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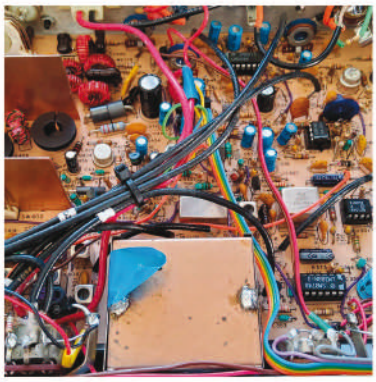
PRODUCT LAUNCHES | **Icom & Yaesu showcase their latest transceivers**

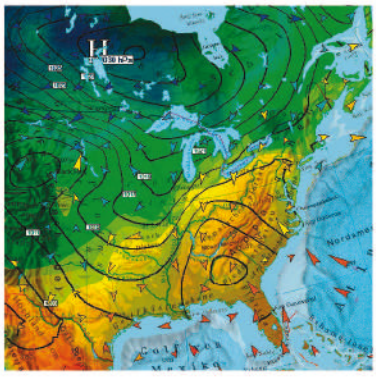
SUN STORM

Investigating this year's solar phenomenon and its effect on high frequency communications



Restoring the Heathkit

An economical way to bring this old favourite back to life



Mapping the airwaves

Charting signals for everything from astronomy to espionage

AWARDS **A look at Bunkers on the Air**

The tale of this rejuvenated and increasingly popular programme

PRACTICAL **Reliable video streaming with Raspberry Pi**

Looking into the practicalities of installing a camera module via your home Wi-Fi network

RALLIES & EVENTS

Start planning for Autumn with our useful guide

YOUR SAY

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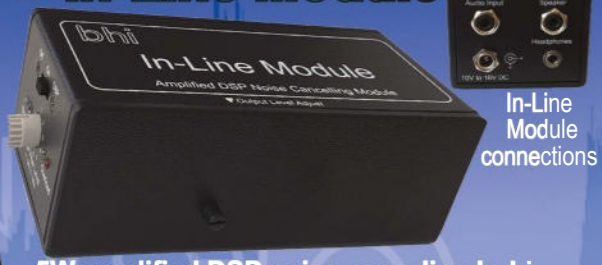
EQ20B-DSP *QST Dec 2019* review *"easy-to-use device that improves the audio clarity of amateur signals"*

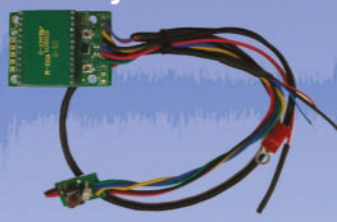
In-Line Module



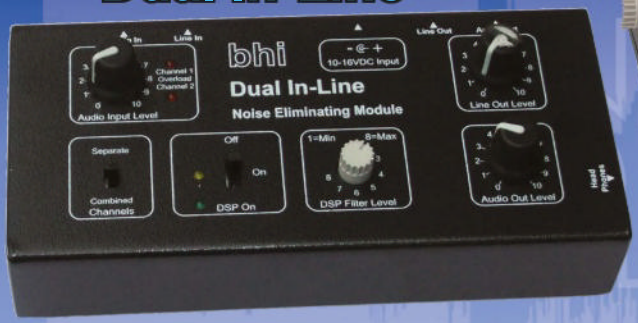
In-Line Module connections

NEDP1901-KBD

Low level audio install module for Yaesu FT-817, FT-897, FRG-100, Icom 706 MKIIG, Kenwood TS-50, TS-440, Realistic dx-394, Alinco DX70, DX-77 and many other radios



Dual In-Line



5W amplified DSP noise canceling In-Line module - 8 filter levels 8 to 40dB - Use in-line with a loudspeaker - Audio bypass feature - 3.5mm mono inputs and outputs - Headphone socket - Audio input overload

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- Line level input for SDR radio and headphone output
- separate 7W mono speaker output, stereo headphone socket and line level output
- Easy to use controls

- Compact In-Line noise DSP cancelling Module
- Powerful audio processor
- Removes noise and interference
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- Suitable for use with SDR radio

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10W Amplified DSP noise cancelling base station speaker
- Easy to use controls
- 8 DSP filter levels
- "Real time" adjustment
- Suitable for all radios incl' SDR
- Headphone socket
- Loudspeaker and line level inputs

NEDSP1962-KBD

Amplified DSP noise cancelling pcb module - easy to install retrofit module
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- Supplied with fitting kit, user manual and speaker labels

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Keylines

Summer finally arrived! I'm sure many of you have been enjoying the good weather and perhaps working on antennas or out and about operating portable. As I've mentioned before, there seem to be an ever increasing number of '…on the Air' programmes nowadays – indeed, we feature one this month in our occasional *In Focus* series. Plenty of summer rallies too – maybe you visited one or more. But this, after all, is the October issue of *PW* – where does the year go? So it's time to enjoy the enhanced autumn HF propagation (the autumn equinox around 21 September is usually a good time to enjoy good propagation, particularly on the low bands) and prepare your station and planned projects for those dark days of winter when you need to stay indoors. At least our hobby plays to that requirement unlike outdoor pursuits – I well remember the days standing on freezing cold touchlines watching my then teenage son playing rugby!

Chasing N5J

I seem to have spent far too much time over the past couple of weeks chasing the N5J, Jarvis Island, DXpedition. This has been a challenging one – they are using a RIB (basically a self-contained buggy with radios and generators on board) to short vertical antennas (the height has been restricted by their US Fish and Wildlife permit, to avoid affecting birds – despite zero evidence that I am aware of that birds fly into antennas any more than they kill themselves flying into trees!). And they are there in August, about the worst month for HF propagation in the northern hemisphere. And from the UK the path is directly over the north pole in a month in which we have yet again seen significant solar disturbances and visible aurora. I guess the team agreed to the restrictions and timing because nowadays, with some of these remote islands, that's the best that can be done. Unfortunately, it makes life difficult for us here in the UK. I realise that this matters little to the majority of *PW* readers, whose interests in the hobby lie elsewhere but, for better or worse, I have almost always been a DX chaser! Anyway, I ended up with QSOs on 12 and 17m, two bands on which I needed this one, so can't complain too much, but did miss out on 40 and 30m, where I never even copied them on either CW or FT8. Oh well!

J Birkett

Not a radio story as such, but I was reading an article in the *Vulcan XH558 Guardians' Magazine* about a restoration of Vulcan bomber XL388 and was amused to see a reference to having obtained needed components from J Birkett of Lincoln. Nice to know the company, well known to readers of *PW* although they no longer advertise here, is still going strong.

New radios

There has been speculation for some time about a new transceiver from Icom and, sure enough, it was launched at the Tokyo Hamfair in late August. At the same event, Yaesu launched a new small radio, looking as though it's a replacement for the (now somewhat elderly) FT-817/818 and as a competitor to Icom's IC-705. Mind you, there's a lot we still don't know about these new radios, not least final price and availability. We will aim to keep you posted!

Radio and the disabled

Geoff Theasby G8BMI used to write regularly for this magazine and makes a welcome return, discussing ways in which those with disabilities can stay in and continue to enjoy the hobby. And this month's article about UKBOTA features a participant who struggles with difficulties but manages to enjoy the chase and even to activate Bunkers on the Air. Of course, disabilities vary significantly in their nature and severity, particularly in those of more 'mature' years. So I would welcome any additional suggestions and guidance from readers that we can publish in our regular *Letters* pages.

RSGB Convention

You can read in our *News* pages about the forthcoming RSGB Convention. This event is for all radio amateurs, not just RSGB members, and is a fixture in my calendar. I have missed just one in over 40 years, when I was away on a DXpedition. I can highly recommend the event as a great opportunity to meet fellow enthusiasts as well as being able to attend some fascinating lectures, take part in various activities and generally have a great time. See you there?

Don Field G3XTT
Editor, *Practical Wireless* Magazine

Contents

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Newsdesk

Have you got something to tell our readers about? If so, then email **practicalwireless@warnersgroup.co.uk**

News from India

Rajesh Vagadia VU2EXP reports, A special workshop on 'Wireless Technology and its Practical Solutions' was conducted for Rajkot - Police Wireless Department at Gujarat (India) on 20 July 2024. The venue was the Police Training Center at Rajkot Headquarter.
Regional Coordinator of AMSAT-INDIA & The Amateur Radio Society of India, Mr. Rajesh Vagadia VU2EXP gave insight into various Radio Communication protocols, types of modulation, modes & various applications used in Amateur Radio & Police department.
As this workshop was targeted for 25 technical wireless officers & radio operators, we focused on the radio communication enhancing methods, utilizing various techniques, using different antennas for specific applications and diagnosis of wireless setup with various measuring instruments incl. SWR/Power Meter, NanoVNA/Antenna Analyzer. We extended a handful of maintenance tips for Radio, Antenna, Feedline & repeaters to optimize radio communications.
We also gave an overview of Ham Radio & its various events, Understanding of Digital Communication, Satellite Communication, Features of newer Digital protocol incl. DMR, D-STAR & Fusion. There was good interaction with participants. Good number of radio stuff was displayed incl. HTs, VHF Base Radio, IC-705 SDR HF Radio, RTL SDR Dongle, Antenna Tuner, CAT Control, Soundcard Interface, Morse Key, CW Paddle & Keyer, CubeSat model, Balun, LNA, SWR/Power meter, NanoVNA, Dummy load, PSU, Feed lines, EFHW Antenna, Telescopic Antenna, Connectors, Adaptors, ARISS Awards, QSL Cards etc., which helped participants to view, discuss & understand our entire stuff better.
We always give practical demos, but here in the audience was a heavy user of CW & RT from the police dept. So we didn't give a demo of that kind, but instead gave demos of Digital Communication - sending text messages between two VHF Setup and a second demo of sending SSTV Images between two local VHF stations! For the audience it was interesting to learn how we hams convert simple ASCII codes to corresponding audio frequencies (for Digital Communication) and RGB pixel values of Image to Slow Scan Television format to transmit & receive 'IMAGES' via our standard radios! That's why we proudly call Ham Radio the oldest Social Media!

RSGB Convention

This year the RSGB Convention will take place between 11 and 13 October at Kents Hill Park in Milton Keynes. It is the place to be if you are interested in everything and anything to do with amateur radio. The Society is delighted that the event will be sponsored by Martin Lynch & Sons and that AMSAT will be holding its Colloquium during the Convention again this year.
Following a recent call for proposals, the RSGB received some fantastic offers of presentations and practical activities. The programme is starting to take shape and will be organised into three streams called 'Getting Started' (aimed at those who want to try something new), Operating and Technical.
To find out more, go to the RSGB website at:
rsgb.org/convention
or read the update in the August RadCom

RAOTA August 2024

The Autumn 2024 edition of our quarterly magazine (*OT News*) has been sent to our printer for a proof, prior to distribution and to **John G7OXK** who records an audio version for members with limited vision.
We will have a stand on the Friday of the Newark Hamfest this year, where we will be launching our latest *OT News* archive in USB format instead of CD, alongside all our other publications. So if you are at the Newark show on the Friday, come over to the stand and say 'hi'.
To find out more about our magazine and our organisation, visit:
www.raota.org

RCF FUNDING EXAMS FOR YOUNGSTERS:

Since the turn of the year the RCF have been funding Foundation Licence exams for youngsters in full-time education. The initiative was prompted by a Headteacher noting that the exam fee was proving to be a barrier for some families.

We are now into double figures for exams funded and we have had permission to share a few success stories. **Millie** and **Natalie** (pictured) are members of the STEAMette group in Kent and, guided by **John Hislop G7OHO** they passed their exams in June this year. **Nordin Belkebir** lives in East Sussex and discovered amateur radio 'by accident' when researching living 'off-grid'. Following study with EssexHam, he passed his exam in July.

The number of exams being funded has been growing but there are still funds available. So if you know of a young person that would benefit from having the RCF pay for their exam, please point them to the RCF website:

https://commsfoundation.org

On the flipside, if you think this is a great initiative and would like to help keep it going, please consider making a donation to the RCF, or making a bequeathment in your will, so the future of the hobby is a little bit more assured. Being a charity, you can also help us by agreeing to Gift Aid, so we get extra money at no cost to you. Details on how to donate can be found on the RCF website, or you can donate via the RSGB Shop.

WORKED ALL BRITAIN AWARDS GROUP:

Worked all Britain held its 55th anniversary AGM at the J28 Radio Rally in Alfreton, with thanks to the South Normanton Radio Club for making this possible. The meeting was attended by approximately 30 members, either in person or via Zoom. (Numbers attending in person have dropped since Covid 19).

Reports were offered from all the Committee Officers, with the usual one-minute silence for SK members. Arrangements were made to cover vacancies within Committee short-term as no offers had been received. If any WAB members feel that they would like to offer, contact details are on the WAB website:

www.worked-all-britain.org.uk

WAB plan to attend both the Newark Hamfest and the RSGB Convention.

Celebrating the dawn of mass global communication

In October 2024, Radio Amateurs in the UK and New Zealand will be celebrating and re-enacting the world's very first trans-global two-way radio communication. Special callsigns will be active, and awards and QSL cards will be available for those who make contact with these special stations.

At the turn of the last century, radio communication was in its infancy. The properties of 'Hertzian Waves' – what we now call radio waves - were only just beginning to be understood.

Starting with Marconi, the use of a crude form of radio communication began to evolve.

The development of the thermionic valve then opened up opportunities both in radio transmitter and receiver design. However, the conventional wisdom remained that the longer wavelengths of radio signals (as used by Marconi) were those most suited to long-distance radio communication.

In that age of technical discovery, many every-day people experimented with radio. These people were the early 'radio amateurs' and their work was at first largely unregulated. When it became clear that 'radio amateurs' could cause interference to emerging commercial radio services, the decision was made to restrict their experiments to wavelengths shorter than 200m - corresponding to a frequency of 1.5MHz and above, as it was felt that such frequencies were worthless for long-distance communication.

And so radio amateurs began to experiment with these 'short waves'. It was not long before they began to realise that, far from being worthless frequencies, they in fact held the key to low power long distance communication. In 1923, tests were conducted to span the Atlantic with radio. In 1924, as both transmitter power and receiver sensitivity improved, the dream was to span the globe by radio. Then, on 18 October 1924, that two-way antipodean communication dream was finally completed between two radio amateurs, **Frank Bell**, callsign 4AA, a sheep farmer in Shag Valley, South Island New Zealand, and **Cecil Goyder**, callsign 2SZ, a student operating from Mill Hill School, North London.

The world had been shrunk, and things would never be the same again.

To commemorate the centenary of this historic contact made between Goyder and Bell, radio amateurs in the UK and New Zealand will be operating four special event stations. Two amateur radio stations will operate from the original locations in New Zealand and the UK, contacting other stations around the world and re-enacting that historic first radio communication:

The callsign G2SZ, reflecting the callsign Goyder Used will be aired from 14 - 20 October, including operation from Mill Hill School London.

The callsign ZL4AA, reflecting the callsign Bell used will be aired from 12 - 20 October, from Shag Valley Sheep Station, New Zealand.

At Mill Hill and Shag Valley station on 18 October, radio amateurs will recreate and re-enact the first contact, hopefully on a wavelength close to that used in 1924. In addition, two other amateur radio stations with callsigns reflecting the centenary will be active:

The callsign GB2NZ will be operated from 29 September 2024 to 26 October 2024 from a number of UK locations.

The callsign ZM100DX will be operated from early September 2024 to 26 December 2024 from a number of New Zealand locations on CW SSB and a number of other modes.

QSL for all four calls via M0OXO. Special awards will be available to radio amateurs around the world making contact with these stations. For details see:

www.gb2nz.com

The RSGB will be installing the Mill Hill stations, and much of the supporting documentation. Mill Hill School will be using the facility provided by the RSGB as a learning workbench.

The Otago Branch of the New Zealand Association of Radio Transmitters will be providing the re-enactment station ZL4AA and on-site facilities.

For more Great Britain information, contact:
Don Beattie, Life Vice-President,
Radio Society of Great Britain
01694 781 666 / 07802 922 219
g3bj.don@gmail.com
Or **Heather Parsons**,
RSGB Communications Manager
01234 832 711 / 07710 395012
comms@rsgb.org.uk

RSGBYOTA Camp blog

This year's Youngsters on the Air camp in the Czech Republic finished on Friday 23 August. The RSGB representative **Rhys Williams M0WGY** took part in a range of amateur radio activities that included kit building, ARDF and surface-mount technology as well as a day trip into Prague. Rhys also made the most of the great station setup and enjoyed plenty of airtime. This included making over 100 QSOs on the 40m band while operating special callsign OL24YOTA, which he has said was good to practice his pile-up management. You can read more by going to the website below and reading his daily blog. This year's camp was organised by the IARU Region 1 Youth Working Group together with the Czech Radio Club.

rsgb.org/yota-camp

Record sunspot highs

According to the NOAA Space Weather Prediction Centre (SWPC), Solar Cycle 25 likely reached its highest sunspot number yet of at least 299 on 8 August.

The World Data Centre - Sunspot Index and Long-Term Solar Observations (SILSO) publishes near-real-time Estimated International Sunspot Number (EISN) reports based on its global network of reporting stations. Daily EISN reports during Solar Cycle 25 were consistently well below 200 until suddenly rising to 218 on 14 July and 289 on 18 July, but then declining to 178 on 22 July. While occasional brief daily EISN increases are not unusual during solar maximum, after only five days the daily EISN suddenly rose to 212 on 27 July reaching a Solar Cycle 25 record high 297 on 8 August and remaining mostly well above 200 through 11 August. Daily EISN reports are likely to remain well above 200 during most days through late September and possibly much longer.

Since February 2002, worldwide 6m propagation has been mostly limited to sporadic occurrences of trans-equatorial propagation (TEP) near the equinox months and occasional sporadic-E propagation reaching many thousands of miles during June and July. Worldwide 6m F2 propagation may again occur -- perhaps very frequently -- starting in late October 2024 if daily EISN reports consistently remain well above 200.

http://www.sidc.be/SILSO/eisnplot
https://tinyurl.com/6bvmz7ww

ICOM launches new IC-7760 at Tokyo Hamfair

Following months of speculation and excitement surrounding their top-secret 'X60 Project', ICOM officially unveiled the highly anticipated IC-7760 today at the Tokyo Hamfair (24/25 August).

The IC-7760 is a 200W HF/50MHz transceiver. It offers a new 'innovative shack style' consisting of a full control head with separate RF deck, connected through a control cable for greater installation flexibility. The supplied control cable is 3m (9.8ft) long and by using a commercially available LAN cable, the RF deck can be installed in a more remote location. Furthermore, the control head and RF deck can be connected through a wired home LAN connection for remote operation.

This simple configuration does not require a PC, and can be easily operated from nearly anywhere in the home as long as a LAN connection is available.

Main and Sub dual displays with touchscreen function are provided for improved viewing of information and also smooth operation.

The 7in main display centralises information important for operation, such as Main/Sub frequencies and the setting/operating status of each function. The newly adopted 2.4in sub-display shows filter effects, various meters, and band stacking register keys.

DIGI-SEL (Digital Pre-selector) and the preamp can now be used together. DIGI-SEL prevents suppression of strong out-of-band signals, while the preamp improves receiver sensitivity. It also maximises the dynamic range of the A/D converter to avoid signal overflow.

Main Features:

- Full control head with separate RF deck for greater installation flexibility*1
- Supports in-house remote operation through a wired LAN *1
- Two displays, 7in and 2.4in, with touchscreen operation
- DIGI-SEL and the preamp can work at the same time
- Advanced RF direct sampling system using FPGA processing
- 200W full power and full duty *2
- DPD (Digital Pre-Distortion) for excellent IMD characteristics and clean transmitted signals

*1 Communication between the controller and the RF deck depends on the network environment in which it is used. Gigabit Ethernet is recommended. The controller can be used on a different network segment than the RF deck such as over a network switch.

*2 200W output and 1-hour continuous transmission with 100~200V AC input (at ambient temperature 25°C)

Initial deliveries are planned for around November 2024 and Icom UK will confirm pricing as soon as this information becomes available. To commemorate Icom's 60th Anniversary, a special 60th Anniversary logo plate is included with the IC-7760 as a special offer for the first 200 units shipped internationally. As part of this special launch, ICOM has released a video showcasing the IC-7760, which can be viewed directly on YouTube:

www.youtube.com/watch?v=NPDNKh56OjQ

A PDF brochure can be downloaded from here:

https://tinyurl.com/yvtvdhm5

Launch of Yaesu FTX-1F

The new FTX-1F is a portable transceiver for HF/50/144/430MHz utilising SDR technology and provides 6W of power output with the 5670mAh Lithium-ion battery pack (Which enables 9-hours stand-alone operating time on the HF bands, SSB mode, and 8-hours operating time on the V/UHF bands, FM mode based on a 6-6-48 duty cycle). Up to 10W of power output is available when using an external DC power supply.

This information and the sample shown at HAM FAIR 2024 are only the preliminary introduction. Detailed information will be announced at a later date.

Features, based on current information:

- Operation in SSB, CW, AM, FM and C4FM digital modes
- SDR Technology and 3DSS (3-Dimensional Spectrum Stream) on a 4.3in high-resolution full-colour touch display panel
- Two independent receiver circuits provide true simultaneous dual-band operation, whether in the same band or in different bands. For example: SSB communication on HF bands simultaneously with C4FM digital communication on V/UHF bands (*HF+V, HF+U, V+V, U+U, V+U, U+V)
- Compatible with WiRES-X operation
- Two loudspeakers ensure clear and powerful audio output
- An optional Automatic Antenna Tuner can be attached to the rear of the transceiver with the 5670mAh high-capacity Li-ion battery pack. The optional cooling-fan, which is necessary for comfortable FT8 operation, can also be combined with the antenna tuner.
- RF front-end and Low Noise Reference Oscillator, enable Phenomenal Multi-signal Receiving characteristics
- Effective QRM rejection afforded via High-speed 32-bit IF DSP (YAESU's renowned interference reduction systems: SHIFT / WIDTH / NOTCH / CONTOUR / APF / DNR / NB)
- PMG (Primary Memory Group) function can register and monitor up to 5 frequently used frequencies
- MAG (Memory Auto Grouping) function enables Memory Channels to be categorised in each band that can be quickly recalled by band groups (HF/VHF/UHF/AIR/OTHERS)
- USB ports support CAT operation, audio input/output and TX control

The new FTX-1F will be available early 2025. ML&S are taking £50 deposits for early delivery.

