
South-East Asia	40	29	21	4	1
Indonesia	171	105	65	13	2
China, Taiwan, Mongolia	119	110	75	32	19
Former USSR	61	59	47	7	3
Far East	38	28	28	9	7
Papua New Guinea	17	20	20	15	0
Australia and Pacific Region	10	4	13	8	9
Central America/ Mexico	21	23	24	5	0
Caribbean	29	3	3	2	3
North-West & South America	98	41	19	3	1
Ecuador	47	33	22	5	0
Peru	78	69	78	28	5
Bolivia	35	42	25	14	1
Brazil	107	87	67	35	7
South America	5	2	1	0	0
Total	**1105**	**819**	**627**	**247**	**66**

Table 1: Tropical HF Broadcasting Stations of the World (1973-2022).

In other news, Radio Caroline's website reports that "*we are still happy to receive reception reports for our 648 AM service*". A reception report is contained on their 649 AM page:
https://tinyurl.com/2w3w435t

Since Radio Caroline's legal return to Medium Wave Broadcasting in late 2017, it has steadily grown its operations and increased its transmitter power in 2021. The new output power of 4kW now covers listeners in East Anglia, East Midlands, and Kent.

Frequency	kW	Station	Location
2485	2	Radio Vanuatu Emten Lagoon	Vanuatu
3260	10	NBC Madang	Papua New Guinea
3325	10	NBC Bougainville	Papua New Guinea
3945	10	Radio Nikkei, Nagara	Japan
4055	0.25	Radio Verdad, San Esteban	Guatemala
4775	1	Radio Congonhas, MG	Brazil
4820	15	Kyrgyz Radiosu, Bishkek	Kyrgyzstan
4835	10	AIR Gangtok, Sikkim	India
4921	1	Radio La Voz del Pueblo	Peru
4940	1	Radio San Antonio Villa Atalaya	Peru
4950	50	AIR, Srinagar, Jammu & Kashmir	India
4965	5	Radio Alvorada, Parintins, AM	Brazil
4985	1	Radio Brasil Central, Goiânia, GO	Brazil
4990	1	R Apintie, Paramaribo	Suriname
5035	10	R Aparecida, Aparecida, SP	Brazil
5040	50	AIR, Jeypore, Odisha	India

Table 2: Tropical Stations Who Have Ceased Broadcasting in 2020/1.

Freq.	Station	Location	SINPO	Language	KW	UTC	Date	DXer
5945	Radio Romania Int	Galbeni-Bacau, ROM	55555	English	300	22:46	27/05	SC
6195	BBC WS	Kranji, Singapore	43333	English	125	22:35	27/05	SC
7295	Radio Algérienne	Issoudun FRA	44444	Arabic	500	05:13	07/06	SC
7335	Radio Marti	Greenville, USA	33333	Spanish	500	23:50	06/06	SC
7465	BBC WS	Kranji, Singapore	22222	English	250	22:31	27/05	SC
9265	WINB	Red Lion, USA	33333	English	50	23:50	05/06	SC
9330	WBCQ	Monticello, USA	43333	English	250	23:54	05/06	SC
9810	BV Broadcasting	Nauen, GER	33333	English	100	17:34	29/05	SC
9920	Radio Thailand	Udon Thani, THA	43333	English	250	19:18	29/05	SC
12005	Radio Farda	Lampertheim, GER	33333	Persian	250	12:09	10/07	SC
15450	Radio Liberty	Lampertheim, GER	33222	Tajik		14:32	25/06	SC
15490	BBC WS	Ascension Island	43333	French		18:13	25/06	SC
15520	Radio Exterior de España	Noblejas, ESP	44444	Spanish		18:07	25/06	SC
15610	VOA	Botswana	33333	Kurdish		14:37	25/06	SC
15825	WWCR	Nashville TN, USA	43333	English	100	18:23	25/06	SC

Table 3: The Author's Main Short Wave Logs This Month.

UTC	Frequency	Target Area	Daily
00:00 – 05:58	15720	Pacific	Daily
05:59 – 07:58	11725	Pacific	Daily
07:59 – 10:58	7245	Pacific	Mon – Fri
10:59 – 12:58	7245	NW Pacific	Mon – Fri
10:59 – 13:58	7245	Pacific	Sat – Sun
12:59 – 16:50	5980	Pacific	Sun – Fri
12:59 – 18:58	5980	Pacific	Sat
16:51 – 18:35	7425 DRM	Cook Islands, Samoa, Tonga	Sun – Fri
18:36 – 18:50	9655 DRM	Cook Islands, Samoa, Tonga	Sun – Fri
18:51 – 19:50	11690 DRM	Tonga Niue, Samoa, Cook Islands	Sun – Fri
18:59 – 19:58	11725	Pacific	Sat
19:51 – 20:58	13840	Cook Islands, Samoa, Tonga	Sun – Fri
19:59 – 00:00	15720	Pacific	Sat
20:59 – 00:00	15720	Pacific	Daily

Table 4: Radio New Zealand International (RNZI): Frequencies (March to October 2022).

3a

SCOTT CALDWELL

3b

I regularly receive their signals in Warrington (Cheshire) after dusk with a strong SINPO rating of 44333.

This currently bucks the trend concerning MW broadcasting, as many stations across Europe are shutting down due to high operating costs and falling listener numbers. It seems ironic that Radio Caroline's second-hand Harris transmitter is located at the former BBC World Service facility at Orfordness.

Radio Caroline can also be contacted via their head office:

Radio Caroline
PO Box 12524
Malden
Essex
CM9 9EX

Last but not least, Radio New Zealand International broadcasts to the Pacific region on the frequencies shown above (Table 4).

The British DX Club (BDXC)

The British DX Club (BDXC) was established in 1974. It was initially named the 'Twickenham DX Club' and catered for a local membership demographic. However, its rapid membership growth dictated that a more national branding was required, and it subsequently changed in 1979 to the BDXC, and it5 is now one of the oldest DX clubs still in operation. In 2019, the BDXC celebrated its 45th Anniversary, documented in a special edition of the club's flagship publication – *Communication*. The BDXC is administrated by a group of unpaid volunteers who are united by their passion for radio broadcasting.

The current membership rates for 12 months are as follows: UK and BFPO £18.00; Europe/ Worldwide via airmail £30.00; Electronic Subscription (PDF format via email £10.00. More membership details are available at the BDXC website **http://bdxc.org.uk**

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The Wellbrook S/N FLX1530LN-3245 Loop Aerial

Keith Rawlings reviews the long-awaited new Wellbrook S/N FLX1530LN-3245 active loop aerial, looking at its key components, directionality, performance and multiple uses.

Wellbrook Communications ('Wellbrook') are renowned for manufacturing high-performance active broadband receiving loop aerials. Over the years there have been several models in the range to choose from, for example, the ALA100N medium aperture loop. For this aerial, users supply their own wire loop (see below).

It can be mounted either indoors or outdoors and can be suspended from any convenient point.

Then there are three variants of the ALA1530 Loop. First, the ALA1530LN 50kHz to 30MHz loop and the ALA1530 20kHz to 30MHz low noise loop. Both of these use a 1m diameter aluminium loop element. Third, there is the brand-new FLX1530LN, the subject of this review.

This aerial does not come with a loop element; instead, the user supplies a loop formed from a coaxial cable, with LMR400, RG213 or RG58 being recommended.

The Wellbrook company literature states that the FLX1530LN was developed for the (presumably US) Department of State to fit in a diplomatic bag for monitoring Radio Free Asia and the Voice of America (VOA).

Whatever the case, the FLX1530LN CAN form the basis of a very compact active loop receiving system for 50kHz to 30MHz.

It includes the same low-noise amplifier design that is also fitted to the ALA1530LN.

It should, therefore, be expected to be offering a very good performance.

A Travelling Loop

I can see immediately that this loop amplifier will appeal to travellers, as the loop and its parts may be easily packed away. Also, those with restricted space may find this design attractive; many potential uses, such as covert listening, portable operation and fixed station use, come to mind.

Further benefits are that it may be possible to locate the loop in a position for optimised reception where, say, minimum levels of locally generated interference are found.

Furthermore, by turning the loop through 90°, a further reduction in local noise should be possible.

At a fixed location, a rotator can be used to turn the loop for the best signal or the least noise. Experience shows that the 'null' of the loop (the point of minimum signal strength) can be quite 'sharp'; signals that are in this null may be missed or at least much reduced.

Another strength of the FLX1530LN is that it responds, in the main, to the radiated magnetic field and largely rejects noise generated in the local electric field.

In this context, Wellbrook claims that, compared to whip and dipole aerials, locally radiated noise is reduced by up to 30dB and mains-borne noise by 60dB

In addition to this, an extra 30dB rejection can be achieved with the 'null point' on the loop. These are, indeed, significant levels.

Opening the Box

The FLX1530LN comes in three parts: The *Amplifier* (or *Head Unit*), which is solidly encased in a plastic box measuring some 73 x 50 x 27mm and has three BNC sockets. Two of them are mounted opposite each other on the side of the case. These are for the loop connection. The third one is the output to the receiver, and it is mounted on the bottom (Fig. 1). Although small, the head unit is surprisingly weighty and as there are no screws securing the lid it is assumed that it is filled with epoxy resin.

The next part is the *Antenna Interface*. It

ALL PICTURES: KEITH RAWLINGS G4MIU

Fig. 1: The loop amplifier module.
Fig. 2: The interface unit and PSU.
Fig. 3: A 'test' mast with the FLX1530LN mounted.
Fig. 4: The compass-markings used for some directivity tests. Fig. 5: The FLX1530LN at my 'radio-quiet' test site. Fig. 6: My radio set-up in the back of my truck at the test site.

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is used for applying power remotely to the head unit via the coaxial cable run. This is also known as a Bias-T or Power Inserter (Fig. 2). Built in a diecast box measuring 113 x 63 x 30mm it has two BNC sockets on each end; one for feeding the head unit and the other one for the receiver. On one side there is a DC socket where 12V DC is applied to the unit; on the opposite side, you will find a red LED power indicator. There is an inbuilt re-setting fuse, in case of accidents, and a warning on the label about not connecting the 'antenna' output to the receiver.

This is always something to be aware of when power is fed down the coax line, as 12V presented to the front end of a receiver may well cause serious damage. Some receivers have DC blocking capacitors to protect against situations such as this. Others do not, so caution is needed.

The third Item is a 'wall-wart' type PSU for the 12V supply to the interface unit. The one supplied with the review model was of the linear type, rather than switch mode. To finish off, a 1m-long BNC patch lead is supplied for the connection between the interface and receiver.

All the parts feel robust and are well made.

The user will need to supply a suitable length of good-quality coaxial cable fitted with BNC plugs on each end to form the loop element, as well as a run of coaxial cable to connect the interface to the head unit.

Testing and in Use

Connecting everything is simple enough, for sure. Install a loop of coax to the two BNC sockets on the head unit (both BNC sockets are 'live' on the outer and inner connections, the outer braid forming the material for the element). Mount this in a suitable position and connect your run of coax back to the operating position.

Here it links with the 'antenna' input of the interface unit. Attach the 'Receiver' output of this to your receiver, using the supplied patch lead, and apply power to the interface unit (not forgetting to check the connections are correct).

While undertaking research for this review, I found a post that questioned the need of using good-quality, low-loss coax for the loop element as the poster suggested losses on the cable would be minimal at VLF to HF.

However, for the loop element, 'loss' is not the issue here. The outer braid forms the loop element and good quality coax *is essential* as cheaper cables have an inferior outer braid. For this reason, to get the best results with the FLX1530LN, you must use a high-quality cable for the loop.

To begin with, I eagerly unpacked the bits and set about temporarily rigging up a loop hanging from the curtain rail in my office. For this, I used a convenient length of LMR-240 I have. It is 3m long and fitted with BNC plugs (Wellbrook claims that a length of 5m can be used for greater sensitivity).

LMR240 seemed a good choice; it is quite rigid and tends to not 'flop' around like RG58. As a good-quality cable, it has an excellent outer braid. At 3m, it formed an approximate 1m diameter loop element. Powering the head unit was simple, as I already have a Wellbrook loop and used the existing interface unit, which is conveniently located by the window. Power was applied from my existing 12V regulated set-up.

Consequently, I found myself up and running in just a couple of minutes.

Using an SDR

Initially, I used my SDRplay RSPdx Software-Defined receiver (SDR). I could see a spectrum full of signals up to 10MHz (the set bandwidth), and experience told me that there was not a great deal of difference between the FLX1530LN hanging by the window and my 66ft receiving end-fed aerial outside in the back garden. This was a very promising start.

A quick switch-over to the end-fed aerial confirmed this, with the only difference being that on the Wellbrook there was some QRM right down at LF some of which was, most likely, noise emanating from my nearby PC and printer. Things were looking good.

I later fitted the FLX1530LN and LM240 loop to my portable mast set-up for use outside. I used this configuration throughout the rest of my testing (Fig. 3).

Directionality and Noise Floor

One of the key features of loops is their ability to be rotated for maximum/minimum signal. In the case of *small* loops, the maximum is off the *ends* of the loop and the minimum is off of the *face*. This can be used to reduce interference from an unwanted signal or to improve the reception of a wanted one.

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Investigating this trait while using the SDRplay RSPdx as the receiver, I found that I could achieve a very useful 27dB null on BBC R5 (909kHz) and 22dB on BBC R4 (198kHz) as indicated on the receiver's RSSI.

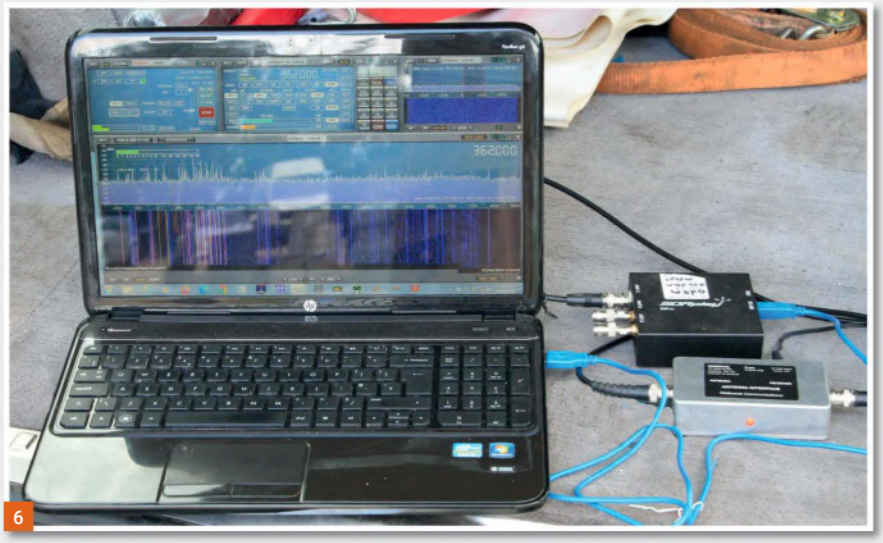
Going lower in frequency I could get similar differences with signals like MSF (60kHz) and DDH47 (147.3kHz).

I noticed that I could not get any reduction in the overall noise floor at LF when turning the loop. In addition, a strong QRM source in sections of the NDB and MW bands tended to be worse on the loop, in comparison to my 66ft end-fed (or PA0RDT), where this QRM is minimal.

Reception on Medium - and Short Wave

The NDB/MW QRM could be reduced by moving the loop to the other end of the garden but the noise floor remained high wherever the loop was placed and regardless of how it was turned. This is not a criticism of the FLX1530LN but more of an observation as I have noticed this phenomenon with other loops.

A tune around the NDB bands demonstrated that the FLX1530LN would be a very good choice for NDB reception. Here, overall noise levels were considerably lower than those on the end-fed, and beacons were generally much stronger. Turning the loop would bring some beacons up while nulling out others.



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MW reception was very good; and turning the loop could be deployed to great advantage, significantly minimising noise and enhancing wanted signals.

On the HF/SW bands, the signal levels received were on a par with my 66ft end-fed. As is usually the case, there were places where the FLX1530LN performed as well as, or better than the end-fed, and vice versa. On the lower frequencies, especially during daylight hours, the loop displayed reasonable directional properties on some signals; as was expected, the higher in frequency the less this became notable, due to the higher angle of arrival of these signals.

Where the FLX1530LN did prove useful was in reducing local noise. As mentioned previously, for LF reception moving the loop position could reduce noise levels considerably, as did turning the loop for minimum interference level. On the higher HF frequencies, this resulted in good noise reduction will little effect on the strength of the wanted signals.

Checking the directional properties of the loop on LW and MW I found that for minimum signal/maximum null – and for a reduction of an indicated 10dB of signal – the loop needed to be turned no more than approximately 10° either way, which is quite sharp. Normally figures for the 3dB point are taken for measurements but the minimum point of the loop was so sharp that I could not steady the position accurately enough for a stable reading (Fig. 4).

I took the opportunity to compare the FLX1530LN with my ALA1530LN, and here I got a bit of a surprise: The overall gain of the FLX1530LN was *higher* than that of the ALA1530LN, probably due to the larger diameter of the LM240 loop element, and the null was sharper. The background noise was marginally lower too. During my tests, there were no noticeable instances of interference from the supplied PSU.

Conclusion

The FLX1530LN performed extremely well at my test site (Figs 5 and 6). Right from the start, it returned surprisingly good results throughout its range of 50kHz to 30MHz. It is compact and unobtrusive; ideal for use on the move and, if suitable weatherproofing is applied, for permanent outside use too. It seems to be capable of largely rejecting a lot of local noise so would be a good choice for indoor use where it can be mounted in any convenient position. The use of a rotator is recommended to take full advantage of the loop's directional properties.

The FLX1530LN provides scope for experimentation and I would have liked to try the amplifier with larger loop apertures and also with different types of coaxial cable. It must be noted that the use of different coax for the loop may result in different figures than those I found here.

However, when using the 1m LM240 loop, I was impressed with the overall results that the FLX1530LN returned.

Therefore, this loop can certainly be thoroughly recommended.

The current price of the FLX1530LN is £216, plus shipping.

My thanks (and those of the editor) go to **Andrew Ikin**, of Wellbrook Communications, for the loan of the review item. For the full technical details of the FLX1530LN, take a look at this page:
https://tinyurl.com/m4fh5f2y

WORTH £216

Win this Wellbrook FLX1530LN

The Wellbrook FLX1530LN is a compact Active Magnetic loop antenna, primarily designed to provide improved performance over conventional passive and active antennas. It offers a higher gain, compared to the original ALA1530LN, plus additional 10dB sensitivity in the mid/upper HF region. Wellbrook is the only company to manufacture active loops that use an ultra-low JFET design. This new design has significantly improved the LW/MW and SW reception by increasing the Signal-to-Noise ratio by up to 16dB, compared to some other active loop antenna manufacturers. The LW and MW 3rd order IMD is now approx. 20dB lower compared to previous models. This is due to the lower IMD of the JFETs.

To be in with a chance of winning this fabulous prize worth £216, all you need to do is visit our website at **www.radioenthusiast.co.uk/competitions** and correctly answer this question...

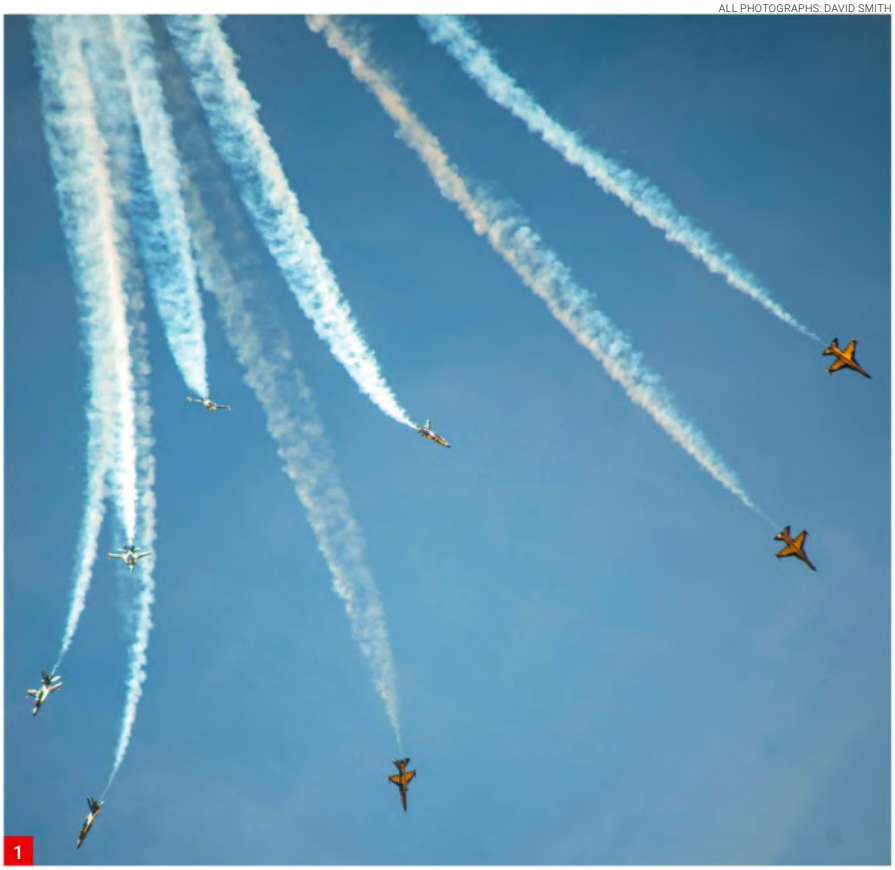
What is the name of the design employed in the Wellbrook FLX1530LN

a. FJET b. TJET c. JFET

Entry is only via our website. Entries close at midnight on **3rd October 2022.** To enter you must answer the question correctly and answers received after the end date will not be accepted. The winner will be notified by email by **10th October 2022.** Warners Group Publications Plc standard competition terms apply, to view visit warners.gr/compterms. For information on how your personal data is processed, secured and your rights, our Privacy Policy can be viewed here – warners.gr/privacy or available in hard copy upon request. The winner will also be announced in the **November 2022** issue of RadioUser.

David Smith
dj.daviator@btinternet.com

ALL PHOTOGRAPHS: DAVID SMITH



1

Typhoons over Ireland and Fairford RIAT

David Smith explains how RAF Typhoons are permitted to enter Irish airspace in certain circumstances and reports on advances in electronic warfare. He profiles RAF Lakenheath and relives Fairford Air Tattoo.

On occasion, the UK scrambles Typhoons to intercept aircraft not responding to ATC in Irish-controlled airspace. However, this is not formally protecting Irish skies, as many still believe. In addition to the RAF intercepting aircraft off the coast of Ireland, there exists an 'agreement' that allows British aircraft to transit sovereign Irish airspace for specific reasons. These are for air counter-terrorism duties, which include checking on unresponsive airliners and responding to hijackings and unidentified aircraft. Typhoons can be launched to intercept such aircraft in Irish Flight Information Regions for air policing duties because Ireland is not capable of doing so itself.

This is mutually beneficial to both Ireland and the UK: Owing to the speed of modern aircraft, the UK needs to be able to intercept aircraft even as far southwest as Ireland and beyond. Additionally, the controversial agreement also reportedly allows British aircraft to transit sovereign Irish airspace should that be required. Sovereign airspace extends 12 miles from the coastline and is part of Irish territory.

However, Flight Information Regions and Upper Information Regions are designed to ensure the safety of civil aviation and have provision for ATC services provided by a nation nearby. For example, sections of French and Dutch airspace are delegated to London Control to better handle the traffic flows.

Ireland operates the Air Corps, which provides military support to the Irish Army and Naval Service but lacks any jet combat aircraft capable of, for example, intercepting Russian aircraft. There are discussions ongoing in Ireland to examine options to remedy this, including the purchase of fighter jets.

However, this and developing the necessary air defence and training systems will be expensive. Therefore in the short term, Ireland will continue to rely upon the RAF to deter and monitor Russian or other aircraft that enter its airspace without permission.

Russian long-range aviation often transits the London and Scottish Upper Flight Information Regions (UIR) without filing a flight plan, talking to ATC or switching on their transponders. They operate according to 'Due Regard', in other words, they use onboard radar to keep clear of other aircraft. This makes them effectively invisible to civilian ATC and is potentially dangerous to airliners flying through this airspace.

By 'shadowing' Russian aircraft, the intercepting aircraft's transponder can show ATC where they are, allowing controllers to move airliners safely out of the way. The Russian air force knows that it can approach or even enter Irish airspace with far less immediate and serious consequences than if it did the same to other North Atlantic countries such as Iceland, where there is a NATO air policing mission, or Norway, which has a well-equipped air force capable of quickly intercepting suspected incursions.

Russian aircraft will normally be intercepted by the Norwegian Air Force and then handed over to RAF aircraft, ensuring they are continually shadowed.

The Advance of Modern Electronic Warfare

Electromagnetic warfare is an emerging method of waging war. It uses electrical energy instead of bombs and bullets to attack an enemy's means and will to continue fighting. It employs aimed electrical energy to destroy or disable critical enemy electronics for navigation and guidance, computing, communications, displays, timing, sensors, and many other military applications.

Fig.1: The *Black Eagles* from South Korea at Fairford.
https://tinyurl.com/ucnzdjye
Fig. 2: An *AgustaWestland AW149*.
https://tinyurl.com/3nuyyjds

Electromagnetic warfare has been classified under names like High-Power Electromagnetics (HPEM) directed-energy weapons, microwave arms and electromagnetic pulse devices (EMP).

It does not involve electronic warfare (EW), optical warfare, laser weapons, or cyber warfare.

Future uses of electromagnetic warfare will be on land, air, space, and perhaps even under the sea. The technology involves the same kind of energy as static electricity. It can give a stinging shock in dry weather, but it is controlled and measured. It typically does not leave explosive destruction and collateral damage behind, as bombs and missiles always do.

Electromagnetic warfare differs from electronic warfare in that it seeks to destroy or damage electronics, rather than jam, spoof, or eavesdrop on electronic signals for communications or radar sensors. It differs from laser weapons in that electromagnetic weapons use electronic energy rather than optical energy. The oldest and best-known electromagnetic weapon is lightning, which does a great job of 'frying' electronics.

Unfortunately, there is no means to control and aim it, and it can cause widespread collateral damage.

Nevertheless, researchers in the US Department of Defense (DoD) are working on electromagnetic weapons that might be the next best thing to controlled lightning.

The US DoD has issued contracts to several companies, including one to determine the feasibility of using electronically-killing EMP weapons aboard combat aircraft. Technologies are being investigated to enable the emission of a short burst of EMP that would damage or destroy targeted electronic systems, such as radar, communications, power grids, land vehicles, and aircraft.

The effects would be similar to those of a lightning strike by disabling or destroying any kind of unshielded modern electronics, ranging from computers to electric generators and small appliances.

Closer to home, last September the UK Ministry of Defence awarded a contract to develop a high-power Radio Frequency weapon for the back of a military truck, as part of the *British Novel Weapons Programme*.