NEW SHORTWAVE TRANSMITTER FOR RADIO NEW ZEALAND: A brand-new 100kW transmitter began sending its signals across the Pacific in August as Radio New Zealand entered a new era of commitment to serving its shortwave listeners.

As one of two nations still providing the Pacific region with shortwave radio service, Radio New Zealand has replaced its 33-year-old transmitter in the central North Island with a new one capable of DRM digital and analogue operation. The move is part of the public broadcaster's $4.4 million investment in facilities improvements.

New Zealand's Foreign Affairs Minister **Winston Peters** was quoted by the Radio World website as affirming the vital role shortwave still places since the service was launched in 1948. He said: *"Shortwave is the most certain system there is to make sure that in a crisis, tsunami or cyclone, we can get through"*. The minister marked inauguration of the transmitter along with dignitaries from the shortwave service area, which includes the Cook Islands, Samoa, Fiji, Papua New Guinea and the Solomon Islands. There are 22 broadcast partners throughout the region using RNZ's DRM digital streams by rebroadcasting them locally without compromising audio quality. Following Australia's shutdown of its shortwave transmitters in 2017, New Zealand and China have become the only two providing the region with shortwave services.

https://tinyurl.com/3k6vfe8r

M17 based radios begin shipping

Connect Systems has begun shipping the first radios that operate M17 'out of the box'. The M17 project is an Open Source digital mode alternative to modes such as D-STAR and System Fusion, which rely on proprietary encoding and decoding hardware and software.

The CS7000 M17 is an HT transceiver running M17 described as '4FSK modulation with an open-source Protocol and Vocoder'. A PLUS version of the HT with additional memory and processing power will also be available.

See more information about the M17 Project – M17 Users Group:

https://tinyurl.com/2bud3yhx

The CS7000 M17 is the first amateur digital radio designed for the M17 protocol. The user can make the radio into either an M17 radio or a standard DMR and Analog radio. There are a few things that make this radio different from the standard DMR radio.

- The ability to easily get in the native boot mode of the microprocessor to unbrick the radio without opening the radio. This is very important when developing new features because of the chance of bricking the radio.
- Hardware modifications from standard DMR radios to allow it to be used with protocols other than DMR and Analog.
- Optional GPS.

Key Hardware Features of the CS7000 M17:

- Dual Conversion Superheterodyne Receiver
- Front end Varactor tuning
- Frequency 400MHz to 512MHz
- IP67 waterproof rating
- 2400mAh battery with Belt Clip
- Large Colour Display. 1.8in, 160 x 128
- Programming port compatible with Motorola
- Programming cable included
- Power Supply and Charger Included
- 128Mb Flash memory for holding parameters
- Microprocessor has 1 Megabyte code memory and 384k Ram memory

Key Firmware Features of the CS7000 M17 in DMR Mode:

- Digital Encryption
- Voice Auto Record
- Channel Voice Annunciation
- CTCSS/DCS Encode and Decode
- DTMF/MDC1200/2 Tone/5 Tone Encode and Decode
- Dual Priority Scan
- VOX
- Kill/Revive
- DMR Slot, Color Code and Contact

https://tinyurl.com/5dn8skpb

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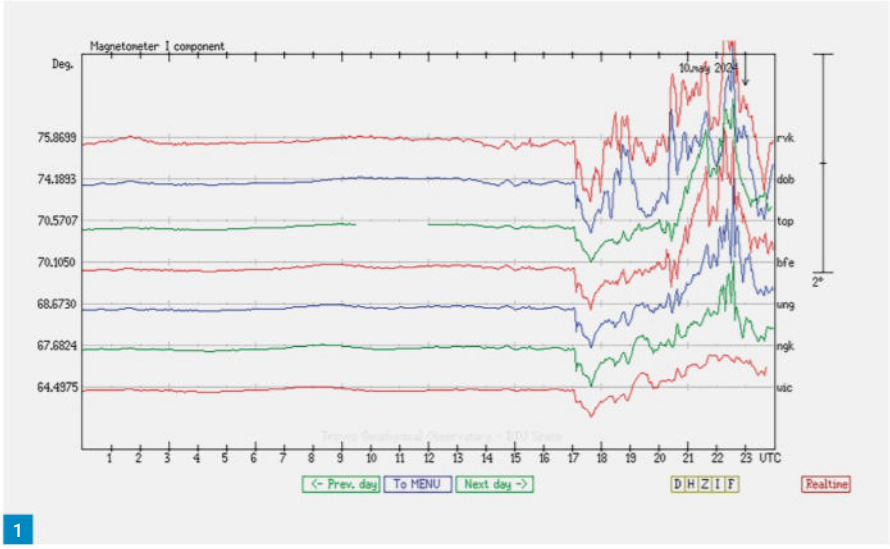

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In the eye of the 'Gannon storm'

It blew through all the newspapers: the magnetic storm that sent northern lights all the way down to North Africa from 10 May 2024. It also affected HF communication. **Nils Schiffhauer DK8OK** investigates.

The third largest magnetic storm since 1985 occurred on 10 May this year. It shook the ionosphere. The global network of magnetometers was the first to feel this shock – the more northerly their position, the sooner, the stronger. **Fig. 1** [**1**] shows the values of seven European stations from north (Reykjavik) to south (Vienna). The German stations Wingst and Niemegk are in fifth and sixth position.

What hit the Earth at around 1705UTC had its cause on the sun. Around 60 hours earlier, an explosion occurred above a huge group of sunspots, **Fig. 2**, which initially generated powerful X-rays, **Fig. 3**. Within an hour, this flare tore over a billion tonnes of charged matter (plasma) out of the sun by twisting magnetic fields and hurled it into space at high speed. While the sun's X-rays, like its light, reach the Earth after around eight minutes, the plasma cloud from this coronal mass ejection (CME) takes several tens of hours, depending on its speed, before it hits the magnetic shell of our planet and dents it. The plasma itself is largely deflected around the Earth by our magnetic field and has the strongest effect at the North and South Poles, where it leads to auroras, which in this case reached as far as North Africa.

Frequent coronal mass ejections (CME), but ...

Such CMEs occur quite frequently. The SOHO-LASCO-CME catalogue lists almost 40,000 such mass ejections between 1996 and 2024 [**2**]. SOHO is a solar observatory in space, jointly developed by ESA and NASA at a cost of over one billion $US, whose instrument called LASCO creates a kind of permanent artificial solar eclipse and thus allows permanent observation of the outer solar atmosphere (corona). In general, there is a certain dependency between sunspots and CMEs: when the sun is active, there occur more CMEs, see **Fig. 4**. However, only a fraction of these CMEs also influence the Earth's magnetic field, see Fig. 4. Particularly in comparison with Fig. 3, a focus of the Earth-directed CMEs is more apparent during the descending branch of the sunspot cycle. Scientists cannot yet fully explain all this, and we can only conclude from observation that although there are statistical tendencies, strong disturbances of the Earth's magnetic field can also show up in times when there are fewer sunspots.

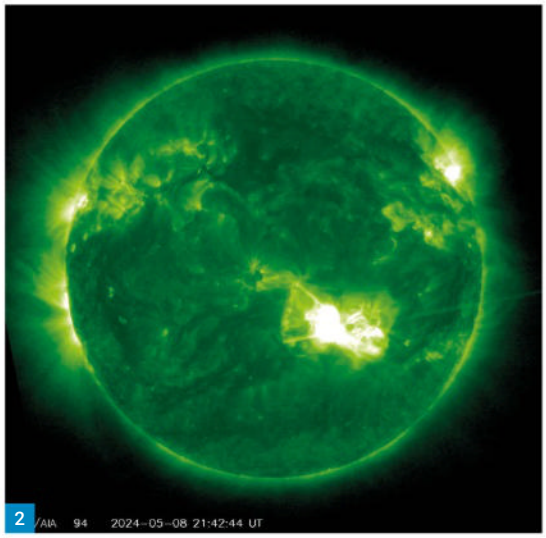
...geomagnetic effects are rarer

Plasma hurled towards the earth leads to geomagnetic storms with effects not only on the ionosphere, but also on metallic cables and pipelines, for example. Big geomagnetic storms are given names, such as the 'Bastille Day Storm' [**3**] around 15 July 2000 or the 'Halloween Storm' [**4**] around 30 October 2003. This year's May storm was named after the physicist **Jennifer Lea Gannon**, who had made an outstanding contribution to the study of space weather and died on 2 May 2024 at the age of just 45 [**5**]. **Fig. 6** shows the six strongest magnetic storms since 1985 using the ap30 index with its temporal resolution of 30 minutes. The ap30 index was developed at the GFZ research centre, Potsdam and is calculated from the measured values of 13 magnetometers distributed internationally outside the polar zones. This index is similar to the ap index, the linear equivalent of the semi-logarithmic 'planetary index' (Kp) introduced by **Julius Bartels** in 1949 for the totality of natural disturbances of the Earth's magnetic field, which is measured every three hours. Compared to the traditional ap index, the ap30 index not only has the advantage of higher temporal resolution, but is also not limited in intensity to a value of 400. The new version 3.0 of this algorithm was available immediately afterwards in response to the disturbance known as the 'Gannon Storm' and was used here. This is the linear version, which shows magnetic storms particularly clearly.

And this is how the Gannon storm came about: between 7 and 14 May, increased flare activity was observed in the sunspot region 3664. A flare on 8 May 2024 at 0437UTC led to a coronal mass ejection (CME) of ionised solar particles one hour later. The plasma from this eruption pointed towards Earth, reached our planet a good 58 hours later 10 May at 1705UTC and, fuelled by further CMEs, caused a geomagnetic storm that lasted several days and brought auroras as far away as North Africa. **Fig. 7** shows the arrival of the plasma on Earth. The start of this simulation 'ZEUS + iPATH CME' was automatically triggered by the CME eruption 58 hours earlier. **Fig. 8** in turn shows the effect on the Earth's magnetic field, which began on the afternoon of 10 May and lasted until 12 May, using the above-mentioned code number ap30 and its semi-logarithmic equivalent Hp30.

How the MUF buckles

The ionosphere was also impressed: due to transport effects within the atmosphere, this CME shockwave became effective in the ionosphere around 20 minutes later. It causes a massive increase in the total electron content TEC of the atmosphere, which can briefly lead to an increase in the highest usable frequency MUF, only to be quickly dampened by increased



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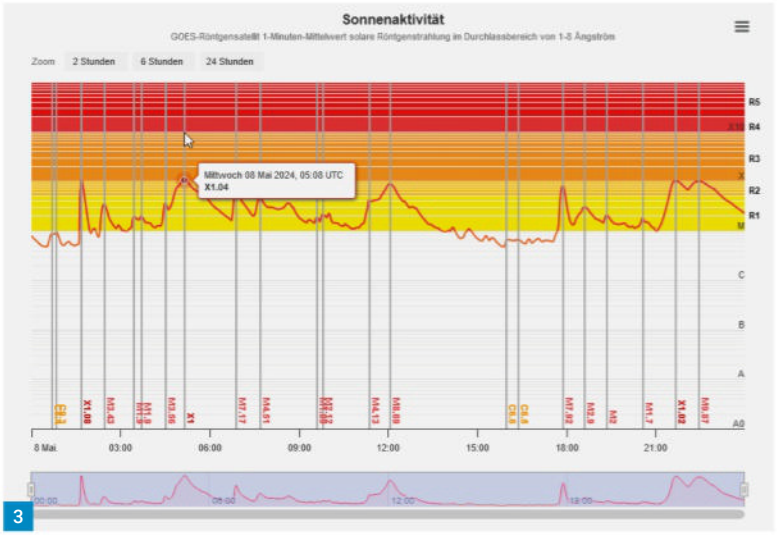

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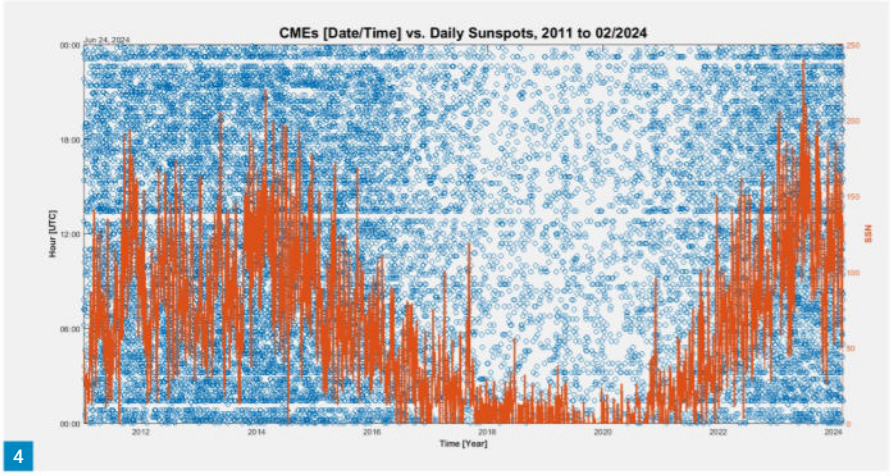
Fig. 1: Until shortly after 5pm, seven European magnetometers from Reykjavik (rvk) to Vienna (wic) record a calm course of the Earth's magnetic field. Until the magnetic storm arrives at around 1700UTC. It reaches its maximum on this day at around 2230UTC. And the north is hit particularly hard.
Fig. 2: An image of the active sun from 8 May 2024, 2142UTC - at the time of the double whammy, see the following image. The sunspot group 3664 responsible for the CME is located slightly south-east of the centre of the solar disc.
Fig. 3: On 8 May 2024, the X-rays reach X values three times. The marked eruption coincides almost exactly with the coronal mass eruption.
Fig. 4: The background of this diagram is formed by the daily registered CMEs, distributed over 24 hours. The curve in the foreground marks the daily sunspot relative number, SSN. Accordingly, CMEs occur more frequently at high SSNs.
Fig. 5: The background again shows the same CME density as in Fig. 4, but in contrast the curve in the foreground marks the value of the daily geomagnetic index Ap as an indication of CMEs pointing towards Earth with a corresponding effect on the magnetic field of our planet.



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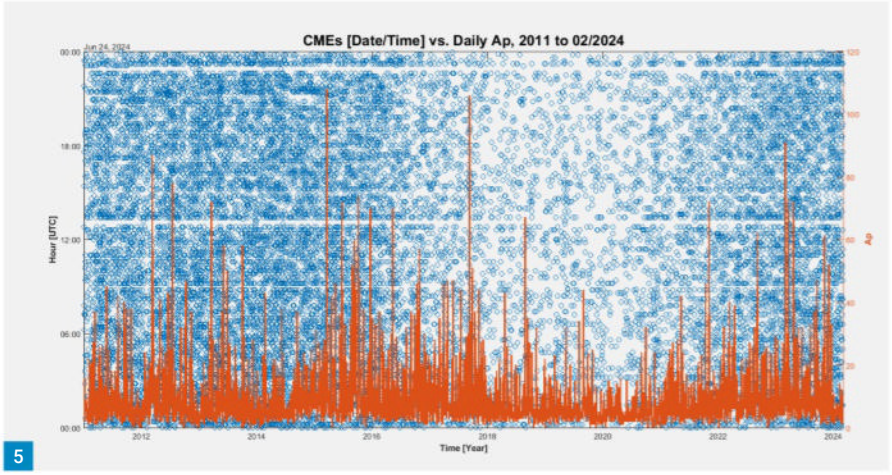

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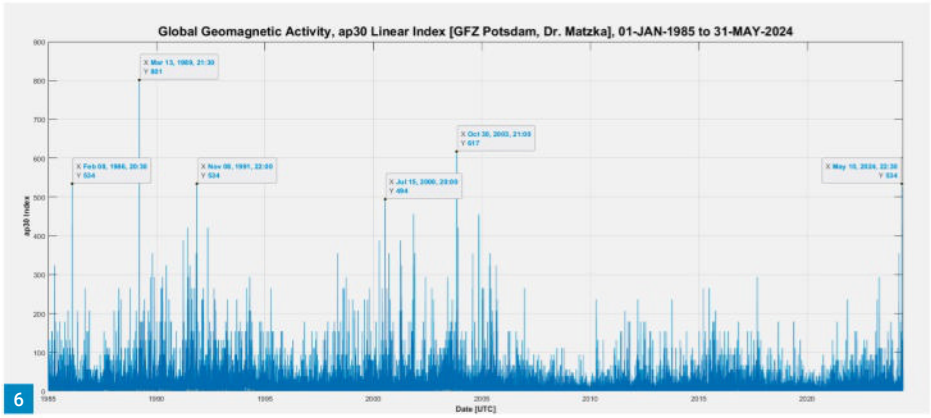
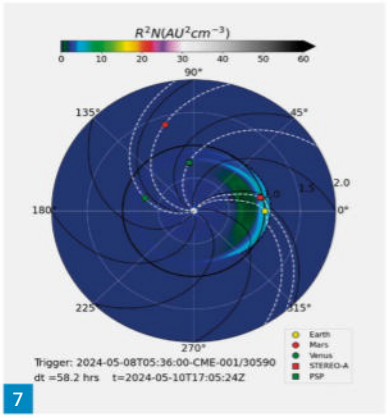
ionisation of the D-layer. The CME hits the day side of the Earth directly, most strongly the area where the sun is highest (subsolar point). As the Earth rotates, the effect spreads westwards like an ink stain on blotting paper: The recombination of electrons and ions and thus the decay of the electron content simply takes time. At 2300UTC, the effect has spread massively over the Pacific, but also over Central and North America, **Fig. 9**, which becomes particularly clear in comparison with the TEC value on the ionospherically relatively calm 1 May at the same time, **Fig. 10**.

So, what is the actual effect on shortwave propagation? To find out, we need to look at solar flux and geomagnetism in parallel. Let us first look at the 'normal case', so to speak. **Fig. 11**, using the Dourbes ionosonde data near Brussels/Belgium as an example, shows that for the average daily MUF to climb above 5MHz, the solar flux should already exceed the value of 75. At higher flux values, on the other hand, the MUF fans out. A high flux value often results in a higher MUF, but the opposite case is also not so rare and marks the lower branch, where even at higher flux values of more than 200 the MUF barely crawls above 5MHz. It is highly probable that a magnetic disturbance is then depressing the MUF.

The statistical correlation between solar activity and Ap value is only very weakly positive daily with a correlation coefficient of 0.16: at a value of '0' the two data show no correlation with each other, at '1' they are





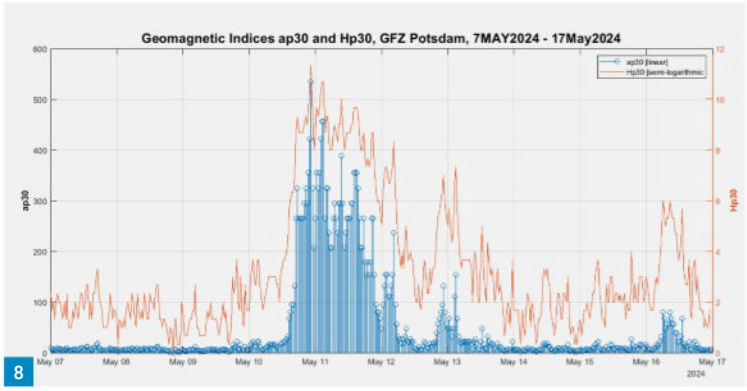
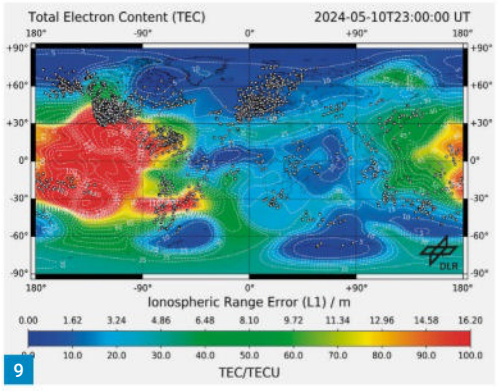


Fig. 6: The course of the linear characteristic values of geomagnetic activity (ap30) recorded at 30-minute intervals. The six strongest geomagnetic storms during this period are marked. Data: GFZ German Research Centre for Geosciences [Dr. Jürgen Matzka], licence CC BY 4.0. Graphic: DK8OK.

Fig. 7: One hour after the flare on the Sun (centre), a coronal mass ejection (CME) occurs at 05:36 UTC, bridging the almost 150 million kilometres to Earth in just over 58 hours. The circles indicate the planets Earth, Mars and Venus, the squares the research satellites STEREO-A and the Parker Solar Probe. The intensity is colour coded.

Fig. 8: The half-hourly geomagnetic indices ap30 (linear) and Hp30 (semi-logarithmic) of the GFZ Potsdam.



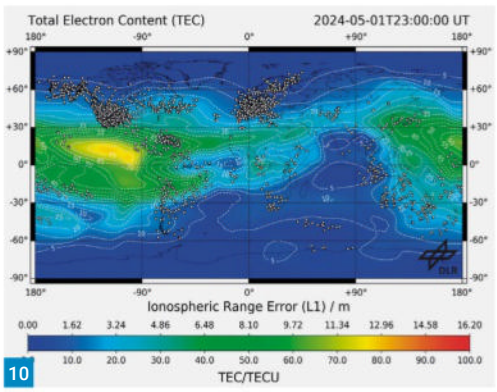


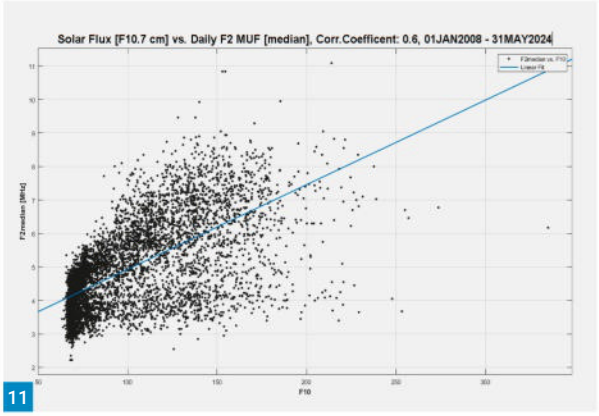
Fig. 9: The CME massively increases the total electron content of the ionosphere with mainly disruptive effects for RF propagation (here: 10 May 2024, 23:00 UTC). Source: DLR/iSWA

Fig. 10: The extent to which the CME influences the ionosphere can be seen by comparing Fig. 3 with this figure, which shows the total electron content on the comparatively calm 1 May 2024 at the same time. Source: DLR/iSWA

identical. As an exception, the solar activity was marked here by the sunspot relative number (SSN), as the flux values only start from March 1947, but the long period from 1 January 1932 to 8 June 2024 with its almost 34,000 days should be used here for a statistically significant statement. **Fig. 12** makes the slight positive correlation more clearly visible. For this purpose, the daily values of SSN and Ap were smoothed over 30 days each ('moving window'), which noticeably increases the correlation coefficient to almost 0.4. This is strongly reminiscent of Fig. 5. On a much broader data basis, Fig. 12 supports the impression that high Ap values occur in the descending sunspot cycle, i.e. with a delay to the maximum. This means that high sunspot activity leads to many sunspots, some of which result in flares. But not every flare leads to a CME, and not every CME is preceded by a flare. The propagation speed of the plasma is also not easy to predict. And ultimately it depends on this, as well as several other factors, whether a CME will actually hit the Earth and shake the geomagnetism there.

Ionoprobes show the effect

Once these correlations have been clarified, the next step is to analyse the effect of the Gannon storm on HF propagation. To do this, I downloaded and analysed the MUF and MUF3000 data collected every five minutes from 18 digital ionosondes from the GIRO DIDBase between 7 and 16 May. As expected, however, they often provided no data directly 'in the eye of the storm'. Whether the probes failed during this time (a funny coincidence), the automatic scaling of the ionograms did not work or whether there really was no backscattering of the radio waves emitted vertically by the ionosondes towards the ionosphere will only become clear in the future. Nevertheless, some tendencies are already emerging. I have selected the most interesting measurements, the locations of which are shown in **Fig. 13**. The results from Juliusruh, Dourbes and Athens, from north to south, are shown in **Fig. 14**. All ionosondes show failures on 11 May. The north (Juliusruh on Rügen) is the first to be affected. Belgium follows suit and Greece remains affected until the early hours of the morning. It is clear to see that with the onset of the storm, the MUF drops dramatically in some cases - compared to the patterns of the previous days. It can also be seen that the storm is followed by a brief recovery period with a recognisable upswing in



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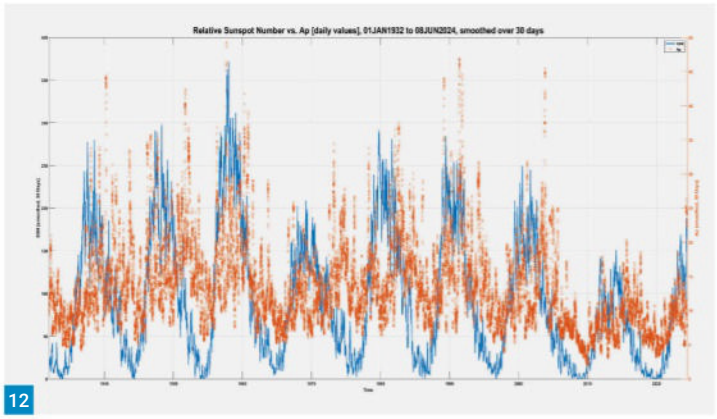

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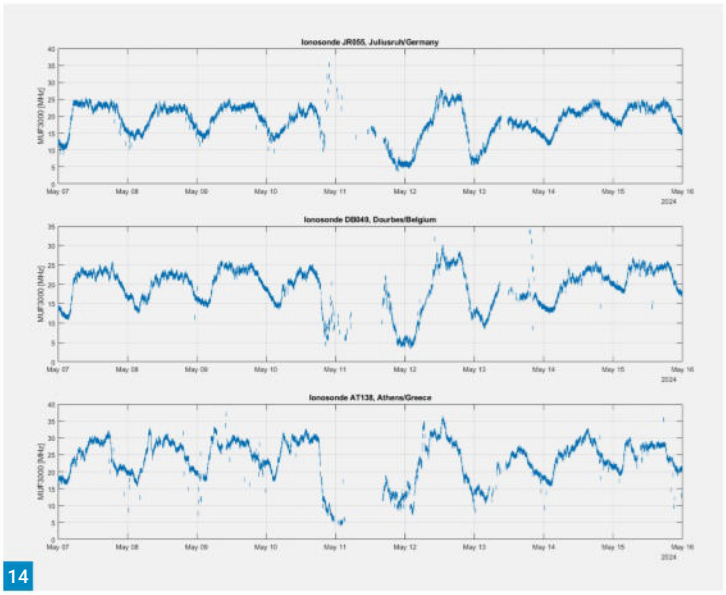

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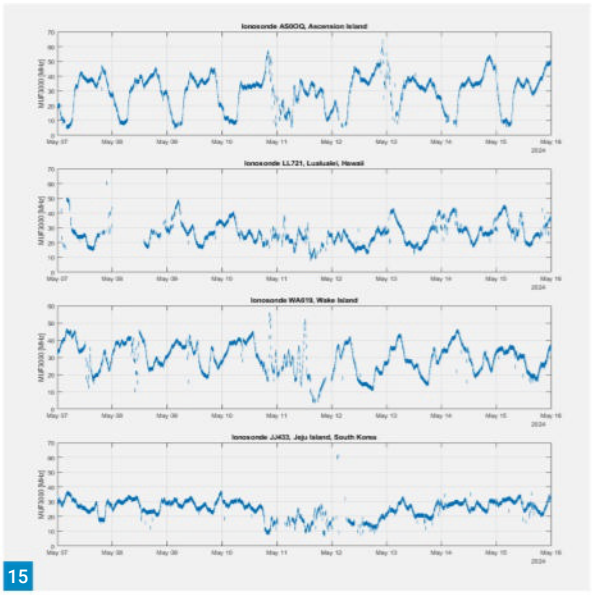

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Fig. 11: Solar flux and the average daily MUF are linked. The positive influence of the flux on the MUF is strongest (upper branch), but the lower branch should not be neglected either. It shows a largely constant MUF below around 4MHz with increasing flux. Fig. 12: The relationship between solar flux and disturbances of the earth's magnetic field - daily values, each averaged over 30 days. Fig. 13: Locations of the ionosonde data used here.

Fig. 14: MUF3000 trajectories of three European ionosondes from 7 to 16 May 2024, sorted from north to south. The coronal mass eruption reached Earth at around 1700UTC on 10 May 2024, which led to a rapid crash of the MUFs between 18 and 1830UTC. Fig. 15: Four non-European ionosondes provide fewer interruptions, but also show a clear decrease in MUF3000 between 6 and 8 pm.

Fig. 16: The representation of WSPR contacts between the IARU large fields FN (East Coast USA) and JO (Northern Europe) between mid-April and mid-June 2024 shows a clear impression on 11 May. The 15m band was highlighted here.

the MUF.

For **Fig. 15**, I have chosen non-European ionosondes on Ascension in the South Atlantic, Lualualei in Hawaii, Wake Island and finally Jeju Island/South Korea. Here it goes westward, following the daylight. As I said, this is only a selection of raw data. The currently publicly available data from many other interesting ionosondes such as Thule/Greenland, Hermanus/South Africa or one of the three from Brazil were simply too spotty. Perhaps something will be done here later through manual scaling. However, the MUF3000 data presented here can still be corrected, especially regarding some possible 'outliers'. Incidentally, not only does the MUF decrease, but the ionosphere, which is usually diffracted with a relatively 'clear edge', fans out, which leads to irritating multipath reception with rough and hoarse speech reception and, due to inter-symbol interference, the complete collapse of many digital transmission methods, even with high redundancy and sophisticated correction algorithms. Shortwave enthusiasts know this 'aurora tone' as the acoustic equivalent of the Polar Lights.

I hope I have been able to show some approaches here as to how all people interested in HF communication can make use of a broad, free and non-discriminatory range of data and models.

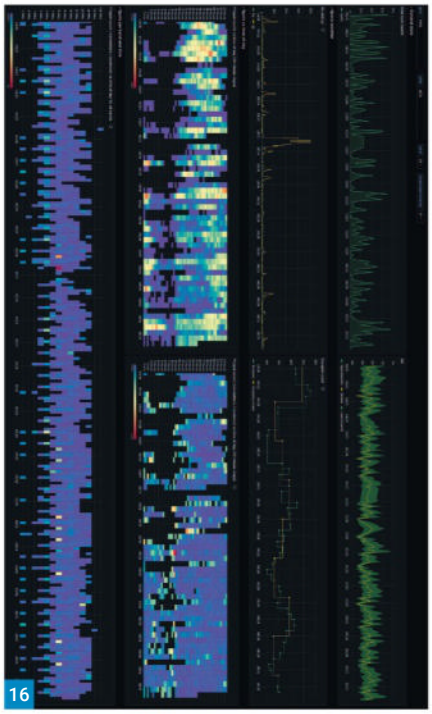
This opens a wide range of possibilities for our technical and scientific hobby, including the aspect of 'citizen science', based on cooperation between scientists and interested people. The scientific utilisation of the WSPR log data, in which the 'Gannon Storm' can also be found, has long since built a bridge to this, **Fig. 16**.

Acknowledgements/sources

All data is available free of charge and non-discriminatory on the Internet under the licence CC BY-NC-SA 4.0.

All ionosonde data come from the Lowell GIRO Data Centre (persistent URL: **http://spase.info/SMWG/Observatory/GIRO**) operated by Prof. Reinisch and Dr Galkin, among others (Reinisch, B. W., and I. A. Galkin, Global ionospheric radio observatory (GIRO), Earth, Planets, and Space, 63, 377-381, doi:10.5047/eps.2011.03.001, 2011).

Ionosondes Ascension and Lualualei: "This paper uses ionospheric data from the USAF NEXION Digisonde network, the NEXION



Program Manager is Annette Parsons".

Ionosonde Juliusruh: "This paper uses data from the Juliusruh Ionosonde which is owned by the Leibniz Institute of Atmospheric Physics Kuehlungsborn. The responsible Operations Manager is Jens Mielich".

Ionosonde Dourbes: "This publication uses data from the ionospheric observatory in Dourbes, owned and operated by the Royal Meteorological Institute (RMI) of Belgium".

The geomagnetic data are from GFZ Potsdam, with thanks to Dr Jürgen Matzka. CC BY-NC 4.0 licence.

Source: Geomagnetic Observatory Niemegk, GFZ German Research Centre for Geosciences.

(Matzka, J., Stolle, C., Yamazaki, Y., Bronkalla, O. and Morschhauser, A., 2021. The geomagnetic Kp index and derived indices of geomagnetic activity. Space Weather **https://doi.org/10.1029/2020SW002641)**

The TEC data comes from DLR's IMPC: "Ionosphere Monitoring and Prediction Center" (IMPC) is operated by the German Aerospace Center (DLR) at the Neustrelitz location. We thank DLR who is maintaining the IMPC services.

The CME simulation follows the ZEUS and iPATH models: "ZEUS has been developed by D. Clarke at the ICA **http://www.ica.smu.ca** with support from NSERC".

"Simulation results of iPATH have been provided by the Community Coordinated Modeling Center (CCMC) at Goddard Space Flight Center through their publicly available simulation services". **https://ccmc.gsfc.nasa.gov**

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[2] This CME catalogue is generated and maintained at the CDAW Data Center by NASA and The Catholic University of America in cooperation with the Naval Research Laboratory. SOHO is a project of international cooperation between ESA and NASA. **https://t1p.de/1u85p**

[3] Worth reading from the HF perspective: Reiner, M., Kaiser, M., Karlický, M. et al. Bastille Day Event: A Radio Perspective. Sol Phys 204, 121-137 (2001). **https://t1p.de/ej6vk**

[4] Detailed analysis of causes, progression and consequences, free of charge and non-discriminatory: **https://t1p.de/w85ld**

[5] https://t1p.de/bwhjt

[6] Introduction [German] worth reading: **https://t1p.de/qi5hh**

[7] **https://t1p.de/fn7yk**

[8] A flare is the eruption of plasma in the chromosphere, a layer of plasma between the surface of the sun and its outer atmosphere. Flares occur together with sunspots and solar flares.

[9] Fundamental to the evolution of active regions on the sun: van Driel-Gesztelyi, L., Green, L.M. Evolution of Active Regions. Living Rev. Sol. Phys. 12, 1 (2015). **https://t1p.de/36a1b**

[10] **https://t1p.de/nezxz**

[11] The MUF is the vertical cut-off frequency measured by ionosondes, which is emitted vertically in the direction of the ionosphere and is just bent back. The MUF3000 is the highest frequency calculated from this for HF communication over 3000 km. The MUF3000 is around three times as high as the MUF.

[12] https://t1p.de/8fzye

[13] Source: Solar Dynamics Observatory, **https://t1p.de/7tepz**

[14] **https://t1p.de/560jk**

[15] Ionosphere-> IMPEC TEC Map: **https://t1p.de/ufstr**

[16] **https://t1p.de/j1b86**

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1

What is UKBOTA?

Jace Dale 2E0JIV introduces a rejuvenated and increasingly popular awards programme.

The Bunkers on the Air (BOTA) program was first established almost 20 years ago, back in 2005. It was the brainchild of **Brian G8GMU** and his grandson **Joshua M3HBM**, along with the Coventry Amateur Radio Society, with the aim of activating several Royal Observer Corps (ROC) bunkers in their local area. The scheme was later integrated into the Castles and Stately Homes On The Air Team (CASHOTA) by **Chris Darlington M0DOL** (now SK) in 2010.

In October 2023, BOTA was relaunched and rebranded as United Kingdom Bunkers On The Air (UKBOTA) under the leadership of **Bill M0DXT**, **Mark M0IXC**, **Carl M0ICR**, **Phil G7TVB** and **Rob M1EGP**. This relaunch enhanced the original concept and added a fresh new element to this 'On The Air' activity. UKBOTA prides itself on being fully inclusive, providing opportunities for both amateur radio operators and short-wave listeners to participate together in this award scheme.

The launch in 2023 saw a total of just over 1,500 bunker locations available to be activated or hunted, most of which included ROC (Royal Observer Corps) bunkers. Ever-evolving, UKBOTA now currently boasts an impressive 2,529 UK bunker locations, including ROC Posts, Chain Home Radar sites, Air Battle HQ locations, airfield storage and defence locations, civil defence sites, local government sites, and Cold War operations sites.

UKBOTA prides itself on not being a contest; there are no leaderboards or tables. Awards are issued for gaining the required number of QSOs between stations during an activation by both activators and hunters. Short wave listeners (SWLs) are required to submit reception logs, allowing them to claim awards and be an integral part of the scheme. As a non-competitive initiative, UKBOTA relies on the involvement of all operators and rewards them for their participation.

How do I get involved and how does the scheme work?

UKBOTA offers an engaging opportunity for radio amateurs to participate as activators, hunters or SWLs. As an operator, your first step is to determine your operating style – whether you prefer to activate, hunt, or operate as a SWL. To get started, visit the main UKBOTA website (URL below), where you can find comprehensive information about the scheme, including the available awards and the rules for claiming them. The sister site (second link below) is where you can locate the Dashboards tailored to your operating style. On these Dashboards, you will be able to upload logs and check your progress. A Bunker Dashboard allows you to download map files of all the UKBOTA locations in various formats, along with a comprehensive bunker list.

www.bunkersontheair.org
www.bunkerbase.org

Activators typically operate on popular bands such as 40m or 20m, although they have the flexibility to choose any band or mode they prefer from a portable or mobile stance. Activations from your QTH or shack are not permitted; however, operating portable from your garden is acceptable if it falls within an activation zone. The activation process begins with selecting your bunker and setting up within a designated 1km activation zone (these have been added to the mapping tools). After ensuring a clear frequency, activators are recommended to announce their presence on social media platforms such as our Facebook Page or our dedicated WhatsApp groups. These platforms are integral to the community for sharing activation schedules and experiences, assisting in most activations being placed onto the cluster. Once the activation is live, the goal is to establish a minimum of 25 QSOs to successfully activate the bunker.

Hunters and SWLs are integral to the success of the activators. Join in by registering on both our websites, checking our social media channels for forecasts and live spots, and beginning your hunt. Upload your logs on www.bunkerbase in your dedicated 'Hunters Dashboard', watch your

Photo 1: Andy 2E0DIQ operating from ROC Post Bacton Suffolk – Using UK PCR 320 on HF and UK PRC 351 for UHF on military telescopic mast. Photo 2: Guisborough & District ARC activating ROC Post Castleton.

progress grow and claim your awards.

UKBOTA fosters a vibrant community, encouraging participation from both UK and overseas amateur radio operators. With a strong emphasis on collaboration and engagement, the UKBOTA scheme not only promotes the activation of bunkers across the UK but also celebrates the camaraderie among its members, making it a rewarding experience for all involved.

The awards

UKBOTA runs multiple award schemes offering recognition for all styles of operation. The awards (issued in PDF format) In Focus stunning designs created by Carl M0ICR, making them collector's items for activators, hunters and SWLs. UKBOTA also runs multiple special event awards alongside our tiered Lifetime, Annual, VHF/UHF and DX awards. Some of our special events have included:

• National Day Events: These have included three of the four nations of the United Kingdom, with the St Andrews Day event taking place in November.

• Historic Counties Event: This involved the activation and hunting of bunkers located in their original historic counties of the United Kingdom pre-1976. This extremely popular month-long event promoted the history of the Historic Counties, culminating in the activation of 91 of the 92 counties, with Kent being the one that got away.

• Airfield Awards Event: This event ran throughout July and involved the activation and hunting of Airfield Battle HQ bunkers. It was fully supportive of the International Bomber Command Centre Memorial Day, which took place on July 25, commemorating those who lost their lives in the service of the Bomber Command, whether at home or abroad.

UKBOTA is evolving

In 2024, the landscape of amateur and hobbyist radio operations saw significant changes with the emergence of new organisations and collaborations. UKBOTA continued to evolve, implementing a new and more inclusive reference list, alongside a greater collective interest from European operators. Although UKBOTA remained the constant, a natural progressive step led to the creation of World-Wide Bunkers on the Air (WWBOTA).

The establishment of WWBOTA marked a pivotal moment for amateur radio enthusiasts across parts of Europe. WWBOTA aimed to unify various National Bunkers On The Air initiatives and promote international collaboration, placing an


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umbrella over UKBOTA and its partnerships.

WWBOTA has welcomed aboard schemes from Belgium (ONBOTA) and the Czech Republic (OKBOTA), North Macedonia (Z3BOTA) with Albania, France and Luxembourg finalising their projects and preparing to join.

Statistics and trivia

It isn't bold or brash to make claims about the numbers, for UKBOTA it measures our success and especially within our first 12 months. I would say the figures speak for themselves and prove the popularity of the scheme.

• UKBOTA can boast having over 2500 bunker location within the United Kingdom and the British Isles.

• Over 2000 UKBOTA activations, over 1000 of these have been unique activations.

• With 156 different activators, that's an average of 12 bunkers a day.

• Over 28500 QSOs logged by the hunters.

The four compass points of UKBOTA.

• B/GM – 0360 is the Chain Home Radar Bunker on the Shetland Islands, the furthest North.

• B/GJ – 0004 is a WW2 Battery and Command Post bunker in Jersey and our furthest South.

• B/G – 0790 Royal Observer Corps (ROC) Post Lowestoft only a few hundred metres from the most Easterly point on the United Kingdom.

• B/GI – 0081 Royal Observer Corps (ROC) Post Springfield in the county of Fermanagh in Northern Ireland forms our most Westerly point.

• That's a staggering further 2525 further bunkers within these compass points, contained within WAB squares with a high majority falling with both POTA and SOTA boundaries.

Over 890 separate award certificates issued by our dedicated awards manager since October 2023 among activators, hunters and SWL's. These certificates have not just been issued for our annual and lifetime awards, but also include:

• Royal Observer Corps event.
• Advent Calendar event.
• Historic Counties event.
• National Days events.
• Airfield Bunkers event, incorporating the International Bomber Command Centres Memorial Day.
• Early Bird event.
• Night Owl event.
• 1000 Club.

Let's just end our statistics with there are currently over 8300 bunkers available to hunt through WWBOTA.

View from a few of our operators

Shaun G7ORH: In 2023, I returned to radio after a 25-year absence, during which time the licensing regulations had changed. Instead of holding a B class licence, I now possessed a full licence,

granting me access to the HF bands. Equipped with a new, high-quality radio and an EFHW antenna, I felt ready to re-explore the world of amateur radio.

I soon discovered that one of my previous interests, Worked All Britain (WAB), was still active. I joined the nearly daily net and even had the opportunity to serve as net controller on several occasions. When the UKBOTA awards scheme was launched, I initially wondered where participants from the WAB net were going to collect rare squares? The answer was through hunting bunkers, which led me to pursue bunker chasing.

The journey continued into 2024, where I have now surpassed 1,000 bunkers. As a new HF radio operator, I have learned a great deal, particularly about working with weak signals, and I have made numerous radio friends along the way. The UKBOTA community is filled with supportive members who assist one another in making contacts. With an awards scheme which is straightforward and user-friendly, operating on a trust basis similar to some other schemes. With no requirement to upload logs; instead, contacts are entered into an online database. Awards can be claimed on an ad-hoc basis, simplifying the process.

Recently, I acquired the necessary equipment to undertake portable operations – an endeavour I had enjoyed during my earlier VHF-only days and was eager to revisit. However, I initially felt somewhat intimidated by the prospect of managing a pile-up. With encouragement from fellow UKBOTA operators, I decided to take the plunge and set off to my local bunker. Since then, I have successfully completed over 25 activations, all in just a couple of months.