The photographs (Figs. 1-5) show some of the participating aircraft at this year's *Fairford Royal International Air Tattoo*.

Military ATC Profiles No 17: Lakenheath

ICAO Code: EGUL IATA Code: LKZ

Frequencies	(MHz)
Lakenheath Approach	275.825; 136.500
Lakenheath Departures	264.575
Lakenheath Radar (PAR)	315.700
Lakenheath Radar (MATZ crossing)	242.05
Lakenheath Radar (Civil transit)	128.900
Lakenheath Tower	373.775; 122.100*
Lakenheath Ground	397.350
Lakenheath Dispatcher	244.475
Lakenheath Command Post	379.800
Lakenheath Metro	257.750; 284.425
Swanwick Mil (Initial Contact Frequency)	259.600

*NATO Common Frequency. Available on request only.

ATIS	
Lakenheath Information	341.050
Navaids	ILS/DME Runway 06 and 24 TACAN LKH
Runways	06 (2742 x 46m)
	24 (2742 x 46m)

Notes (A-Z)

Arresting Systems
Cables both ends.
CAT II/III Operations: Nil.

Ground Movement
Portions of the Taxiway are not visible from the control tower. Vehicle driving lanes adjacent to all Taxiways. Use Taxi lights at max brilliance for night operations.

Military Aerodrome Traffic Zone (MATZ)
Standard 5nm radius with stubs aligned Runway 06/24 surface to 3,000ft above aerodrome level. Additional NE stub 1,000-3,000ft AAL.

Noise Abatement Procedures
Mandatory Quiet Hours apply. Jet aircraft to avoid overflight of towns of Lakenheath, Brandon and Thetford. All arrivals and departures during quiet hours require 48 hours' approval.

Operational Hours
0600-2200 Mon-Thu, 0600)-1800Fri. Closed Sat, Sun UK and US Holidays.
Closed weekends and Public Holidays.
Use of Runway: None specified.

Warnings
Transient aircraft Instrument Approaches only. All aircrew contact Approach Control for the status of Danger Area EGD 203. Instrument Approach Procedures (IAP) for this aerodrome are established outside controlled airspace. Bird strike hazards effective May to June and October to February. Avoid Lakenheath Fen by a margin of 1 to 5nm, or overfly not less than 3,000ft AMSL, due to increased bird activity and pyrotechnic bird dispersal technique. The Danger Area EGD 208 is situated 7-12nm final to Runway 24.

RAF Mildenhall is located 4nm SW, sharing Aerodrome Traffic Zone and MATZ.

Fig. 3: An *FA-18 Hornet* of the Spanish Air Force.
https://ejercitodelaire.defensa.gob.es/EA/ejercitodelaire/en

Fig. 4: The *Frecci Tricolori* MB-339s.
https://aerobaticteams.net/en/teams/i66/Frecce-Tricolori.html
Fig. 5: A *KAWASAKI C-2* of the Japanese Air Self-Defence Force.
https://www.mod.go.jp/asdf/English_page

Airshows

David Smith has diligently compiled the final part of our popular Airshow Guide for the 2022 Season. Don't forget to take your scanners and aerials, notebooks and cameras and let us know what you have spotted.

August 26th (Friday)
SIDMOUTH AIR DISPLAY: Sidmouth, Devon EX2 4DR. Seafront show which includes the *Red Arrows*.
https://tinyurl.com/s7hzujrf

August 27th (Saturday)
DUXFORD FLYING EVENING: Duxford, Cambs CB22 4QR. Featuring vintage and classic aircraft.
https://tinyurl.com/5n76rwfw

August 27th (Saturday)
PROMS SPECTACULAR: Three Counties Showground, Malvern WR13 6NW. Classical concert, parachuting and Spitfire display.
https://tinyurl.com/msvb27xm

August 27th (Saturday)
WINGS AND WHEELS: Henstridge Airfield, Henstridge Marsh, Somerset BA8 0TA. No air displays but many classic cars and visiting aircraft. Visitors will be able to inspect them.
www.wingsandwheelshenstridge.com

August 27th & 28th (Saturday & Sunday)
RHYL AIR SHOW: Rhyl, Denbighshire, North Wales LL19 3AF. Free seafront airshow with military and civil aircraft.

August 28th (Sunday)
LITTLE GRANSDEN AIR AND CAR SHOW: Fullers Hill Farm, Little Gransden, Cambs SG19 3BP. Always a popular family event with several hours of display flying.
www.littlegransdenairshow.co.uk

September 1st to 4th (Thurs to Sun)
BOURNEMOUTH AIR FESTIVAL: Bournemouth, Dorset BH1 3AF. Over the water between Boscombe and Bournemouth Piers. Billed as one of the biggest free airshows in Europe, supported by many ground events for all the family. In 2021, the Red Arrows performed on each of the four days.
www.bournemouthair.co.uk

September 2nd to 4th (Fri to Sun)
CHATSWORTH COUNTRY FAIR: Chatsworth, Bakewell, Derbyshire DE45 1PP. Mainly extensive ground events, but there are usually hot air balloons and a few aircraft displays, the latter on only one of the days not yet specified.
https://tinyurl.com/59zcn434

September 3rd & 4th (Sat & Sun)
THE VICTORY SHOW: Foxlands Farm, Cosby, Leicestershire LE9 1SG. A tribute to World War Two with 1940s vehicles, 50 re-enactment groups and much else. Expect static and flying classic and modern aircraft.
www.thevictoryshow.co.uk

September 4th (Sunday)
SHUTTLEWORTH STEAM AND VINTAGE AIR SHOW: Old Warden, Biggleswade, Bedfordshire SG18 9EP. Lots of old aircraft performing, plus extensive ground attractions with a vintage theme.
https://tinyurl.com/2tbshtzu
Tel: 01767 627927

September 8th (Thursday)
JERSEY INTERNATIONAL AIR DISPLAY: St Aubins Bay, Jersey, Channel Is. A coastal event with an impressive line-up, including much foreign participation rarely seen on the mainland.
www.jerseyairdisplay.org.uk

September 8th (Thursday)
GUERNSEY AIR DISPLAY: St Peter Port, Guernsey, Channel Is. Centred to the east of the harbour, it features many of the same performers as the Jersey show on the same day, including the Red Arrows.
www.guernseyairdisplay.com

September 9th (Friday)
ABINGDON DUSK PHOTOSHOOT: Abingdon Airfield, Oxfordshire OX13 6JG. An opportunity to photograph a selection of the aircraft taking part in the airshow on the following day.
https://tinyurl.com/3a4yme3p

September 10th (Saturday)
ABINGDON AIR AND COUNTRY SHOW: Abingdon Airfield, Oxfordshire OX13 6JG. Extensive military and civil aircraft participation, plus many ground attractions.
www.abingdonairandcountry.co.uk

September 10th (Saturday)
GATHERING OF MOTHS: Old Warden, Biggleswade, Bedfordshire SG18 9EP. Presented by the de Havilland Moth Club and a fly-in rather than an airshow.
https://tinyurl.com/m5dutbmn

September 10th (Saturday)
CORNWALL STRUT FLY-IN: Bodmin Airfield, Cornwall PL30 4BU. Not an airshow as such, but spectators are welcome to attend.
Strut is the name given to each branch of the Light Aircraft Association.
https://tinyurl.com/34kk6e57

September 10th & 11th (Sat & Sun)
BATTLE OF BRITAIN AIR SHOW: Duxford Cambs CB22 4QR. A themed 1940s show with ground events remembering Duxford's history and much else from that era.
https://tinyurl.com/2dayrr3e

September 10th & 11th (Sat & Sun)
CAUSEWAY INTERNATIONAL AIRSHOW: Portstewart, Coleraine, Northern Ireland. Viewable from the A2 coast road between Portrush and Portstewart.
An extensive programme includes the Red Arrows on Saturday.
https://tinyurl.com/5bapvek7

September 16th to 18th (Fri to Sun)
GOODWOOD REVIVAL: Goodwood, West Sussex PO18 0PH. Recreating the early days of motor racing at Goodwood, along with static and flying displays of pre-1966 aircraft.
https://tinyurl.com/55hy83z9

September 24th & 25th (Sat & Sun)
SYWELL CLASSIC PISTONS AND PROPS: Sywell Aerodrome, Northants NN6 0BN. Classic cars, bikes and aircraft, along with great family entertainment.
www.sywellclassic.co.uk

First published in 1986 as *Air Band Radio Handbook*, David J Smith's *Air Traffic Control Handbook* (pictured) is now published in 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.
https://tinyurl.com/37zz78nd

1

Time, Measurement and Radio (Pt I)

The editor looks at the relationship between time measurement and radio and experiments with simple but versatile setups to try out the reception of Standard Frequency and Time Signal (SFTS) stations.

Georg Wiessala
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Time flies". "Time and Tide wait for no Man". "Second-time Lucky". "A Stitch in Time Saves Nine'; and, above all: *"Time is money"* – The English language is replete with references to 'time' – that most precious, most subjective, and most elusive of phenomena. Two developments, in particular, have recently channelled my interest in time and radio towards writing this article:

First was a piece (Daniel, 2021) regarding the world's most accurate clock winning the 2022 *Breakthrough Prize in Fundamental Physics*. Scientists from the National Institute of Standards and Technology (NIST) and the University of Colorado (Boulder) put together an optical lattice clock, which will lose one second every 15 billion years. That is more than the currently assumed age of the Universe, and the device, once out of the lab, has applications from astronomy to geophysics.

https://tinyurl.com/3v8sbk9n

Second, on 20th May 2022, we celebrated *World Metrology Day 2022* (Fig. 1) Enough impetus then, to take the time to write about time – and radio. There are many different ways in which you can acquire accurate time signals – both radio-derived and not (Table 1).

Not all of them may count as 'radio', and there are 'auxiliary' systems too, where time signals appear as a part of other services. In Europe, for example, one may think of the *Meteo Time* scheme, with weather data embedded in the DCF 77 transmissions from Germany (Fig. 2).

The Scope of this Article

In this two-part article, I look at dedicated time signals, especially but not exclusively those disseminated through radio. In *Part One*, you are invited to accompany me into a bit of theory and history. The history, that is, of the measurement of time, otherwise known as the science of Metrology. I will also say a few words about propagation on the low (LF) and very low (VLF) frequency bands, on which some of the world's time signal transmitters are still, occasionally, to be seen (e.g. RJH63; Fig. 3).

Then, in *Part Two*, I will examine how you can best receive time signal stations in practice, including hints and tips on which antennas and receivers to use. In preparing this article, I have not only learnt a lot about a fascinating application of radio, but I have

Fig. 1: Celebrating *World Metrology Day 2022* at the NPL (National Physical Laboratory, UK). Fig. 2: The intricate structure of the DCF77 Time Protocol (PTB). Fig. 3: RJH63 Krasnodar/ Russia on 25kHz with the signal structure shown.

also enjoyed experimenting with different combinations of receivers, accessories and aerials – some general and some much more 'specialised, as you will see.

Metrology – not Meteorology

The relevance of time and its measurement (metrology) for *radio* and radio enthusiasts seems obvious: After all, many of us will want to know at what time our favourite radio show is on, especially if you are a DXer, and are used to such concepts as 'UTC', 'GMT', or the 'TAI'. TAI is the International Atomic Time (*Temps Atomique International*) to which many SFTS stations contribute a certain, pre-determined, percentage (Table 2).

Moreover, Alan Gale has recently emphasised the importance of GPS for DXers by testing the popular *Leo Bodnar Reference Clock*, which has found a place in many shacks, especially those of SDR users whose receivers do not offer an inbuilt clock (Gale, 2021).

In addition, some professional propagation prediction tools like *PropLab PRO* depend on very exact time measurements (Fig. 4) https://shop.spacew.com

One of the most innovative applications of time measurement in amateur radio is the following: in the Kiwi network of Software-Defined Receivers (SDR), transmissions can be earmarked with a 'time-stamp'. Therefore, by employing information from at least three stations, a fairly sophisticated way of direction-finding, regarding the transmitter of origin, becomes possible, by looking at the TDoA (Time-Difference-on-Arrival) data. https://tinyurl.com/3v8sbk9n

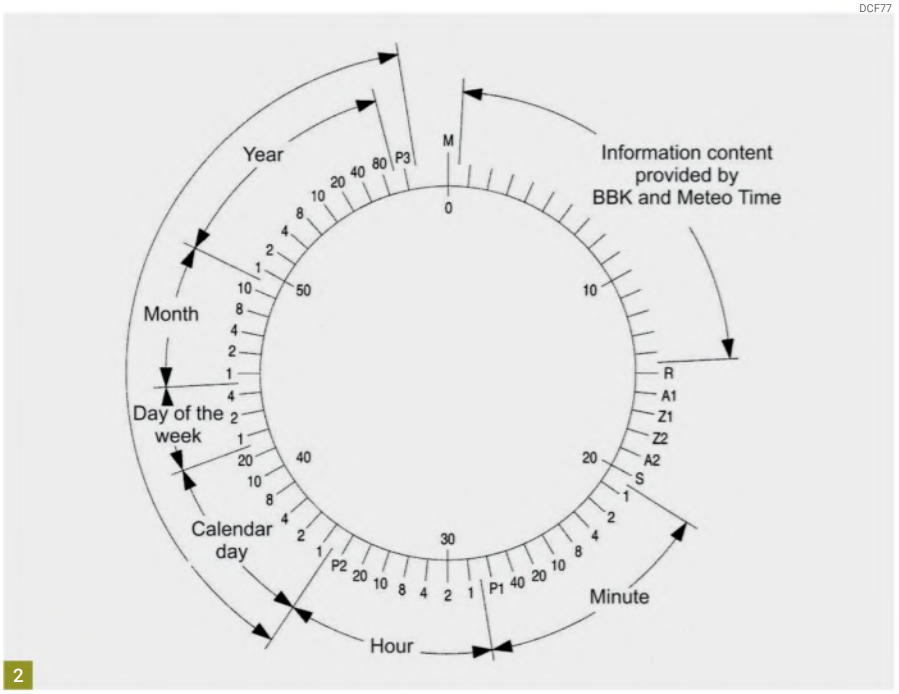
Perceptions of Time Through Radio

Impressive stuff, this. But Like many others, I often still run my day (when I can) around the time a favourite radio programme is on. At least I used to. In our 'always-on', 'streaming', 'on-demand' age, this concept is being thrown out of the window, as we all make our own schedules now, for better or worse.

To be perfectly honest with you, I am still getting used to being able to 'pause' and 'rewind' a programme on my DAB radio (a Pure *Evoke 3*)!

And as for being able to record the entire HF band overnight and replay one's DX 'catches'

DCF77



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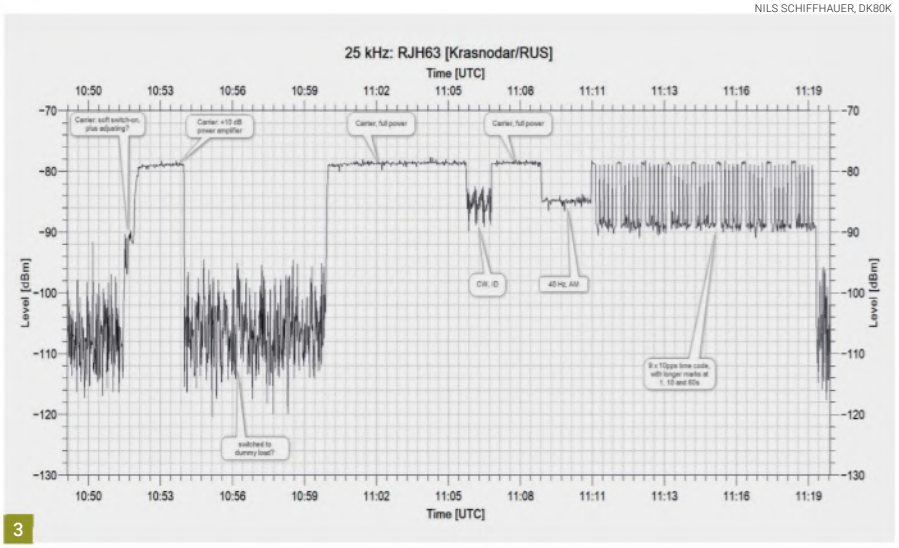
NILS SCHIFFHAUER, DK80K



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the next day; this is amazing; a 'Brave New World', indeed. These developments perhaps demonstrate that 'radio', both old and new, can change our perception of 'time'.

Knowing the Time in the Radio Hobby

Beyond that, time is vital for radio in many other ways too. For example, passengers, airband monitors and avionics trackers will, of course, want to be aware of the Estimated Arrival Time (ETA) of a flight they are interested in, while the correct time is, naturally, the very lifeblood of GPS, DGPS and general satellite communications, including voice, data and SSTV signals from the International Space Station (ISS).

The value of *über-precise*, 'atomised', time-keeping is, arguably, at its highest in the context of the Global Positioning System (GPS). This is extremely accurate but – being a satellite-to-ground infrastructure – it still requires a god direct line-of-sight path, as well as power-hungry computer systems and such infrastructure (Schiffhauer, 2018: 40).

And accurate 'time-stamping' is, of course, of the utmost importance for many utility-signal monitors, Non-Directional Beacon (NDB) enthusiasts and ham radio contesters.

I could go on: the list of how 'time' impinges on 'radio' is endless – maybe timeless.

Radio in the Fabric of Time

Perhaps most significantly, 'time' is woven into the very fabric of what 'radio' actually *is*. We all know that, like most waves,

electromagnetic ones are defined by their *period* (the time it takes for the wave to 'return' to any specific point) and by their *frequency* – the number of wave peaks that pass any given point in a second.

'Frequency' is thus the reciprocal of 'period'.

As all radio amateurs are aware, the formula for frequency-to-wavelength conversion takes into account the speed of light and is, therefore, a *time-derived measurement*. Frequency (f) and Wavelength (λ) are joined by the equation **fλ = c**, where c is the speed of light (300.000 km/s | 670 million miles/ h).

Thus, oscillations, frequencies and periods are indissolubly intertwined with time (Goldsmith, 2018: 3).

Take, for instance, the traditional SI (*Système International*) unit for the *second*. In 1967 the International Committee for Weights and Measures (CIPM) defined it as 9,192,631,770 oscillations of a *Caesium-133* atom. And the *hertz*, as an SI unit, is a measure of frequency, defined in divisions of s^{-1}, which is a count *per second* (Hand, 2016: 7).

Moreover – as I am sure that you also remember from your Physics lessons – that, on a cosmic scale, the gravitational effects of large celestial bodies, such as our Sun, cause a *time delay* for radio waves, for example, those bounced off planets (Mercury, Venus) or of one of the many man-made space probes.

This effect too had been predicted as an outcome of Albert Einstein's work (Clifton, 2017: 31/2).

Measurement & Wireless

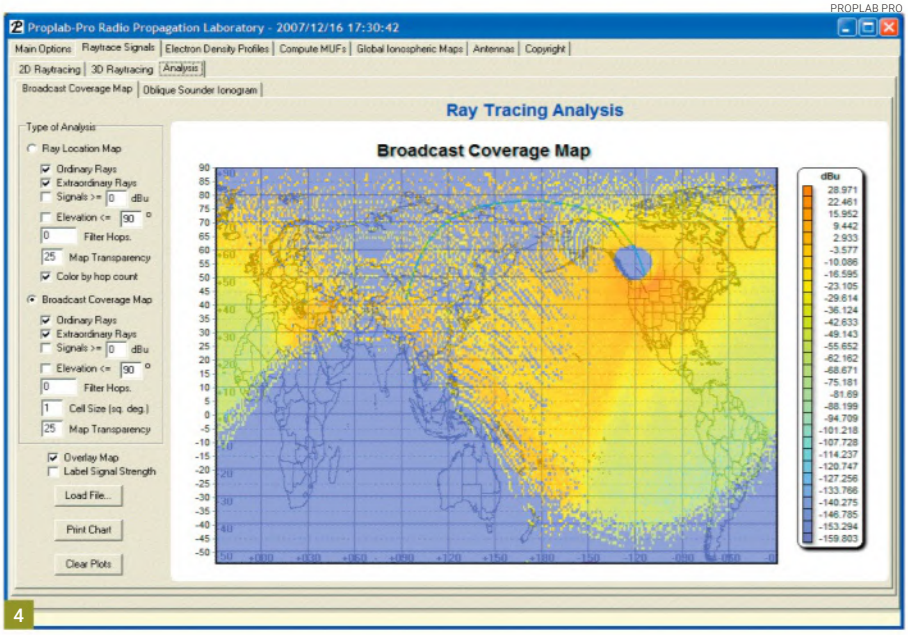
In the time before Time Signal Stations ('Standard Frequency and Time Signal Stations – SFTS' – to give them their proper name, Table 2), there was Ruth Belville (1854-1943) - the *Greenwich Time Lady*.

For decades, Ruth assiduously walked the streets of London with an 18th Century pocket watch called the *John Arnold No. 485*). She was literally selling the exact time to her business subscribers, mostly the London watchmakers (Rooney, 2008; Wiessala, 2020: 51; Orzel, 2022: 187/8).

It is a wonderful story on a truly human scale; I suppose you would call Ruth Belville the first 'human time signal station'. Ruth's time service was derived from Greenwich Mean Time (GMT) at the Royal Greenwich Observatory (RGO). GMT became the 'legal' time in Britain in 1880. Greenwich also provided the *Time Ball* for mariners at Sea (1838) and sent out electrical time signals (from 1852).

Today, the (1.00 pm) *Time Ball* – a visual time-synchronisation device – still lives on in the *Six Pips* on BBC Radio. Consider also the *Time Cannon* at Edinburgh Castle – definitely audible! Other such markers were located on Table Mountain in South Africa and elsewhere.

PROPLAB PRO



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Time & Navigation

The wider problem of time and navigation and of determining accurate *Longitude* at Sea, by comparing local time to an independent time standard, had been dogging navigators since the time of the 18th Century clockmaker John Harrison (1693-1773). He eventually succeeded with his *'H4' Chronometer* (Sobel, 1995; Hancock, 2017: 32).

Naturally, semaphore, telegraphy and the telephone were also made to serve time. And, as early as 1840, Scotsman Alexander Bain (1810-1877) claimed that it would be quite easily possible to send *time signals over a wire* (Jespersen and Fitz-Randolph, 1999: 119).

Meanwhile, time by telephone became famous via the *Speaking Clock ('TIM')* which (in Britain) was disseminated by the mellifluous voice of Miss Ethel May Cain, who was chosen for the job after a lengthy competition, involving the recitation of Milton's poetry (1909-1996; Rooney, 2008: Ch. 8).

https://tinyurl.com/2s3v555m

Hyperbolic Systems

Taken together, these developments meant that, by the end of the 19th Century, the phrase *"It is 12 noon in London"*, for instance, could easily be dispatched around the planet in one way or another, in no time at all.

Moving closer to our own time, the time-navigation nexus has long been used in various hyperbolic navigation systems, which are still in living memory for many today. These were mainly the following:

Alpha [RSDN-20, ca. 11-16kHz]
Decca
LORAN-A, LORAN-C, and
OMEGA [ca. 10-14kHz]
(Klawitter, 1991: 28).

http://www.loran-history.info/default.htm
http://www.vlf.it/alphatrond/al[ha.htm

Electric Time Lords

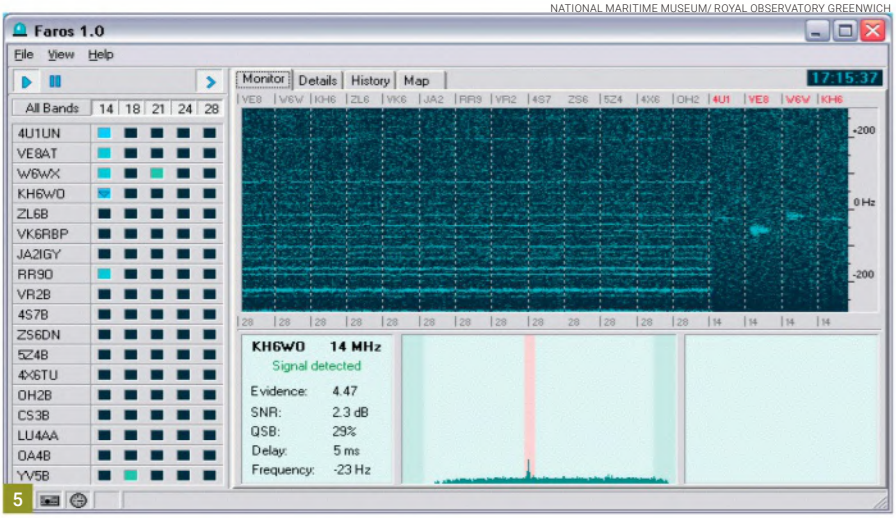
In the telegraphic time dissemination of later ages, the Royal Observatory, the General Post Office (GPO), the US Naval Observatory in Washington, DC, the National Bureau of Standards, and the little-known Standard Time Company (STC), were, indeed, the *Time Lords* of the day, to borrow a phrase from *Dr Who*.

"The click-click of the telegraph", observes Frank (2011: 123), *"provided people with their first direct experience of simultaneity at great distances."* But before that, the issue of delays incurred by the time it took for the telegraph signals to *travel down the wires* had to be resolved, for the sake of future geodesy, longitude, and exact map-making.

This was soon overcome, and in the late 18th and early 19th Centuries – the Age of Empire(s), industry, railways, time zones, the *Prime Meridian* (fixed at the *International Meridian Conference* in Washington, DC in 1884) and undersea cables – even more accuracy was required.

Time transmissions were now subservient to the strict demands of *standardization, simultaneity* and *synchronization*. Time was now 'UTC' – and a public resource. In 1870, the British Post Office took over the control of all former telegraph companies, to facilitate what might be called the 'dispersal of simultaneity'.