Nick 2E0NAQ: I joined UKBOTA back in October of 2023 because I was looking for a community of like-minded individuals who shared my passion for amateur radio, portable activations and hunting those who activate. My personal journey with UKBOTA has been incredibly rewarding. From birth I have suffered from Cerebral Palsy, which has presented numerus difficulties as a radio operator. I have faced challenges with logging my QSOs, entering callsigns into my logbook, my speech and personal confidence. However, being part of UKBOTA has provided me with a supportive and inclusive environment where I have received encouragement and assistance from other members. UKBOTA has helped me overcome my personal difficulties. It has made the hobby even more enjoyable for me, removing boundaries and stigma that, unfortunately, I have faced in the past. Despite my disability, I have used it as a strength and have found that using the amateur radio to communicate with others has helped improve my speech and confidence. The support and encouragement from the UKBOTA community have been instrumental in my personal growth, my mental health and my ability as a radio operator. I am grateful for the positive impact it has had on my life.


3

UKBOTA isn't just an activity directed predominantly at the activator, it involves everyone, hunters and short-wave listeners with multiple awards to complement whatever your operating style maybe. Throughout the year they have held special events to complement the annual and lifetime awards. Celebrating national holidays, the historic county that formed the United Kingdom and most recently the Airfield awards which aligned with and supported the International Bomber Command Centre's Memorial Day on 25 July.

UKBOTA has made me feel included and welcomed, and I have received a tremendous amount of support from other members. This has ignited a new-found interest in amateur radio and has given me the confidence to pursue this aspect of the hobby and when my health permits go out and operate as an activator. **PW**

4

Photo 3: Jennifer 2E1PEG operating from a ROC Bunker – Congratulations from UKBOTA on achieving your new call.
Photo 4: Nick 2E0NAQ set up for ROC Post Lowestoft – Band conditions aren't his only challenge.

ALINCO Japan

Dependable Power wherever you need it!...

DM330 MW MkII

30A Communications Grade Power Supply

- Low noise with extra filtering
- Lightweight and portable
- Triple Protection circuit
- Low Ripple

The DM330MW MkII Power Supply is an ideal travel companion that will power all your radio needs.

It's lightweight low noise design delivers up to 30 Amps with ease. Unlike some lower cost units on the market, the Alinco has additional filtering and fully meets the latest UK safety regulations.

This Supply has been designed to be electrically quiet for communications use, but if you should find noise the patented Noise Offset Circuit that lets you move any noise you might find to another frequency. Other features include a large Illuminated Volt/Amp meter, rear panel Binding posts (32A), front panel cigar adaptor outlet (10A), two sets of snap-in terminals (5A) each and a front panel customer-defined output 'memory'.

Specifications

- Input voltage 230VAC
- Output voltage (5 - 15) VDC variable
- Output voltage variation less than 2%
- Triple Protection:
  - Short-circuit,
  - Automatic current
  - Over-temperature
- Output current 30A(max), 25A (continuous)
- Ripple less than 15mVp-p at rated load
- Fuse: 4A
- Meter single Volt / current meter, back-light
- Size: 190(W) - 69(H) - 181(D)mm
- Weight: Approx 2.5kg with UK Mains cord

£149.95

DM330FXE

25A Lightweight Switch Mode Supply

- 9 - 15V DC variable
- Twin USB outputs
- Front/Back DC outputs
- Fully Protected
- Weight: 2.5kg (with AC lead)

£139.95

DM430E

25A Switch Mode Supply

- 5.0 - 15V DC variable
- Digital Volt/Amp meter
- DC terminals + Anderson poles
- Cooling fan
- Weight: 1.6kg

£109.99

DM-30E

20A Switch Mode Supply

- 9 - 15V DC variable
- Digital Volt/Amp meter
- DC terminals + Banana con.
- Noise offset control
- Weight: 1.6kg

£99.95

DM-30G

20A Digital Display Switch Mode Supply

- 9 - 15V DC variable
- Digital Volt/Amp meter
- Anderson poles + Terminals
- Noise offset control
- Weight: 1.5kg

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BBC coronations Pt XVIII

Keith Hamer and **Garry Smith** continue the special series looking back at the BBC's coverage of Coronations since 1937. There is also a Coronation vintage wireless advertisement from the archives featuring the 'Armstrong FC 38'. There are more unique details about Roland Pièce, the pioneer of Swiss radio broadcasts, from family archives supplied by his Grand-Nephew, and PW reader, Pierre-Yves Pièce. The series charting the rise and fall of BBC 198kHz transmissions focuses on interference problems caused by the use of shared frequencies. Coverage detailing 60 years of BBC-2 looks at studio modernisation in 1964. We also continue our series about the development of Swiss Radio and Television since 1922.

Keith Hamer
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Garry Smith
Garry405625.gs@gmail.com

On Coronation Day, 2 June 1953, BBC Television carried, in sound only, Her Majesty's broadcast to the nation, and beyond, as part of the day's marathon transmission which finally came to an end with a fireworks display, staged on the South Bank of the Thames. The display began with a 41-gun salute followed by four set-pieces showing portraits, outlined in fire, of **HM The Queen**, **HRH the Duke of Edinburgh**, **Prince Charles** and **Princess Anne**. Hundreds of Roman candles were lit on two barges moored off the South Bank. The programme ended with the launching of 1,500 rockets.

Earlier in the day, as soon as the tail of the Coronation procession had passed *Marble Arch*, the television unit at *Grosvenor Gate* was made ready to move on to the next Coronation event. Cameras were dismantled and, complete with its mobile control room, the unit moved to a new location. As soon as the unit arrived, the work of rigging the cables and installing lights and equipment continued throughout the night. Speed was essential to make sure everything was ready for the evening's Outside Broadcast of the *Coronation Ball* from the *Royal Ballroom*, Tottenham, on Wednesday 3 June. A 30-minute programme on Wednesday evening showed festivities in Scotland, Wales, and Northern Ireland.

Six famous bands and some 500 amateur and professional dancers, together with hundreds of members of the general public, took part in the invitation ball which included a pageant of dances dating from the reign of **Queen Elizabeth I**. The programme featured a wealth of famous artists and an item called *The Passing Show,* which recalled some of the musical shows from five Coronation years: 1838, 1902, 1911, 1937 and, of course, 1953.

Vintage coronation wireless equipment

This month's stray through vintage copies of dusty newspapers and magazines has yielded an advertisement by *Armstrong Wireless & Television Limited* for their high-specification radio equipment, **Fig. 1**. The advertisement dates from May 1953. As well as celebrating the Queen's Coronation, the company also marked their 21st anniversary. The text has been left in its original format to reflect the spelling, grammar and punctuation of the time.

This is the full description of the *Coronation FC 38* wireless receiver.

There was certainly more than sufficient technical information packed into this 1953 advertisement. Whether most people understood it is another matter!

Roland Pièce archives: Part XII

The following information has been sent from Bex in Switzerland by **Pierre-Yves Pièce,** Grand-Nephew of **Roland Pièce**, the pioneer of radio broadcasts in Switzerland.

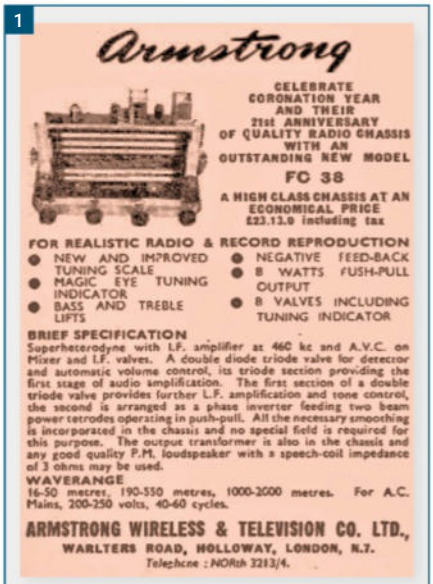
In April 1924, Roland Pièce was amazed, and no doubt delighted, to receive a letter from London detailing reception of his radio broadcasts from the *Champ-de-l'Air* transmitter near Lausanne which opened on 14 October 1922, **Fig. 2**. In his letter, dated 8 April 1924, **John Clements**, who lived at the 'Redlands' 35, Muswell Avenue, Muswell Hill, London N.10, wrote the following: *"Dear Sir, On Monday evening, the 7th. April, between the hours of 19.30 and 20.30, I received on my T.S.F. station a concert which I thought to be sent out from '2HB Lausanne'. The 'onde' was about 1,100 metres, and the reception was very good indeed. I was able to put the concert on the 'haut-parleur', and throughly enjoyed the items. I only recognised one piece which was a piano solo, and included the soloist's name. Then the orchestra played a fox-trot, and later there was a woman singing. After the fox-trot I heard the announcer make some reference to the 'Savoy Hotel'."*

The above letter, which included a few grammatical mistakes, but reproduced here in its original version, was simply addressed to: "*The Director, RADIO STATION, Lausanne, Switzerland.*"

The Rise and Fall of 198kHz: Part XI

Following the introduction of the *Luzern Plan*, various countries were forced to share channels

1



"**Armstrong**
CELEBRATE CORONATION YEAR AND THEIR 21st ANNIVERSARY OF QUALITY RADIO CHASSIS WITH AN OUTSTANDING NEW MODEL
FC 38
A HIGH CLASS CHASSIS AT AN ECONOMICAL PRICE
£23.13.0 including tax
FOR REALISTIC RADIO & RECORD REPRODUCTION
• NEW AND IMPROVED • NEGATIVE FEED-BACK TUNING SCALE • 8 WATTS PUSH-PULL OUTPUT • MAGIC EYE TUNING • 8 VALVES INCLUDING INDICATOR TUNING INDICATOR • BASS AND TREBLE LIFTS
BRIEF SPECIFICATION
Superheterodyne with I.F. amplifier at 460 kc and A.V.C. on Mixer and I.F. valves. A double diode triode valve for detector and automatic volume control, its triode section providing the first stage of audio amplification. The first section of a double triode valve provides further L.F. amplification and tone control, the second is arranged as a phase inverter feeding two beam power tetrodes operating in push-pull. All the necessary smoothing is incorporated in the chassis and no special field is required for this purpose. The output transformer is also in the chassis and any good quality P.M. loudspeaker with a speech-coil impedance of 3 ohms may be used.
WAVERANGE
16-50 metres, 190-550 metres, 1000-2000 metres. For A.C.
Mains, 200-250 volts, 40-60 cycles.
ARMSTRONG WIRELESS & TELEVISION CO. LTD., WARLTERS ROAD, HOLLOWAY, LONDON, N.7.
Telephone : NORth 3213/4."

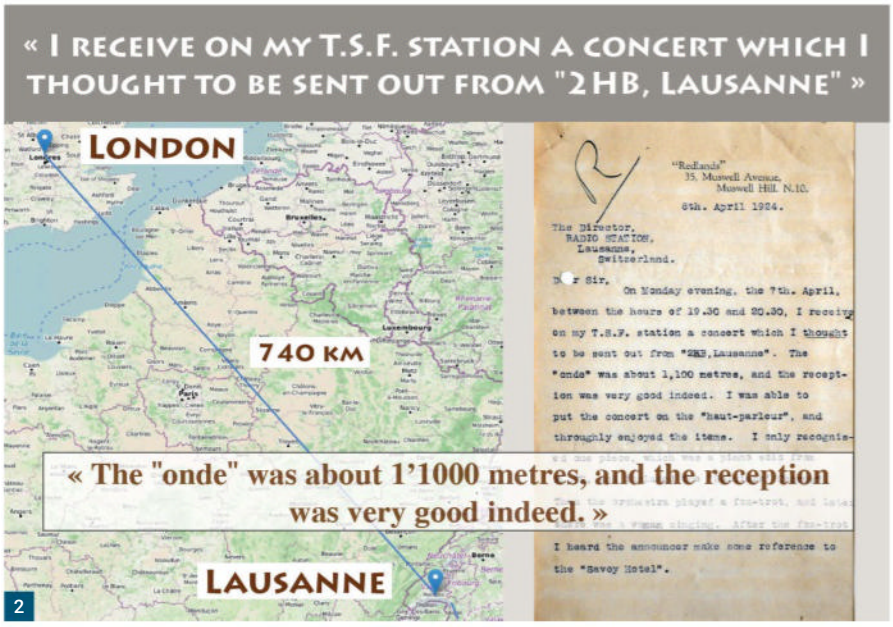


Fig. 1: An advertisement by *Armstrong Wireless & Television Limited* for their high-specification *'Coronation FC 38'* wireless receiver. The advertisement, which also celebrated the company's 21st anniversary, dates from May 1953. Fig. 2: A letter dated 8 April1924, written by John Clements in Muswell Hill, London, confirming reception of a programme broadcast by Roland Pièce from the *Champ-de-l'Air* transmitter near Lausanne at a distance of approximately 740km. Fig. 3: The headquarters of *SRG-SSR idée suisse* in Bern. The organisation's name was introduced in 1999.

with other nations due to limited availability of frequencies. This entailed operating two stations in different countries on the same frequency with a carrier-wave accuracy of approximately 10Hz. Under these conditions, satisfactory results could be obtained if the stations were far enough apart so that mutual interference was avoided. If the accuracy of the frequency of one station deviated from 10Hz, an audible heterodyne note could be superimposed on the carrier of the other station.

BBC engineers conducted numerous tests to collect valuable data concerning interference on shared channels from distant stations. The data indicated the vast majority of countries employed at least one exclusive channel which was available for distant listening. In the United Kingdom, there were three transmitters available for this purpose, one of which was a long-wave station on 1500m (200kHz). The transmitter was originally located at Daventry but was later transferred to Droitwich.

Regulations stated that stations sharing channels had to be equipped with *drive* apparatus to maintain a constant carrier-wave frequency which could not deviate by more than the stipulated 10Hz. This was very important as the whole success of the 'shared channels' system depended on the ability and willingness of broadcasting authorities to take the necessary precautions to maintain the daily 10Hz accuracy.

60 years of BBC-2: Part VII

As part of the preparations for BBC-2 in April 1964, the complete modernisation of the older London studios was necessary, in particular, the three at *BBC Lime Grove*. *Studio 'E'* was equipped with switchable *EMI 203* channels in July 1961. In addition, two small studios (*Presentation 'A'* and *Presentation 'B'*) were installed at the *BBC Television Centre* for announcements and interviews.

Although London received priority (because only the Crystal Palace transmitter was in operation at the beginning), corresponding work had already started in the Regions and was greatly accelerated towards the end of 1964.

In the same year, a large new studio was completed in Glasgow. The studios were dual-standard and were immediately able to offer 625-line programmes for BBC-2. Certain other important Regional dual-standard facilities were made available in time for the opening of BBC-2, including Outside Broadcast units in the *Wales*, *Midlands* and *North* Regions.

Service information, Switzerland: Part XX

A new fourth group of television stations from SRG-SSR arrived in 1993. Initially known as *S Plus*, they gained the status of fully-fledged national stations in 1995 when the S Plus stations became known as *Schweiz 4*, *Suisse 4*, *Svizzera 4* and *Svizra 4* (German, French, Italian and Rumantsch languages, respectively). The channels were intended to complement existing regional programming and to act as platforms for some sports broadcasts.

However, these stations were closed down in 1997 and replaced by a second television station for each of Switzerland's main linguistic communities, resulting in the creation of SRF-2, TSR-2 and TSI-2.

In 1999, SRG-SSR was given a new official name: *SRG SSR idée suisse*. Loosely translated, the new name meant 'the best of Switzerland'. It became the hallmark for high-quality public-service broadcasting provided by SRG-SSR. The headquarters were based in Bern, **Fig. 3**.

'SRG-SSR idée suisse' began the switch to digital radio broadcasting with the first DAB broadcasts being introduced in German and French-speaking areas of Switzerland. In the same year, *Virus*, a radio station intended for young people, operated by *Schweizer Radio DRS*, took to the airwaves. This was Switzerland's first digital-only radio station.

Stay Tuned!

All photos this month are from Keith and Garry's archive collection. Please send archive photographs, information or suggestions for future topics via the email addresses shown at the top of this column. **PW**

Geoff Theasby G8BMI
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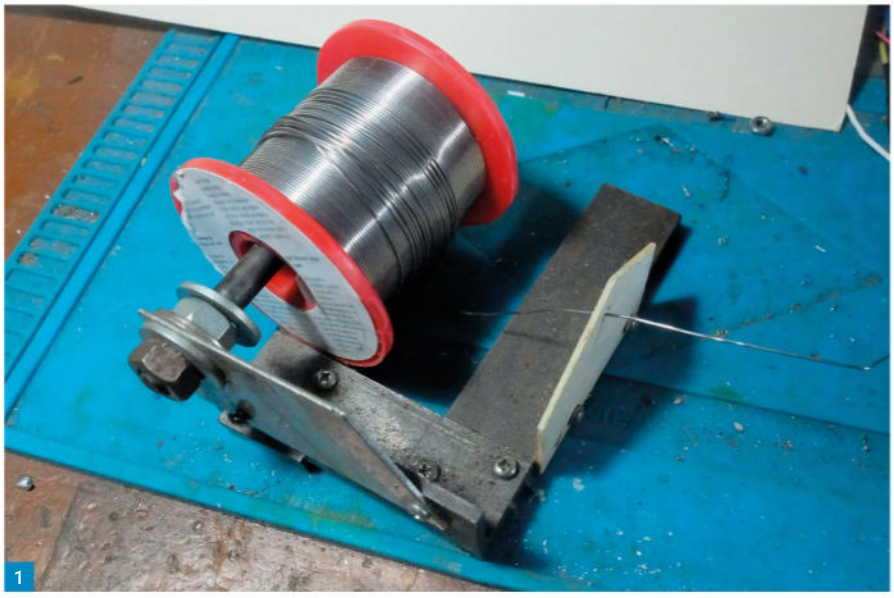
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Electronics/radio for the disabled

Geoff Theasby G8BMI, who used to write regularly for this magazine, offers advice on how to stay with the hobby as infirmities start to set in.

For many of those who are overcome by ill health in their old age, there are those who can continue their activities with suitable assistance. I speak of the constructors amongst us, who perhaps cannot solder wires together due to tremor of hands or lack of grip. Unlike those who once actively played some physical activity, those pursuing a solitary existence need not give it up. The Radio Amateur Invalid & Bedfast Club caters for those needing aerial erection, equipping a shack or its modification, or the loan of equipment. For more detailed activity, there appears to be little available. I have therefore assembled a number or 'workarounds' which should help make life easier.

Let me introduce myself. I am **Geoff Theasby G8BMI**, potentially active on all bands to 1296MHz, with the emphasis on VHF, and have just acquired an FT-107 on which I repaired the display using a PCB kit from Japan, JA2SVZ. I have Parkinsons disease which affects my hands with a tremor, and I tire easily. I have difficulty walking more than a few yards without assistance, and my movements are slow and restricted. I also had to surrender my driving licence, so my patient and understanding wife, **Deborah**, drives me. I have a stick, wheeled walking frame and an electric disability scooter. With these aids I can go on holiday cruises, weekends away and mobile rallies etc. The scooter folds up, and will go in the car, so can be taken on buses, taxis and trains.

A number of strategies have been adopted to help such as myself which may be listed under soldering, mechanical, suitable tools, etc.

Soldering

Form hooks on wire ends so they hang together when soldering in mid-air. Obtain small bench vices for model makers to hold components while being soldered. Use a heavy soldering iron. This will reduce the effects of shaking, by inertia.

With photography, use a fast shutter speed, of the order of 1/1000 second. Open the camera's anti-shake program if available. Use a tripod, floor standing, and/or tabletop, with a remote shutter release. A 'light tent' made from thin translucent paper or cloth hides an unwanted background and allows diffuse illumination, with no shadows.

Lighting

Good lighting is necessary, as our eyesight declines as we age. There is no need to go for pricey domestic lamps, it's the contrast of print on page that matters. With bench lighting, and the ubiquitous use of 'spot' lighting, for local illumination, you can change them about from day to day to arrive at the perfect lighting set up 'for you'.

Eyesight

Use equipment with large controls and meters which can be seen easily across the bench. Adopt equipment with LED display rather than LCD. Even with back lighting the LCD can be hard to see.

Mechanical

PL259 and N type RF connectors are better than BNC being larger, for arthritic and painful/weak hands to assemble. Similarly use ¼ inch jack sockets rather than 3.5mm jacks.

Use 'Pozidriv' fasteners where possible, they are less likely to slip under stress. Any mechanical construction can be made with Meccano, not just the rigid items but there is also a good range of small electric motors available. PCBs, Veroboard etc, are good for small items, and a PCB building jig is most helpful.

The jig in **Photo 3** is my favourite, with the simple device in **Photo 4** next on my list. Various vices as in **Photo 2** suit one job over another, each has its advantages. Other '3rd hand' devices equipped with alligator clips and magnifying glass may help. Mine tended to overbalance, so I Araldited an old CD to the foot to make it more stable. Various vices, from clamp-on the bench edge, to permanently mounted for general use. Engineers' clamps and 'G' clamps can also be useful. Do not forget the old dodge of electricians' pliers held shut with rubber bands. Soft jaws for vices are good. If the item still moves, wrap sandpaper around it for extra grip.

Interference

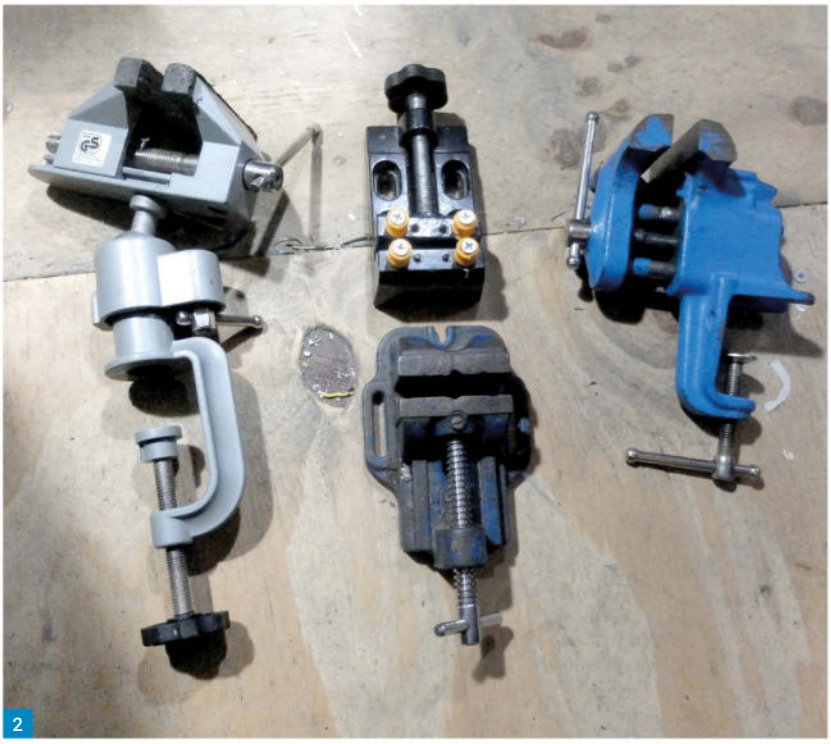
Many electronic items generate interference, even those which are not obvious. LED lights run from DC should be OK, although electronic regulators in speed controls may generate noise.