NATIONAL MARITIME MUSEUM/ ROYAL OBSERVATORY GREENWICH



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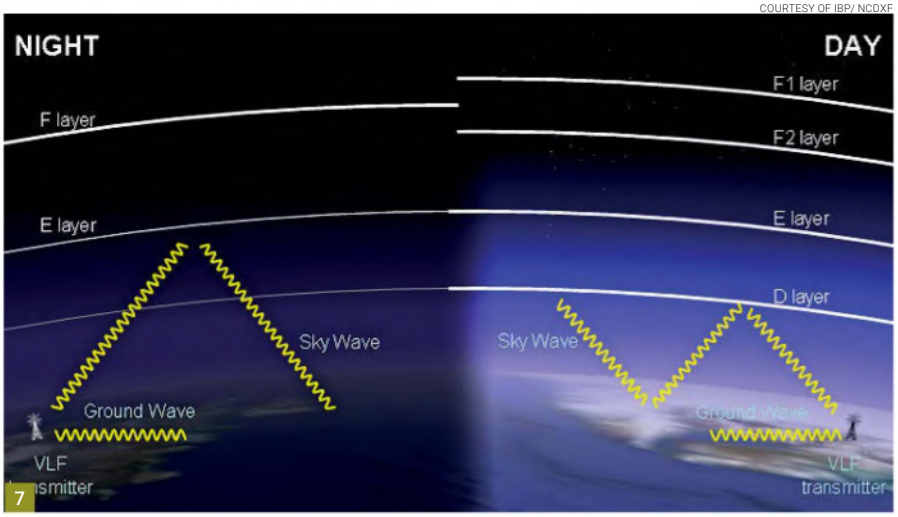
CROSBY LOCKWOOD & SON LTD (AND LEGAL SUCCESSORS)

6

COURTESY OF IBP/ NCDXF



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WIKIPEDIA

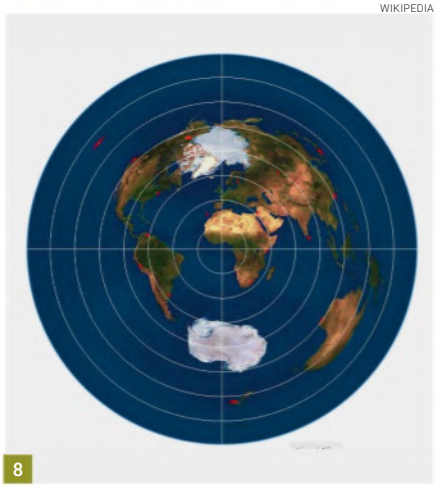

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Fig. 4: Software prediction tools like *PropLab PRO* require very accurate time data to work.
Fig. 5: FAROS: shows the 'Lighthouses in the Ether' (Nils Schiffhauer).
Fig. 6: A map showing the 'travelling distances' of Big Ben's sound across London.
Fig. 7: A general overview of propagation of (VLF) signals by day and night.
Fig. 8: Locate yourself; Azimuthal Map from the IBP/ NCDXF homepage.
Figs. 9 & 10: Time Signals, observed and visualised over a longer period.

This, then, for many, was the *First Age of Globalisation*, preceding our own.

Standardisation & Coordination

From the late 19th Century onwards, electrically coordinated time became mandatory, worldwide. Frank summarises perspicaciously: *"Time and space collapsed into the invisible domains of electric currents racing along wires […]."*

Meanwhile, in the early years of the 20th Century, the unparalleled genius that was Albert Einstein (1879-1955), was working away in the Swiss Patent Office (from 1902 to 1909) to make sure the hearts of the clocks of the city of Berne (Switzerland) were all beating to the same electrical impulse. That was his day job.

While the mechanics of clock synchronization employing electrical signals filled his routines, he also formulated his *Special Theory of Relativity* (Frank, 2011: 126/7, 142). As you do!

Controlling Space and Time

It was a mere three years after Guglielmo Marconi's (1874-1937) first experiments with wireless communications (Weightman, 2004), that Howard Grubb (1844-1931) suggested, in 1898, that one could employ 'Hertzian Waves' to transmit signals containing information about the correct time.

Some 50 years after that, the US Navy sent the very first-time signals to control ship chronometers remotely.

What is more, both Nicola Tesla (1856-1943) and Oliver Lodge (1851-1940) are known to have investigated 'natural' radio and signals at very low frequencies from about 1904 (Schiffhauer, *RadioUser*: October 2018: 40) – the former especially at Colorado Springs and Wardenclyffe (Wiessala, 2022a: 51).

Then, in the year 1910, the Eiffel Tower in Paris was used to send Europe's most popular time signal on a wavelength of 2,000m. The BBC followed suit, with an automatic time signal from 1924. Aside from the *Six Dots*, the BBC also broadcast the toll of the bells in *Big Ben*. Towers and lighthouses, real or not, still echo throughout the story of time, if only in a name (Fig. 5). And the map in Fig. 6 shows a wonderful old image, illustrating the time it took for the sound from the chimes of Big Ben to reach the various inner and outlying parts of London *at the time* (de Carle, 1947).

https://tinyurl.com/yzsyp4bm
https://tinyurl.com/y9f3qcbk)

Radio Control for Clocks

During the further few decades of the 20th Century, quartz crystal timekeeping technology first appeared (32,768Hz = 1 s) and Wolfgang Hilberg (1932 - 2015), finally

- Broadcast Radio (e.g. BBC LW 198kHz, Greenwich Time Signal, 'pips')
- COAA Radio Clock
  https://www.coaa.co.uk/radioclock.htm
- DAB Radio | GPS Navigation Satellites
- Gude Expert Mouse Clock
  https://tinyurl.com/2tdwb569
- Meinberg MSF Radio Clock
  https://tinyurl.com/4vj6b3kj
- Mobile Phones | Radio Data System (RDS) in Radios
- Network Time Protocol
- Radio Reloj (Cuba: 570, 790, 820, 830, 850, 860, and 950 kHz (Havana), or 1020kHz
  http://www.radioreloj.cu/en/home
- SFTS stations on short wave (WWV, WWVB and WWVH from the USA (2.5, 5, 10, 15 and 20MHz) (Table 2).
- SFTS stations on VLF (e.g. RJH69, RJH77, RJH63, RJH999, RJH66, RAB99, ca. 25kHz; MSF 60kHz; DCF77 (77.5kHz) (Table 2).
- Telephone (The 'Speaking Clock')
- Televisions with 'Text' function or Electronic Programme Guide (EPG).

Table 1: Accurate or Not? Some Simple Ways of Telling the Time (A-Z).

came up with the idea of radio-controlled clocks.

However, this did not fully come onto the market until the 1960s.

Today, things have moved on; nearly all time signal stations synchronise via *Rubidium* or *Caesium* standard atomic clocks – hence the name '*Standard* Time and Frequency' stations.

It will be clear from the above that the regular use of radio for the determination and dissemination of the correct time has played a crucial role, maybe most noticeably in the age before atomic clocks.

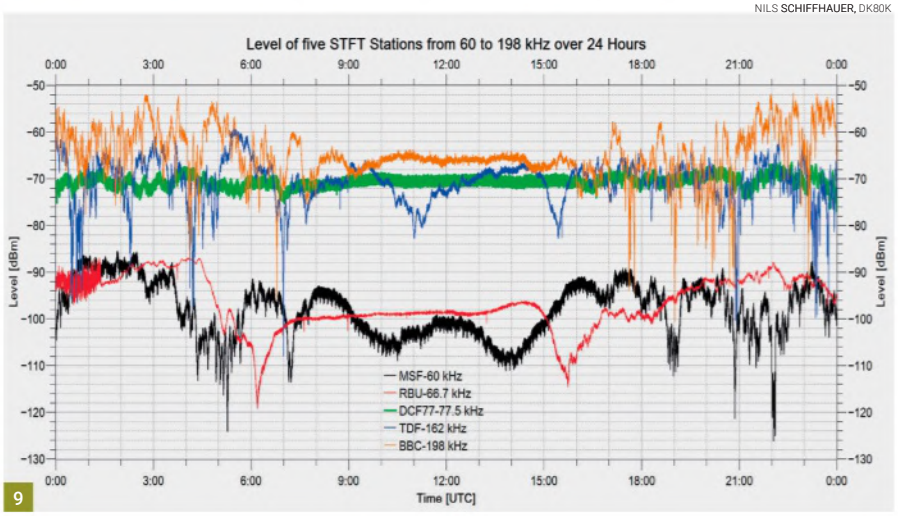
Propagation Issues: From VLF to HF

Some of the world's time signals are transmitted in the VLF and LF bands; therefore, a few words about propagation in this area may be in order.

First, when choosing receivers and aerials for base-band time signals, remember that propagation is contingent on frequency, diurnal, seasonal, annual and solar patterns, transmitter power and an aerial's efficiency, amongst other phenomena (Figs. 7, 9, 10).

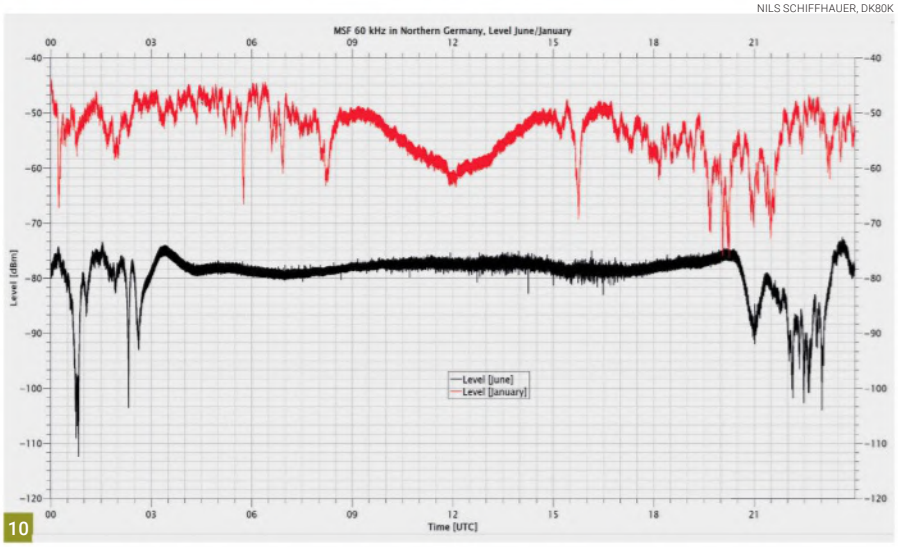
VLF *Groundwave* travels close to the Earth, following its curvature. Signals on 60, 77.5 or 100kHz, for example, can be slowed down by the ground's dielectric constant, reaching further over water (Friese, 2007: 11-13).

NILS SCHIFFHAUER, DK80K



9

NILS SCHIFFHAUER, DK80K



10

Groundwave VLF predominates by day; after dark, LF signals travel by both Ground- and Skywave.

Skywave VLF travels globally, through the Earth-Ionosphere Waveguide (80-800km). This 'sub-ionospheric propagation' undergoes refraction, reflection or attenuation; inside, signals have typical skip distances of between 1,000 to 2,000km.

When both kinds of waves arrive at the receiver simultaneously, this can cause (constructive and destructive) interference and fading, as happens in other frequency bands.

And VLF signals – for instance, those containing time information – are of mainly a *vertical* polarisation.

Last but not least – and in stark contrast to short wave signals – VLF propagation can be *augmented* by enhanced atmospheric ionisation, during solar storms or in the case of meteor scatter.

However, Solar Eclipses have been shown to have a dampening effect on signal levels **https://tinyurl.com/2p8e275w**

Low Information Content

There is a price to pay though – the key information content of any man-made radiated VLF signal will be sparse, and bandwidths are, typically, narrower than around 200Hz. What is more, transmitter aerials are huge, and the radiation efficiency is low (Evren Ekmekçi, 2004).

To learn more, you can find resources on VLF propagation both online and in print. Many predictions are based on a phenomenon called the Equatorial Ring Current (ERC) and on geomagnetic activity, especially the measurement of the *Disturbance Storm Time Index (DST Index)* included in many propagation banners.

https://tinyurl.com/5xyx2ew7
http://wdc.kugi.kyoto-u.ac.jp/dstdir
https://tinyurl.com/4psu44u7

Where the SFTS stations transmit on Short Wave (e.g. on 5,000 or 10,000kHz), the 'normal' rules of propagation apply (see, for instance, Tomas Hood's popular column in previous issues of this magazine).

Special Time-Signals: NCDXF International Beacon Project

As one example, the *International Beacon Project*, run by the *Northern California DX Foundation (NCDXF)* and the *International Amateur Radio Union (IARU)* was initiated in 1979 (Reitz, 2019: 58). This network depends on GPS-disciplined transmissions (on 14,100, 18,110, 21,150, 24,930, and 28,200kHz, in a three-minute cycle).

The 18 beacons in this network (Table 3) follow a fixed number of slots and times.

The IBP transmissions consist of the beacon callsign, sent at 22 WPM in CW (Morse code). This is followed by four one-second long dashes ('-'; 'dah'). The callsign (Table 3) and the first dash are sent at 100W, while the remaining dashes are transmitted at 10W, 1W, and 100mW. The letter 'b' is sent, indicating that this is a **b**eacon station.

At the end of each 10-second transmission, the beacon steps up to the next-higher band, and the next beacon in the sequence begins transmitting.

A network timetable ensures that no two beacons transmit at the same time on the same frequency; the accurate timing is shown on the NCDXF *Transmission Schedule* page:
https://tinyurl.com/yeyvfcyz

The idea is that the more of the beacons you hear, the more open the band is to different parts of the world. The more 'dashes' you hear per beacon, the better the quality of propagation, and the more stable the band. If you hear the 100mW dashes from many beacons, you know the band is wide open.

Therefore, in just three minutes you will be aware of the prevailing band conditions, worldwide. The heading and distance from your location to the beacons are on the *Beacon Azimuthal Map* page (Fig. 8):
https://tinyurl.com/2vvyxw6x

Bringing Home the Beacon

Aside from a 'traditional' (hardware) receiver, web-based SDR, Kiwi-SDR or home SDR (see Part Two) you may wish to try some alternatives for catching these timed beacons. *N3ZI Kits*, for example, once offered a fixed-frequency receiver for one of the IBP frequencies (14.100kHz), which can still be found on eBay. Or you may wish to build the *BeaClock Project* (cf. the second URL, below).
https://www.pongrance.com
https://tinyurl.com/3j5dz5vt

You can still get a very handy device to visualise this: the MFJ-890 Beacon Clock/Monitor. For me, the MFJ-890 is an n eloquent visualisation of the idea of 'radio-in-time'; it is one of my favourite shack accessories. Here in the UK, the MFJ-890 synchronises with MSF on 60kHz (set Jumper 1 to 'H'; JMP 2 to 'L' and JMP 3 to 'L'). I think that there is something simply relaxing about watching the LEDs span the globe, each in its proper turn – regular, well, as 'clockwork'. The MFJ-890 has an inbuilt atomic clock to ensure the perfect synchronicity required for the use of the beacon chain (Wiessala, 2020: 52; Kleinschmidt, 2021: 61).

You can also sync the monitor manually. And if you fancy a home project, why not build a special receiver for (one or more of) the IARU frequencies? You may find ideas on the web pages, below.
https://www.ncdxf.org/beacon
http://www.pongrance.com
https://tinyurl.com/3j5dz5vt

ATA (India)	10000
BPC (China)	68.5
BPL (China)	100
BPM (China)	10000
CHU (Canada)	3330, 7850, and 14670
DCF 77 (Germany)	77.5
HLA (South Korea, RUK)	5000
JJY (Japan)	40, 60
LOL (Buenos Aires)	10000
MSF (Anthorn, UK)	60
NATO	10001.8 (STANAG 4285) encrypted
PPE (Brasil)	10000
RTA (Russia)	10,000kHz
RTZ (Russia)	50
RWM (Moscow)	4996, 9996 (1.071%)
WWV (USA)	2500, 5000, 10000 and 15000
WWVB (NIST, USA)	60
WWVH (NIST, USA)	10000 [...].

(Sources: WRTH (76th ed., 2022); Klingenfuss 2021/2022 Guide to Utility Radio Stations (31st ed.); Betke, K. [DL4BBL]; ITU).

Table 2: Selection of SFTS Stations (A-Z; in kHz, not complete; some inactive).

Time-Lighthouses in the Heavens

The *Faros 1.4* ('*Pharos*' = 'Lighthouse', cf. Fig. 5) program is an automatic *NCDXF Beacon Monitor* (see the previous section) mostly for radio amateurs, SWLs, HF engineers, and other interested parties.

It is a great piece of software, allowing you to monitor beacons in this network. It only requires an audio device (set to a low level) to perform precise timing measurements and to show whether signals are coming in via the usual *short* part, or by the *long* path.
http://www.dxatlas.com/faros

As an alternative to *FAROS*, there is also the (older, free Windows PC software) *Beacon Tracker* by W6NEK. Besides, you can find *PA3EWG's Dutch Beacon Monitoring Station* at the first URL (below). Some advice by Peter VE3SUN on *How to Create a Faros Beacon Monitoring Web Page* is on the second website.
http://www.w6nek.com
https://monitorstation.ccms-best.nl
http://faros.ve3sun.com

Finally , and in anticipation of some of the topics to be covered in Part Two of this article, please take a look at Figs. 9 and 10.

Here, RU contributor Nils Schiffhauer has visualised some longer-term observations of time signal stations between 60 and 198kHz (Fig. 9) and monitored the observable seasonal variations in signal strength (Fig. 10).

[N.B.: A bibliography will appear at the end of Part Two of this article - Ed].

Argentina
LU4AA Buenos Aires GFØ5tj RCA
Australia
VK6RBP Rolystone OF87av WIA
Canada
VE8AT Eureka, Nunavut EQ79ax RAC/NARC
Finland
OH2B Lohja KP2Ø SRAL
Hawaii
KH6RS Maui BL10ts Maui ARC
Hong Kong
VR2B Hong Kong OL72bg HARTS
Israel
4X6TU Tel Aviv KM72jb IARC
Japan
JA2IGY Mt. Asama PM84jk JARL
Kenya
5Z4B Kariobangi KI88ks ARSK
Madeira
CS3B São Jorge IM12mt Delegação Madeira
New Zealand
ZL6B Masterton RE78tw NZART
Peru
OA4B Lima FH17mw RCP
Russia
RR9O Novosibirsk NO14kx SRR
South Africa
ZS6DN Pretoria KG44dc ZS6DN
Sri Lanka
4S7B Colombo MJ96wv RSSL
United Nations
4U1UN New York City FN3Øas UNRC
United States
W6WX Mt. Umunhum CM97bd NCDXF
Venezuela
YV5B Caracas FJ69cc RCV.

Table 3: The 18 NCDXF IBN Beacons.

European Private Shortwave Stations

August 1st 2022

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

kHz	Country	Name	Transmitter site	Schedule (UTC)
3955	D	Radio Channel 292	Rohrbach Waal	Daily 0600-2000 & 2100-0500
3975	D	Shortwave Radio	Winsen	Irr. evenings
3985	D	Shortwaveservice	Kall-Krekel	Daily 1400-1930 ('Radio Popexpress' a.o.)
3995	D	HCJB	Weenermoor	24/7
5920	D	HCJB	Weenermoor	24/7
5930	DNK	World Music Radio	Bramming	24/7
5940	NL	Radio Piepzender	Zwolle	Irr.
5955	NL	Sunlite	Westdorpe	Daily 0400-1800
5970	DNK	Radio208	Hvidovre	24/7
5980	DNK	Radio OZ-Viola	Hillerød	We 2100-2200
5980	FIN	Scandinavian Weekend Radio	Virrat	1st Sa of the month 18-20
6005	D	Shortwaveservice	Kall-Krekel	Daily 0800-1600
6005	NL	Radio Delta International	Elburg	F.pl. (Fr or Sa 2100-0300)
6020	NL	Radio Delta International	Elburg	Irr. (Su 0600-1500)
6055	DNK	Radio OZ-Viola	Hillerød	Sa-Su 1100-1300
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	Gera	Irr. (Sa or Su 1000-1200)
6130	NL	Radio Europe	Alphen a/d Rijn	24/7
6140	NL	Radio Onda, Belgium	Borculo, NL	Irr. (weekends only)
6150	D	Europa 24	Datteln	
6160	D	Shortwave Radio	Winsen	Irr. evenings (approx. 1600-2200)
6170	FIN	Scandinavian Weekend Radio	Virrat	1st Sa LT of the month 21-18 & 20-21
6185	NL	Radio Piepzender	Zwolle	Irr.
7260	NL	RockPower	Nijmegen	Irr. mornings (approx. 0800-1200)
7270	NL	RockPower	Nijmegen	Irr. afternoons (approx. 1200-1600)
7365	D	HCJB	Weenermoor	24/7
7425	NL	Radio Piepzender	Zwolle	Irr.
7445	NL	Radio Piepzender	Zwolle	Irr. (0800-1800)
9670	D	Radio Channel 292	Rohrbach Waal	24/7
11690	FIN	Scandinavian Weekend Radio	Virrat	1st Sa LT of the month 21-15 & 20-21
11720	FIN	Scandinavian Weekend Radio	Virrat	1st Sa of the month 15-20
15700	DNK	World Music Radio	Randers	24/7
15785	D	BitExpress	Erlangen	24/7 DRM-modulation ('Funklust')
25800	DNK	World Music Radio	Mårslet, Aarhus	24/7

Radio News

A MOST UNUSUAL BROADCASTER: *Radio Reloj* is a Cuban news station – very unusual because the station does not broadcast music, the only background noise is the ticking of a clock that can be heard during broadcasts. In its beginnings, *Radio Reloj* did not have journalists and it was an announcer who read copies of the CMQ television newscasts. CMQ was a Cuban radio and television network. CMQ began on March 12, 1933, as a radio station in Havana and later became a national radio and television network. Pre-revolutionary Cuba was advanced in new technologies, and Cuba was the first Latin American country to have Television.

In December 1946, station CM-21P made an experimental live broadcast from different locations.

Regular commercial broadcasts began on October 24, 1950, with Unión Radio TV. CMQ-TV was officially launched on March 11, 1951, and it became an affiliate of NBC. By 1954, CMQ-TV had expanded into a network made up of seven stations. With the CMQ network, Cuba became the second country in the world to have a national television network. After the 'Cuban Revolution' of 1959 and the subsequent elimination of advertising in 1960, CMQ-TV was transferred into State control and became what is now Cubavisión. Going back to *Radio Reloj*, his studio was installed in a small barracks transformed into a studio, installed on the roof of the headquarters of the CMQ network, in the centre of Havana. The furniture was limited to a table, a microphone, two chairs, and the metronome. Over the years, the station grew and new broadcasting and journalism professionals joined its staff. On March 13, 1957, his studies were taken over by young people from the 'Revolutionary Directorate', who took over the antenna to transmit their messages and fired shots from their weapons. From the first hours of the Cuban Revolution, the radio followed all the news. 75 years later, *Radio Reloj* has remained true to tradition and is now the only Cuban station that broadcasts the news, and the time, minute-by-minute, 24 hours a day, completely live. *Radio Reloj* strives to transmit, as quickly as possible, national and foreign information with brevity, clarity and truthfulness – under the ticking of the alarm clock. The radio also has two websites, one in Spanish and one in English. Transmission is ensured by *Radiocuba - Señal Radio y TV* on 22 Medium Wave transmitters and an FM network. The station also transmits online on the web Read more about *Radio Reloj* on page 28 of this issue. (Source: Martín Butera | Radio Reloj).

https://tinyurl.com/ynxkcn26


HOUSE OF LORDS

Communications and Digital Committee

1st Report of Session 2022–23

Licence to change: BBC future funding

Ordered to be printed 7 July 2022 and published 18 July 2022

Published by the Authority of the House of Lords

HL Paper 44

HOUSE OF LORDS *BBC FUTURE FUNDING* REPORT: The House of Lords *Communications and Digital Committee* has released a report looking into the future of BBC funding. The report highlights the need for the BBC to define its future role more clearly, including setting out options for future funding models that go beyond the existing licence fee system. Whilst the report concentrated on paywalls or hybrid funding models for television and online content, radio was also discussed.

The report highlights it is not technically feasible to develop conditional access technology for analogue radio: *"We heard it may be possible for DAB, though Claire Enders told us this would not provide good value for money. All DAB sets would have to be replaced, including in-car radios."* Noting that the switchover from analogue television to DTT cost approximately £500 million, she argued: *"the radio sector is not significant enough to find these resources. The overall income of radio advertising is not far north of £500 million anyway."*

The report goes on to say: *"We do not recommend a funding model that places BBC radio behind a paywall unless and until both FM and DAB radio listening decline to the point that a switch-off is feasible. We do not believe this is likely within the next 15 years at least."* *Radiocentre* has welcomed the report. Matt Payton, Chief Executive, said: *"The Lords Committee is a welcome voice of reason in the debate on the BBC funding. As they acknowledge, it's simply not viable to place all of the BBC's radio services behind a subscription paywall. Any attempt to move to fund BBC services by advertising would also do irreparable harm to both the services offered by the BBC and the sustainability of commercial broadcasters. We look forward to continuing our discussions with Government and parliamentarians on this crucial issue."*

Arqiva's Chief Executive Officer Shuja Khan also responded, saying: "Today's report from the Lords Communications and Digital Committee addresses the hugely important question of the future of broadcasting. *"I was pleased to give evidence to the Committee's inquiry about the prevalence of Digital Terrestrial Television in the UK. We welcome their acknowledgement of the continued significance of DTT for millions of people across the country. Research shows that the public wants to see continued support for DTT, which is particularly important for vulnerable groups, including older people, as well as those in rural areas. That's why we recently launched the Broadcast 2040+ campaign, to secure a commitment from Government on safeguarding these critical services for the long term. We look forward to continuing to work with the Committee in the months ahead as they build on the outcomes of their inquiry."*

(Sources: RADIOWORLD [USA] | Radio Today House of Lords).

https://tinyurl.com/ydtbn2ab
https://tinyurl.com/2t5bj5nk
https://tinyurl.com/2p8urrfx

VERITONE SYNTHETIC VOICE GETS AN AUDITION: *iHeartMedia's* plan to use *Veritone's* voice-cloning technology for its podcast platform has some radio industry observers asking the obvious questions: How good does it sound and is broadcast radio far behind?

The largest radio company in the United States says that for now, the synthetic voice solution will only be used to translate podcasts from English to other languages for use on the *iHeartPodcast* Network, first for Spanish-speaking audiences. But Veritone officials confirm its technology could someday be used for advertising to reduce time-to-market and production costs for radio.

One veteran broadcast engineer said Veritone's voice cloning product is exactly the sort of tech breakthrough that media are quickly adopting as the industry embraces cost-saving measures and could at the very least bring a more centralized approach to commercial production and staffing by leveraging artificial intelligence. There are dozens of examples of text-to-speech apps available commercially, many of which can convert text into human-like speech, even if it is still might be a bit robotic. Observers familiar with this technology say some of the services on news websites are becoming good enough to be, *"almost indiscernible from real human voices."* But what Veritone and *iHeartMedia* are trotting out appears to be an effort to take synthetic speech and voice cloning to another level, according to those familiar with the AI platform. Veritone says *"hyper-realistic custom voice clones"* will offer increased revenue streams for branded synthetic voices of top talent — imagine the cloned voice of Ryan Seacrest someday pitching for the local hardware store. *Veritone* launched *Veritone Voice* in 2021, which has the ability to, *"control and manage the entire voice creation lifecycle for efficiency and scale."* The company says its synthetic voice solution will allow iHeartMedia to reach new audiences at scale with their current top podcast talent. *"With no additional studio time, voice talent can authorize Veritone's synthetic voice solution to automatically produce more podcasts, advertisements and additional audio in multiple languages with the same energy, cadence and uniqueness of top talent,"* the technology company says.

(SOURCE: iHeartMedia | RADIOWORLD).

https://tinyurl.com/vnh2j7ry

OFCOM SPECTRUM REGULATIONS: Bob Houlston G4PVB reports on a recent statement by OFCOM, regarding its new approach to licensing and spectrum rules, which will result in a range of 'restricted' radio services being able to take to the airwaves. The statement reads (in part): *"Our new flexible approach means restricted radio services – which typically cover small areas and can include hospital radio, drive-in movie soundtracks and services for events – will find it easier to access the spectrum they need to broadcast. These restricted services are mainly broadcast in the AM and FM broadcasting bands, but we haven't always had sufficient frequencies available to meet demand. But by making changes to our spectrum planning, we can identify small gaps in spectrum use – known as 'limited coverage spectrum'. Because this spectrum only enables limited coverage, it is not suitable for national, local and community radio broadcasts, but is particularly suited for restricted services which only need to be broadcast nearby. We have also simplified our licensing process to make it easier for these smaller services to get the licences they need to broadcast. Before today's announcement, several services took part in a trial to see how the new process would work. One of these was Stoke Mandeville Hospital Radio (SMHR), based in Aylesbury, Buckinghamshire. As part of the trial, the station was able to broadcast on an FM frequency which has previously been unavailable to it."* You can access the full story at the URL below.

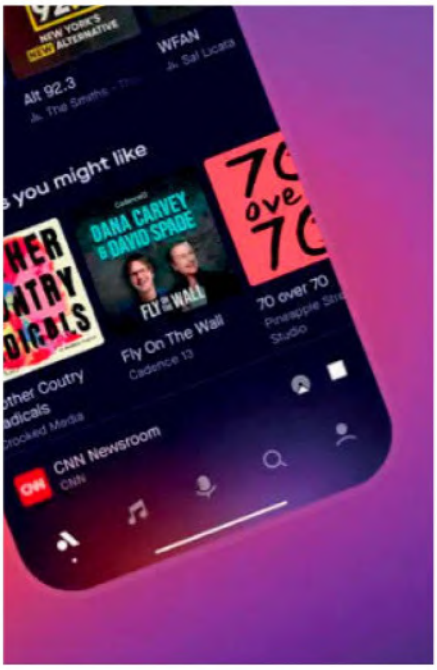
(SOURCE: OFCOM, via Bob Houlston G4PVB RU Volunteer Correspondent).

https://tinyurl.com/2p9yy3ys

Rfinder B1+ Deluxe Package (USA)

RadioUser STOP PRESS!

The Rfinder B1+ Deluxe package includes a free extra battery, cup holder mount for your car, screen protector, DMRoIP and APRS-IS integration. DMRoIP allows connecting to DMR networks via 4G or Wi-Fi in case a local repeater or hotspot isn't within reach. This means that you will always have access to your favourite DMR networks.
(SOURCE: Network Radios).
https://tinyurl.com/2s4a8nfv



Audacy To Improve Its Digital Offerings

Audacy is making improvements to both its app and website. It said it is adding more exclusive content, features and functionality. The changes will take place over the coming weeks and months, the company said in a blog post. *"At the heart of these updates lives truly interactive radio."* It said the changes will give listeners more control over streaming radio with additional interactivity to live and on-demand content. Initial updates include a better rewind function. *"Listeners will be able [to] rewind our live spoken-word stations (news, sports and news/talk) and hear it all again, whenever they want, wherever they are."* Audacy has also added chapters and descriptions to live radio streams, helping listeners find specific content and, *"further combining the experience of podcasts and on-demand radio."* Another feature is 'curated discovery'.

Audacy promises a personalized, interactive experience, more 'customisable' and based on specific interests. Moreover, *Audacy.com* has been redesigned so that moving from web to mobile app and back is smoother.

Finally, the company promises a better podcast experience. *"And the Audacy app will now present radio and podcast content together, allowing listeners to consume the latest content from the shows they love along with the topics they're interested in."*
(SOURCE: Radioworld).
https://tinyurl.com/bdm3rnrk

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Rescues, Comms and Jacob's Ladders

Robert Connolly offers seasonal safety hints, shows the importance of communications during rescues, has news on the COAA Decoder and DSC, and guides us on the roles and frequencies of maritime pilots.

As I write this column in early July, the summer season is here again, and already a couple of incidents have caught my eye. Summer is always a busy time for our Coastguard and lifeboats, and I do not doubt that this year will be no exception. With careful planning, and obtaining local knowledge, many incidents may well be prevented. One particular incident that demonstrated this was the recent rescue of a family of four, two adults and two children at Nash Point Wales.

The family had become cut off by the rising tide in a cove that was backed by cliffs. This rescue was attended by the RNLI lifeboats from Porthcawl and the Llantwit Major, a local Coastguard rescue team and a Coastguard rescue helicopter from its base at St. Athan.

In addition, Milford Haven Coastguard, controlling the incident, requested that the South Wales Fire and Rescue Service send a crew from Bridgend, rope rescue teams from Barry and Newport, and an ambulance.

The family was successfully airlifted from the base of the cliffs by the helicopter and landed in a field on the top, to be checked by paramedics in an overall operation that lasted 90 minutes.
https://tinyurl.com/wsk78ccr

Summer Safety

This type of incident can be very common during the summer months. Holidaymakers from towns and cities visit the seaside, either on a day trip or for a holiday, and then decide to take a walk along the beach.

However, many do not check tide times and tidal state and also do not seek any advice regarding potential hazards, for example, quicksand or areas of shoreline that become cut off quicker during an incoming tide or tidal rips. Thankfully, the family in this incident were unharmed but the cost of such a rescue is high, especially when a helicopter is involved.

Over the years, I have seen open water users, speed boats, jet skis, windsurfers, and so on, arrive on a sunny afternoon and take to the water without any idea what potential hazards are beneath the surface that they may contact as the tide falls. It is important to know local sea conditions and hazards.

Ideally, boaters should see the area they plan to use at a low tide to determine what hazards they may encounter during the day as the tide goes out.

No-Fault Rescues

However, there are occasions when, despite having extensive knowledge and experience, boaters need to be rescued *through no fault of their own*. A recent incident in the Irish Sea demonstrated this. The *Row Around Great Britain* event is often acknowledged to be the toughest rowing race in the world. Rowing over 2,000 miles unassisted requires much more than just strength, stamina, and endurance.

To be able to successfully circumnavigate Great Britain, teams need to understand navigation and the sea's tidal flow. Rowing against changeable winds and fast-turning tides makes this a greater test of endurance and skill than Trans-Ocean rowing. This year three teams, *Albatross, All Systems Row* and *Sea Legs*, each with very experienced rowers, departed Tower Bridge, London, on 12 June to complete this challenge.

The crews were rowing up the Irish Sea in late June and encountered gale force eight winds and high seas. One vessel taking part sustained damage to its rudder at about midnight on Friday. The crew decided to head to Wexford in the Republic of Ireland as they were fatigued and concerned about worsening weather conditions. However, they had to be towed to Milford Haven in Wales by an RNLI lifeboat.

Owing to the offshore location and delicacy needed in the towing, the lifeboat was out for nearly 12 hours.

On the Saturday afternoon, another team got into difficulties off the Co. Antrim coast and was rescued by the Red Bay RNLI Lifeboat. A Coastguard helicopter from Prestwick in Scotland was also deployed.

Regular Communications

Regular communications between the rowers of the third boat, Sea Legs, and the Belfast Coastguard had been maintained during the Saturday night / Sunday morning. At 0700 on the Sunday morning, the third team reported that they had capsized but were able to right themselves. However, they were unable to row because of high winds and large, steep, waves. The crew advised Belfast Coastguard they would monitor the weather, and liaise with *GB Row Challenge*, but were *"still of the*

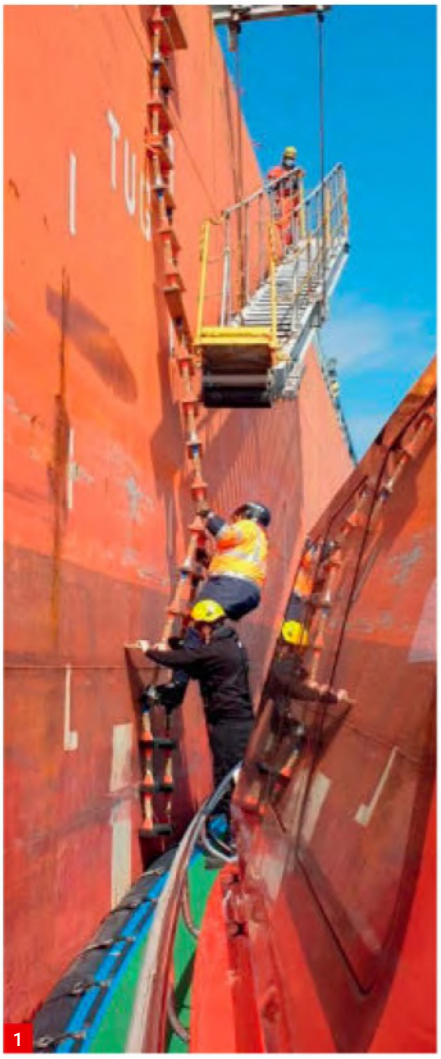
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FIG. 1: COURTESY OF LIVERPOOL PILOTAGE SERVICES; FIG. 2: ROBERT CONNOLLY

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COURTESY OF MARINE INSIGHT

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Fig.1: A pilot boarding a vessel. Fig. 2: A typical pilot cutter. Fig. 3: A pilot is winched onto a ship from a helicopter. Fig. 4: the pilot ship *Edmund Gardener*.

mindset" to continue in the event if possible.

However, as conditions were deteriorating, the Coastguard decided to launch the Newcastle, Co. Down Lifeboat to the rowers' position some 23 miles offshore. In a 12-hour operation, with Force 9 winds, the lifeboat successfully rescued the crew and towed their boat to the fishing port of Ardglass in Co. Down.

Thankfully no members of any of the three teams suffered any injuries during the ordeal. This was largely because all the rowers were experienced and had the necessary safety equipment including satellite phones, Emergency Position-Indicating Radio Beacons (EPIRBs) and Personal Locator Beacons (PLB).

DSC & ATIS

You will recall that, in last month's issue (*RadioUser*, August 2022: 34-36), I covered some general aspects of monitoring Digital Selective Calling (DSC) signals.

This month, I would like to add a little more technical information on this system to explain why some DSC decoders do not work for VHF transmissions.

On the MF and HF marine bands, DSC uses F1 (FSK) signalling at 100 Baud, with a 170 Hz shift, based on a nominal subcarrier frequency of 1700Hz. To receive these transmissions, you need to use a receiver that can tune to the relevant frequencies with USB, LSB or CW modes. You will need to tune the receiver in such a way as to create a 1700Hz heterodyne at the assigned frequency.

Remember that the DSC frequencies on MF are 2177.0, 2187.5, and 2189.5kHz. HF DSC frequencies are 4207.5, 6312.0, 8414.5, 12577.0, and 16804.5kHz.

VHF marine band DSC and VTS uses VHF CH 70 (156.525 MHz).

VHF DSC uses F3 (FSK) signalling at 1200 Baud with a 400Hz shift around a subcarrier frequency of 1700Hz. To receive these transmissions, you need to use a receiver that can tune to the relevant frequencies with FM or NFM mode.

ATIS messages precede all voice transmissions in the marine band in regions where the system is in use.

Some DSC decoders, for example, YADD ("*Yet Another DSC Decoder*"), are not capable of resolving VHF DSC signals. If you want a decoder to receive both MF/HF and VHF DSC, then probably the best decoder is the COAA *DSC Decoder*. It may be downloaded from here:

https://www.coaa.co.uk/dscdecoder.htm

The COAA DSC Decoder

This decoder is suitable for MF/HF and VHF DSC, along with NAVTEX and VTS (Vessel Traffic Services) signals. In addition, it does not need a very powerful computer. I have run it on an old *Pentium-2* laptop running Windows XP.

It is fully functional for 21 days before you have to register it for €25 plus VAT.

From an operator's point of view, the other main difference between MF/HF DSC Transmitter and VHF DSC transmitter is that when you have programmed in your message using the menu selection with the

MF/HF system there are several seconds after you have pushed the 'send' button before the message is transmitted. This enables you to cancel the transmission should you wish to do so for any reason.

However, the VHF DSC transmitter does not have that option; once you hit send it is sent instantly.

https://www.coaa.co.uk/dscdecoder.htm

The Role of Pilots

Now to pilots – no, not those men and women who fly aeroplanes, but *maritime pilots*, who date back to long before the age of aircraft. Those of you who monitor marine VHF transmissions will be aware of them and will know that they are usually heard on CH 12 (156.600MHz).

However, maybe not many are aware of their roles and how they carry them out. The work of the maritime pilot goes back to Ancient Greece and Roman times, when incoming vessels employed locally experienced harbour captains - often the local fishermen - to bring their vessels safely into port. For many years maritime pilots were not regulated and those who offered their pilotage services to incoming sailing ships raced out to sea against each other to get to the ship first.

Whoever got to the ship first got the pilotage job, and there was always competition among knowledgeable local fishermen to get there first, often despite weather and sea conditions.

Initially, the pilots used their own fishing boats, often heavy drifters carrying fishing equipment. However, these were frequently slow; therefore, a new form of boat was developed.

In some locations, pilots would have rowed out to ships. New boats were developed from single-masted cutters and twin-masted yawls; eventually, they evolved into the specialist pilot cutter (Fig. 2).

These were lightweight, and over-powered, single-masted, boats with large, steeply angled keels, making them deep draft under power and shallow draft in lighter sail.

Eventually, in light of the need to regulate the act of pilotage and ensure pilots had adequate insurance, the harbours themselves licensed pilots for each harbour.

The Development of Pilotage

The sailing cutters later developed into steam-powered vessels and eventually into vessels propelled by marine diesel. While many pilots were located in, or close to, the various ports being used by ships, some were stationed on a larger vessel at sea.

ROBERT CONNOLLY

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For many years, qualified pilots who led vessels entering and leaving our local ports may have used little more than the family fishing skiff. The skiff was, of course, fully open to the elements. When this was not being used to carry the pilots to meet incoming vessels or pick up pilots who were leaving a departing vessel, the skiff was used for lobster- and other types of fishing.

In more recent years, dedicated pilot vessels emerged, which had an enclosed cabin and were able to cope better with rougher sea conditions. While a maritime pilot can guide many different sizes and types of vessels in and out of ports it is not easy embarking or disembarking those ships, especially large ships. Normally, the pilot would have to climb up a swaying flexible rope ladder with wooden rungs (Jacob's Ladder) to get on or off the ship in all sorts of sea conditions (Fig. 1).

Where possible, a pilot would request the ladder to be placed on the leeward side of the ship to make the transfer slightly less hazardous. However, there was always the risk of the pilot not only falling off the ladder into the sea and drowning but also of being crushed between his cutter and the ship (Fig. 1).

The pilot may have to climb up 30 metres on the side of some large ships (Fig. 1).

Pilot transfers take place not only during daylight but also during the night, with darkness adding another element of danger. In some locations around the world, pilots do not board from a tender but are transferred to/from the ship by helicopter (Fig. 3). Some pilots will provide instructions on speed and course changes to a ship's officer on the bridge. However, on some smaller ships, the pilot will take physical control of the vessel.

Some interesting videos of this may be viewed by visiting this website:

https://tinyurl.com/ytesxcvt

Some ships, of course, do not require the services of the port pilot. On these vessels, mainly commercial ferries, either based at the port or using the port daily, the ship's master will hold certification for pilotage in and out of those particular ports.

Other Pilot Categories

In addition to those port pilots, mentioned above, there are another two categories of marine pilots that you may be unaware of: These are the *Deep-Sea Pilot* and the *Coastal Pilot*. These will assist the master of a ship in maintaining a safe and expeditious passage through waters that the ship's captain may be unfamiliar with.

More information on marine pilots may be found at the following websites:

www.dscp.net
www.pilotmag.co.uk
www.liverpoolpilots.co.uk

Following the theme of maritime pilots, this month's picture is one of the three Liverpool pilot station ships, *Edmund Gardner*. It is now one of the exhibits in the *Liverpool Maritime Museum* (Fig. 4).

For more information on this vessel and on the maritime museum, you can visit this informative website:

https://tinyurl.com/59m3ckt4

Rallies & Events

All information published here reflects the situation up to and including 15th August 2022. Readers are advised to check with the organisers of any rally or event before setting out for a visit. The Radio Enthusiast website **www.radioenthusiast.co.uk** has the latest updates, please check it regularly. To get your event on this list, e-mail full details as early as possible: **wiessala@hotmail.com**

21 August
RED ROSE RALLY: Organised by West Manchester Radio Club. St Joseph's Hall, Leigh WN7 2PJ. Those requiring tables, please contact Colin (BB | CR | FP | MS).
rally@wmrc.co.uk
www.wmrc.co.uk

21 August
RUGBY AMATEUR TRANSMITTING SOCIETY RADIO RALLY: Princethorpe College, Princethorpe, Rugby CV23 9PY. Open 10:00 (CBS).
Steve G8LYB: 07956 855 816
rally@rugbyats.co.uk
www.rugbyats.co.uk

28 August
MILTON KEYNES ARS RALLY: The Irish Centre, Manor Fields, Watling Street, Bletchley, MK2 2HX (Opposite *Dobbies* Garden Centre). The entrance fee is £3.00. Open to the public from 9:00 am. Outdoor pitches and indoor tables are available (FP | CF | D).
Brendan G8IXK, Vice Chairman
rally@mkars.org.uk
www.mkars.org.uk

28 August
TORBAY ANNUAL COMMUNICATIONS FAIR: Newton Abbot Racecourse, Devon TQ12 3AF. Doors open at 10 am, disabled visitors access at 9.30 am. Indoor event (FP | BB | RSGB CF).
Pete G4VTO: 01803 864 528
Mike G1TUU: 01803 557 941
rally@tars.org.uk

29 August (Bank Holiday Monday)
HUNTINGDONSHIRE ARS (HARS) ANNUAL RALLY: Ernulf Academy, St Neots PE19 2SH. Gates are open for Traders at 7 am, public at 9 am. Indoor and outdoor stalls available. Talk-in on 145.550 MHz on GX-0HSR (BB | CR | FP).
Malcolm M0OLG: 01480 214282
events@hunts-hams.co.uk
www.hunts-hams.co.uk

3 September
G-QRP CLUB AND TELFORD & DISTRICT ARS CONVENTION: Harper Adams University Campus nr. Telford, Shropshire TF10 8NB (See also the entry for 4 September). Featuring the famous G-QRP 'Buildathon'.
Martyn G3UKV: 01952 255 416
John M0JZH: 07824 737 716
www.gqrp.com/convention.htm
www.telfordhamfest.org.uk

4 September
ANDOVER RADIO CLUB BOOT SALE: Wildhern Village Hall, SP11 0JE (just north of Andover). Open for sellers at 9 am and buyers at 10 am. Costs are £8 per boot and £2 for buyers. The tables in the hall are £10.
http://www.arac.org.uk
arac@arac.org.uk

4 September
TELFORD HAMFEST (AND CONTINUED G-QRP CONVENTION): Harper Adams University (HAU); TF10 8NB (See also the entry for 3 September). Presentations by three excellent speakers.
Martyn G3UKV: 01952 255416
www.gqrp.com/convention.htm
www.telfordhamfest.org.uk

9-11 September
67TH WEINHEIM VHF CONFERENCE: The traditional Weinheim VHF Conference has been organized by committed radio amateurs (on a non-profit and voluntary basis) since 1956. It sees itself in its tradition as a meeting place for everyone interested in radio and electronics. amateurs from all over Europe present their experiences at this forum, provide information on innovative developments and share their know-how [...].
https://tinyurl.com/4rkv6cxm
https://ukw-tagung.org

11 September
CAISTER LIFEBOAT RADIO RALLY: Caister Lifeboat Station, Caister on Sea, NR30 5DJ. The entrance is via the car park on Beach Road; admission is free for the public. Doors are open from 9 am to 2 pm (8 am for sellers). Inside tables £10 each, outside £5 each. Raffle, onsite cafe, gift shop, museum.
Zane M1BFI: 07711 214790
m1bfi@outlook.com

11 September
RIPON RADIO RALLY: Hugh Ripley Hall, Ripon, North Yorks, HG4 2PT, 100 m west of High Skellgate traffic lights B6265. Traders from 7 am to 9.30; tables £10 each. Doors open at 10 am. £3 per person. The Bring-and-Buy is upstairs: if you can't carry it, don't bring it! Donation £1 per item to a local charity.
https://www.g4sjm.co.uk/contact-us

17 September
PAISLEY ARC SES: Paisley Amateur Radio Club (parc) will be operating the special event station GB0DOD from the Methodist Central Hall, 2 Gauze St, Paisley, PA1 1EP as part of Paisley Doors Open Day. Club members will be demonstrating voice, digital and Morse modes on HF, VHF and UHF.
Graham Auld 2M0IJU, Club Secretary
https://gm0pym.wixsite.com/paisleyarc

25 September
WESTON SUPER MARE RS 7TH RADIO & ELECTRONICS RALLY: The Campus Community Centre BS24 7DX.
https://tinyurl.com/2p986v6t

25-30 September
EUROPEAN MICROWAVE WEEK 2022 (MILAN)
https://tinyurl.com/y49mv8j6
https://www.micomilano.it/en

2 October
WELSH RADIO RALLY
NEW VENUE: Llanwern High School, Farm Rd, Newport, South Wales NP18 2YE. Doors open at 10 am (BB | TS).
www.gw6gw.co.uk

7-9 October
THE RSGB CONVENTION
https://tinyurl.com/265yh44r

14-15 October
THE NATIONAL HAMFEST: *George Stephenson Pavilion*, Newark & Nottingham Showground, Lincoln Rd, Winthorpe, Newark, Notts. RG24 2NY. (BB | CBS | RSGB | SIG). Tickets can be purchased online.
http://nationalhamfest.org.uk

16 October
HORNSEA ARC RALLY: Driffield Show Ground, Driffield, E. Yorks YO25 9DW.
www.hornseaarc.co.uk

22 October
ESSEX CW BOOT CAMP/ CW CONVENTION: 3rd Witham Scout & Guide HQ Rear of Spring Lodge Community Centre Powers Hall End Witham Essex CM8 2HE. Doors open at 08:30 for registration. Begin 09:00. Finish approx 16:30. Entry is £10, with free drinks. Pre-register with G0IBN (CR | FP).
0745 342 60 87
g0ibn1@yahoo.com

30 October
GALASHIELS RADIO RALLY: Volunteer Hall, St Johns Street, Galashiels, TD1 3JX. Open 11 am (BB | CR | TS).
http://galaradioclub.co.uk/?cat=7

30 October
HACK GREEN RADIO SURPLUS HANGAR SALE: Hack Green Secret Nuclear Bunker, Nantwich, Cheshire CW5 8AL. Sale of electronic equipment, amateur gear, components, military radio items, and vehicle spares. The doors are open at 10 am.
01270 623 353
www.hackgreen.co.uk
coldwar@hackgreen.co.uk

6 November
BUSHVALLEY ARC RALLY: Limavady Football Club. Doors open at 11 am; entry is £3 with a door prize ticket.

6 November
HOLSWORTHY RADIO RALLY (HARC): Holsworthy Leisure Centre, Well Park, Western Road, Holsworthy, Devon EX22 6DH. Traders from 8:00 am; doors open to the public at 10 am. (BB | CR | D | TS). Traders & General Enquiries, contact the Secretary:
m0omc@m0omc.co.uk
https://tinyurl.com/yckypn5v

20 November
CATS 43RD RADIO AND ELECTRONICS BAZAAR: Oasis Academy Coulsdon, Homefield Road, Coulsdon, Surrey CR5 1ES. Open from 10 am to 1 pm.
Andy G0KZT: 07729 866 600
bazaar@catsradio.org.uk

27 November
BISHOP AUCKLAND RAC RALLY: Spennymoor Leisure Centre, High St, Spennymoor DL16 6DB. Open 10.30 am (BB | CR | D | FP | TS).
Bob Dingle G0OCB: 07710 023 916
g4ttf@yahoo.co.uk

BA Buildathon **BB** Bring-and-Buy **CBS** Car Boot Sale **CR** Catering /Refreshments **D** Disabled visitors **FM** Flea Market **FP** Free Parking **LB** Licensed Bar **L** Lectures **MS** Meeting Spaces **RF** Raffle **RSGB** (RSGB) Book Stall **RU/PW** RadioUser/ PW in attendance **SIG** Special-Interest Groups **TI** Talk-In (Channel) **TS** Trade Stalls **Wi-Fi** (Free) Wi-Fi

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Kevin Ryan
kevin@radio-digital.co.uk

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Satellite Radio: Now and Then (Pt II)

Kevin Ryan offers the second and final part of his mini-series on satellite radio, he introduces his satellite receiving equipment, addresses some intriguing irregularities and has Part Two of his Glossary.

Last month (*RadioUser*, August 2022: 38-40), I introduced the idea of tuning into digital radio services delivered by satellite to Europe. This is a part of our hobby that was quite popular a decade or so ago.

Encouraged by my easy success with *Hotbird 13E*, I was now hopeful of picking up at least one satellite.

Receiving Gear

First of all, a quick summary of my satellite reception kit. I bought it about 10 years ago before Maplin closed down its shops. At that time, the more efficient *DVB-S2* standard was in use on many transponders, which, I believe, the Comac SC-25S receiver ignores. I am not completely sure about this because of the strange signal strength readings from DVB-S2 transponders.

Setting up the equipment (Fig.1), was relatively easy, once I figured out the various mounting options for the dish. The 40cm oval dish (measured from bottom to top) has mounting brackets for a vehicle, tabletop, wall and pole. I went for tabletop as the most convenient option (Fig. 2). The operating manual for the Comac SC-25S covered all details of the installation, including how to fit F-Type connectors.

The Low Noise Block downconverter (LNB) has a noise figure of 0.3dB (see Glossary). This was good in its day but modern LNBs tend to have noise figures of 0.1dB. After reviewing the results of my tests, I concluded that this small difference probably had very little effect overall.

The digital satellite receiver is very compact and is powered by a mains adaptor or the cigarette-lighter type plug to use a 12V supply from a road vehicle. The receiver plugs directly into a SCART socket on the back of a TV. After I attached the LNB feed from the dish, the IF output to the TV socket on the TV, the power plug and the remote control sensor plug on the receiver tended to fall out of the socket. In the end, I taped the receiver to the back of the TV with duct tape. I've found that SCART sockets on other equipment have a better grip on the plugs so the receiver might fit more securely onto other TVs.

The Satellites

The SC-25S receiver has nine satellites preset with the details of the transponder, symbol rate, polarization and FEC rate. Apart from *Sirius 2* (no connection to *SiriusXM*), all those satellites (or their replacements) are still in orbit, although it is likely that some transponder configurations will have changed over time.