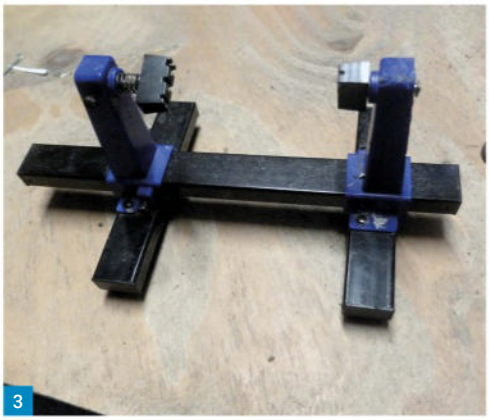
Medical

Beware of burns from your soldering iron, and use a proper stand for it. As always, take care to avoid electric shocks. Some people are in danger of falling. If this is you, install plenty of handholds for support as you move about. Local hardware stores, B&Q etc, have lots of examples. Penknives, modelling knives, and other sharp objects should be kept in a suitable container, school pencil boxes are useful for this. Have a mobile telephone and keep it on your person in case of difficulties. Keep it charged!

Relevant mode

Speech difficulties may hamper some, so CW, and the data modes should be considered. Conversely, speech modes if a Morse key is unusable through shaky hands marring the transmitted signal.... **PW**





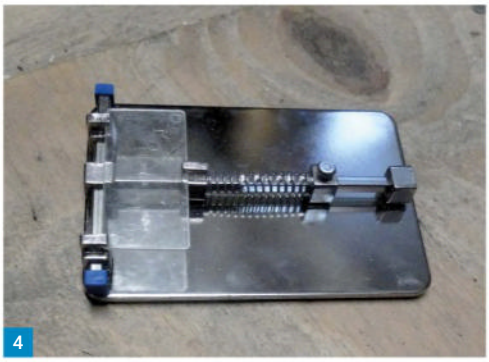
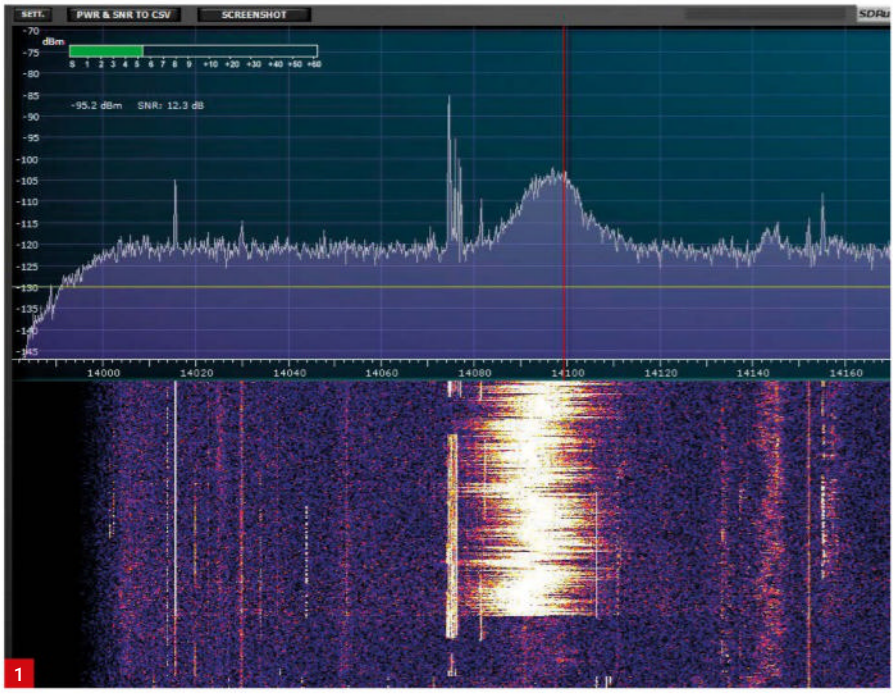


Photo 1: DIY solder dispenser. Photo 2: Various vices. Photo 3: PCB jig. Photo 4: Steel PCB jig.

Keith Rawlings G4MIU
keith.g4miu@gmail.com



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MultiPSK Digital Decoder Software: NCDXF Mode

Keith Rawlings G4MIU looks at MultiPSK, including using it for antenna comparisons. He also has an update on his OCFD trials and tribulations.

I mentioned in last month's column that MultiPSK now has a new feature that enables it to monitor HF beacons in the NCDXF/IARU International Beacon Project. MultiPSK is a Windows 'Digi mode' software package for amateur radio operators and also 'Utility' listeners. I'm not sure how long it has been going but it is a long time, and its author **Patrick Lindecker F6CTE** has been continually updating and improving it over the years. It has benefited from having a good CW decoder for much of its life and in more recent times an NDB decoder was introduced under its CW decoding 'Button'. Now under the CW mode it has the ability to monitor the NCDXF beacons that are spread throughout the world.

The beacons can be used by radio amateurs to determine, at any time during day and night, the propagation, or lack of it, on five HF bands (14, 18, 21, 24 and 28MHz).

There are a total of 18 CW beacons in the network, which are spread around the world and which transmit in turn for 24 hours a day at a speed of 22wpm followed by four one-second dashes. The callsign and the first dash are sent at 100 watts, then 10 watts, 1 watt and 100 milliwatts. At the end of each 10 second transmission, the beacon steps to the next higher band and the next beacon in the sequence begins transmitting. Frequencies are 14.100 MHz, and then 18110, 21150, 24930 and 28200kHz (Zero Beat). As beacons transmit for 10 seconds it takes three minutes for all the beacons to transmit on a given band. Therefore, it is easy to determine the propagation state of any band in three minutes and in around 15 minutes the propagation state of all of the five bands covered by the beacons can be determined.

In its simplest mode MultiPSK can be used to monitor a single band at a time but as the software is capable of controlling a large number of radios, both receivers and transceivers, it is capable of band switching them automatically at the appropriate time to the correct frequency to display an almost complete picture of propagation conditions of the HF amateur bands at the user's location.

In use

For the simple example shown here I have used my 66ft Inverted-L receive antenna connected to an SDRplay RSPdx receiver running under SDRuno in standalone mode, i.e. it is not controlled by MultiPSK. The 20m band has been chosen as it is presently open during the daytime and evenings.

I should say now that something that has to be taken into account in this description is that right around 14.100MHz I suffer from a sprog of QRM, which is 30kHz wide and varies in amplitude from S5 to S9, **Fig. 1**. To hear the beacons on this band I have to use noise phasing, which reduces wanted signals by at least three S-points, so bear this in mind when interpreting the results shown in the graphs.

For MultiPSK to work the receiver is set to 14.0993MHz, and the CW/NDB/NCDXF button is selected from the mode options. The next thing to do is select NCDXF while in the CW options and then 'Beacon State' needs to be selected where a window pops up displaying a list of all the beacons in the network on all of the bands that are used, **Fig. 2**.

After a period of monitoring the list will start to display the signal strengths of any of the beacons heard and on what bands (only 20m in this case). Clearly the longer the beacons are monitored the more data is displayed.

Using the buttons at the bottom of the window the user can then scroll through this list to display data for each hour of monitoring as a graph, the history of individual beacons, and also the complete history by band.

Fig. 3 shows the main MultiPSK screen and the beacon graph window monitoring the 20m band, timed from 0830 to 2130UTC. It is clear that on 20m OH2B (the black line) is the most predominant beacon received at this location with good signal strength throughout the day (Again, bear in mind to add at least three S-points to the graph levels to allow for the loss of the QRM phasing unit). It can be seen that each beacon has its own coloured line for easy identification.

With the 'Scan' capability of MultiPSK the software can automatically control compatible receivers so that all bands may be scanned in step with the beacon transmissions. This means a complete picture of propagation to a particular area on the amateur bands may be displayed. MultiPSK also has the capability to display the locations of received beacons on a local map set up by the user.

Antenna comparison

This new mode is primarily a propagation tool, which is useful for unattended beacon monitoring and/or for those with limited CW reception skills.

As MultiPSK can run with multiple instances it should be possible to connect two or more receivers with different antennas and make comparisons, over time, of each antenna to see how they stack up against each other. I have not tried

Fig. 1: Annoying QRM 'sprog' on 14.100MHz with and without noise cancelling.
Fig. 2: MultiPSK beacon list.
Fig. 3: MultiPSK main screen and beacon graph.
Fig. 4: Unknown AN-SOF design.

this and I don't know if each MultiPSK instance can automatically scan a different receiver. It is possible to direct each instance of MultiPSK to a different Windows audio path so multiple receiver reception is feasible but I'm not sure if remote control of a receiver from each instance is.

MultiPSK's decoding of the beacons is not perfect as I can often hear a weak beacon when the software doesn't and this situation is recognised by the software's author. It has long been proven that the human ear can resolve CW signals even at very poor signal-to-noise ratios.

That being said, this is a neat addition to the software and I have found a renewed interest in beacon monitoring after experimenting with it. Hopefully it will be found to be of use for antenna evaluation too.

MultiPSK also has a WSPR feature and this mode has long been used for antenna evaluation with the added advantage that there are many stations around the world active in the mode, albeit some are not on the bands as consistently as the beacons.

MultiPSK decodes (and transmits) many digital modes which are included in the free version but to receive NCDXF for more than 10 minutes it is necessary to purchase a 'User Key' which is presently 35 euros. Up until now, once bought, all additional modes and upgrades are free and the software may be used on as many computers as you like.

http://f6cte.free.fr/index_anglais.htm

Other software for working with the beacons can be found on the IBP website:

https://www.ncdxf.org/beacon/index.html

Name that antenna

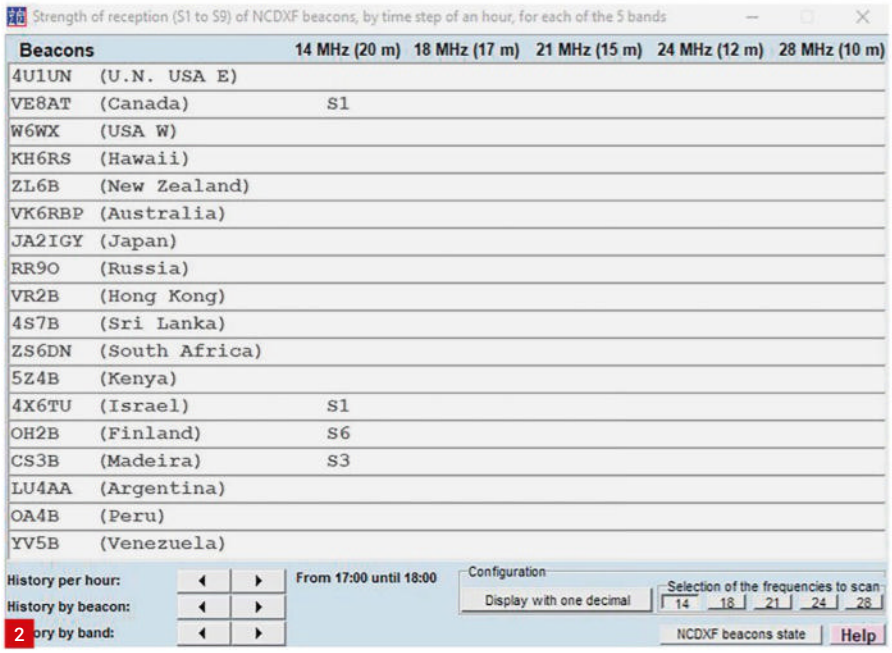
The folks at AN-SOF antenna simulator are looking for information on an antenna that has featured as one of the example designs bundled with the software for some time now. It is described as:

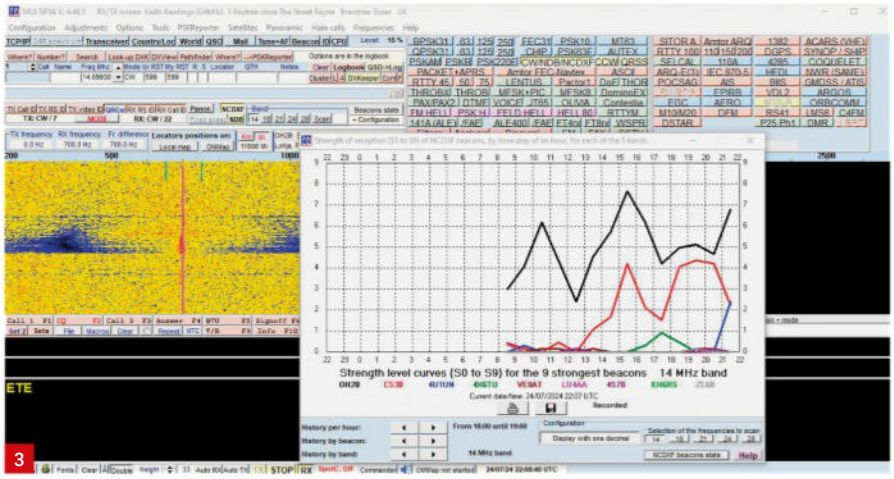
"Broadband Directional Antenna.

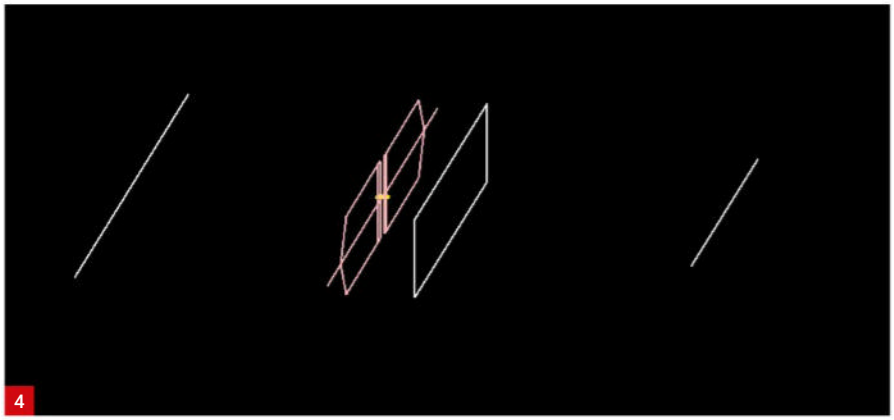
This is a 4-element broadband directional antenna. More than 50MHz of bandwidth (SWR <1.5) around 285MHz Gain 7 to 8dBi. Length 0.52m and maximum width 0.6m.

The driven element is shaped like a double arrow and has a folded parasitic element right in front of it."

The only information known about the antenna is that it originated from a Japanese user of the simulator. Its configuration can be seen in **Fig. 4**. Centred on approximately 285 MHz it has a 2:1 VSWR bandwidth from a touch under 250MHz to about 315MHz, **Fig. 5**.







Quite often antennas are modelled at 300MHz for convenience but assuming the model was indeed intended to be centred on 285MHz, then the first use that comes to mind would be that it was designed to cover the lower part of the Military Air Band. There are frequencies allocated from 240-320MHz for Satellite Communications but these 'UHF-Satcom' transmissions tend to use right-hand circular polarisation and a more efficient antenna for this use would be a helical.

Perhaps its designer intended it to be for DAB use but it is resonating higher in frequency? So, I'll throw it out to readers to see if you can give any insight on the design.

A copy of the model may be found here:
https://tinyurl.com/54b9s9mh

OCFD Update

In my recent description of an HF Bands Off Centre Fed Dipole readers will be aware that my plan to erect the antenna went a little awry. In the event I had to temporarily mount the antenna at a lower height and on a flimsy mast arrangement. To save weight, instead of fitting a common mode choke (CMC) at the antenna feedpoint, I fitted it at the transceiver end of the feeder (basically turning it into a Carolina Windom). This was despite the warnings that to get the antenna to resonate on 40m the choke should have been at the feedpoint. The result was, of course, a very poor match on 40m.

I decided to knock up a temporary 'quick and easy' choke that was light enough so that it would not put too much stress to the fibreglass poles. Using what was readily available this lash-up consisted of ten turns of RG174U over another of the FT FT140-43 cores from the junk box. Two BNC sockets were soldered onto the RG174U and without using a box of any sort the ungainly looking choke was put into place, see **Fig. 6**. Now I would see just how much a difference it would make.

A sweep of the antenna's response using the VNA-3G displayed an immediate improvement, **Fig. 7**. So, while still not perfect on 40m, it has, as was expected, made a huge difference to the matching on this band. Consequently, the temporary choke has been seeing service during summer's sunshine and, mostly rain, 'as is' until I either add the OCFD transformer and a choke into a single box or I just build the choke into a second box. Either way the masts need sorting out first to be able take the added weight.

While on the subject of the OCFD, *PW* reader **Paul Wilton M1CNK** contacted me to share his experiences with the K1POO design. He used his for over 15 years but gave it up as it was causing Common Mode problems in his loft conversion shack.

Paul writes, *"The short end was about 10ft above my operating position. I got a lot of common mode RF in the shack and I had to put in a lot of choking - I had a high performance 1:1 choke below the 4:1 balun and a further one (the GM3SEK design) on the feeder in the shack. It was a OK-ish at 10W but when I upgraded my Elecraft K2 to 100W then it became unusable.*

"I replaced it with a G7FEK (with a pair of inverted L's), which had the feeder further down the garden of my terrace house. The G7FEK also had the advantage of giving me 80m coverage."

Paul points out that the K1POO design has more imbalance and consequently may suffer more common mode problems than a 'conventional' OCFD.

Paul also went on to say, *"As an aside, I have been using WSPR to compare antenna results in what I think is a novel way. I have compared RX performance of antennas by connecting up two receivers to the two antennas under test and seeing how many spots received plus SNR changes for stations received on both. Not over novel but was really good in proving the benefit of an active loop for RX in my VSDL soaked garden. I have also done it in TX mode by using two transmitters (normally a pair of QRP-LABS QDX) and transmitting simultaneously. There is a website that allows you to plot the difference between the two signals for using stations that receive both signals. By using a known 'fixed' antenna, it is possible to directly measure improvements made. If you are interested, I have a talk to the Itchen Valley Radio Club about it":*

https://tinyurl.com/4rtk54r5

Many thanks for this input Paul, your presentation makes interesting reading and is well worth the download.

That's if for another month! **PW**

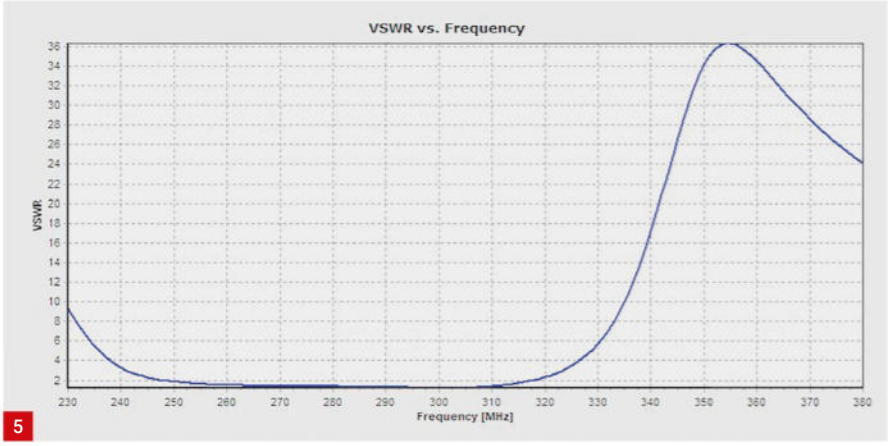
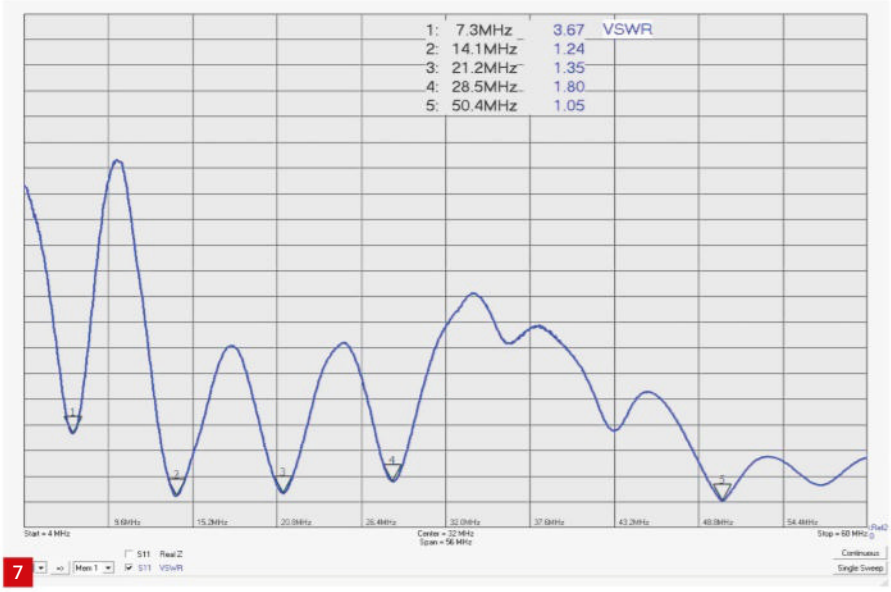


Fig. 5: VSWR bandwidth plot of AN-SOF Unknown.
Fig. 6: Lash-up common mode choke.
Fig. 7: Improved VNA-3G VSWR plot of OCFD with choke at feedpoint.