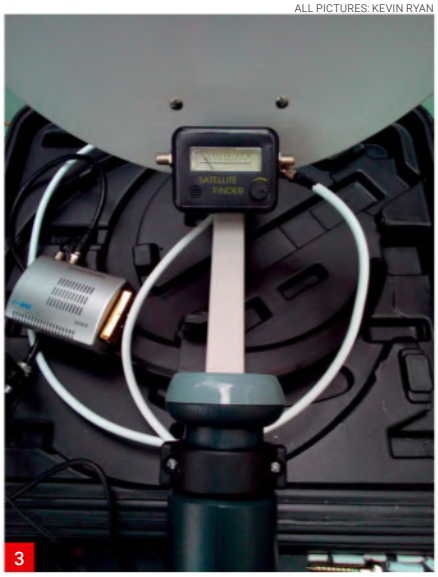
In common with most free-to-air satellite receivers, it is possible to add other satellites via a simple screen that only asks for the most basic information. Combined with the 'auto-scan' function (rather than the 'preset scan' option that uses the factory-set data) the receiver will perform a thorough search for any new channels and store them.

Armed with a compass and a satellite finder meter (Fig. 3) that is powered by the receiver and sits between the LNB output and the receiver, I began the hunt for new satellites. I set the satellite finder at a high sensitivity level, slowly changed the azimuth until the meter indicated a signal and moved the elevation to peak to the 'full' setting. After this, I lowered the sensitivity thresholds and repeated the process. There will be a point when further adjustment begins reducing the signal strength; therefore, small, incremental, moves are essential.

The most westerly satellite on my limited horizon (blocked by trees and a water tower that doubles up as a mobile phone relay point) is *HispaSat* at 30W. I peaked the satellite finder meter until I couldn't get any more increases but the receiver didn't find any services.

Signal strength was 71% but the signal quality was only 14%. *Eutelsat 5W* and *Thor* at 0W produced the same results with high signal strength and low signal quality.

ALL PICTURES: KEVIN RYAN



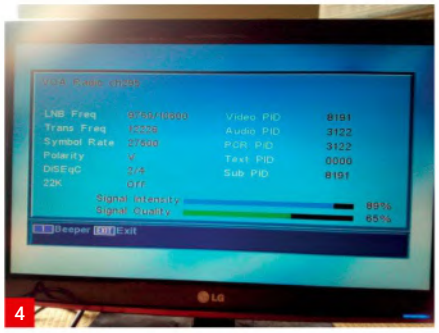


Fig. 1: The basic setup for the dish and LNB. *DISEeQ* only applies if there is a positioner on the dish. Fig. 2: The 40cm dish and the LNB on the offset LNB arm. The kit is sat on its hard shell travelling case. Fig. 3: A basic satellite finder meter, powered by the receiver. You can see the skew markings on the LNB and the SC-25S receiver. Fig. 4: The info screen for VOA radio shows the signal intensity and quality from transponder 12226, plus the 27500 baud symbol rate. Fig. 5: A few of the 80 radio channels found on the *Hotbird 13E* satellite cluster are dominated by USAGM stations. Fig. 6: Radio *Tunis Chaîne Internationale (RTCI)* has a single programme in English, at 1305 each day.

LNB Skew

I tried adjusting the LNB's skew but without any gain in signal quality on any satellite. Looking back, I did this without figuring out the markings on the LNB. Some dish systems have markings (and numbers) on both the LNB and its holder. I should have been facing the dish before making any changes. Skew will be dead-centre for the satellite that is closest to me in longitude, which was *Thor* at 1W. For satellites to the East, the LNB is turned clockwise (*Hotbird's* skew is -10.9°); and for satellites to the West, the LNB is rotated anticlockwise (*HispaSat's* skew is +21.1°). The LP401 LNB is marked in 5° steps, with major marks every 10°.

Hotbird 13E and Hotbird Radio Services

My first 'success' was *Hotbird* at 13E. Having obtained the best signal strength on the satellite finder meter, I set the SC25-S receiver to scan all free-to-air services with both vertical and horizontal polarization. At this stage, the receiver showed a signal strength of 89 (out of 100) and a signal quality of 65 (Fig. 4).

Further 'tweaking' pushed this to 92% and 71% respectively.

Later in the afternoon, the signal quality dropped to 14, following a light rain shower just like the satellites that I couldn't pick up. This is a common effect when the satellite signal is coming through foliage.

Once the leaves get wet, the signal is scattered and attenuated by water droplets.

This satellite cluster ('constellation') carries domestic digital radio services for around a dozen countries and international digital radio services for major broadcasters including the BBC World Service, Deutsche Welle, USAGM, Radio France International and Portugal.

Hotbird transmits radio and TV on 132 transponders (TP) but many are encrypted and need to be unlocked by a viewing card specific to a country. I was only interested in free-to-air radio with both horizontal and vertical polarization, and from my research, I expected to find radio stations on about a dozen transponders. After the full scan, the receiver listed stations on just five: TP70-12110V (transponder number –transponder frequency in MHz plus polarization), TP72-12149V, TP76-12226V, TP81-12322H, and TP94-12597V.

In total, I picked up 80 different radio stations (Fig. 5) dominated by those of the USAGM and stations from Italy. There are other transponders carrying radio services but they are encoded using the newer DVB-S2 broadcasting standard that didn't exist when the S-25SC receiver was made.

USAGM, Eutelsat 16E, and Beyond

The US Agency for Global Media (USAGM) is responsible for all US Government and government-sponsored international broadcasting. TP76 had services from the Voice of America, Radio Free Europe, Radio Liberty (Radio Svoboda), Radio Free Asia, as well as various services for the Middle East (Deewa, Mashall).

The Radio Liberty services (for the former Soviet Republics) are listed using their vernacular names – *Radio Ozodi* for Tajikistan, *Radio Tavisupleba* for Georgia, *Ozodlik Radiosi* for Uzbekistan, and so on.

The 2022 WRTH says Radio Farda and Sawa Radio are on *Hotbird 13B* but I didn't find them. You can find out more about the USAGM and the services from Radio Free Europe and Radio Liberty online.

https://www.usagm.gov
https://tinyurl.com/5akpjzk8

Another 'find' was the main radio service from San Marino, a small republic on the Italian mainland. There were three WRN services in English, Russian and Arabic. World Radio Network (WRN) aggregates radio services from broadcasters and then broadcasts them as a linear audio service.

https://www.sanmarinortv.sm/radio

TP70 had two services from Portugal (RDP Internacional and RDP Antena 1) and many of the Italian stations that operate national FM networks. TP72 carried many more services from Italy, plus two from Tunisia: Radio Tunis International (Fig. 6) and Radio Tunis National. I also listened to Radio Congo (Brazzaville) that I last heard on short wave on 15190kHz.

My final target also produced the now familiar 71% signal strength with a 14% signal quality result. I didn't try to receive *Astra 1* at 19.2E because all the transponders use the DVB-S2 modulation standard. The EIRP from the satellite is strong so there was a good chance of tuning in to it but my receiver just wouldn't cope.

6

Explaining Dish Mount and Size

I was determined to figure out why I only managed to pick up one of the seven satellites on my target list. Of course, without investing in new equipment I can't prove anything for sure. Here are a few ideas:

I was using an offset satellite dish, where the LNB arm is positioned usually on the bottom of a parabolic dish. The signals are reflected from the surface of the dish to the offset position. This is different to a prime focus dish, where the LNB arm is in the middle of the dish and blocks some of the signals.

Using this offset technique means the physical dish can be smaller.

However, aligning can be more difficult because the azimuth setting tends to be lower than you expect. I'm sure that I fell into this trap. Installers generally recommend putting this type of dish on a wall or a pole rather than the tabletop method I was using. A tripod mount would be a good compromise for the tests I was carrying out so that I could accommodate the offset.

There is conflicting information on the web about dish size, and most of it is about Sky systems that come in two sizes, for the North and South of the UK. A larger (60cm) dish offers a gain of about 37dBi. This would improve the chances of resolving satellite signals with EIRPs in or around 50dBW such as *HispaSat*.

Dish Alignment and Skew Adjustment

The azimuth is the most important alignment of them all; once you have this fixed, it is just a case of setting the elevation before you start to find the satellite. If you have the azimuth adjustment off, you could waste hours finding the wrong satellites (there are loads) so you will need to do

A Satellite Glossary (Part 2)

Symbol Rate A symbol is a collection of bits, sent as a change to a radio carrier's phase or amplitude. Phase Shift Keying (PSK) is used extensively in satellite broadcasting. For example, 8PSK (DVBS-2) carries three bits per symbol; the '8' means that there are eight possible phases that the carrier can use, and three bits of data can encode eight different bit combinations of ones and zeros. DVB-S uses QPSK (Quadrature) which carries two bits of data in every symbol. The symbol rate is the same as the baud rate.

FEC (Forward Error Correction) adds extra bits to the data stream to allow the receiver to check and correct any errors in the audio data. An FEC of 2/3 means that for every three bits of data sent, two will be data bits and the third a redundancy bit for error detection.

LNB is a Low-Noise Block downconverter. It both amplifies a signal and shifts the frequency down to the 950-2150MHz band. On domestic systems, they come with a 'feedhorn' built in to guide the signal to the internal antenna.

LNB Skew is the correction to the rotational position of the LNB mounted on a satellite dish. It is necessary to rotate the LNB to compensate for the polarisation deviation or skew angle caused by the curvature of the Earth. It must be set within certain limits to reduce the number of errors received on both vertically and horizontally polarised transponders.

LNB 22K Signal A universal LNB requires a 22kHz signal to switch its local oscillator to 10.6GHz (high band) from the default setting of 9.75GHz. The LNB can only handle half the frequencies at any one time to downshift them into the 950-2150MHz IF range.

LNB Noise Figure The noise figure of the LNB is a measurement of how sensitive the LNB is or how much noise the LNB will add to the signal you may be intending to receive. The lower the noise figure of the LNB, the better the LNB will be able to receive weaker signals. In practice, other parts of the dish system have a greater effect on the carrier-to-noise ratio.

Link Budget The link budget is the term used for the calculation of the carrier-to-noise ratio of a received satellite signal. The link starts with the satellite's radiated power usually from its parabolic dish and includes the various losses to the signal, as well as the noise added at every state. Starting with this value, which for the *Hotbird 13E* satellite is 53 dBW, we can calculate the carrier-to-noise ratio at the receiver. The space segment calculation can be quite complex; using typical values for a 12GHz signal, we can work out the first part of the path to give the signal into the LNB feedhorn:

LNB_{IN}=EIRP(53dbW)-Space Loss(205dB)+Dish Gain (33dBi) = -119dBW

RX_{IN} = LNB_{IN} (-119dBW) +LNB Gain (55 dB)-Cable Loss (3dB) = -58 dBW (-28 dBm).

The noise calculation is harder to work out. There is an online link budget calculator on the following website. This lists the many elements, and the system information needed, to work out the carrier-to-noise ratio.
https://www.satsig.net/linkbugt.htm

Carrier-to-Noise Ratio The carrier-to-noise ratio (CNR or C/N) is the signal-to-noise ratio (SNR) of a modulated signal in the radio frequency part of a system. Once the signal is demodulated, the more familiar term 'SNR' is used for the video/audio signal.

some investigation on the satellite angles that you wish to use. Once the azimuth is set correctly, it is far easier to get the elevation right, rather than the other way around. My satellite dish has an elevation angle scale marked on it but this is only valid if the dish is mounted on a perfectly flat, vertical, surface, which is quite uncommon.

I also found the LNB skew to be a distraction but that might be because I was never properly aligned on most of the satellites. This is the angle that the LNB itself sits at within the holder. The LNB in my kit had scale marks on it but no indication of what each division meant. The 'zero' mark only applies to satellites exactly due South. The satellites closer to a zero-degree azimuth will appear highest. Because the Earth is round the further East or West you deviate from due South the lower the satellite will be in the sky, so the satellite is effectively beaming the signals at an angle, which you have to work with to get the best signal.

The reason this is so important is that satellite signals are broadcast in both horizontal and vertical polarisation; without setting the skew correctly, the LNB and satellite dish will not be able to identify the difference between them. They can interfere with each other, resulting in an unreliable signal or possibly a complete loss of signal altogether. This could explain the strange signal strength/low signal quality of 71/14% where the receiver is reading the mangled polarisation.

https://tinyurl.com/42h679nt
https://tinyurl.com/2p8ad8sp
https://en.kingofsat.net

Summary

My satellite kit and setup procedures both contributed to my low 'haul' of digital radio signals. I will need a tripod to mount the offset dish on, probably a 60cm dish for its extra gain, and a DVB-S/DVBS2 receiver.

However, I think that the 0.3dB LNB will be OK. In future, I would set the LNB skew correctly first, then the azimuth, and finally the elevation. A satellite finder is a coarse tool but I don't think I can justify a spectrum analyser for occasional use in just one part of my hobby!

You will find many equipment suppliers on the internet, and UK-based companies are good starting points.

There are more *Sky* systems available than free-to-air ones; if in doubt, make contact with the vendors.

https://tinyurl.com/vpvh6znr
https://satellitesuperstore.co.uk/cat.htm

Radio News

RADIO VETERAN CHRIS STUART: Former BBC Radio Wales and Radio 2 presenter and producer Chris Stuart has died aged 73. Chris was one of the first hosts on Radio Wales in 1978 as a breakfast news reader, and also hosted shows on BBC Radio 4.

He was born in Durham, brought up in the Midlands and moved to Wales for work. BBC Cymru Wales director Rhuanedd Richards has paid tribute, saying: *"Chris used his intelligence, curiosity and engaging personality to brilliant effect. He was instrumental in ensuring the success of Radio Wales in its early days and became one of its defining and most recognised voices. He could engage with any topic and find the right words for the big occasions."* BBC Radio Wales broadcast a special 30-minute programme with Roy Noble on Wednesday evening as a tribute to the broadcaster.

Chris and his wife Megan, a former producer on *BBC Woman's Hour*, set up their own production company called *Presentable* in 1993. *Presentable* was the company behind BBC quiz *Only Connect* and *Late Night Poker* on Channel 4

https://tinyurl.com/3mc67b6z

Moonraker: Xiegu G106 80-10m QRP

This news is just in from Moonraker: The G106 is a 5W portable QRP model with an SDR circuit structure which uses 16bit-CODEC sampling and can deliver superior performance. The whole machine has SSB/CW/AM three modes and an extra WFM (88~108MHz) receiving function, allowing you to listen to local FM broadcasts while communicating. Equipped with a CW digital filter with three bandwidths, it can help you connect to more radio stations. With the external DE-19 digital adapter (optional), it can be easily connected to the computer and complete FT8 communication. As an entry-level portable SDR transceiver, G106 will be a good helper for you to play CW and FT8 all at an amazing price from Moonraker at just £349.95. At the time of writing, the radio's main features were advertised as follows:

- Audio Output Power: 0.3W | Compact and robust structure
- Computer online control available | Dimensions: 120mm*40mm*135mm
- Amateur data communication is available
- Frequency Stability: ±1.5ppm within 30min after power on, @25°C: 1ppm/hour
- High-performance SDR core circuit
- Operating Mode: SSB/CW/AM, WFM (receive only) | Operating Voltage: 9~15V DC
- Receiving Frequency: 0.55~30MHz, 88~108MHz (WFM)
- Receiving Sensitivity: CW: 0.25uV @10dB S/N, SSB: 0.5uV @10dB S/N, AM: 10uV @10dB S/N
- Shortwave full-range continuous receiving
- Standby Current: 0.37A @Max | Technical Specifications:
- Transmission and receiving of all amateur frequency bands within 3.8~29.7MHz
- Transmitting Current: 2.8A @Max
- Transmitting Frequency: 3.5~3.9MHz, 10.1~10.15MHz, 18.068~18.168MHz, 24.89~24.99MHz, 7.0~7.2MHz, 14.0~14.35MHz, 21.0~21.45MHz, 28.0~29.7MHz
- Transmitting Power: ≥5W @13.8V DC | Transmitting Spurious Suppression: ≥50dB
- Weight: About 720g (only host) | WFM broadcast receiving.

(SOURCE: *Moonraker Newsletter*)

https://tinyurl.com/35mtanb5

TELESIA TV FACEBOOK

1

Always Something New to Discover

Chrissy Brand enjoys the summer of 2022, recommending a choice of radio broadcasts and podcasts, which reflect such diverse activities as commuting in Italy and discovering some obscure music from New York.

Chrissy Brand
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When in Rome recently – *doing as the Romans do* – I was struck by the high quality of information available on the morning and evening commute. Many of the metro trains and the larger metro stations have screens relaying a range of news and information in a format one might call 'tabloid television'.

The information was streamed in manageable soundbites and short video clips; enough for a commuter to digest whilst waiting for a train or travelling between stations on the public transport network.

The content was easy to understand, even for a non-Italian speaker like myself, with fast-changing video and images aiding comprehension. *Telesia TV* is the provider of this exciting and addictive (for me) service. The programme content was aimed at headlines and soundbites of news, technology, sport, fashion, music, weather, literature, and even horoscopes (Fig. 1). As well as the Rome, Milan, Genoa and Brescia metros, *Telesia* also operates on some Italian buses, at airports, and on the wider train network.

Another interesting observation of Rome's radio and electronics heritage is that there is a subway station named after Marconi (Fig. 2). In addition, at Piazza Guglielmo Marconi in the EUR area of the city, there is an obelisk dedicated to Marconi (1874 - 1937). This is in the fascist-era area developed under Mussolini, which has evolved to become a business district. The obelisk was commissioned two years after Marconi's death in 1939, but it was not completed for a further 20 years.

www.Telesia.it
https://tinyurl.com/yhchhda4
https://tinyurl.com/4nea7wee

Media Programmes

Pod Roast is a short, weekly programme all about the media industry but, in particular, about other podcasts (Fig. 3). John Ryan takes a critical ear to what he has heard on podcasts and in the news. His career included 23 years of running BBC stations in Leeds, Manchester and Northampton, making him well qualified to express some scathing opinions.

On the *Pod Roast* programme first streamed on May 12th, he took a critical look at podcasts produced by newspapers in the north of England. In June, among the podcasts reviewed were TalkSPORT's *The Men's Room*, Times Media's *The Crop Shop*, *Committee Corridor* from the House of Commons, *Bat Chat* from The Bat Conservation Trust, and *A Gay and a Non-Gay*. The latter is an award-winning LGBTQ+ podcast that is hosted by comedians James Barr and Dan Hudson.

Generally, John reviews two or three popular mainstream podcasts from the big production companies. It can be heard on Podcast Radio on Fridays at 1200 UTC and repeats include an 0830 UTC airing on Thursdays. Or simply stream at your leisure.

https://tinyurl.com/yc7hza55

The Dutch radio scene is very vibrant, with lots of medium wave stations still operating. To get an idea of what is available, why not head to the Dutch blog which is named *Ontvangstrapporten Middengolf Piraten* (Reception Reports MW Pirates). There is a weekly round-up of station logs, and each blog post is nicely illustrated with a recently-received QSL card (Fig. 4). It is heartening to

Fig. 1: *Telesia TV* provides news, fashion tips, and other information for Italians on the move. Fig. 2: The *Marconi* station on the Rome subway. Fig. 3: *Pod Roast* - hosted (roasted?) by John Ryan - is about the media industry and beyond. Fig. 4: Tune to 1629kHz for Dutch station *Blue Cow Radio*. Fig. 5: *TVP World* broadcasts from Poland, in English.

witness the longevity of this old-school element to the radio listening hobby.
https://mgpiraten.blogspot.com

The *Media Network Vintage Vault 2022-2023* is an update of Jonathon Marks' incredible back catalogue of Radio Netherlands' output. He also adds new reports and material, which is worth taking a look at. Five new videos were released last year. In addition, Jonathon says he is, *"gradually sorting out my off-air radio cassette collection. I realise that if I don't do it now, I will never get around to it. But I also realise that a lot of off-air recordings are disappearing, especially once the radio programme is made, and very few people keep the original interview or recordings. For some reason, I did. And 40 years later I am so glad I didn't throw things away… I'm sharing an off-air recording of the* Falklands Island Broadcasting Station *during the Argentine invasion of April 1982."*

A reminder as well, that the *Radio Netherlands Archives* website is still operational. After the broadcaster unforgivably pulled the plug in 2012 on Radio Netherlands transmissions, a group of former employees created a website, to make 1,200 of the station's programmes available for future generations.
https://tinyurl.com/4v5xmrjm
https://vimeo.com/showcase/7953619
https://tinyurl.com/429afv3r
www.radionetherlandsarchives.org

The *Tech Guy* YouTube channel may be of interest to many readers. Over 31,000 people already subscribe to this vlog, which is also broadcast as a twice-weekly radio programme. The channel blurb states, *"No one does a better job of explaining technology, computers, and the Internet than Leo Laporte. This channel contains the full content of his twice weekly radio talk show as heard on stations all over the US on the Premiere Radio Networks."* Transcripts of each show and more information can be found on the accompanying website. Leo first started presenting a technology-oriented talk radio show in 1990, co-hosting on KNBR in San Francisco with columnist John C. Dvorak.
https://youtube.com/TheTechGuy
https://techguylabs.com

CHRISSY BRAND

2

Campaign is an organisation that started as a weekly magazine in London in 1968. Today, it covers marketing, advertising and media communities, "providing real-time news and analysis by expert commentators in eight territories around the world. Apart from the UK, Campaign now serves the US, South East Asia, India, China, Japan, Turkey and the Middle East." Its podcast is entertaining and informative, with recent episodes reporting on the Cannes Lions Festival of Creativity, the Campaign Against Living Miserably (CALM), and Andy Warhol's impact on the world of advertising.
https://tinyurl.com/3k7vdua9

North America

Vintage Obscura is an online radio station in New York where "Nearly 70,000 music-obsessed researchers scour the internet daily to uncover nearly forgotten music of every genre and category." When I last visited the website, it stated I was one of just 10 tuned in. Other listeners were in Austria, Finland, France, Germany, Colombia, The Netherlands and the USA. I do like being one of a select band of people!

What did I hear? Well, a selection from curated playlists that are said to, *"rotate between recently posted tracks or hour-long shows of the same or similar genres."* To be more specific, a melancholic, psychedelic hard rock track from 1974 called Those Days by US band Headstone; a French psychedelic experimental track by Fille Qui Mousse called *Cantate Disparate*; and a 1983 Brazilian track called *Mata*, by Marlui

POD ROAST

3

BLUE COW RADIO

4

Miranda, described as an, "*unusually sweet, blue and groovy folk ballad.*" All the tracks that are streamed have fewer than 30,000 views on YouTube at the time of discovery and were released before 1996. It makes for an interesting afternoon of music you have probably never heard before, and a nice alternative to many radio stations.
https://vintageobscura.net

From 1994 to 2016, The Vinyl Cafe aired weekly on CBC Radio, on select public radio

Date	Time (UTC)	Station	Programme	Podcast	URL/ Stream/ Frequency
Daily	24/7	ERT Voice of Greece	Misc. features in Greek and music	radiostreaming.ert.gr/ert-voiceofgreece	Radio Garden, https://webradio.ert.gr/i-foni-tis-elladas
Daily	24/7	Nostalgica FM	Chilean popular music 1970s to today	App and www.nostalgica.cl/playerRadio	FM throughout Chile, online, www.nostalgica.cl
Daily	Circa 0500	Bangladesh Betar	News in English	Google Podcast app	www.betar.gov.bd
Tuesday	2000 to 2100	Jazz FM	Sarah Ward Jazz Travels	https://tinyurl.com/yjuh2wbc	DAB, online, app, https://tinyurl.com/29n59eue
Wednesday	2000 to 2200	Charity Radio, Dublin	Colum King and the Ceolplay Show	www.mixcloud.com/CharityRadioIreland	https://charityradio.ie
Thursday	1700 to 1800	BBC Radio Bristol	The Pavilion with Geoff Twentyman	BBC Sounds	DAB, FM https://tinyurl.com/mr25dbp5
Saturday	0700 to 1000	Absolute Radio	Frank Skinner and Emily Dean Breakfast Show	https://tinyurl.com/mvz7vs3w	DAB, online, app https://tinyurl.com/4v6acjfx
Saturday	0900 to 1130	BBC 6 Music	The Huey Show	BBC Sounds	DAB, online https://tinyurl.com/mp8fju7y
Sunday	1600 to 2200	Classic FM Denmark	Classic Sunday, Passion for music, Danish popular music	http://netradio.classicfm.dk/cla8d	FM throughout Denmark, Sonos speaker, https://classicfm.dk/hoer-os-her
Sunday	1700 to 1740	RTE Lyric FM	The Lyric Feature	RTE Player app	FM, https://tinyurl.com/3j4nttnk

Table 1: Chrissy's Top Summertime Listening Tips for the Month Ahead.

stations in the USA, and via podcast. The radio show was written and hosted by the late Stuart McLean and featured stories, essays and music, often recorded at live concerts across Canada and the USA. The stories are about Dave, owner of a second-hand record store called *The Vinyl Café* and feature Dave's wife, Morley, their two children, Sam and Stephanie, and assorted friends and neighbours. The stories are collected in books and CDs, as well as in digital formats.

Periodically, *The Vinyl Cafe* returns to its old home on CBC Radio. An update at *The Vinyl Cafe* Facebook page in June alerted me to the fact that CBC Radio's *The Current* broadcast the episode called *Petit Lac Noir* on July 1st Listeners were invited to, "*escape with us to a cottage in the Laurentian Mountains ... via the airwaves!*" Other *Vinyl Cafe* stories aired by *The Current* in recent months have included *Tree of Heaven, Odd Jobs* and a story about Dave's neighbours Eugene and Maria and their amazing fig tree.

www.vinylcafe.com
www.cbc.ca/radio/thecurrent

From humorous observations of everyday life, we move to science, and station WCPT 820 AM, billed as *"Chicago's progressive talk - where facts matter."* Amongst the many varied programmes on offer, there is *Think Theory Radio's Weird Science*, and *Tales to Astonish*.

This latter 50-minute programme is aired on Saturday evenings in Illinois, so early on Sunday morning in Europe.

Of course, you can catch up at a more civilised hour by listening online. Amongst the many questions asked and topics tackled are such gems as *"Eerie sounds emitting from a super-massive black hole? "Is the Chinese Government Working on a Time Machine?"; "Can Scientists Communicate with Lucid Dreamers?"; "What is the Large Hadron Collider?"*, and *"How will the new James Webb Space Telescope help Research the History of the Universe?*

https://soundcloud.com/wcpt820
https://tinyurl.com/ypzerss7

Radio Lab, from WNYC, continues to create high-quality programmes. In June, the team were researching the effect of the *Alexa* smart speaker on individuals who were named *Alexa* by their parents.

Sindhu Gnanasambandan reported that there are approximately 130,000 *Alexas* (as well as a few hundred thousand *Alexis, Alyssas* and *Alexias*) across the USA.