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- Includes Carrying Belt
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* Photo shows the FT-710 AESS

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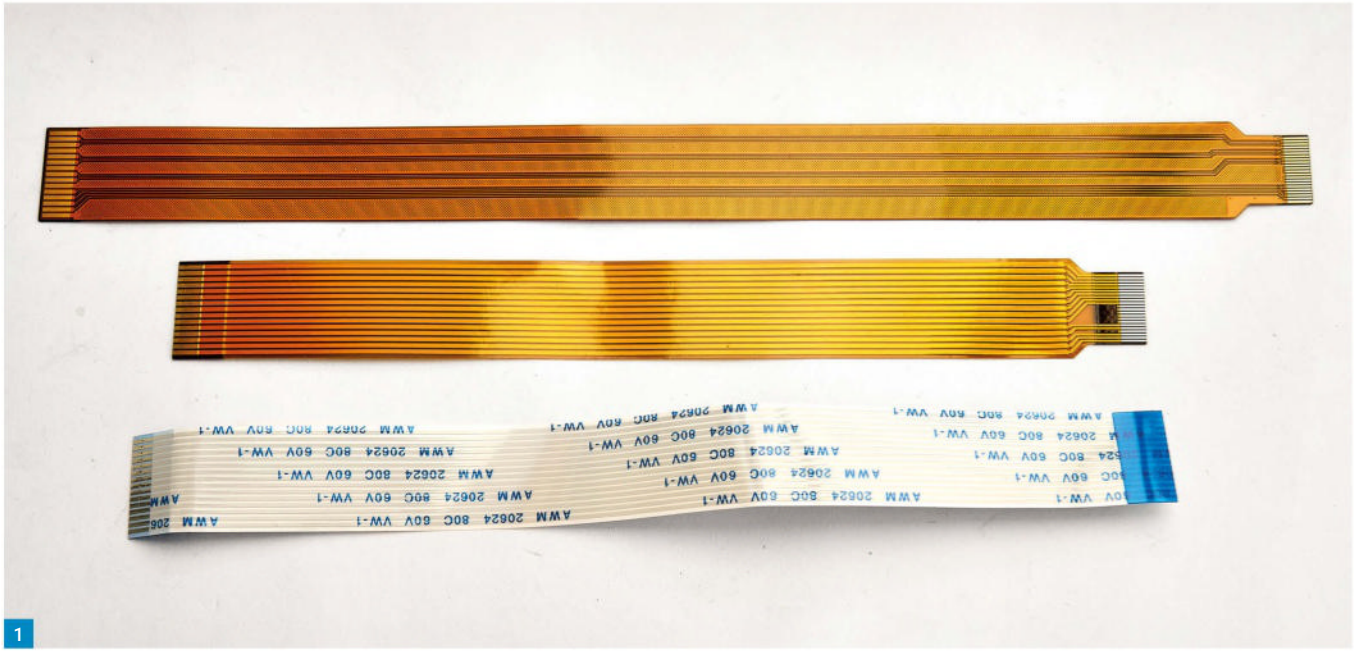


1

Mike Richards G4WNC
practicalwireless@warnersgroup.co.uk

Inflated SNR!

Mike Richards G4WNC starts by looking at SNR figures when using WSJT-X, before moving on to installing cameras for use with the Raspberry Pi.

Andy Talbot G4JNT in a recent *RadCom* raised an interesting point about using SDR filters with WSJT-X software modes. Using anything other than the standard SSB speech band filter for modes such as FT8 and FT4 is not usually necessary. This is because WSJT-X uses its own narrow-band filtering to isolate the signals for decoding. Therefore, adding additional filtering simply limits the number of signals that will be decoded by excluding those outside the filter passband. Another point to note is that most filters introduce some phase distortion close to the filter skirt that can seriously impair any data channels in the vicinity. This used to be particularly noticeable when RTTY operators tried to filter too close to the desired signal and started encountering errors. Another corruption from over-filtering the speech-band channel is an incorrect, inflated signal-to-noise report. Noise measurements always need to be made relative to the measurement bandwidth. In the case of FT8, the software assumes a 2.5kHz bandwidth. If you reduce the bandwidth, the overall measured noise will be less, thus WSJT-X will incorrectly report a higher SNR for any signal in the revised passband. In practice, all you've done is change the bandwidth, not the noise level affecting your signal, hence the false result. The only occasion I can think of for applying additional filtering to an FT8 channel is for supressing a strong interfering signal that may be desensitising your receiver.

SuperFox reminder

Following last month's introduction to the new SuperFox mode in WSJT-X, I wanted to remind you that you can expect to see DX stations starting to use SuperFox from 1 September 2024. You can only participate in these QSOs if you upgrade your WSJT-X software to v2.7.0-rc6 or later.

Raspberry Pi – reliable video streaming

One of the popular uses of the Raspberry Pi is to link it with one of the readily available CSI camera modules. These can be purchased with various viewing angles, including infrared and visible light sensors. The cameras are usually in the £20-£30 range, so they can be attractive. I've built many Pi-based camera systems over the years and regularly use them around the home for security. I also have two cameras observing the hedgehogs in the garden, while another is in the loft helping to locate a rat! I've even used one on a pole to examine my antenna closely!

I've found the best way to use Pi cameras is to stream the video to your home Wi-Fi network. By streaming the video to the network, you avoid using a dedicated screen with the Pi. You can view the camera output using any computer, tablet, or phone on your home network. In the early days Wi-Fi streaming was problematic because Wi-Fi speeds were slow, and links were often unreliable. However, that changed significantly with the introduction of Wi-Fi 6 bringing much faster speeds to home networks. On my home network, I reliably see up and download Wi-Fi speeds in the hundreds of Mb/s. This effectively eliminates the Wi-Fi as a video streaming bottleneck. With most Pi based camera systems, the processor becomes the bottleneck, but just adds a little latency (delay).

With the network issues solved, the next step is deciding how to stream the video signal onto the network. This is an area where I've tried countless solutions to find a reliable option. For a long time, I used motionEyeOS. This dedicated Pi image built on the BuildRoot operating system uses Motion software to examine the image for changes. The MotionEye software then acts as a front end to provide user controls, etc. It's primarily designed to be used as a security camera to detect movement, but can also be set to deliver continuous video. The software is still available on Github:

https://tinyurl.com/yc65errm

However, the author has moved on, and the project hasn't been updated for four years. As a result, there's no download for the Pi 5.

Many of the early streaming options used the picamera software to interface with the camera hardware and generate the video stream, but the generic libcamera library has now superseded that. This is a general-purpose library intended for all Linux camera applications. This change has resulted in many out-of-date Raspberry Pi camera solutions online. These can make finding a workable solution both difficult and frustrating.

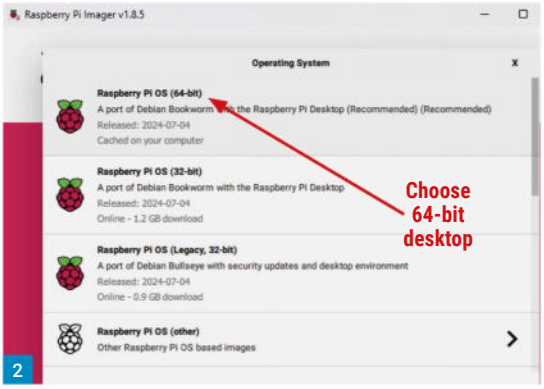


Fig. 1: Cables for the Raspberry Pi range. Fig. 2: Selecting the 64-bit desktop in Pi Imager. Fig. 3: Precompiled binaries on the MetiaMTX site. Fig. 4: Using Xarchiver to extract the downloaded files. Fig. 5: Revised text for the paths section of mediaMTX.yml.

That's why I decided it might be helpful to include the following solution.

After much experimentation, I came across the rtsp-simple-server project, which has since been renamed, MediaMTX. This project is very much alive and undergoing regular updates. Rather than act as a simple camera interface, MediaMTX is a complete media router. That means it reads the data from the camera, processes it into all the common stream types, and presents these on the appropriate ports of the host device. The following stream types are provided: RTSP, RTMP, HLS, WebRTC, HTTP and SRT! Some of these streams are available in multiple formats, so all you need is in this package. I've been using this software for a while now, and it's undoubtedly the best I've found.

Installing MediaMTX

MediaMTX works with all Pi models, though the latency improves with the more powerful processors. I've found the best value is the Raspberry Pi Zero 2W at around £15. This uses the same compact form factor as the original Pi Zero, but has a 64-bit quad-core processor and 2.4GHz Wi-Fi. In addition to the Pi, you'll need a camera complete with a ribbon cable for your selected board/camera combinations. There are three separate cables for the main Pi models (i.e. 2, 3, 4 A/B), Pi 5 and Pi Zero, **Fig. 1**. Most cameras made for the Raspberry Pi will work. However, I would avoid models from Arducam because they use a separate driver, which makes the MediaMTX setup more complex.

The first step is to burn the latest Raspberry Pi OS image to a microSD card using the free Raspberry Pi Imager. I suggest using a 64-bit desktop operating system if you're relatively new to the Pi as it provides a more friendly interface, **Fig. 2**. More experienced users can opt for the Lite OS as we don't need the desktop. Once the microSD card is programmed, power up the Pi and follow the instructions to start the operating system. For the sake of this tutorial, keep the user name as **pi** but create a secure password. You also need to connect to your local network. Before moving on, ensure everything is working, and you have an active internet link.

Assuming all is well, navigate to the MediaMTX download page at:

https://tinyurl.com/zb6by7ke

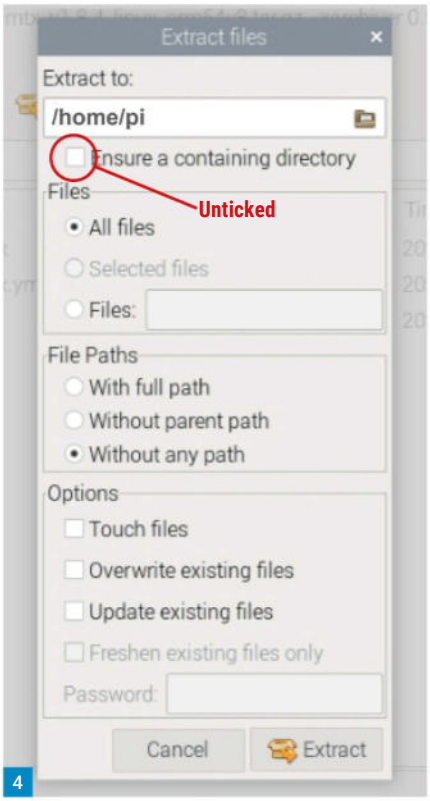
This contains pre-compiled binaries for a selection of operating systems. I've shown a screenshot of the relevant section in **Fig. 3**. At this point you need to decide which file you need.If you're using a Pi 2B v1.2 or later model and you have installed a 64-bit operating system, then it's the linux_arm64v8 variant you need.

When the download completes, use the File Manager to open the Downloads folder and double-click on the downloaded file. This will open Xarchiver so you can use the Extract icon and extract the files to your home/pi folder or something similar. **Fig. 4**. **NB**: Untick the box labelled: *Ensure a containing directory*. Finish by checking that you have mediamtx and mediamtx.yml in your /home/pi folder.

Before we get to test the camera, there are two essential files we need to install and a slight change to the configuration file. Here are the steps:

1. Open a terminal session and enter: sudo apt install libcamera0 libfreetype6
2. Next, go to the Pi menu at the top and choose Programming – Geany Programmer's Editor
3. In that program go to the File menu and choose Open and navigate to the extracted MediaMTX files.
4. Open mediamtx.yml
5. This is a very long configuration file of about 700 lines
6. Scroll to the end, where you should see a section titled paths:
7. Replace everything inside paths so it looks like **Fig. 5**.
8. Use the File menu to save the file with the same name.

It's now time to test your camera. Begin by following the online instructions for connecting your

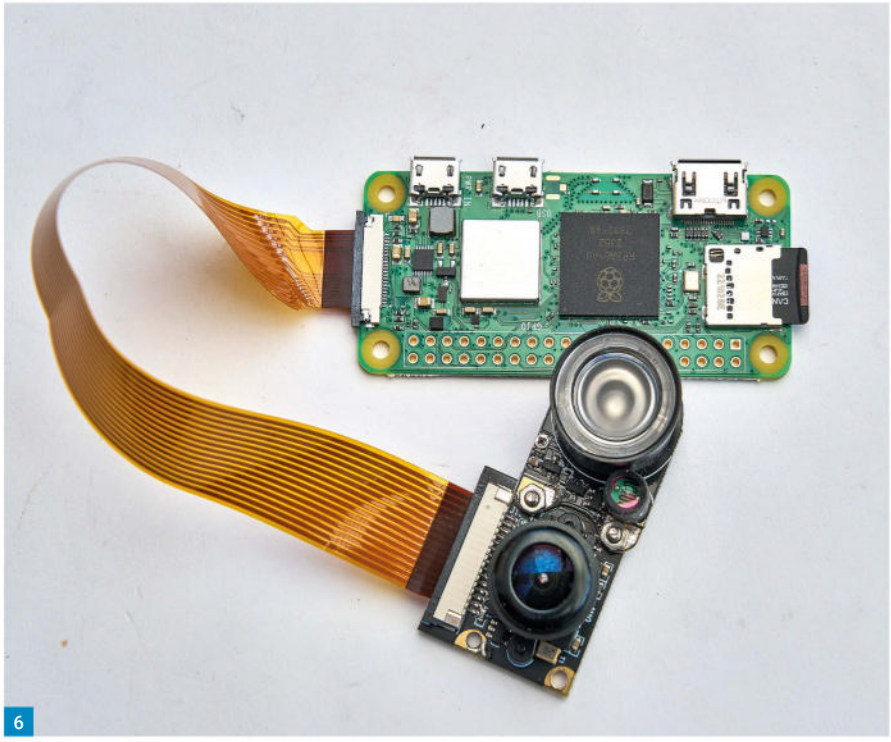



```
paths:
  cam:
    source: rpiCamera
```

5

camera. I've shown how a Pi Zero 2W is connected in **Fig. 6**. Here are the steps for your first test:

1. Hover your mouse over the network icon to the right of the top toolbar and note your IP address
2. Open File Manager and navigate to the mediamtx folder
3. Go to the Tools menu and select Open Current Folder in Terminal
4. Enter the following with no spaces: ./mediamtx
5. That will start the server and you should see an output similar to **Fig. 7**
6. Open a web browser on any device connected to your local network



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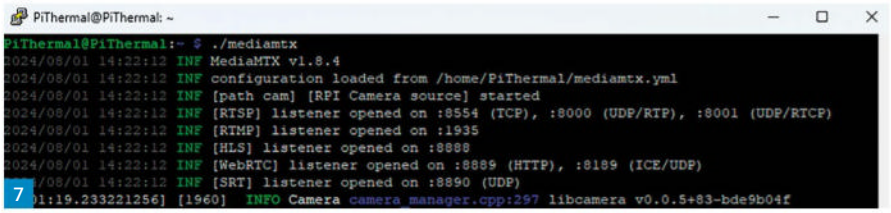

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Stream Mode	Available ports		
RTSP	8554 (TCP)	8000 (UDP/RTP	8001 (UDP/RTCP
RTMP	1935		
HLS	8888		
WebRTC	8889 (HTTP)	8189 (ICE/UDP)	
SRT	8890		

Table 1: MediaMTX Supported Streaming Modes

Fig. 6: Pi Zero 2 W connected to an IR camera.
Fig. 7: MediaMTX server output.

7. Enter the Pi IP address you noted earlier followed by: :8889/cam
8. For Example: 192.168.1.123:8889/cam
9. This should display the video from the camera.

If you have a problem double-check the steps you've taken to get to this point.

Automated streaming

The final step is to arrange for MediaMTX to start automatically when you boot the Pi. To do that we'll use the CRON method as this is a simple way to start programs automatically. Here's a step-by-step guide:

1. Open a terminal session and enter: crontab -e
2. If this is the first time you've used crontab you will be asked to choose an editor; choose Nano, option 1
3. Use the arrow keys to move the cursor to the bottom of the file
4. Enter the following: @reboot (cd /home/pi; ./mediamtx)
5. Press Control + X then Y followed by enter to save the file
6. Reboot the Pi and you can check that the server is running using a browser

Utilising the stream

As I mentioned before, the MediaMTX server provides a selection of feeds that can be used directly by a browser or with a media player such as VLC. However, the streams also work with most security software so that you can add Pi cameras to your home security. This is great for keeping an eye on the shack. I use my Pi cameras with the Bluelris security system, which work very well. In **Table 1** I've shown all the streaming modes and related ports. **PW**

News Extra

APPLICATIONS OPEN SOON FOR ARISS CONTACTS WITH SCHOOLS: Schools in Great Britain and Northern Ireland will soon be able to apply for an amateur radio contact with an astronaut on the International Space Station (ARISS). If the application is successful, the contacts could take place in the latter half of 2025. Application forms are available now from: **https://tinyurl.com/de7u4mt5**
The timeframe for submitting them is between 1 September and 26 October 2024. The RSGB is encouraging schools to apply as it is a great opportunity to integrate space into the STEM curriculum and to have the excitement of their pupils speaking to an astronaut! Go to the ARISS website at:
https://www.ariss-eu.org
to find out more and watch the RSGB's celebration video of the ten **Tim Peake** school contacts:
rsgb.org/gb1ss-schools

EXAM DOCUMENTS PUBLISHED: The RSGB Exams Teams are pleased to release the exam reference documents for Syllabus 1.6 at Foundation, Intermediate and Full levels. You can find them on the RSGB website by searching for 'Exam Forms'. The Exams Teams have also released the updated mock exams for all levels including new questions from the question bank relating to licensing and operating. These are on the RSGB website at:
rsgb.org/mock-exams

WORLD POLIO DAY: Polio is a serious disease that can disable and kill. Once endemic in the UK, cases of wild polio are now counted in the low tens worldwide. Since 1978, Rotary members across the world have raised or contributed over $2 billion to fight the disease, and vaccinated over three billion children. Rotary members continue to support the eradication programme, financially and by their efforts in the field, as vaccinators, logistics and support workers. Here in the UK, a group of Radio Amateurs who are also members of Rotary are setting up a Special Event station GB4WPD (World Polio Day) and a rota of operators to put it on the air on World Polio Day, 24 October. We would welcome support from UK Amateurs to join us. Depending upon support, we hope to operate on a few days before and after 24th, but the main aim is to promote the Polio eradication programme supported by Rotary across the world on World Polio Day. We anticipate operating on as many modes and bands as possible. If you think you could join us, please contact us via
gb4wpd@gmail.com

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TMate2 allows the control of main functions of SDR software as FDM-SW2, PowerSDR and Perseus. Intended mainly to allow the use of SDR software without the need to watch the screen of the PC, or when the screen of the PC is crowded by various programs such as LOG or software for DIGITAL operations or CONTEST.

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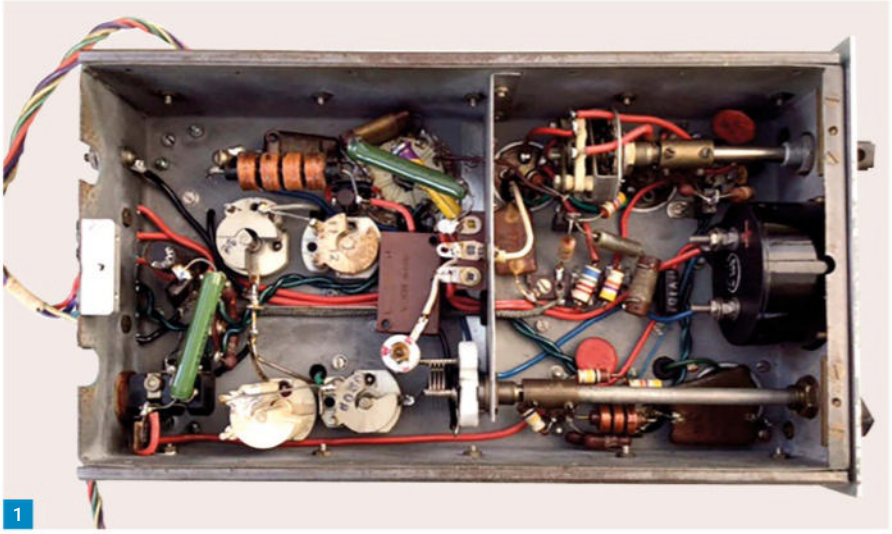
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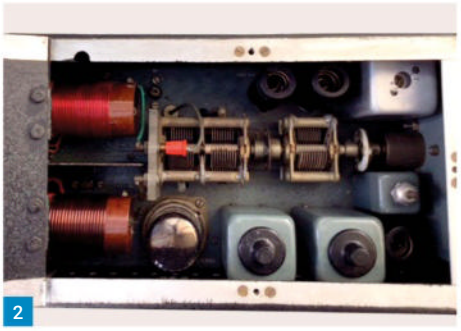
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NFD – take 2

Roger Cooke G3LDI indulges in a little Field Day nostalgia.

Prior to me becoming G3LDI, it was usually a home-made transmitter purposely made for NFD by **Bill G3CQE**, **Ted G3IVH** or **Don G3JIE**. That decision had to be made long before the date, of course, to enable construction. It would be a valve device, with relay switching, and muting of the RX. I still have a transmitter built for that purpose by Ted G3IVH.

I thought you might be interested in the construction of this transmitter. Ted was very meticulous in his construction techniques. He was an engineer for the electricity board. He built the transmitter with tracking tuning of the PA with the VFO. The pictures, **Figs 1**, **2** and **3**, are self-explanatory but interesting even so. This dates back to the mid 1950s. Interestingly, in Ted's usual style the valve types are sign-written on the chassis by each valve. It is a VT510 PA, a couple of CV138's and a CV287.

Essex CW Club Autumn Bootcamp

Hopefully Bootcamps will increase again now we are well out of the Covid scare. **Andy G0IBN** informed me that the Essex Club will be holding their autumn Bootcamp this year, on Saturday 26 October, **Figs 4** and **5**. Meet your CW friends face to face for a day of CW activities. Please book early as spaces are limited. For further details see:

https://essexcw.uk

If your club is running a Bootcamp, please send details so I can publicise it in this column.

The Telegraph Instructor, George M Dodge

This book can be downloaded from the internet and makes very interesting reading. Don't, however, think of it as any form of CW instruction! The code is American Morse and is no longer used. However, I have mentioned this before, and I still find it quite incredible, my friend **Dick Bendicksen N7ZL** was fluent in both American Morse and also the code we use today. Take a look at the code table and you will see what I am talking about. I shall stick to the code I am familiar with!

It provides a fascinating look into the business of commercial telegraphy. A table of a dozen numerical codes includes 73, with the meaning we currently ascribe to it.

Signal reports

There has been a thread running about signal reports just lately. Stating the obvious, somebody complained that signal reports in contests are irrelevant. Contesters know this to be true. The same could be said for DXpeditions. The sending of a 599 in a contest usually represents a lead-in to the exchange that is actually required, which could be anything ranging from a serial number to the operator's age, locator, membership number of a club and so on.

Lots of contests nowadays do not require a signal report within the exchange anyway. As an unnecessary part of the exchange it usually ends up in a log as a 'fill', which means it is anticipated, but contests that do not require a signal report have no space in the log for the RST.

Seeing the complaint, I read some of the emails in the thread. Interestingly, the list of some contests NOT requiring an RST is:

- all VHF/UHF contests (in USA)
- All CWops Contests
- ARRL November Sweepstakes
- ARRL Field Day
- International CW Council Medium Speed Contest
- The Lightbulb QSO Party
- Stu Perry (W1BB) Top-Band Challenge
- ARRL Rookie Roundup
- ARRL International Digital Contest
- all ten 10-10 International QSO parties
- North American Sprint (National Contest Journal)
- Winter Field Day
- North American QSO Party two times/year, CW, RTTY, SSB
- CW Mini-CWT Contests (CW Operators' Club)
- Northern California DX Club Mini-Sprints
- State QSO Parties for AZ, CA, CO, MD-DC, MI, MN, MT, NM, NC, OH, PA, SC, VA & WI
- Phone Fray (NW2K)
- RTTY OPS Weekend Sprint

In real QSOs I would support the use of RST every time and in fact a lot of newer licensees are not familiar with the code at all, sending the ubiquitous 599 for every QSO. Just shows how ancient I am I guess. I was told that the RST is a very important part of a QSO and conveys a lot of useful information to the other party. Most people in this age have no idea what C, K or X mean when attached to the RST. Sad really!

Please send all your comments, offerings, information and especially pictures to:

roger@g3ldi.co.uk

73 and May the Morse be with you! **PW**

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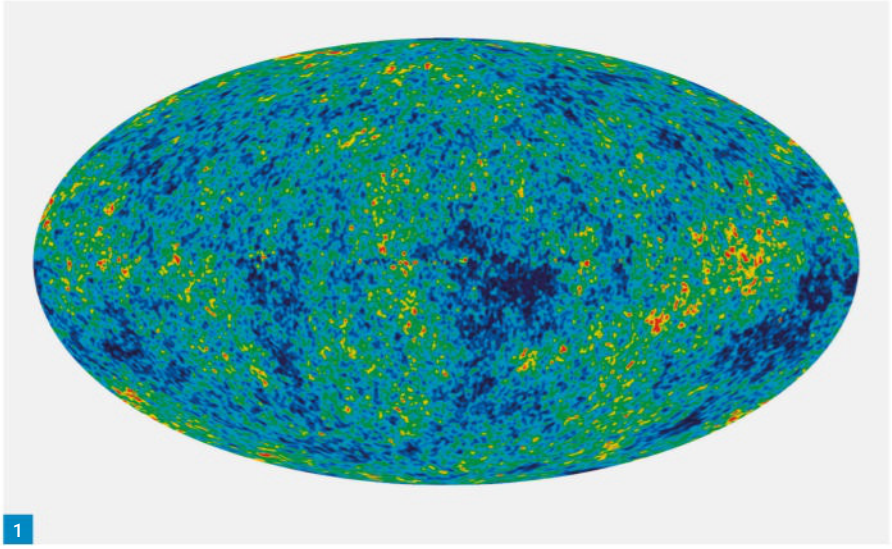
Georg Wiessala
wiessala@hotmail.com



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Radio and Maps – Mapping Radio

Georg Wiessala looks at the intersection of radio and mapping.

I recently took a book down from a shelf I had not visited in some years. A most unusual tome, indeed – I had forgotten that I had it. In *Shadows of the State* (2018), the author **Lewis Bush** offers images of (what is left of the) locations of many former Cold War numbers stations, such as the 'Lincolnshire Poacher', 'Cherry Ripe', and many others. In a way, this is almost an 'artistic' kind of book, combining, as it does, accurate aerial photography with (radio) history, geography and the study of clandestine transmitters. Here, 'mapping' has come to mean cartographic plotting of many of the formerly covert stations.

Unidentified signals and transmitters are still of great interest to many amateur radio operators and short wave enthusiasts today, and there is no shortage of books and websites on this topic. Just take a look at the ENIGMA2000 and Priyom fora to get a glimpse of what I mean. Unusual – and downright weird – signals abound. I have recently enjoyed following **Lewis Ringway's** blog because the information in it is easily verifiable.

Maps, locations and radio

This made me think just how valuable information about precise locations and maps would have been for Cold War spies preparing to meet their handlers or gearing up for a sabotage or prisoner exchange. When I was growing up in the still divided Germany, many field agents acquired details through number stations and one-time-pads, using maps, letterboxes in trees and other paraphernalia in the secret spy repertoire on both sides of the Iron Curtain (see our *'Cold War Radio'* series in *RadioUser*, May-July 2018). This is just one example of how radio and mapping intertwine in many ways.

Thinking about this topic a little more, I was surprised at just how many other cases I could think of, where radio patterns and mapping designs intersect. Like many radio users, I look at the world maps section first, in any new copy of the *WRTH (World Radio & TV Handbook)* when it comes out. I am sure many of you do too. Furthermore, you can now use apps and colourful interactive maps to listen to worldwide radio stations online. *Radio Garden* is one such radio location map, as is *RADIOSIDE*, the *Kiwi SDR Network*, *World Radio Map*, and *Radio Map EU*. The internet is, in itself, a very large map – some say a 'Matrix', leading you down a rabbit hole …

Radio Garden:
https://tinyurl.com/599kk569
Radio Map EU:
https://radiomap.eu
Radioside:
https://tinyurl.com/3yk7xr76

In what follows, I am taking a very wide view of the definition of what a 'map' is, and I am boldly going where no one has gone before – including objects and representations that you may not think of as 'maps' in the first place, because they may be leaning more on the side of technology, art or material culture. But bear with me, see what you think and do let me know what your favourite 'radio-maps' are.

From the universal to the very small

In fact, there are so many areas of radio being 'mapped' – and of maps being 'radio-ed' – that covering them all would exceed the format of this article. Instead, allow me to categorise a little and then perhaps look at a couple of fine examples in some more detail.

It is humbling, to begin with what is arguably the largest radio map of them all, a radio astronomy image of the entire Universe. This shows the well-known Cosmic Microwave Background (CMB, **Fig. 1**). The remaining background radiation of the 'Big Bang' was first detected by **Robert Wilson** (b. 1936) and the recently deceased **Arno Penzias** (1933-2024) back in 1964. Can you still remember *that* famous horn antenna? The one with the pigeon in it! The CMB charts Microwave radiation in the observable universe. This allows scientists to look back towards its beginning. Mapping the 'music of creation' – the scales here are truly mind-blowing.

Closer to our home on Earth, how are maps and radio linked on a smaller, human, scale? Let me suggest the following provisional groupings, from the obvious and merely quotidian to the obscure and less thought-about. No need to say that what follows does not claim to constitute any kind of comprehensive listing.

To begin with, some maps are still *physically* transmitted by (radio) Fax. These are, for instance, weather forecasts or maps as part of a radio facsimile (Radio Fax) general news broadcast. Think of the WEFAX transmissions of the German Weather Service (Deutscher Wetterdienst, DWD), still going out each day from Pinneberg, near Hamburg. I am still putting my AOR AR7030 and some software to use a few times each week, to get a variety of general and special forecasts (**Fig. 2**). Many radio enthusiasts share these on Facebook Groups and elsewhere now. Here is the DWD transmission schedule:
https://tinyurl.com/pmh6fb77

Networks, services and objects

Other radio-derived charts show worldwide networks and locations of radio services, such as the familiar NCDXF Beacon Network of the Northern California DX Foundation. The MFJ-890 Beacon Monitor (**Fig. 3**) is one of my favourite radio devices. It carries a global radio map right on its very face; radio science and map knowledge are harmoniously united here. So sad to hear, by the way, that MFJ is discontinuing production. Another wonderful example of a rare radio map is the *Radio Taiso Calisthenics Map* from Japan, long broadcast via radio (ラジオ体操, radio taisō, literally: 'radio exercises'; **Fig. 4**).

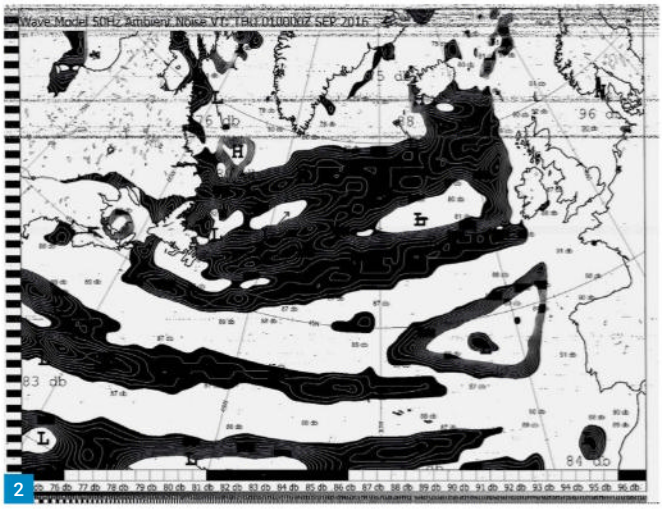

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Fig.1: A Map of the CMB, the Cosmic Microwave Background (Wikimedia). Fig. 2: A forecast map from the German Weather Service (Deutscher Wetterdienst, DWD). Fig. 3: The MFJ-890 Beacon Monitor (Wiessala). Fig. 4: Radio Taisho exercise map: charting the body by radio (Wikimedia). Fig. 5: Inside the Stampfl 'Stressless' HF Radio: mapping circuits (Georg Wiessala/ Heinz Stampfl).

Here, the human body is the surface onto which the radio exercises can 'map' themselves. Radio 'Calisthenics':
https://tinyurl.com/yc5a6hsu

Some things are not obviously (radio-) maps but reveal themselves as such when you look a bit more closely; for instance, circuit diagrams. What is the latter, if not a map, with its roads and junctions? The inside of my new Stampfl 'Stressless' HF Radio looks to me like a typical city grid (**Fig. 5**; *Practical Wireless*, May 2024: 10; *The Spectrum Monitor*, April 2024). And what about the waterfall diagram, which is ubiquitous nowadays? Surely this is a map too, of a kind, defined as *a representation, in time, of a specific reality*.

There are also special radio maps which unlock, for example, the locations of Standard Frequency and Time Signal (SFTS) stations in Europe, as well as the sites of global Very Low Frequency (VLF), Low Frequency (LF) and LOFAR transmitters (**Figs 6** and **7**).

The LOFAR (Low Frequency Array) network is nearly a quarter of a century old. Designed and built by ASTRON in the Netherlands as a distributed research system, it enables great astronomical research. During a decade of operation, LOFAR has grown to a European scale, with partners in nine countries. The brochure *Ten Years of LOFAR Highlights*, by the Dutch Institute for Radio Astronomy, represents a great primer to the LOFAR infrastructure.

Beyond LOFAR, VLF stations may also be received here, using a good SDR, such as the

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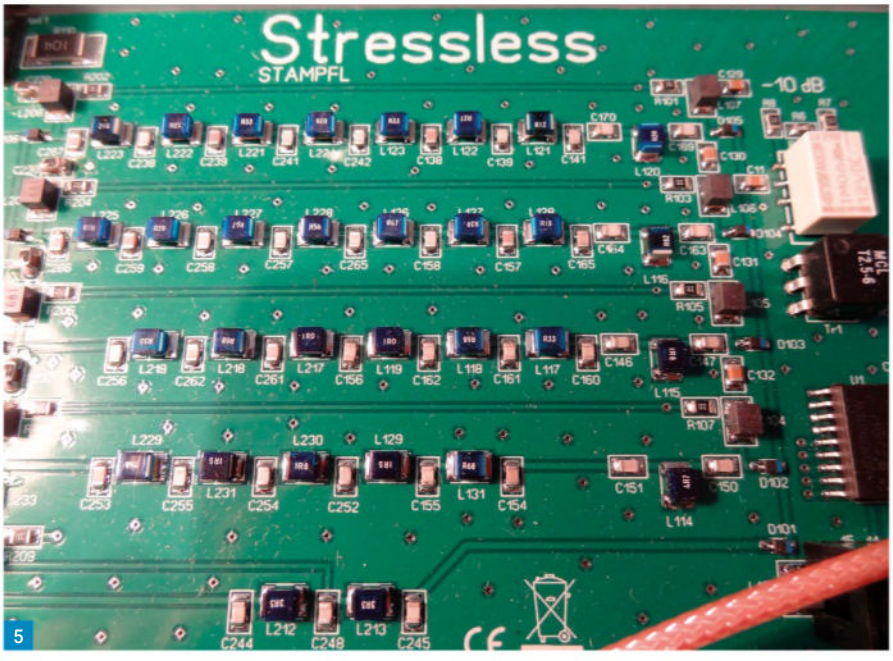

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Fig. 6: Countries with LF Transmitters (Wikipedia). Fig. 7: The LOFAR Network of the European Space Agency (ESA) (ESA/ Wikipedia). Fig. 8: Maps in your mind: vintage radio scales (Wiessala). Fig. 9: An extremely detailed Aeronautical HF Radio Map (AHFRM) (Wikipedia). Fig. 10: A USA weather map compiled by Zorns Lemma 11.42 (by kind permission of Ulrich Neuber).

AirSpy HF+ Discovery, or a special VLF radio in conjunction with software.
LOFAR:
https://tinyurl.com/5bcnw9pt
LOFAR UK:
https://lofar-uk.org/observers.html
LOFAR Highlights:
https://tinyurl.com/2k5wh6ax

Maps on radios and radios as maps

There are a few hardware radios where the actual 'mapping' is taking place in much more subtle ways: The *Palomar City Radio* (€99) for instance, designed by **E. Pizzolorusso**, allows you to literally, 'stick the geography onto your radio' and access radio stations from a defined area of a map or country. Your radio then becomes a portable, tangible, listening-map you can hold in the palm of your hand. How cool is that (*RadioUser*, November 2020: 28).
City Radio:
https://tinyurl.com/45nu66jw
AirSpy:
https://airspy.com/download

Compare that to the 'olden times', when the radio map was actually *in your head* – like on the gorgeously-lit frequency scales and dials of many a vintage radio, showing the names of those faraway places. In the USA, the town of Schenectady was often among them, on account of its local 'radio wizard', **Charles Proteus Steinmetz** (1865-1925).

Vintage radio dials were thus windows onto the world, in the true sense of the phrase. You listened, closed your eyes, and the map was building up automatically in your mind. Maybe this is, in fact, the best possible kind of radio map. The image in **Fig. 8** was taken at the Museum of Electricity in Funchal, Madeira, which has several such wonderful vintage radios on display. Or explore the British Vintage Wireless Society (BVWS) for more.
BVWS:
https://www.bvws.org.uk
Steinmetz: SWLing Post/ Solder Smoke:
https://tinyurl.com/ydctues3

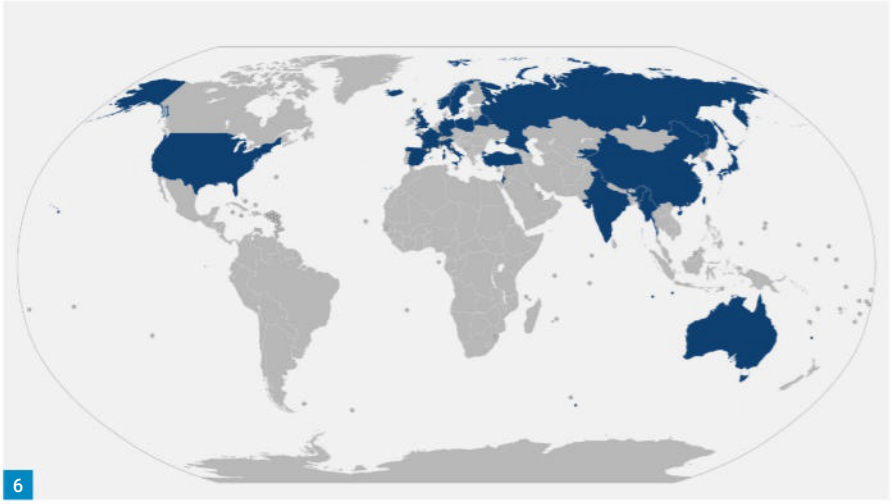
Radio+maps=navigation

Then there is, of course, the vast area of (radio) navigation to be considered. This is probably the most significant and wide-ranging practical application that springs to mind when people think of 'maps', 'charts' or 'plots', in combination with radio. Here, radio communications are either essential or merely ancillary, for transport and traffic by sea, on land and in the air. Just consider Shanwick Oceanic Control. For my money, the following Aeronautical HF Radio Map (AHFRM) never ceases to amaze me in its detail (**Fig. 9**):
AHFRM (Source: SWLing Post):
https://tinyurl.com/89wz48s7

From the 'hyperbolic' navigation era – using such techniques as *Decca, Alpha, Omega* and *LORAN (Long-Range Aids to Navigation)* – to today's GPS, Satellite Communications and ADS-B, via Radio Direction Finding (RDF) and triangulation, there is a wealth of radio navigation systems that help users plot and reconcile their course to the Earth's surface, via pilot maps, naval charts, and, increasingly, digital screens.

In this field above all, the kind of technology that was once the preserve of professionals has by now filtered down to the amateur and hobby radio markets. A modern specialist receiver, like the Jetvision Air!Squitter [sic] can certainly make you aware of what the seriously dedicated radio hobbyist can link into nowadays:
https://airsquitter.com

One point I find worth commenting upon in this context is that, in some principal areas of navigation, traditional technologies live on in some modern guises. Thus, in maritime radio, data-casting (data broadcasting) to ships, via DRM (Digital Radio Mondiale) technology is currently at the forefront of both communications and mapping developments.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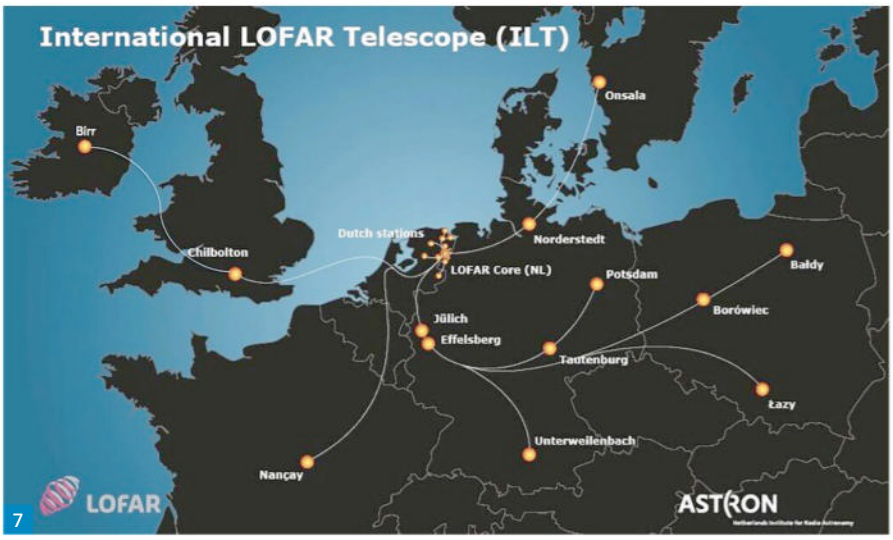

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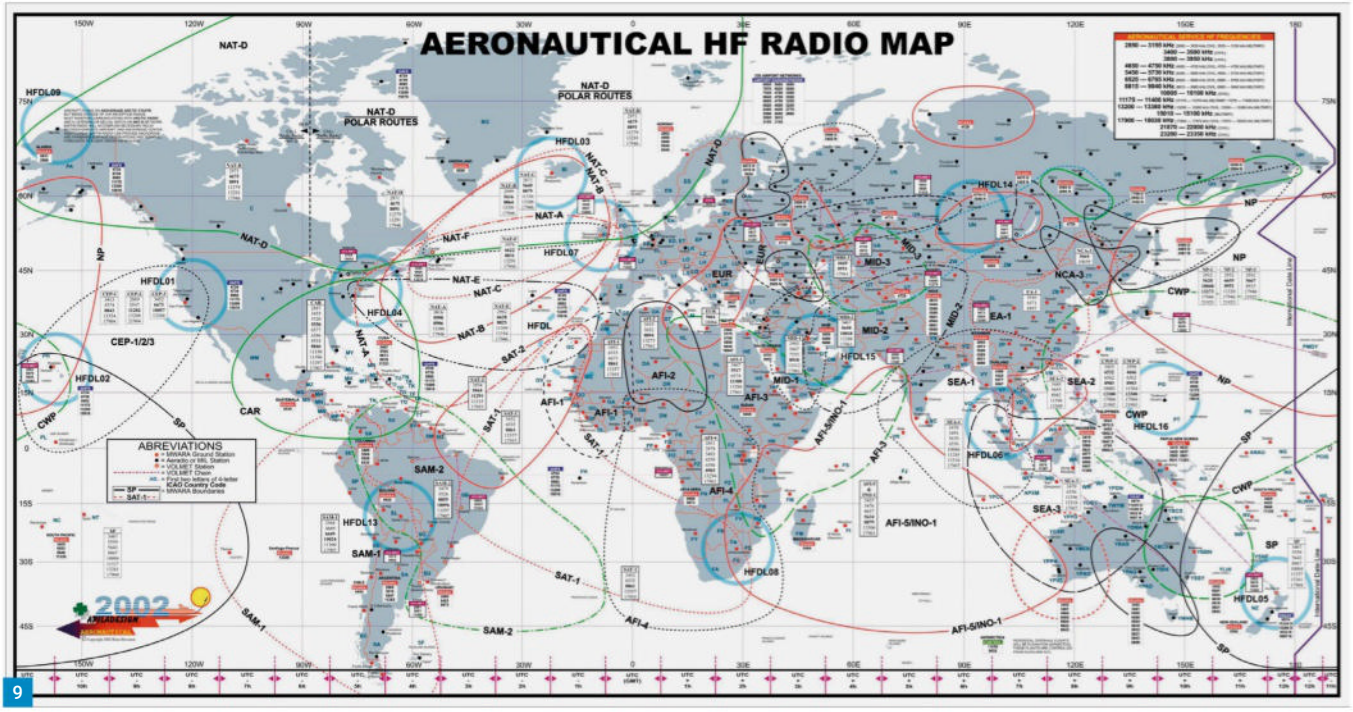

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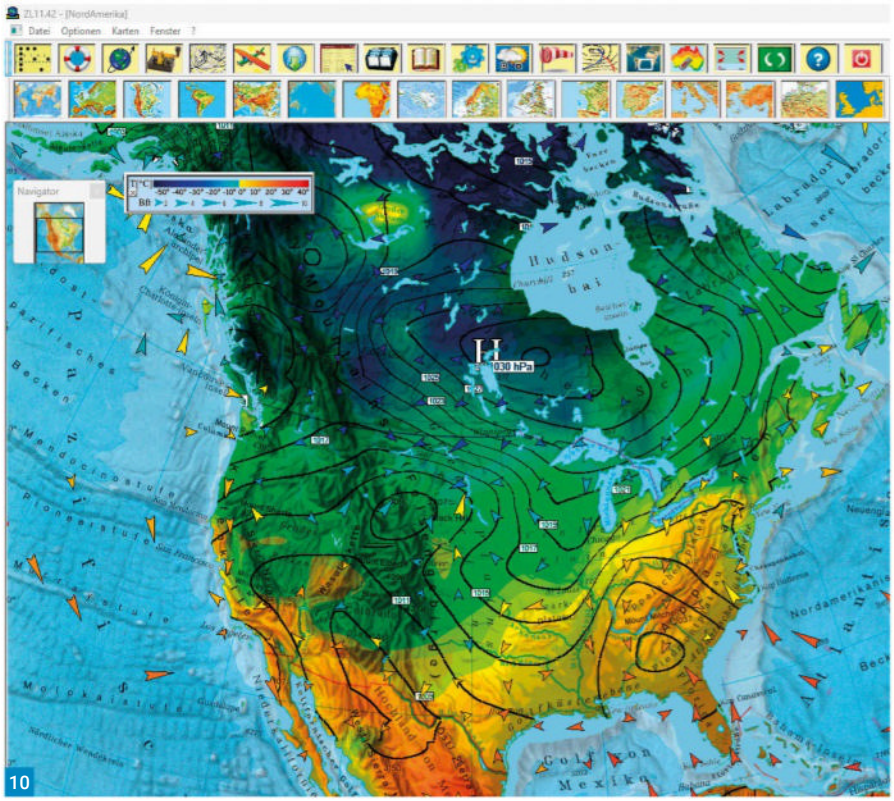
However, this is not an article about the future of radio navigation, there are plenty of good materials out there, both in print and online, if you want to know more (e.g. **Bennett**, 2017; *Radioworld*, June 2018; *RadioUser*, July 2018: 22).