Sindhu dived deeper and she asked for people with any other co-opted names to share their stories on Twitter, tagging @ radiolab or e-mailing the station. This idea came to Sindhu when she was working on the episode "*Hello, My Name Is*" which aired at the end of April: "*As a species, we're obsessed with names. They're one of the first labels we get as kids. We name and rename absolutely everything around us. And these names carry our histories, they can open and close our eyes to the world around us, and they drag the weight of expectation and even irony along with them. On* Radiolab*, we've got six stories all about names. Horse names, the names of diseases, names for the beginning, and names for the end.*"

https://tinyurl.com/3rhjjm5a

Eastern Europe

Graham Smith has some useful information on a range of radio topics. He was listening to Andrei Borisov on a Saturday night into Sunday morning on Radio Rossii, on 999kHz between 0010 and 0100 UTC. The programme was called *Exotica* and, "*either stopped or moved. Unfortunately, the Radio Rossii website is unreachable right now due to the Ukraine war, but I would like to know what happened to the programme.*"

In an interview with Andrei about the Exotica record label, he explained how, "*Exotica is a label for music-lovers, for those who understand the music and want to listen to something more interesting, modern and unusual than one-day-lasting hits, which are everywhere nowadays on TV and radio. Exotica produces innovative, original music.*"

vuk.free.fr/en/andreiBoris_en.htm

Graham also noted that Ukrainian Radio broadcast in English, on 1386kHz from 0000 to 0007. He also observes how Polish Radio used to be a major international broadcaster. It still is, in my view and can now be heard online, look for Polskie Radio. There is also the Polish television channel *TVP World* that broadcasts in English, and you can watch it via the website (Fig. 5).

www.polskieradio.pl/395
https://tvpworld.com

Blackouts Bombs & Banning Crooners

David Harris
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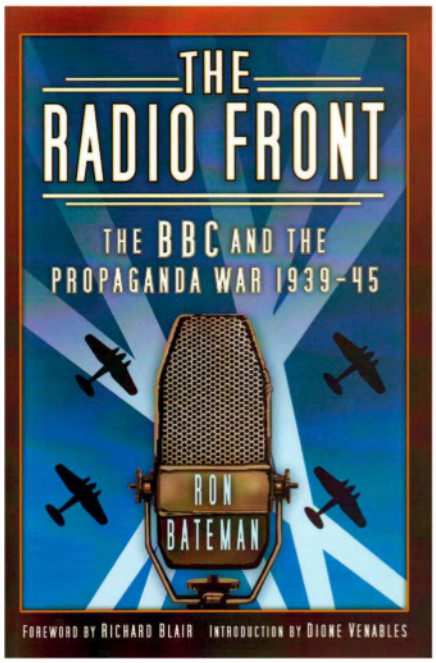
David Harris evaluates a book about the activities of the BBC during World War Two. This author covers deception, 'psych-warfare', external broadcasts, 'black ops', fake news, personalities, and unwanted music.



The Radio Front. The BBC and the Propaganda War 1939 -1945
by Ron Bateman
History Press. 2022. 256 pp. Pbk. £17.99.
ISBN 9780750996648
www.thehistorypress.co.uk

This new title explores the role of the BBC in delivering carefully controlled propaganda during the Second World War (1939-1945), both to listeners in the UK and around the world. Ron Bateman is a founding member of the *Orwell Society* and a former editor of the *Orwell Society Journal*.

The BBC was rather slow in entering the world of international broadcasting, with the English-language *Empire Service* not starting until 1932 and the first foreign language (Arabic) broadcasts in 1938.

When war was declared in 1939 the BBC regional stations closed down and gave way to the *BBC Home Service* (previously the *National Service* and now *Radio 4*).

There were many complaints in the early days of the war that the programmes were very dull with up to 6 million UK listeners tuning into Lord Haw-Haw (William Joyce) who broadcast Nazi propaganda from Berlin.

The author makes the point that during the war the BBC had an important role in working with the government to build morale in a country that was threatened with invasion and possible obliteration through aerial bombing. The first major change to programmes was an increase in the number of news bulletins. There was an insatiable appetite in the country for news of the war even when there were few developments.

The 1940 evacuation of British troops from Dunkirk is cited as an example of how this event was not reported as a defeat and that the BBC was not allowed to interview the returning troops. Instead, the focus of the BBC was on the bravery of the crews of the small ships who carried out the rescue of the soldiers.

'The BBC began broadcasts to the then neutral USA as a way of trying to win it over to the Allied cause'

In June 1940, the troopship RMS *Lancastria* was sunk by German bombers off the French coast with a loss of life estimated to have been between 3,000 – 6,000 British soldiers. News of this tragedy was withheld by the BBC, even though details were broadcast by German radio and reported in US newspapers. It was several weeks before British newspapers reported on this event.

In 1940, the BBC began broadcasts to the then neutral USA as a way of trying to win over the USA to the Allied cause. These broadcasts were very popular; by 1944, some 725 out of 914 US domestic radio stations were rebroadcasting BBC war reports.

The book alternates between the role of the BBC at home and abroad where it had the difficult task of broadcasting to Allied countries, occupied countries, Axis nations and neutral countries.

In January 1940, the *BBC Forces* programme started as a second domestic radio channel, featuring light entertainment and popular music. This became the *Light Programme* after the war – *now Radio 2*.

Bateman devotes a lot of space to the roles played by entertainers such as Tommy Handley (1892-1949). His comedy programme, *ITMA* (*It's That Man Again*) is widely credited with raising morale during the war when he attracted up to 18 million listeners. It was also felt that some musical content, such as crooners and sentimental songs, were not helping the war effort and the BBC banned this content (including Vera Lynn) in 1942 for several months.

Churchill's government during the war was not a big supporter of the BBC (Bateman is one of several writers who point out that the BBC has always had a difficult relationship with the government of the day) but Churchill needed his speeches to be broadcast to the whole nation and abroad.

In this context, the author emphasises the importance of the role of Noel Newsome who was head of the BBC's European Service during the war (see my review in *RadioUser* February 2020: 12). Newsome is credited with keeping the BBC European services as a trusted source of news and not merely a propaganda outlet. He cites Anne Frank (1929-1945) a German/Dutch diarist of Jewish heritage as being a keen listener to the BBC's Dutch Service which broadcast as *Radio Oranje*.

Overall, this book packs a lot into its 256 pages and includes some fascinating information, for example, about George Orwell's role in the *Eastern Service*. Bateman also discusses the role of the 500kW *Aspidistra* transmitter, which played a role in 'black' radio transmissions to Germany: programmes from the UK that purported to come from official German stations.

In all, *Radio Front* does a very thorough job of advancing our understanding of the role of the BBC during the Second World War.

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JOHN ANDREW, WIKIMEDIA

1

The BBC Radiophonic Workshop (Part One)

In the first of a two-part mini-series, **Chrissy Brand** examines the history and achievements of the BBC's Radiophonic Workshop and its ongoing legacy, in terms of music production and culture.

One of the most highly innovative of the BBC's departments over the past century is, perhaps, one of its less appreciated by the mainstream and general public. However, the *BBC Radiophonic Workshop* contributed to a whole new genre by combining music with natural and human-made sounds. This has inspired future generations to experiment with sound effects, tape loops and digitised forms of *Electronica*.

Founded in 1958, the Workshop was based at Maida Vale Studios in London (Fig. 1), which the BBC is due to leave in 2025. This base was shared with the BBC Symphony Orchestra and offers spaces that were used for live concerts by most of the BBC national radio stations.

The Workshop was initially charged with creating experimental sounds and new music to accompany BBC television and radio productions. One of its early pieces was for *Quatermass and the Pit*, a TV series about a Martian invasion. This was the third in the 1950s *Quatermass* serials, and it was broadcast live, in December 1958 and January 1959.

However, if you were to ask people to remember four facts about the *BBC Radiophonic Workshop*, they might well start by mentioning the reworking of the *Doctor Who* theme, when the television programme debuted in 1963. After that, perhaps a trio of three names are synonymous in the public consciousness: Daphne Oram, Delia Derbyshire and Paddy Kingsland. Details of their roles at the Workshop will appear in part two of this article.

The Origins of the Workshop

In the 1950s, new forms of music and drama were being created across Europe. These had a direct influence on the evolution of the *BBC Radiophonic Workshop*. New forms of electronic music, in particular, were being used to enhance the moods of radio plays.

In his book, *Special Sound, The Creation and Legacy of the BBC Radiophonic Workshop* (Oxford University Press, 2010; Fig. 2), Louis Niebur, Associate Professor of Musicology at the University of Nevada, observes that this need was noted by a group of British electronics music enthusiasts, who, "*followed in the footsteps of French radio drama and German Hörspiele* ['radio plays' – Ed.] *producers*." It was partly this that meant the inspiration to create a BBC electronic effects studio emerged from the Drama and Features Department rather than the Music Department.

Jo Hutton is a researcher and sound

practitioner specialising in the history of electroacoustic music from the viewpoint of women composers in the analogue years. In a May 2006 article, *Radiophonic Ladies*, she perfectly captures the *Zeitgeist* of the era's evolution of wider European electronic music.

Jo explains, "*In the early 1950s the world was gradually waking up to the 'musique concrète' of Pierre Schaeffer, and the tape manipulations and electronic music experiments of Luciano Berio, and Karlheinz Stockhausen. The celebrated pioneer studios of electronic music share one common denominator: the word radio. Schaeffer worked at the Radiodiffusion Télévision Française in Paris; Stockhausen worked at Radio Cologne and Berio at Radio Audizioni Italiene[RAI] in Milan*".

Significant developments in sound recording and reproduction technology for radio were a legacy of urgent wartime need for improved means of communication and a precursor to a new peacetime artistic obsession with the infinite musical possibilities of the tape recorder. This was a time when tape recorders were the size of a large fruit machine and [only] movable by crane when home studios were unheard of and budgets for this equipment could only be found in national radio stations."

https://tinyurl.com/yc3ywuhb
www.johutton.com

A 2008 article celebrated the 50th Anniversary of the *Radiophonic Workshop*. Entitled *Sorcerers of Sound*, by the '*Caught-by-the-River*' website, Simon Reynolds (writing for *The Guardian*) noted that in the 1950 and 1960s, *"state-run stations, such as Radiodiffusion-Télévision Française, Westdeutscher Rundfunk and Radio Italia funded their own sound laboratories dedicated to exploring the new tape-editing techniques and grappling with primitive devices, such as ring oscillators, for generating pure electronic sound."*

https://tinyurl.com/3eymj9z2

However, the output of the *BBC's Radiophonic Workshop* had more of a practical nature than its European counterparts. Any experimentations of sound which occurred were harnessed firmly within the remit of the radio or television programme for which the soundtrack was being created.

Change Over 40 Years

The *Radiophonic Workshop* went through many variations in its 40 years of existence. This was inevitable, with personnel changes, evolving technologies in sound and vision, and an ever-changing range of television and radio programmes being produced.

OXFORD UNIVERSITY PRESS

Fig. 1: Maida Vale Studios: home to the *BBC Radiophonic Workshop*. Fig. 2: Some recommended reading on this fascinating subject. Fig. 3: Dick Mills, of the *Radiophonic Workshop*, during a performance in 2009.

The late 1950s and 1960s are referred to by Louis Niebur as the Workshop's first golden age of special sound. It progressed from the output in the 1950s, where, "*the early obsession with frightening, disturbing, and alienating sound*" was partly due to the technology available to the composers at the Workshop.

Donald McWhinnie was the producer of *Private Dreams and Public Nightmares: A Radiophonic Poem*, which was created by Frederick Bradnum and Daphne Oram for broadcast on the *BBC Third Programme*. He explained that it was, at that time, easier-to-make sounds that were horrific rather than warm and soothing.

https://tinyurl.com/4dd23rzb

Tape loops, rhythmic structures and sound effects came into use in radio productions, from recreating the noise made by walking in the snow, to a novel set at sea, *The Ocean*. Giles Cooper's ground-breaking plays *The Disagreeable Oyster* and *Under the Loofah Tree* also were greatly enhanced.

www.suttonelms.org.uk/GC.HTML

With the advent of BBC local radio in the late 1960s, a new area for work came into being. Sign-on calls were created for Radio Nottingham and Radio Sheffield. David Cain made the latter's theme using the sound of Sheffield cutlery, whilst one of radio Nottingham's call signs evoked the sound of flying Sherwood arrows. This was made by David Baker and described by Louis Niebur as, "*the sound of air passing over the opening of an old bottle, a plucked ruler, and pouring water, with each note individually pitched on a variable-speed tape recorder to create the main melody*."

The 1960s saw the first electronic keyboards appear in the Workshop. The addition of the Mellotron and the Moog synthesizer added to the creativity at Workshop employees' disposal.

Two of the television series that the Workshop produced incidental music and a soundtrack for, and which achieved a global audience, were *Life on Earth* and *The Living Planet*. The latter was a 1982 and 1983 series presented by David Attenborough and was part of the change in direction for the Workshop, moving their repertoire into that of a more musical nature. Elizabeth Parker was the composer at the Workshop who worked on the series, using instruments and technology which included the Yamaha SY2 synthesizer and an EMS vocoder. The results were much lauded and, in 1984, an LP was released of Elizabeth Parker's music from the series.

Her first big success was her work on the cult science fiction series *Blake's Seven*, which ran from 1978 to 1981. She was interviewed about this in 2018 when DVDs of the series were released. Elizabeth said how she approached each episode in a new way and talked of how to make the envelope, sustain and decay sounds that emulated the opening and closing of doors on a spaceship.

She also stated how she used breathing and her voice quite often, to make the sounds more 'organic' and less 'electronic'. Elizabeth was trying to obtain a more subtle, more 'feminine' sound than some of the previous Workshop's output on *Doctor Who* and *Blake's Seven*.

www.bbc.co.uk/programmes/p06r7zc0

Elizabeth Parker was the last composer to leave the *BBC Radiophonic Workshop* when it closed after 40 years, in 1998. The closure was partly due to BBC budgetary cuts. Although at the cutting edge of technology, it was in financial difficulty. In addition, by the 1980s, producers were sourcing more of the material, that they previously required from the Workshop, from independent, non-BBC studios.

However, another factor in the closure was that it was being overtaken by technology that was more widely available and affordable for the public; in particular, the accessibility of Macintosh computers, with a graphical user interface.

The Legacy of the Radiophonic Workshop

The spirit of the *BBC's Radiophonic Workshop* lives on in many individual creatives and, from an organisation point of view, at *The Radiophonic Institute*. This is a partnership which champions innovation in sound and music. One of the joint projects is *The Museum of Sound's Sound of the Year Awards*. This is a celebration of everyday sound in all its forms, with 16 categories, and it is covered by BBC Radio 3's *Late Junction* programme, amongst others.

The *Sound of the Year* website states that the awards, *"highlight the rapidly growing international community of sound professionals and enthusiasts as the value of good sound, listening, and healthy sonic environments are becoming recognised as a vital part of our lives. Whilst there are many awards shows for the moving image, we think the time is right to acknowledge and support those working hard to build and share their expertise in moving audio as we enter this new age of sound."*

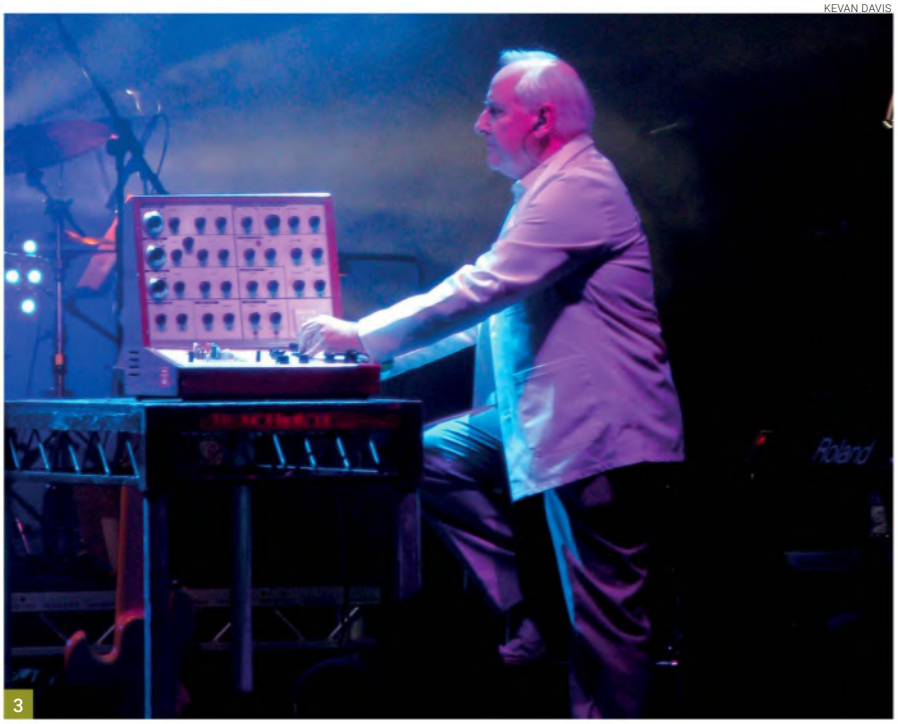
The 2021 award winners each received a prize in the form of a 'geophone' microphone. This is a sensitive omnidirectional device, originally designed for seismic measurements, but since adjusted for field recording purposes. An audio mix of the 2021 shortlisted submissions, all playing at once, can be heard on the Awards website. Matthew Herbert created this rather beautiful and otherworldly soundscape. It is a seven minutes and 49 seconds cacophony of bird song, chimes and atmospheric noises.

The *Daphne Oram Trust* is another partner in *The Radiophonic Institute*. Named after Daphne Oram, a founder of the *BBC Radiophonic Workshop*, it, *"celebrates innovation in music, sound and related technologies by the next generation of forward-thinking women, girls and gender minority artists."* The *Oram Awards* are one of the initiatives of the Trust.

Daphne Oram had a key role in establishing women at the forefront of innovation in newly emerging audio technologies around the world. The Trust also notes many other pioneering women at the *Radiophonic Workshop*, which included Delia Derbyshire, Glynis Jones, Jenyth Worsley, Maddalena Fagandini, and Elizabeth Parker. As well as being a creative force, they helped challenge gender inequalities in the workplace and wider society.

Another *Radiophonic Institute* project emerged in the form of *The Radiophonic Travel Agency*. This is a wonderful experience instigated in 2019 by *BBC Research and Development*. It enables you to, *"travel the world through the power of sound"* and listen to selected pieces of music and field recordings, some of which last up to an hour. The recordings and soundscapes include a train to Brighton, modern and ancient cities of Iran, places of refuge in Ramsgate, a journey through the US postal system, a week the life of a tree, hiking with the Yamabushi mountain monks, sea cliff walks in Iceland, and much more.

KEVAN DAVIS



3

Contemporary Issues

The *Radiophonic Workshop* continues with reworkings of music from the past too, often in collaboration with cutting-edge artists of today.

In 2015, the *Digital Journal* reviewed a *Radiophonic Workshop* live concert, held at *Queen Elizabeth Hall* on London's South Bank. Theme tunes such as *The Hitchhikers' Guide to the Galaxy* were performed, alongside new compositions.

These live performances started in 2009, with several former *Radiophonic Workshop* colleagues. Dr Dick Mills, Roger Limb, Paddy Kingsland, Peter Howell and Mark Ayres composed new music and played several gigs, which included the Glastonbury Festival (Fig. 3).

As a result of public demand, or perhaps 'cult-status', a series of remastered *BBC Radiophonic Music* and *BBC Radiophonic Workshop* vinyl albums were reissued. Another example of the legacy was seen at the *Jodrell Bank Bluedot Festival* in July of this year, there was a performance of the soundtrack to the 1973 science fiction animation, *La Planète Sauvage* ('The Fantastic Planet'). The soundtrack to René Laloux's film was reimagined by electronic modernists Stealing Sheep, who were aided by the *Radiophonic Workshop's* Bob Earland, Dick Mills and Roger Limb. *"La Planète Sauvage is a thing of ambient beauty punctuated with electronic earworms that switch from intensely ominous to otherworldly dreamlike moments."*

This performance followed on from a release of the reworked soundtrack on *Delia Derbyshire Day 2021*, as part of Fire Records' re-imagined score series. Since then, it has become available on CD and various vinyl versions, including a limited edition pressing of 250 as a two-LP set on blue and white vinyl with a psychedelic burst. The Vinyl Factory summed it up nicely when they stated, *"No institution has had a greater impact on the development of electronic music than the BBC Radiophonic Workshop."*

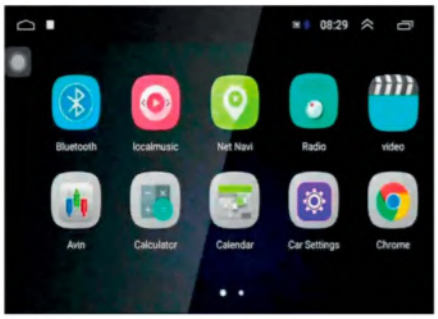
www.theradiophonicWorkshop.com
www.soundoftheyearawards.com/2021
www.soundoftheyearawards.com
www.oramawards.com
https://tinyurl.com/mx94p593
https://tinyurl.com/23nadm8y
https://tinyurl.com/33km42f3
https://tinyurl.com/4v3nu4sk

In Part Two next month, I will concentrate on key individuals who made their mark at the *BBC Radiophonic Workshop* and examine the series of *BBC Sound Effects* records that were produced for public consumption.

Radio News

PARKINSON'S CLINICAL TRIAL : David Jensen has been talking about the hallucinations he sometimes has that are caused by Parkinson's and has urged people to join a trial into a drug for the disease. The Radio and TV presenter was diagnosed with Parkinson's in 2011 and has revealed that hallucinations are a part of his life, including seeing a dog that doesn't exist or bumping into someone on the stairs. Now, David is taking part in a world-first clinical trial with *Parkinson's UK*. This association has joined up with University College London (UCL). The *Phase-2* clinical trial (*'TOP HAT'*) is investigating if the drug *Ondansetron* is beneficial, safe and effective at alleviating hallucinations in people with Parkinson's. David, who is a *Parkinson's UK* celebrity ambassador, is calling on those who have loved ones with these conditions to encourage them to consider taking part in this and other pioneering research [...].
(SOURCE: ontheradio | Parkinson's UK | National Press)
https://tinyurl.com/5n7pyz33
https://tinyurl.com/mr3sj77u

SENIOR STAFF CHANGES: Global's Director of Broadcasting and Content James Rea has made several high-profile promotions to his senior team. The teams responsible for artist relations, booking A-list guests on Global's radio brands and digital platforms, and booking acts for Global's flagship events, will now be combined into one team under the leadership of the new Group Head of Talent, Music and Artist Relations, Mark Findlay. Mark, whose promotion will see him report directly to James Rea, will have overall responsibility for an 'impactful' multi-platform strategy that creates the best experiences for audiences. Ryan Hunter, currently Capital FM's deputy managing editor, has been promoted to Group Head of Brand Content, Events & Specials for Global Player. The role will be responsible for accelerating the 'Global Player-first' strategy, spanning all of Global's radio brand and special event content on Global Player. Capital XTRA Programming Manager Lisa Cheung is promoted to Capital XTRA Deputy Managing Editor, reporting to Matt Deverson, Managing Editor of Capital XTRA. Russ Evans joins James' core team as Group Head of Music Programming. Russ will continue to oversee Heart's music and will now expand his role to support Managing Editors in developing the music strategy and teams on all brands. Classic FM and Smooth presenter Margherita Taylor MBE will join *Global's Broadcast and Content Leadership Team* as *Senior Talent & Content Advisor*. Margherita has played an increasing role in nurturing and developing talent, on and off the air, at Global and is one of Global's longest-serving radio presenters, having joined the company in 1993. James Rea said: *"These are key appointments to my senior team to make sure Global is in the best shape and as focussed as ever to deliver for our audiences now and in the future. We also continue to accelerate our Global Player first strategy, including developing and innovating with unique content from our flagship moments from all brands across the year, with Global Player fully integrated and cross-promoted across all of our platforms. I'd like to congratulate all those in their new roles at Global today!"*
(SOURCES: Global | RadioToday)
https://tinyurl.com/2xd7zrun



2022 WORLDDAB AUTOMOTIVE CONFERENCE: Our columnist Kevin Ryan wrote: "I was a remote attendee for the *2022 WorldDAB Automotive Conference* held on the 23rd of June. This is the third time I've taken part, and the themes are now familiar although I detected a drop in confidence that a radio tuner will be included in every new car worldwide. A DAB+ tuner is required by law in the EU and the UK in all new cars but even then the concern is how prominent it will be on the dashboard. Even that step will leave FM and AM in danger of being excluded. One presentation included an 'ideal' screenshot of a future car dashboard.
The threat is coming from 'Big Tech' in the shape of Apple CarPlay and Android Automotive who probably have little concept of a radio tuner. They want to deliver audio over the internet probably using the *Radioplayer* app. *Amazon Prime* is also in the mix; it has agreed to a deal with BMW to fit out its luxury range with a 31-inch 8K TV with a built-in Amazon Fire TV service. It's no wonder that WorldDAB produced a new set of guidelines about driver distraction. WorldDAB sent a white paper to Google promoting the cause of having a radio tuner highly visible on the dashboard. Some broadcasters are pushing for radio stations to have easy one-touch access on the dashboard screen now called the infotainment screen. Big Tech may insist that broadcasters provide their in-car apps that will be added to a crowded screen of other apps. Several listener surveys conclude that radio is still in demand in the cars of the future but how it might be included is far from settled. It struck me that few of the presenters considered that many places barely have a mobile phone signal – nowhere near the data capacity needed by the 'connected' car."
(SOURCE: KR: kevin@radio-digital.co.uk)
https://tinyurl.com/2panfsk8

Keith Rawlings
Keith.g4miu@gmail.com

KEITH RAWLINGS G4MIU

1

Calculating and Building Open Wire Line

Keith Rawlings responds to questions and feedback by providing some more in-depth information about open wire line aerials, and he looks at the military use of a Near Vertical Incidence Skywave Loop.

In recent editions of this column, I have sometimes referred to 'open wire line', and this has generated some interest from readers. I have been asked why the impedance of the slotted/ladder types of lines are different to each other; others have wanted to know about ways of making up open wire lines from scratch.

Therefore, describing how such a line can be constructed should also answer the question as to why the impedances of the ladder line vary with size.

For this column, I have drawn heavily on Mike Parkin G0JMI and his *Antennas* Column in the September 2020 edition of *RadCom* magazine. In my view, this is one of the best descriptions I have seen on the subject so far, especially for the less experienced hobbyist. I'd say it's recommended reading.

Some Definitions

I often refer to terms such as 'coaxial cable', 'open wire line' or 'balanced feeder', with the latter also including 'ribbon feeder' and 'slotted ladder line' – although these are not strictly open wire line because they have a dielectric material between the wires. This Is solid, in the case of a ribbon feeder; it has 'cut-outs' or 'windows' in the 'slotted' type. 'True' open wire line has mainly air as a dielectric, although spreaders do factor into the equation to keep the wire apart.

Unlike coaxial cable, an open wire line does not have an outer shield; yet there will be little radiation from the two wires as each magnetic field of the individual wires will be equal and opposite to each other and will cancel out. Therefore, as long as the system remains balanced, any feeder radiation will be negligible.

In most cases, the use of a 300Ω or 450Ω slotted ribbon feeder will be sufficient for the use of most listeners.

However, it may be cheaper to construct your own line; there may also be circumstances where the actual values of commercially available cable will not be suitable.

To make an open wire line, you will need two lengths of suitable wire and some spacers, the length of which will depend on the impedance required.

Some Simple Sums

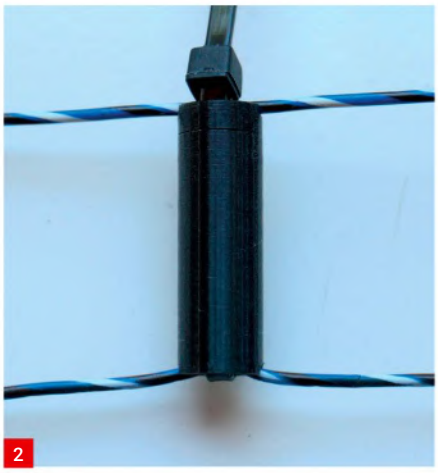
A bit of simple maths is involved when calculating the impedance of the line: To find the dimensions for a given impedance of line Zo ≈ 276 x $\log_{10}$(spacing/radius). This calculation assumes that the insulation between wires is mainly air, which would make the relative permittivity close to 1; in this case, this part of the calculation is not shown but would have to be included if some other dielectric was used.

Spacing equals the distance between the two wires and the *Radius* will be equal to half the diameter of the conductor (not including the insulation, if any). Readers' questions have kindled my interest also, so to make up some of my open wire lines, I have made some 3D-printed spacers from PET-G. These are 25mm in length, and they are made along the lines of those used by Mike Parkin G0JMI (see above).

Basic Calculations

To go with the spacers I have some lightweight, coated and stranded, wire with a di-

KEITH RAWLINGS G4MIU



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WIKI COMMONS

3

Fig. 1: A 3D-printed 25mm open wire line spacer. Fig. 2: An open wire line using a 24mm spacer and cable ties. Fig. 3: The *Harris RF-3134* mounted on a vehicle. Fig. 4: Another view of the *Harris RF-3134* (L3 Harris). Fig. 5: The *AN_SOF V7.2 Frequency List* box.

ameter of 1.5 mm, which makes the radius 0.75mm. Therefore, the calculation will go as follows:-

25mm divided by 0.75mm equals 33.33. We then take the $\log_{10}$ of 33.33, which equates to 1.522. Then 276 multiplied by 1.522, which equals 420.

Consequently, the calculated impedance for an open wire line with a wire gauge of 1.5mm spaced at 25mm is 420Ω. This is a *calculated* value but the finished product should end up being very near it.

When making these calculations, remember to take into account any insulation on the wire. The thickness of this will move the position of the conductors out from each other, effectively changing the spacing between them, and hence the impedance.

The calculation gives us the dimensions for a given line impedance. The accuracy will, in most cases, be more than adequate. If, however, the actual characteristic impedance needs to be measured, then the use of an aerial analyser will prove useful.

Mike used an MFJ269c analyser and measured the open and short circuit impedances over a range of frequencies between 2-6MHz. Using the equation

$$Zo=\sqrt{Z_{\text{short circuit}} \times Z_{\text{open circuit}}}\ \Omega$$

will give the characteristic impedance of the line, where Z=impedance.

Mike's article goes on to describe how to measure the inductance and capacitance of the line and also the line loss but this is beyond the scope of this column.

Suffice it to say that line loss of a well-constructed line should be minimal.

Making Space for Spacers

The spacers I have made up have two radius slots in each end, for the wire to be located. These are spaced so that I get 25mm between the wire conductors allowing for the insulation coating of the wire (Fig. 1). They have an outside diameter of 8mm and a bore of 5mm. This allows the use of a 2.5mm cable tie to secure the wire. The length of the cable tie is 100mm; naturally, a longer tie would be needed if a longer spacer is used.

The wire is simply affixed to the spacer by locating it in the slot at one end, threading the cable tie through and doubling it back to the other end where the second wire is placed in its groove. The cable tie is then gently tightened to fix the wire firmly in place. If you use thin wire be cautious not to over-tighten, as this will draw the wire into the hole in the spacer (Fig. 2).

I have a basic STL file available for the 25mm spacer.

The dimensions are to suit the wire I used but will be usable for a wire of a similar size, with a small variation in the resulting line impedance.

You can e-mail me at this address for further information if you are interested.

keith.g4miu@gmail.com

Further recommended reading can be found in the *RSGB Radio Communication Handbook* (5th ed.) pp. 12.17 -12.20.

https://rsgb.org

WIKI COMMONS

4

The HIMARS Loop.

While Russia's war continues in Ukraine, many states around the world are stepping in to provide support and aid for the Ukrainian people. Much of this support is military and one system that is now opera-

tional in Ukraine is the American HIMARS system.

HIMARS, the *M142 High Mobility Artillery Rocket System* to give it its full military designation is pretty much 'what it says on the tin': a light multiple rocket launcher system, which was developed in the latter part of the 1990s. It can be mounted on a standard US Army wheeled M1140 truck chassis and utilises launchers used on the tracked M270 system (which the UK is also reportedly supplying to Ukraine).

The payload that HIMARS can carry is varied, as is the range at which it can engage targets. There has been considerable coverage in the media, and especially online, and various photographs have been shown of the HIMARS system, some, displaying a loop-type aerial mounted up high just behind the cab (Fig. 3).

Lockheed Martin build the HIMARS system and have fitted the Harris RF-3134 high-frequency full loop 'antenna' to the vehicle. Its full name is *L3HARRIS RF-3134-AT003/5*).

It is thought that the loop is connected to the Harris Falcon AN/PRC-150 radio outfit. This enables the HIMARS system to receive targeting data, long-distance data and voice radio links. This includes 'limited line of sight' (presumably VHF or UHF links would primarily be used for this) and also Over-the-Horizon (OTH) communications.

Harris describes the RF-3134 as an OTM (On-the-Move) Vehicular Loop Antenna designed to use NVIS (Near Vertical Incidence Skywave) HF communications (Fig. 4). As such it is used not only for reception but transmitting purposes as well. To this latter end, coupling units are used. The loop has a frequency range of 2-30MHz with a VSWR of less than 2:1 when used with a coupler. As may be expected, the gain – or lack of it –

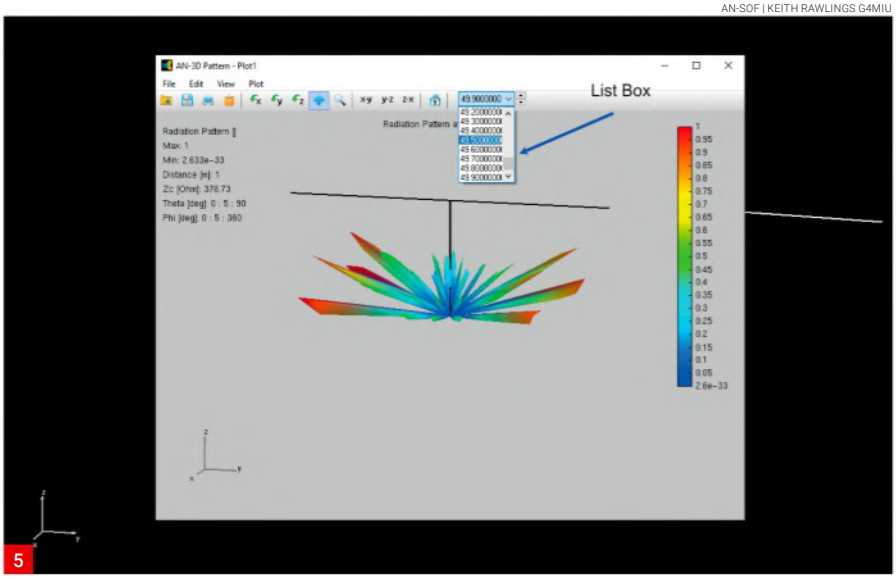
is quoted as being > -24 dBi at 2 MHz, > -15 dBi at 3.5 MHz, > -8 dBi at 10 MHz, and > -3 dBi at 30 MHz.

The loop is capable of handling some 150W continuously.

Needless to say, its radiation pattern varies with frequency but for frequencies up to 10MHz, the maximum angle tends to be in the upward direction, as would be required for NVIS.

Harris term this radiation pattern as 'Quasi-Hemisphere'. Being a loop, the aerial does not depend on a ground plane, as many vehicle-mounted aerials do. However, it should be noted the ground plays a large part in sending the NVIS signal in the desired direction, that is, mainly straight upwards.

AN-SOF | KEITH RAWLINGS G4MIU



5

Although the RF-3134 is quoted as having a 2-30MHz operating range, NIVIS propagation tends to be limited to an upper frequency of around the 10MHz mark. I am not sure how efficient it would be on the higher frequencies but then, I guess (and it is only a guess) that SATCOM links could be used over longer hauls.

NVIS communications should be good out to 400 miles or thereabout.

Quite often military vehicles may be seen with HF whips which look like they have been clipped back to form a semi-circle over the vehicle. It may look like they have been put this way to avoid fouling branches or low obstructions – which in some cases they may have. However, often enough this happens because it has been found that communications on the mid-HF bands are much improved by bringing the element near to the ground. The reason for this is that the radiated signal reflects almost directly back up from the ground and thus is useful for NVIS.

A vertical whip will, technically, provide a low angle of radiation out to the horizon with a 'dead' spot above. This would not be suitable for NVIS. However, there are aerial systems now that look like they are a folded-back whip; in fact, they may be 'Half-Loop' aerials, which are fed by a control unit, with one end the 'feed' end and the other end connected to a tuning unit. These also usually cover the entire HF range but are mainly used for NVIS operation.

AN-SOF 7.2 Update.

Last but not least, the *AN-SOF* aerial simulator software suite has undergone another subtle update: The software uses a routine called *AN-3D Pattern* to display simulated radiation plots and current distribution.

The user would run the simulation and then select either 'Far-field 3D Plot' or 'Plot Current Distribution' to bring up the *AN-3D Pattern.* A frequency of interest would be entered, and the simulated plot would be displayed using any of the numerous built-in options. This would then have to be re-run for other frequencies.

One advantage of *AN-3D Pattern* is that multiple instances of it may be run, making it easy to compare patterns side-by-side on the screen or to save and print them. *V7.2* retains this 'multiple-instance feature', but it is now possible to see how the radiation pattern changes with frequency directly in the AN-3D Pattern. When a Frequency Sweep is set under 'Configuration', 'Frequency Steps' also have to be set.

For example, *Frequency Sweep 1-30MHz, Frequency Step 1MHz*, where the software sweeps over the range 1-30MHz making calculations every 1 MHz. Previously, a pattern would have needed to be run for each frequency of interest. Now the near field 'heat-map' and current distribution patterns can be viewed dynamically by changing the operating frequency from a drop-down list with the pattern changing accordingly (Fig. 5).

Furthermore, the up-down arrows may be used to automatically scroll through the frequency steps thus 'animating' the plot – neat! Incidentally, the *AN-3D utility* can be run separately from the AN-SOF program to analyse previously saved plots without having to run the main simulator again.

Remember that AN-SOF is paid-for software. There is a (free, fully functional) 'Demo' version available that is limited to 100 segments. This is still enough to run an interesting number of models.

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ALL PICTURES: THE KEITH HAMER+GARRY SMITH BBC COLLECTION

1

BBC 100 Years: 2000-2009

Keith and Garry have arrived at the start of the new Millennium in their look back at the BBC's history. The decade encompassed some unique engineering and programme-production achievements.

The new millennium started with a television extravaganza called *2000 Today*. This was a marathon 28-hour-long 'live' programme to celebrate the new millennium. Seventy-one television services from around the world participated, with the BBC playing a major role in providing transmission distribution facilities.

First 'Live' Broadcast From Buckingham Palace

The BBC Television Centre was bombed by terrorists at 00.30 on Sunday, March 4th, **2001**. There was extensive damage to the front of the BBC News Centre and many windows were shattered.

The BBC Radio 4 Arts programme, *Front Row*, was the first programme to be broadcast 'live' from inside Buckingham Palace. This was on March 22nd to mark *Royal Book Day*.

To begin the new decade, a new series of BBC-2 Identification Symbols were introduced on November 19th. The first one featured some fish (Fig. 1).

New Digital Channels and BBC-3

Two new BBC Children's Television digital channels were launched on February 11th, **2002**. *CBBC* was originally aimed at 6 to 13-year-olds. The second new channel was *CBeebies*. This channel was intended for children aged 5 and under. The *BBC Knowledge* channel was replaced by *BBC-4* at 7.00 pm on Saturday, March 2nd. The opening ceremony and all subsequent programmes on launch night were also relayed on BBC-2. There was a change to the BBC-1 on-screen ID Symbols on March 29th.

The *Hot-Air Balloon* floated away serenely into the distance to be replaced by eight 'contemporary dance' sequences. The BBC-1 Clock Caption was finally discontinued the previous day. All scheduled programmes on BBC-1 were suspended on March 30th due to the death of Her Majesty Queen Elizabeth The Queen Mother. The National Anthem was played after the 7.00 pm time signal during the special News programme.

Moreover, the final edition of *Tomorrow's World* was broadcast in August, after 38 years. The year 2002 ended with a whimper, and partygoers waiting for the traditional broadcast of the New Year chimes of Big Ben were disappointed. BBC-1 didn't bother to transmit the bells at midnight and BBC Radio 4 also failed.

A new television channel, *BBC-3*, was brought into service, without any fanfare or publicity by the BBC, at 19:00 on Sunday, February 9th, **2003**. Sadly, radio presenter, Alan Keith, died on March 18th, 2003, at the age of 94. He had devised and introduced every edition of *Your Hundred Best Tunes* since the programme had begun in 1959. It was originally called *The Hundred Best Tunes In The World,* but the title was changed in 1960. The very first piece of music played was Parry's *Jerusalem*, performed by the Royal Choral Society and Philharmonia Orchestra, conducted by Sir Malcolm Sargent.

Time Signals, Weather Charts and Local TV

The *Greenwich Time Signal* celebrated 80 years of service on February 5th, **2004**. It was first transmitted by the BBC on Tuesday, February 5th, 1924. The veteran broadcaster, Alistair Cooke, died on March 30th, aged 95. The first edition of his *Letter From America* was broadcast on March 24th, 1946. He joined the BBC in 1934 and his programme was transmitted for 58 years.

Later in 2004, BBC Weather Forecaster, Michael Fish, made his final appearance, on September 6th, due to his retirement. He joined the Meteorological Office in 1962, read his first weather forecast on BBC Radio in 1972, and first appeared on BBC-1 in 1974.

A three-minute silence was observed at midday on all BBC Television and Radio Services on January 5th, **2005**, as a mark of respect for the victims of the undersea Earthquake centred in the Indian Ocean the previous year. It had measured 8.9 on the Richter Scale, and the resulting tsunami on Boxing Day 2004, killed over 150,000 people. This mark of respect was also observed throughout Europe at midday, CET.

By the way, in the early days of television, it was difficult to have a true silence of more than one minute because this could cause transmitters to automatically switch off.

A new BBC-1 weather forecast format was introduced on May 16th. The Weather Chart symbols, which had been in use for decades, were replaced with 'flying' graphics.

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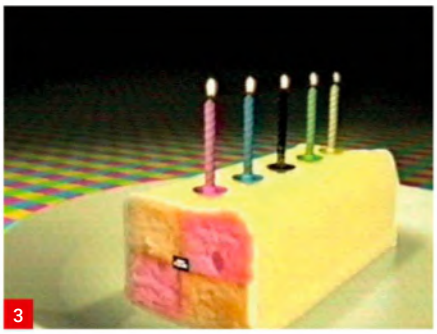
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Fig. 1: A new series of BBC-2 Identification Symbols was introduced on November 19th, 2001. Fig. 2: The first edition of the iconic sports programme, '*Grandstand*', was on October 11th, 1958. Fig. 3: BBC-4 celebrated their fifth anniversary on March 2nd, 2007, with this special *Battenberg* cake. Fig. 4: The BskyB HD test card featuring the singer Myleene Klass. Fig. 5: Keith with 'the little girl on the BBC Colour Test Card 'F'', Carole Hersee, in the studio, ready to record for BBC Radio 4. Fig. 6: This photograph shows Keith with Michael Aspel, host of the *Antiques Roadshow*. Fig. 7: The 'Angel Fish' Interlude film was first transmitted on December 3rd, 1953.

The traditional green landmasses were also replaced by sand-coloured graphics. There were many complaints from Scottish viewers because Scotland was shown as being much smaller than England! This was eventually corrected.

It was a difficult day for BBC executives on May 23rd. Staff belonging to the NUJ, BECTU and AMICUS unions held a 24-hour strike from midnight in protest about the planned 3,780 redundancies due to take effect over the next three years. Only 'live' programmes were affected.

Six *BBC Local Television* stations started in the West Midlands on December 1st. These were: BBC Black Country TV, BBC Hereford & Worcester TV, BBC Shropshire TV, BBC Staffordshire TV, BBC Coventry & Warwickshire TV, and BBC Birmingham TV. They were available via satellite TV and internet connections.

BBC Radio 4 UK Theme Discontinued

The BBC Thai Service finally closed down on Friday, January 13th, **2006**. In other developments, the new controller of BBC Radio 4, Mark Damazer, announced that, from April 2006, the much-loved *BBC Radio 4 UK Theme* would be discontinued. It had been used for approximately 33 years. This brought a storm of protest from listeners, and questions were raised in both Houses of Parliament.

Monday, April 24th, 2006, saw the introduction of a new BBC Radio 4 schedule and the *BBC Radio 4 UK Theme* was discontinued. This was a medley of well-known British national themes and traditional folk tunes, specially selected to represent all parts of the United Kingdom.

Elsewhere, the final 'live' edition of *Top Of The Pops* was transmitted on Sunday, July 23rd. For some reason, the 'live' programme was broadcast on BBC-2, rather than BBC-1. The final recorded edition of *Top Of The Pops* was also shown on BBC-2 on Sunday, July 30th. The first edition of the programme (presented by Jimmy Savile) went on air on BBC-tv at 6.34 pm on Wednesday, January 1st, 1964. BBC-1 didn't exist until April 20th, 1964. The final edition was also presented by Savile, at the age of 79.

The year 2006 marked the 70th Anniversary of BBC Television. At the time, we were invited onto several radio and television stations to talk about the history of the BBC. These included *BBC Radio Cambridgeshire*, *BBC Radio 2*, *BBC Radio Derby* (with presenter Alex Trelinski), *BBC Radio Leeds*, and *Kerrang! Radio*. Reporter, Rob Glass and Cameraman Mark Turnbull, were despatched by *BBC East Midlands Today* for a filmed report. The programme's producer, Kevin Hill, wanted to reflect the typical formal dress code worn by BBC Television announcers in 1936, so Rob was commanded to wear a black dinner jacket and bowtie for the occasion! National newspapers also wanted to cover the story and we found ourselves featured in *The Daily Telegraph*, *The Sunday Times*, *The Daily Express* and – dare one admit to it – *The Sun*!

A Busy Year for Us – and the BBC!

The final edition of *Grandstand* was broadcast on January 27th, 2007. The iconic sports programme first appeared in 1958 (Fig. 2), and, for many years, it had been introduced by David Coleman.

BBC-4 celebrated their fifth Anniversary on March 2nd, 2007, with a special ID, featuring a Battenberg cake divided into four segments with 5 candles (Fig. 3).

The year 2007 marked the 40th anniversary of BBC Colour Television which had begun on July 1st, 1967. In this context, we were contacted by various newspapers for our memories of this very important engineering achievement; and on May 22nd, 2007, we were booked to take part in a live interview on BBC Radio 4's *Today* programme to talk about our BBC archives and the introduction of a brand-new HDTV test card for BskyB, featuring Myleene Klass (Fig. 4). In the course of an exciting – and sometimes con-

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fusing – day, we met Carole Hersee, the girl on the BBC Colour Test Card "F" (Fig. 5).

We remember 2007 as a very busy year for us; we were involved with projects relating to John Logie Baird's son, Malcolm Baird, and through many appearances on local radio. What is more, the *Antiques Roadshow* team had invited us to Leicester to meet Michael Aspel and appear on the programme (Fig. 6).

The *Antiques Roadshow,* broadcast on February 3rd, **2008**, made a special 'AR Interlude' film as part of the closing graphics, and several radio stations were keen to ask us about the original *BBC Interlude* films shown in the 1950s. These films, with titles like *The Potter's Wheel*, *The Young Ballerina*, and *Angel Fish* became firm favourites with viewers (Fig. 7).

In this way, we had many more opportunities, in 2008 and at other times, to share our growing archive with producers like Eric Smith of *BBC Radio Shropshire*, and several others.

Last but not least, BBC-3 introduced new Identification Symbols on February 9th, 2008.

On September 1st, 2009, we rounded off the BBC decade on a more personal note, by travelling to London with Simon Hare from BBC East Midlands. This was to make a documentary about the history of BBC Television for the regular series called *Inside Out*. Filming locations included the home of television - Alexandra Palace, Broadcasting House to meet doyen BBC Continuity Announcer, David Miles, and the *BBC High-Definition TV Research Department* at the BBC White City Media Village.

Conclusion

The decade from 2000 to 2009 was, perhaps, the highlight of our involvement with the history of the BBC, mainly through the sharing of our television and radio archives, and through interviews and media appearances. This is where our fascination with the medium and its history intersected.

In summary, the decade saw many important advances, including a unique worldwide television marathon, the first 'live' broadcast from Buckingham Palace, the launch of three new television channels, and the demise of another, new hi-tech weather forecast graphics, the launch of six *BBC Local Television* stations, the end of the much-loved *BBC Radio 4 UK Theme*, the final editions of *Grandstand*, *Tomorrow's World* and *Top Of The Pops*, the 70th anniversary of BBC Television, 40 years of Colour Television, and BBC Interlude films from the Fifties, remembered on the radio.

DX-TV & FM News

The latest DX news, plus details of changes to broadcast television and radio services, is available online via the *Radio Enthusiast* website:

www.radioenthusiast.co.uk

Stay Tuned!

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

Tim Kirby
tim@livingland.wales


NASA

1

The Space Race

The very first signal from space, at least of a human-made origin, was from the Soviet Sputnik-1 satellite. This month **Tim Kirby** brings us the story behind the signal.

The roots of the project started in December 1954, when the chief Soviet rocket scientist, Sergei Korolev (1907-1966) proposed a development plan for an 'artificial satellite'.

Perhaps just as importantly, along with his development plan, he included a list of similar projects that were being planned overseas, particularly, in the USA.

In addition, Mikhail Tikhonravov (1900-1974), who had been responsible for this blueprint, made it clear that, in his view, the launch of a man-made orbital satellite would be an inevitable stage in the development of rocket technology.

Some months later, US President Dwight D Eisenhower (1890-1969) announced that the USA would be launching a satellite during the *International Geophysical Year (IGY)*. The IGY was, oddly, 18 months long; it lasted from July 1957 to December 1958. https://tinyurl.com/2p8fj22v

Just a few days later, the Soviet Union responded in kind: Leonid Sedov (1907-1999) announced that the USSR would also launch an artificial satellite. The Race for Space was on, and the runners were declared.

In January 1956, approval was given, in the USSR, for the commencement of work on an artificial Earth-orbiting satellite, named *Object D*, which was planned to be completed in 1957/58.

It would have a mass of 1,000 to 1,400kg and would carry 200 to 300kg of scientific instruments.

The Soviet delegation making the announcement consisted of Mr. Vereschetin, Mr. Sannikov (Soviet State Security), Professor Kyrill F. Ogorodnikov (1900-1985; Astronomy) Leningrad University, and Leonid Ivanovich Sedov (1907-1999; Specialist in Mechanics) USSR Academy of Sciences (Fig. 1, back row, 2nd to 4th from left; see also URL, below). https://tinyurl.com/4u3cn5ep

A Joint Task

The work to design and build the satellite was split between six different ministries. The *Ministry of the Defence Industry*, along with its primary design bureau, *OKB-1* was assigned to build the satellite itself. The *Ministry for the Radio Technical Industry* would develop the control, radio and telemetry systems.

I was intrigued to see that gyroscope devices, required for the stability of the satellite were developed by the *Ministry for Shipbuilding*.

The design work was completed by the middle of 1956, and the scientific tasks to be carried out were defined. These included measuring the density of the atmosphere, measuring the solar wind, the strength of the magnetic fields and the detection of cosmic rays.

It was clear that ground stations would be required to receive the telemetry from the satellite. The lifespan of the satellite was likely to be fairly limited, and observations were planned for around 7 to 10 days.

By the end of 1956, it was becoming clear that the ambitious design could not be realised in time for the required launch date (one can only imagine what this 'realisation' could have meant to the careers and lives of some of the people involved). The main problem was the creation of the required instrumentation and the lower-than-expected impulse of the R-7 rocket engines, which were due to take *Object D* to space. With all this in mind, the launch was rescheduled for April 1958.

A Simple Radio Transmitter

The concern, of course, in the USSR was that the United States would launch their satellite first! So, the design agency *OKB-1* suggested the launch of a satellite in April/May 1957, before the *International Geophysical Year* started! The new proposal for a satellite would focus on simplicity, with a much lower weight of around 100kg.

This time there would be no complex instrumentation, just a simple radio transmitter.

The revised, simpler, design was approved, and the new satellite was designated *Object PS*. This satellite could be tracked visually by Earth-based observers and could transmit tracking signals to ground-based receiving stations.

The launch of the satellite was contingent on the R-7 rocket having at least two successful test flights.

The R-7 rocket had its origin as an *Intercontinental Ballistic Missile (ICBM)* and at the time of its' design in 1954, it was the most powerful one in the world. It had been designed with a great deal of thrust, as no one knew how heavy a potential hydrogen bomb payload might be.

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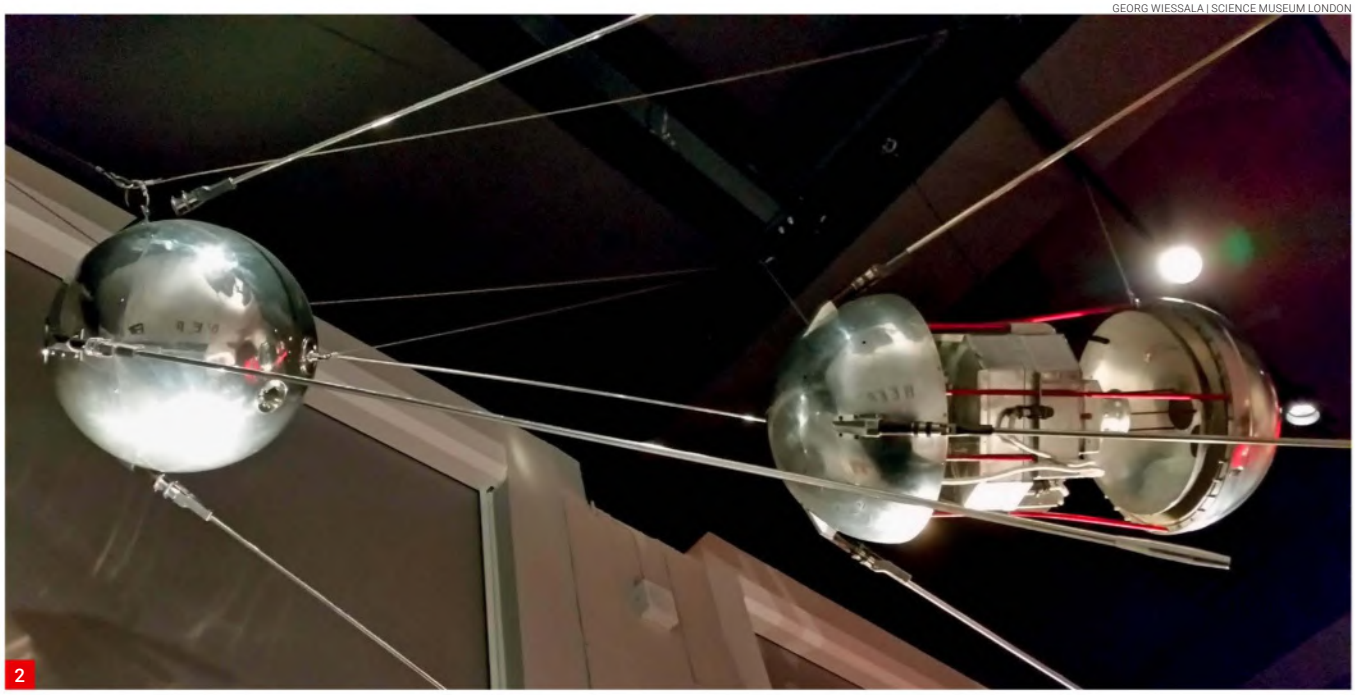

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Tyuratam, near the Aral Sea, was selected as the site for launch. Interestingly, according to a 1984 article by Dino Brugioni, the Soviet Union never used the name '*Tyuratam*' in any of its announcements regarding its space program. The same article explains, "*The US intelligence community inevitably became aware that the Soviets were constructing a missile test site somewhere south of the Aral Sea. But the exact location was unknown, and the site became a priority target for U-2 reconnaissance missions.*

"The U-2 mission tracks were aligned along the main rail line in the area, and the site was quickly located. The mission launch complex was located in the Bet Pak Dala Desert, south of the Aral Sea, and near the north-flowing Syr Dar'ya River. The huge launchpad was located at the end of a spur extending some fifteen miles into the desert from the main rail line".

https://tinyurl.com/d77nwahv

In the Soviet lexicon, the Tyuratam range was generally referred to as *NIIP-5*. The site's construction was approved in 1955 but the site was not completed until 1958.

The first launch of an R-7 rocket took place on 15 May 1957. A fire began almost immediately, but the booster rocket kept firing for another 98 seconds after launch and the vehicle crashed some 400km downrange. A second rocket launch failed (three times) on 10/11 June. A third rocket launch took place on 12 July and this too, was unsuccessful, because of an electrical problem which had put the missile into an uncontrolled spin. The crash site was around 7km from the launch site.

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3

Successful Launch

Because of these early failures, serious concern must have been growing at many levels about the R-7 rocket. However, on 21 August, the fourth rocket was successfully launched. The rocket carried a dummy warhead, to the target altitude and velocity. It then re-entered the atmosphere and broke apart at a height of 10km.

It had travelled for around 6,000km.

A further, fifth, rocket was launched successfully on 7th September. This too reached altitude but the dummy warhead once again broke apart on re-entry. From the point of view of an ICBM, this was not satisfactory, as it would not enable the warhead to reach its target.

On the other hand, for a satellite launch, this was just fine.

It was agreed to use the next R-7 launch to take PS-1 to space. On 22nd September, a modified R-7 rocket named '*Sputnik*' arrived at the proving ground and preparations for the launch began. The mass of the R-7 for the Sputnik launch had been reduced from 280.1 to 272.1kg. The length of the rocket, with the PS-1 attached, was 29.1m. There was no intention for PS-1 to be controlled, but it could be observed, visually and by radio.

Observations and Communications

For this purpose, six observatories were clustered around the launch site, ready to send data back to the NII-4 missile research centre near Moscow. Additionally, seven different tracking stations were established along the projected ground track of the launch. These were located at *Tyuratam, Sary-Shagan, Yeniseysk, Klyuchi, Yelizovo, Makat*, and *Ishkup*. These stations had radar, optical instruments and communications systems.

The observatories used a trajectory measurement system called *Tral*, which had been developed at the Moscow Energy Institute.

This received and monitored data from transponders which were mounted on the R-7 rocket's core stage. Even after the satellite had separated from the second stage, this was useful data, as the distance between the satellite and the second stage was known and therefore the position of the satellite could be determined.

The chief constructor of *Sputnik 1* (Fig. 2) was Mikhail S Khomyakov (1957- ?) who led

Fig. 1: The Soviet Delegation announcing a plan to launch a satellite into Earth's orbit. Fig. 2: A model of the *Sputnik-1* satellite (on the left). Fig. 3: 'Build-your-Own': From *Practical Wireless* in 1955. Fig. 4: Some suggestions for further reading.

a specialist team of engineers.
https://tinyurl.com/yck6z9v5
https://tinyurl.com/w9emzk4a

The satellite was a 585mm-diameter sphere, assembled in two halves, sealed and connected by 32 bolts. It had a mass of 83.6kg. The two halves were 2mm thick and covered with a heat shield, 1mm thick, made of an aluminium-magnesium-titanium alloy. The satellite had two pairs of antennas, each antenna was made up of two whip parts, 2.4 and 2.9m in length.

The artificial satellite's power supply weighed 51kg, consisting of three silver-zinc batteries. Two of the batteries powered the radio transmitter, and one of them powered the temperature regulation system. The batteries were expected to last two weeks and, in the event, they lasted for 22 days. The power supply to the radio transmitter was turned on automatically as the satellite separated from the second-stage rocket.

The Radio Transmitter

The radio transmitter had been designed by Vyacheslav Lappo of NII-885, the *Moscow Electronics Research Institute*. It weighed 3.5kg and had an output power of 1W. The transmitter operated on 20.005 and 40.002MHz. Signals on the first frequency were transmitted in 0.3s pulses at a frequency of around 3kHz and pauses of the same duration, during which there would be transmissions on the higher, 40MHz, frequency.

The temperature and pressure of the satellite were encoded in the duration of the beep transmissions. The temperature regulation system switched on a fan if the temperature of the satellite exceeded 36C and turned it off if the temperature fell below 20C. Should the temperature exceed 50C (or fall below 0C) the radio pulses would change duration accordingly. The satellite was also fitted with a barometric switch so that if the pressure vessel of the satellite failed, then, once again, the radio pulses would indicate this.

The intended orbit of the rocket carrying *Sputnik* was set as 223 by 1,450km with an orbital period of 101.5 minutes. This orbit had been calculated using the *USSR Academy of Sciences* mainframe computer (which must have been quite some-thing at the time).

A Historic Launch

The rocket was launched on 4th October at 19:28 UTC (5th October at the launch site). The strap-on rockets separated 116 seconds into the flight and the main stage shut down 295.4 seconds into the flight. At the time of the main stage shutdown, the rocket, with the satellite attached, had reached 223km above sea level and a velocity of 7780 m/s. This resulted in an initial orbit of 223km by 950km, with an apogee of approximately 500km lower than intended and an orbital period of 96.20 minutes.

At 19.9 seconds after the engine cut-off, the PS-1 satellite separated from the second stage, and the satellite's transmitter was activated. These signals were first detected at the IP-1 station by Junior Engineer Lieutenant V G Borisov, with the expected *beep-beep-beep* tones confirming the satellite's successful deployment. The tones were heard for approximately 2 minutes until the satellite fell below the horizon.

Many of the designers and others involved in the project had watched the launch from the Tyuratum range, and then drove to the mobile radio station after launch, to listen for signals from the satellite. They waited another 90 minutes, with bated breath, to see if the satellite would complete an orbit. It did, and it was still transmitting. Sergei Korolev called Nikita Khrushchev (1874-1971) to report the success. The Soviet News Agency, *TASS*, reported almost immediately, *"As a result of great, intense work of scientific institutes and design bureaus the first artificial Earth satellite has been built"*

An Orbital DXing Target

Although the satellite itself was almost invisible from the ground, being a sixth-magnitude object, the core stage of the R-7 rocket had been fitted with reflective panels which made it easily spotted from the ground, as a first-magnitude object.

The satellite itself completed 326 orbits until the batteries ran out on 26 October 1957. The core stage of the launcher remained in orbit for 2 months until 2 December 1957 while *Sputnik 1* orbited for three months until 4th January 1958, having completed 1,440 orbits of the Earth.

Amateur radio operators were encouraged to listen for the signals from *Sputnik*, with the American Radio Relay League (ARRL) providing the following directions: *"Tune in 20 megacycles sharply, by the time signals, given on that frequency. Then tune to slightly higher frequencies. The 'beep, beep' sound of the satellite can be heard each time it rounds the globe."*

Our sister magazine, *Practical Wireless*, also got in on the space-listening act, as it were (Fig. 3).

The first recording of *Sputnik's* signal was made by RCA engineers near Riverhead on Long Island, New York. As *Sputnik* rose higher in the sky, Columbia University's amateur radio station W2AEE picked up the signal and listeners to the university's FM station, WKCR were the first to hear the signals before the tape made by the RCA engineers could be driven into Manhattan!

Perhaps as much as the technological achievement, the political and psychological impact was of equally great significance, essentially giving the Soviet Union the advantage in the Space Race – and demonstrating a potential capability to deliver ICBMs to targets in Europe and the United States of America.

The images in Fig. 4 point to some background reading on the Soviet Space Programme, the Cold War by Proxy, and the Race to Space during that period.

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SCAN TO SHOP

1

Vintage Radios: The Philips D2999 Portable World Band Radio

In a new, occasional, series on vintage radios, the editor travels back to his student days, prompted by the entirely unforeseen acquisition of a Philips D2999 world band radio.

Georg Wiessala
wiessala@hotmail.co.uk

You know the adage about the London buses, of course, do you? First, no bus for hours, and then three come down the road at the same time. Well, radio-wise, I have experienced something like that this month.

After years of searching, I recently bought a Philips D2999 receiver (Fig. 1). As I write this, there is at least one more of those available on eBay. At the time, the D2990 was also marketed as the *Magnavox D2999*.

Both models have gone almost completely unnoticed in the Short Wave listening and DXing worlds, even now.

It was, in fact, the Philips D2999 that had been my constant companion when I had just finished my degree and was living on my own, doing my first job near Darmstadt, Germany. The only other radio that evokes similar memories for me is the *Grundig Satellit 650 'Europa'* (Fig. 2) which I also acquired at the time.

I used both these heavy portables to try and keep up my English, by listening to the BBC World Service (*"Why hasn't that worked then"*, I hear you ask)! Yeah, right.

I also enjoyed keeping up with the (then) numerous foreign-language broadcasters from all over the world.

Keeping a hand in with languages was one thing, but there was another reason too: At the time, there were still a few broadcasters across the internal German border from the German Democratic Republic (The GDR, East Germany), on both Medium- and Short Wave.

Listening to, for example, *Soldatensender* and *Radio Berlin International (RBI),* provided an often refreshing and surprising counter-narrative to the news in the West and afforded a broader view of International Relations more generally, especially for someone studying this subject.

A Great e-Bay Find

Aware of these memories, and with many other reminiscences in the back of my head, I was delighted to find a pristine unit of the Philips D2999 on eBay around two months ago, complete with a pristine telescopic aerial, the original box and and internal 'ferroceptor' aerial (so says the manual).

Even with the punitive post-'Brexit' import-duty, the radio still came at a bargain, so I took the plunge. It came from a seller in The Netherlands, after a long-ish wait of nearly three weeks.

The D2999 measures 32 x 10 x 25 cm and weighs in at just under 4kg with the memory batteries inserted. You can run it off (D-type) supply batteries, from a (9-14V) car battery, a rechargeable Lithium-ion battery back or, naturally, via the two-prong (Continental-style) mains cable, which plugs in, at a hidden angle, at the bottom of the receiver (Fig. 3).

In Operation

This, then, is a typical 1980s microprocessor-controlled desktop radio of Dutch origin. To be precise, the D2999 is a double-conversion superheterodyne, with a First IF at 55MHz and a Second IF at 468kHz.

The mixer signal of 55,164 – 84,999kHz derives from a highly stable PLL (Phase-Lock Loop) synthesiser.

ALL PICTURES: GEORG WIESSALA

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Fig.1: The Philips D2999 double-conversion superheterodyne (just about) portable world band receiver. Fig. 2: My Other Love: The Grundig Satellit 650. Fig. 3: A nifty and protected cable bay at the base of the radio. Fig. 4: The unique two-speaker arrangement in the Philips D2999. Fig. 5: A happy design decision in the 1980s. Fig. 6: The signal strength indicators and large frequency display are perfectly calibrated. Fig. 7: The roughly contemporary *Braun T 1000 World Receiver (Silver)* Fig. 8: A very 1980s cover page design for the short manual. Fig. 9: The telescopic aerial (circled, top-right) lifts out, tilts and is fully (horizontally) retractable.

Subsequently, the signal is conducted to the second mixer through a crystal filter. The 468kHz second IF has to pass a ceramic filter and is then led to the demodulator. There is no pre-selector (Source: *Radioworld*).

Two of the main reasons why I truly coveted this radio, were the direct-access meter-band selection buttons running across the top of the set, the auto-scan function, and the sound quality. Not only does it offer meaningful bass and treble front controls, but there are also two great speakers.

This is unique. The first one is front-facing when you lie the radio down, and the second, larger one is on top of the set and can be switched in independently for a more satisfying sound (Fig. 4). I do this mainly for music programmes.

The sound on HF is great, and on FM, this is still setting a benchmark, in my view, for listening – DAB or not.

Some of these points – sound quality and quick access – were also the reasons why I loved the *Grundig Satellites*, which were, arguably, even more, renowned for their speakers.

This is the archetypal *one-button-one-function* radio – and this is how I like at least one set in my shack to be, notwithstanding the advantages of Software-Defined Radio (SDR) or of more modern, multi-menu, receivers.

Tuning accuracy is to 1kHz in AM and SSB, and the tuning wheel is speed-adaptive at three speeds (1, 2, and 10kHz on HF; 10, 20, and 100kHz on FM; Source: D2999 Manual, page 6).

Design meets Function

Design-wise, the Philips D2999 leaves little to be desired, in my humble view: as far as can recall, this radio was the only foray by Philips into the world radio portables market, and it was made to look like an amateur radio transceiver in the 1980s (Fig. 5).

In the same years, as Philips offered the D-2935 transceiver, the firm also built the D-2999 Desktop Short Wave radio, based on the same circuitry but with a different appearance, more memories and some additional features, such as double conversion, digital display, attenuator, keypad, memories, clock, and timers (Source: Radioworld).

This is, therefore, a quintessential technology product of the 1980s, and it has aged so very well, indeed.

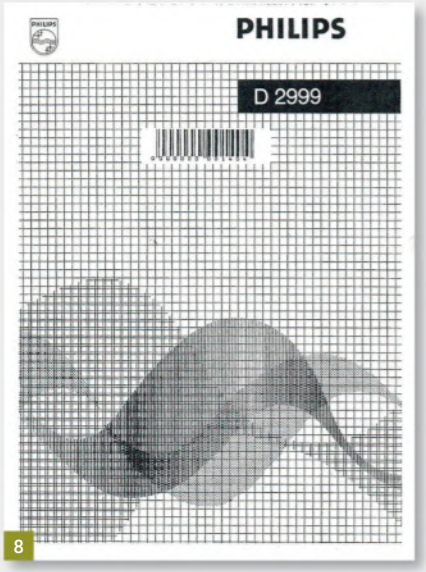
In my opinion, only the *Grundig Satellit 650* and the triple-telescopic *Braun T 1000 World Receiver (Silver)* (Fig. 6) can match the looks and design philosophy of the Philips D2999. Does anyone have a Braun for sale, by any chance?

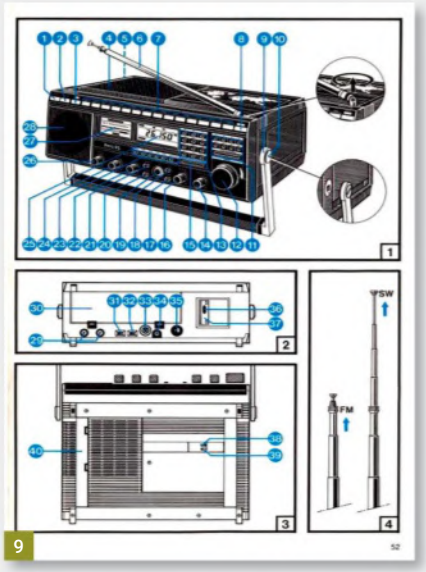
The set has just 16 memory presets, all of which are accessible from the front (top-

The Philips D2999

Double-conversion Superhet
First IF at 55MHz and a Second IF at 468kHz
Mixer Signal: 55,164 – 84,999kHz

FM	87.5 – 108MHz
LW	150 – 360kHz
MW	520 – 1608kHz
SW	2,300 – 26,100kHz





right). You use the 'Store/ Preset' key, followed by a letter/ number combination to enter into memory and just the letter/ number combination keys to recall the memory. The 16 memory presets are enough for the handful of regular programmes/ channels I follow.

For tuning to SSB transmitters, there is a simple BFO (Beat Frequency Oscillator); sufficient, yes, but this is not a utility signals hunter's radio. I could resolve amateur radio on all the usual bands, though.

Final Thoughts

You could use this as a portable, of course, but it is at the upper limit, weight-wise, of what one may reasonably still lug around; plus, to be honest, I am happier with the Philips D2999 sitting quietly in my shack or next to my bed (with the tilt bar removed). The signal meter and frequency display are at just the right (fixed) light level (Fig. 7).

As you tune the bands manually and at three different speeds, it is lovely to see the LEDs next to the band selection keys in the top row come on, move and even overlap.

The images in Figs. 8 and 9 show some sample pages from the manual of the Philips D2999 world band receiver.

Further Information

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OLD HALF INCH FERRITE RODS. Must be half inch 12.7mm in diameter and be six inches long or more will pay good money for the old rods.
Contact Peter Tankard on 0114 2316321
Email: peter.tankard@gmail.com SHEFFIELD

FOR SALE

YAESU FRG7 Receiver SW, full working condition, buyer collects £190 ono. **Tel: 01795 538599**

Trading Post adverts cost £5 per advert (Subscribers free). Adverts will also be published in Practical Wireless unless requested otherwise.

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RECEIVERS

Air!Squitter Basic Bundle

NEW

ADS-B receiver as bundle with combined ADS-B/GPS antenna, 10m antenna cable and mounting kits. No monthly or yearly subscription required. **ML&S: £599.50**

AOR AR-DV1 COMMUNICATIONS RECEIVER

ML&S: £1299.95

Covers 100kHz to 1300MHz in traditional analogue modes (SSB, CW, AM, FM, S-FM, W-FM) as well as various digital modes. In fact, we know of no other radio in this category that can decode Icom's D-STAR mode, Yaesu's new C4FM mode, Alinco's digital mode, NXDN (note: 6.25kHz only), P25 Phase 1, etc. Plus lots of interesting features!
www.HamRadio.co.uk/ardv1

AR-5700D RECEIVER

Advanced digital communications.

Frequency range 9kHz-3.7GHz. Tuning steps 1Hz-999.999kHz.
ML&S: £4595.95

ELAD FDM-DUOr

A Receive-only Version of the famous FDM-DUO!

ML&S: £769.96

10kHz-54MHz Direct Conversion SDR Receiver.
SDR receiver that offers the possibility to operate stand-alone like traditional radio or attached to a Personal Computer discovering the possibilities offered by the SDR technologies.

Elad Companion Speaker SP1 for FDM-Duo. £134.95

ICOM IC-R8600

100kHz-3GHz Receiver with SDR Technology from IC-7300.

The IC-R8600 replaces the IC-R8500 wideband receiver and features technology incorporated into Icom's best selling IC-7300. The IC-R8600 receives a wide frequency range from 0.01-3000MHz frequency in analogue and various digital modes (D-STAR, P25, NXDN and dPMR). The IC-R8600 also features a larger 4.3 inch touch screen display which displays a fast moving spectrum scope and waterfall display.

ML&S: £2599.96
Includes an Icom AD-55 PSU worth £49.95!

DIGITAL & ANALOGUE

SANGEAN ATS-909X2 £214.95

NEW

The Ultimate SSB / FM / SW / MW/ LW/ Air / Multi-Band Receiver in White or Graphite.
The Discover 909X is the perfect world band radio to roam the globe with.

SANGEAN FUSION 600 £269.95

NEW

The Fusion 600 is a multi-purpose network streamer. The tuner makes it possible to play music files via wired or wireless network.

See www.HamRadio.co.uk for our full range of Sangean products

UNIDEN UBC-355CLT

Quality base and mobile scanner in an elegant cabinet.
Designed for home and mobile use, with a large speaker for excellent sound.

ML&S: £99.95

UNIDEN UBC-370CLT

Base Scanner

- Watch, alarm clock & FM broadcast radio.
- 12V DC power supply
- Telescopic antenna
- 500 Channels in 10 banks
- FM & broadcast (Store and search up to 30 Preset FM broadcast channels)
- CTCSS/DCS (Search and display any tone)
- Alarm Clock
- USB PC Programmable

ML&S: £129.95

UNIDEN SDS100EDN

Handheld Scanner Scanner Receiver (PRE LOADED DMR & NXDN)
The SDS100's digital performance is better than any other scanner in both simulcast and weak-signal environments.
ML&S: £679.96

UNIDEN SDS200E ML&S: £749.95

Desk Top/Mobile Scanner Receiver Activated DMR, NXD, ProVoice monitoring.

UNIDEN UBC-125CLT

Compact 500 channel handheld scanner.
Covers 25-88MHz, 108-174MHz, 225 - 512MHz and 806 - 960MHz.
ML&S: £139.95

AR-DV10 ML&S: £969.95

The ULTIMATE all mode digital handheld scanning receiver.
Latest firmware! 100kHz-1300MHz. Analogue & Digital Modes.

UNIDEN UBCD3600XLT

New digital TruckTracker V Professional Scanner Receiver. 25-1300MHz wideband frequencies.
The TruckTracker V operation allows this scanner to scan APCO 25 Phase 1 and Phase 2, DMR, Motorola, EDACS, LTR Trucked Systems as well as conventional analog and P25 digital channels.

ML&S: £479.95

NEBRA HNT INDOOR HOTSPOT MINER

NEW

ML&S: £594.00

Earn HNT cryptocurrency by mining Helium and building coverage for The People's Network using the Nebra HNT Indoor Hotspot Miner.

SF Screen Protectors ONLY £7.95

For Yaesu, Kenwood and Icom.

SANGEAN MMR-88-DAB-PLUS

ML&S: ONLY £129.95

NEW

The Survivor DAB rechargeable emergency radio.
When the power is out, you can receive important information via DAB+ or FM radio. You can use the hand crank, Micro USB or the solar panel to recharge this radio!

SDR RADIO

SDRPLAY RSPdx

New Mid-range SDRplay Radio.

Complete redesign of the popular mid-range RSP2pro 1kHz–2GHz. receiver.
ML&S: £194.95
FREE SHIPPING!

Multiple antenna selection, Improved pre-selection filters, Even more software, Selectable attenuation steps, Special HDR (High Dynamic Range) mode for reception at frequencies below 2MHz.
Designed and made in Britain.

SDRPLAY RSP1A

Brand new design.

The RSP1a is a major upgrade to the popular RSP1.

ML&S: £99.95
FREE SHIPPING!

Offering a powerful wideband full featured SDR covering 1kHz to 2GHz & up to 10MHz visible bandwidth. Better still, it's "Built & Designed in Britain"!!

RSPduo DUAL TUNER 14-BIT SDR

Dual-Tuner wideband full feature 14-bit SDR, 1kHz to 2GHz, 10MHz of spectrum visibility.
ML&S: £239.95
FREE SHIPPING!

Simultaneously monitor 2 separate 2MHz bands of spectrum between 1kHz and 2GHz. 3 software selectable antenna inputs, & clocking features ideally suited to industrial, scientific, Ham & educational applications. Windows 10.

FUNcube Dongle Pro+

ML&S: £179.95

Wideband SDR Receiver. 150kHz-1.9GHz incl SAW Filters.

HackRF One

HackRF One from Great Scott Gadgets is a Software Defined Radio peripheral capable of transmission or reception of radio signals from 1MHz to 6GHz.

ML&S: £219.95

ANTENNAS

MyDEL JPC-12

NEW

Portable Shortwave Antenna Kit
10m Messi and Paolini Ultraflex 7 Coax now included, fitted with 2 x PL-259's.
£199.95

ORDER NOW FOR DELIVERY IN MID-JULY 2022.

MyDEL JPC-7

NEW

DP Portable Shortwave Antenna
4m High Quality Tripod now included with 5/8" adapter to mount worth £118 alone! Don't forget to add dynema rope and coax.
£339.95

Diamond D-777

***VHF/UHF air band receiving antenna**, not for transmitting. 3.4dB on VHF (120MHz) and 5.5dB UHF (300MHz) with an approximate length of 1.7 metres. The antenna is constructed from fibre glass materials and it is pre-tuned and fully weatherproofed. Mounting components are included. It's fitted with an SO239 connector, so can be connected to a PL-259 without the need of an adaptor. Tuned to receive 108-137.975MHz civilian air band, 225-400MHz military air band.*

RRP: £83.94 ML&S ONLY: £66.95

AOR SA7000

Super wide band base aerial system.
The SA7000 is an ultra-wide range external receiving aerial with a useable frequency coverage of 30 kHz to 2 GHz - short wave / VHF / UHF. The aerial is designed for areas where space is a problem or when an "unobtrusive" installation is essential.

ML&S: £249.95

Diamond D-190

Super Discone Antenna covering 100 to 1500MHz for receiving and 144/430/904/1200MHz for transmitting. Rust-free stainless steel is employed in major component parts making the antenna rust resistant and durable with 10m cable included.
ML&S ONLY: £81.95

AOR DA1500

***DA1500 is a multi-purpose wideband antenna** that receives 70 to 1500MHz continuous whilst being small in size and lightweight. The antenna is only 92cm high and attaches to any (non-supplied) mast from 25 to 50mm in diameter with the two supplied V-bolts. It is recommended for places where space is limited.*

ML&S ONLY: £149.95

MyDEL Smart Wire Kit

The MyDEL Smart Wire Kit antenna pack includes; 132ft of high quality flex-weave wire, 2x 3 metres of nylon guy rope and 2x heavy duty dog bone insulators.

ML&S ONLY: £44.95

THIS IS JUST A SMALL SELECTION OF OUR EXCELLENT RANGE OF 'SHORT WAVE LISTENING' PRODUCTS. SEE www.HamRadio.co.uk