DRM Datacasting:
https://tinyurl.com/43947tmf

Propagation, location and weather

So far, we have been looking at how map-making and radio may interconnect, complement, and often depend on, one another. Let us now turn to a few more practical examples of how mapping and radio are essentially co-dependent. An application that has recently been coming to the fore more so than ever before, is the use of radio and maps in the services of radio wave propagation prediction, aimed at both professionals and radio amateurs, weather watchers and DXers. In this context, maps are not just the *result* of radio transmissions, like in the case of WXFAX for instance (Fig. 2 again); they are rather produced to *forecast* the vagaries of space weather, the atmosphere and ionosphere, and band conditions.

This happens for both RX and TX operations. There are some excellent radio wave propagation prediction tools out there, such as *VOACAP, PropView*, and *HamCap*, plus plenty of others. You may already be using them. What is more, there is no shortage of websites and Facebook interest groups now, on which hobbyists and citizen-scientists share the very latest solar storm observations, aurora predictions, and often general articles on the joy of propagation monitoring, especially in connection with the recent USA Solar Eclipse.



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I particularly like software tools, which allow you to acquire data from global servers in the formats of GRIB (GRIdded Binary), ECDIS (Electronic Chart Display and Information System) or general (synoptic data) files. These then enable you to build your own maps facilitating radio operation. For my money, the now slightly older *Zorns Lemma 11.42* software suite (**Fig. 10**) is the most versatile; it enables reception of NOAA Satellites, RTTY and FAX, as well as ordinary synoptic data downloading and mapmaking.

The resulting charts can be tailored to your needs. They are based on thousands of short reports from weather stations on land and sea, and from buoys and special meteorological

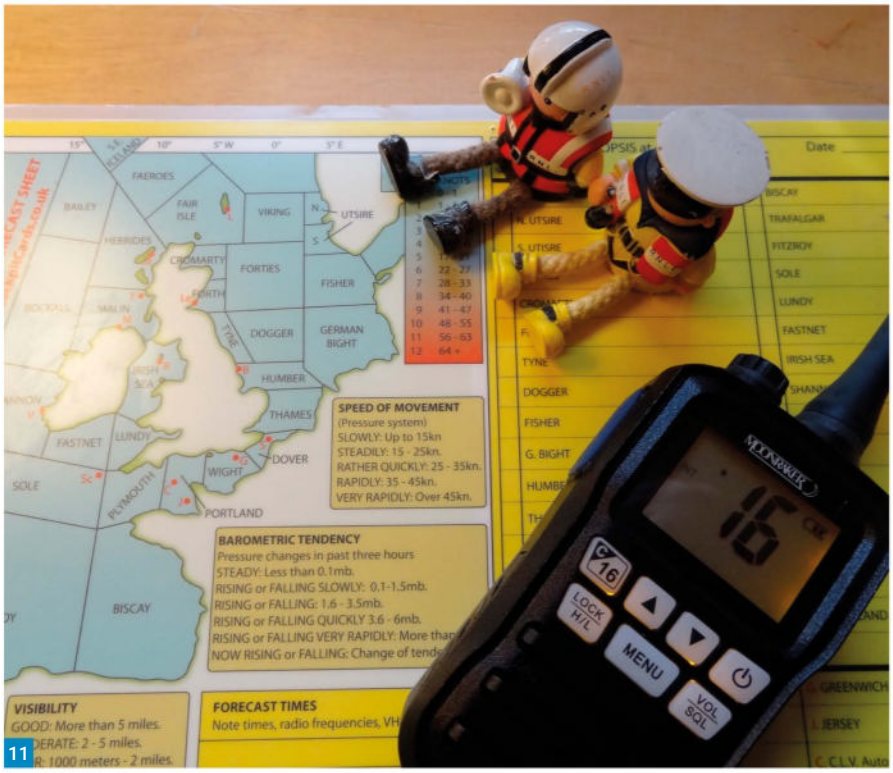


Fig. 11: Maps for radio-logging. The Cockpit Charts for European Sea Areas (With permission of Cockpit Charts). Fig. 12: A QSL card: one of thousands with a map on it (Wikipedia). Fig. 13: The *2024 Ham Radio Guide* by Giovanni Schiavino (WiMo: https://tinyurl.com/4pv5d8tj) (WiMo) Fig. 14: A chart of a range of time signal stations over time (courtesy of Nils Schiffhauer DK8OK).

vessels (see our review in *RadioUser*, February 2020: 63-66). Beyond this, there are many other tools: check out the RSGB website for further information about a plethora of propagation and weather forecasting software packages and apps. Propagation Software (via the RSGB):
https://tinyurl.com/bdczcj94

On a more 'hands-on' level, you might listen to your local Shipping Forecast and translate what you hear on the wireless into your very own shack map. I do this all the time, as long as we still have a Shipping Forecast here on BBC Long Wave (198kHz). Its days are numbered. I also use the *Cockpitmaps* laminated charts of the Sea Areas around Germany and the UK to jot down the observations broadcast on the radio. Good fun, this (**Fig. 11**).

Moreover, ask yourselves: just how many QSL cards are in your collection, with at least an outline map on them, showing the region, country or continent of origin of the station(s) you have been chasing (**Fig. 12**)? QSL cards are, quite possibly, the largest area of the radio hobby in which maps and radio intersect, aside from amateur radio and stamp collecting.

Coverage, identification and promotion

But let us not forget how maps are also deployed out there to help broadcasters, DXers and amateur radio operators to promote, identify and locate themselves and share knowledge. For instance, numerous broadcasting stations on Short Wave, Dutch Pirates, or stations on the 'Fastradioburst/ Imaginary Stations' forum, have been known to issue promotional gifts, announcements or adverts in map form. Fastradioburst:
https://tinyurl.com/2m8b9vwz

There are, of course, diverse coverage maps on all levels, and concerning all modes of radio, for example, DAB coverage maps by Ofcom, the UK radio regulator. The *2024 Ham Radio Guide* by **Giovanni Schiavino** is a great compilation. This nifty hobby publication contains a great variety of maps, indicating coverage, frequencies, identification, and much more:
https://www.qrz.com/db/IK0WMJ

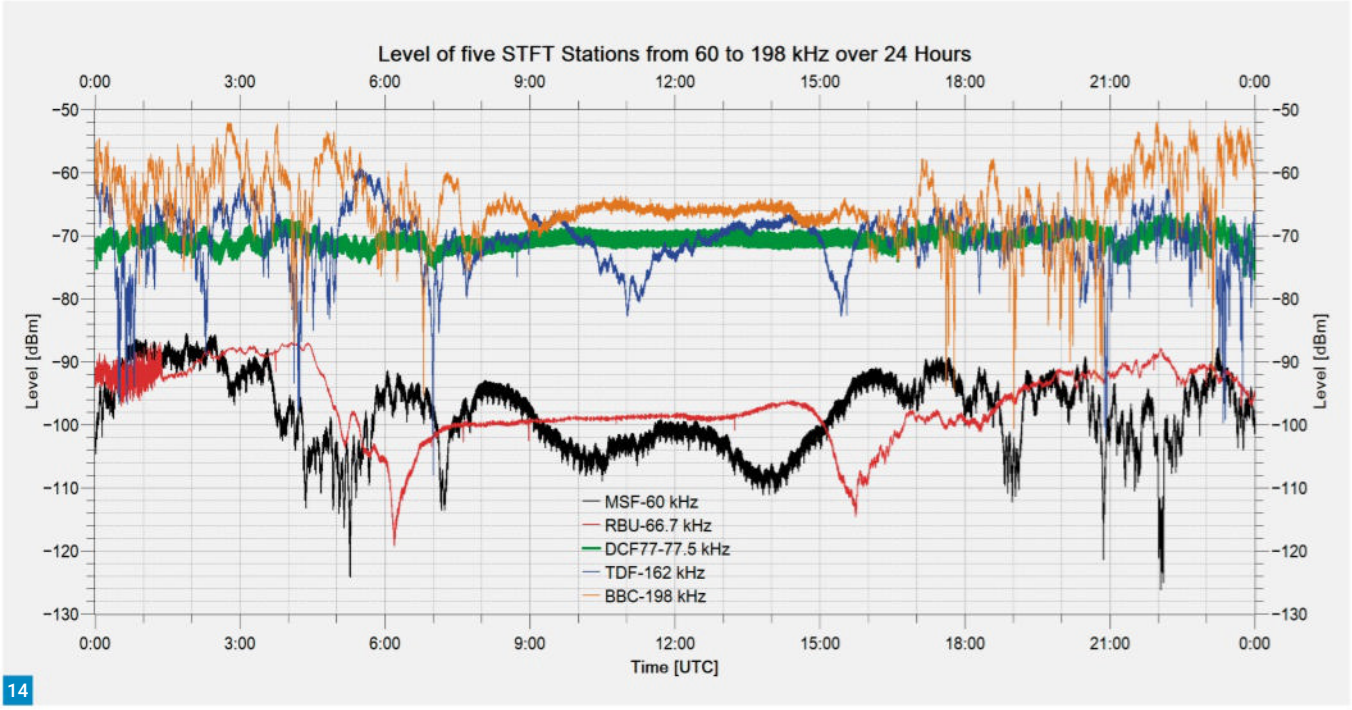
The *Ham Radio Guide* speaks to, and at the same time illustrates, almost all aspects of radio and mapping touched upon in this article (**Fig. 13**), and its cover will appeal to both radio fans and map aficionados alike. It also forms a bridge into the rich world of maps used to work and promote amateur radio (see below).

Talking about promotion, just look at the stunning historical 'promotional' radio maps from history at the URLs below. If this is not map-art-in-radio, I don't know what is! The Philips *SW Radio World Maps*, as well as the lovely *Philco Vintage Poster*, are my favourites here. There are now numerous stations, and I mean both private radio amateurs and broadcasters, which regularly use maps and charts to attract QSLs or find new listeners.
Philco Poster:
https://tinyurl.com/473x4f4w
Philips SW Stations Map:
https://www.ebay.co.uk/itm/133338190650
Philips Radio World Map (Boston Rare Maps):
https://tinyurl.com/mry2nu26
SW Vintage World Map (Etsy):
https://tinyurl.com/3ana7j9u

Charting the best of all hobbies: amateur radio and maps

Moving now to the world of Ham Radio, it is awash with mapping knowledge, as you will know better than I do. 'Zones' (CQ and ITU) and 'Prefixes', 'Maidenhead Locators', 'DXCC Entities', and 'Grey-Line' maps, as well as, 'Band Condition' and 'Propagation' maps spring readily to kind. Also, the 'Great Circle' maps – so you can see which way to beam.

There are far too many examples to cover here, so I will keep this short. In practical terms, I guess many of you will use the Great Circle Maps (AEMs, or 'Azimuthal Equidistant Maps') in one of their many incarnations, to find out about long-path and short-path openings and



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possible QSOs. You can make your own, centred on your QTH.

Or you can go the whole hog and get yourself a *Geochron Atlas 4K* or customise *HamClock* for your shack – these pieces of kit are just über-cool: time, maps and radio all rolled into one. If you are an experimenter, homebrewer or maker, there are few limits nowadays to how you can combine radio and maps as a radio amateur.

Geochron:
https://www.geochron.com/4k
HamClock (Moonraker):
https://tinyurl.com/4h3wm7p8

The other kind of map many readers will, perhaps, be familiar with is a kind of 'geocoding'. This is the European Maidenhead Grid Square Locator (aka 'QTH Locator' or 'IARU Locator'). This representation is widely used to delineate the precise coordinates of VHF Band operators. You may recall that it was in Maidenhead that the system was first planned, in the course of a meeting of European VHF managers in 1980.

Moreover, check out the different kinds of map diagrams, covering everything from ground conductivity to ITU and CQ Zones and Prefixes, offered by **Serge Stroobandt ON4AA** at the URL below. Here and elsewhere, you can easily find a wealth of useful and beautiful information. Add to this the World Time One and Repeater Maps frequently relied on in amateur radio and you have more maps than you can shake your vintage microphone at.

Ham Radio Maps:
https://tinyurl.com/3zcj5hw3
Serge Stroobandt (ON4AA):
https://hamwaves.com/maps/en/index.html

Maps in radio astronomy and VLF studies

Last but not least for this article, radio astronomy and Very Low Frequency (VLF) radio studies are also fruitful hunting grounds for exciting maps, plots and charts. There is, of course, the famous map of the Cosmic Microwave Background, with which I began this article. On a less ambitious scale, there are plenty of images of the centre of our Galaxy, the Milky Way, where some of the most powerful radio sources are.

Mapping the radio sky is part of the hobby for many radio amateurs and DXers too. Take a look at the websites of the organisations listed below, for example, the one of the United Kingdom Radio Astronomy Association (UKRAA), which offers special equipment to the hobbyist.

BAA: Radio Astronomy Group:
https://britastro.org/sections/radio-astronomy
SARA:
https://radio-astronomy.org
UKRAA:
https://www.ukraa.com

In terms of Low and Very Low Frequency (VLF) radio signals, I have already mentioned LOFAR (above, Fig. 7). In your shack, you can observe solar events indirectly, through their effects on Earth-based VLF transmitters.

My final map for now (**Fig. 14**) represents a long-term observation of the signal levels over time of some active SFTS (Standard Frequency and Time Signal) stations, courtesy of former *RadioUser* contributor and current *PW* author **Nils Schiffhauer DK8OK**. For me, this introduces the additional dimension of 'time' into radio mapping, in a way that two-dimensional maps just cannot do.

A timely conclusion

And there you have it: 'maps and radio' turns out to be a diverse, growing and fruitful field, indeed. I hope this article has both given you an idea of how mapping is used in radio, and how radio is deployed for charting, in its many incarnations old and new. It might have whetted your appetite to explore this exciting subject further.

The latest innovations in this area, as far as I can see, are currently to be found in the use of Artificial Intelligence (AI), the further development of Quantum Radio with diverse mapping technologies, coverage maps, direction-finding (DF), and the use of Time-Distance-on-Arrival (TDoA) methodologies, as well as the new remote-receiver and online radio technologies (e.g. WebSDR/ KiwiSDR).

Mapping radio and radio maps in the future – both in the real world and in the virtual one – will in all likelihood, be very different from what we are familiar with now.

Quantum Radio and Mapping:
https://tinyurl.com/mr254cd3

Further Reading

- Bennet, J. (2017) *Navigation: A Very Short Introduction* (Oxford: OUP)
- Bush, L. (2018) *Shadows of the State* (Brave Books)
- De Carle, D. (1947) *British Time* (London: Crosby Lockwood & Son Ltd.)
- Scavino, G. (2024) *Ham Radio Guide* (86 Maps).

Tim Kirby GW4VXE
gw4vxe@icloud.com

1

VHF CW evenings and the next 145 Alive session

Tim Kirby GW4VXE looks back on a lively month, with several types of propagation in evidence, and forwards to 145 Alive and more.

To counter the oft-heard statement 'there is no activity on VHF' (which actually, I don't think is true…) there have been various initiatives recently to promote activity. In the column recently, I've covered '145 Alive' (the next session is on 29 September and at the time of writing, over 25 nets are already scheduled to be run in most parts of the country).

Another initiative started recently is '2m CW Tuesdays'. A group of 2m CW enthusiasts picked a time slot, 1830UTC for around an hour on a Tuesday, and congregated around 144.050, calling CQ and making contacts. This has gone well so far and has been picking up momentum with more and more stations being active.

With the success of the 2m evenings, other bands have been added! Wednesday night is 50MHz night, in the same timeslot, 1830UTC, with the centre of activity being 50.090MHz. Thursday night is 4m evening, again around 1830UTC for an hour, and the centre of activity is 70.200MHz. Finally, Fridays are for 70cm – 1830UTC around 432.050.

There are some who seem rather grumpy about this type of activity period, saying that people should just go on the bands and call CQ. Of course, to some extent that's true, but I think it's more likely that this will happen if people think they have a reasonable chance of a reply. While, of course, if more of us called CQ at random times the activity periods wouldn't be needed, we are where we are and this is a good start. And of course, if you're enthused by the contacts that you make on a particular evening, you might well be tempted to try on other evenings too – maybe even setting up a sked with someone you can work regularly.

These are sessions for CW operators, but for those who don't operate CW and prefer SSB, it's worth noting the evenings when people are on the band and calling CQ – you never know you might catch a CW operator with a microphone plugged in! This is particularly true on 4m where the CW and SSB activity mixes fairly freely on 70.200MHz.

It's really good to hear about this activity and it would be great to have input from anyone who's taking part, with information about the contacts that are being made. Who knows, if this goes really well, we could reintroduce the 'Annual CW ladder' which ran in the late **Norman Fitch G3FPK**'s VHF column in *Short Wave Magazine* the 1980s, showing the number of unique stations worked on each band using CW each year. I remember entering it myself!

By the way, if you're after some nostalgia, you can browse the old copies of *Short Wave Magazine* as well as older copies of *Practical Wireless* (1932-1999) and other publications on the amazing World Radio History website:
www.worldradiohistory.com/index.htm

It's fascinating to look at these magazines. One of things that always strikes me is the price of equipment. Back in the 1980s, we paid much more, in real terms, for equipment than we do now. Budget handhelds were definitely not a thing and mobile and base station rigs were a much greater proportion of a month's salary, say, than they are now. It's also fun to look at the old VHF columns, for example, noticing callsigns who are still around and remembering some of those who are not.

APRS to Mastodon and Twitter/X links

Jef VanRaepenbusch ON8NT has been trying out a link from APRS to Mastodon (which is a Twitter/X like system, built on open concepts). If you send a message to MSTDN from APRS, the message will appear on a website (below). Jef says a similar link exists to Twitter/X although he hasn't tried it as yet.
https://botsin.space/@aprs

Meteor scatter on 432MHz

Over the years there have been many attempts at making meteor scatter QSOs on 432MHz. Some contacts have been made for sure, but of course reflections are generally much shorter than on 144MHz, for example. I've sometimes been suspicious that some 'meteor scatter' QSOs have actually been aircraft scatter (obviously they're still interesting contacts – just a different propagation mode). During this year's Perseids shower **Bill Ward GM0ICF** (Ayrshire) worked **Ingolf SM6FHZ** (JO57). The QSO took an hour and 42 minutes although one reflection lasted around 23 seconds

Fig. 1: Spectacular colours from the Aurora at GW4VXE on 12 August. If you look closely, you can see a Perseid meteor just above the polytunnel! Fig. 2: FM DX received by Simon Evans during the last 30 days from mid-August. Fig. 3: DAB DX received by Simon Evans during the last 30 days from mid-August.

enabling both stations to use the burst! During the QSO there were five reflections in total. Bill has been studying meteor propagation for over 40 years and you may find a look at his QRZ page of interest.

Connect Systems announce rig to cover M17 digital mode

Chatting with **Peter G7RPG** the other day he mentioned that Connect Systems have announced a new radio, the CS7000 M17 Plus. This will be the first radio to cover DMR, M17 and analogue modes. The radio is single band 70cm and looks interesting. It is nice to see a radio coming to the market with the open M17 protocol available and I've no doubt this will increase activity on the M17 mode. The radio is not yet available but you can read more at:

https://tinyurl.com/4me43v9v

The 6m band

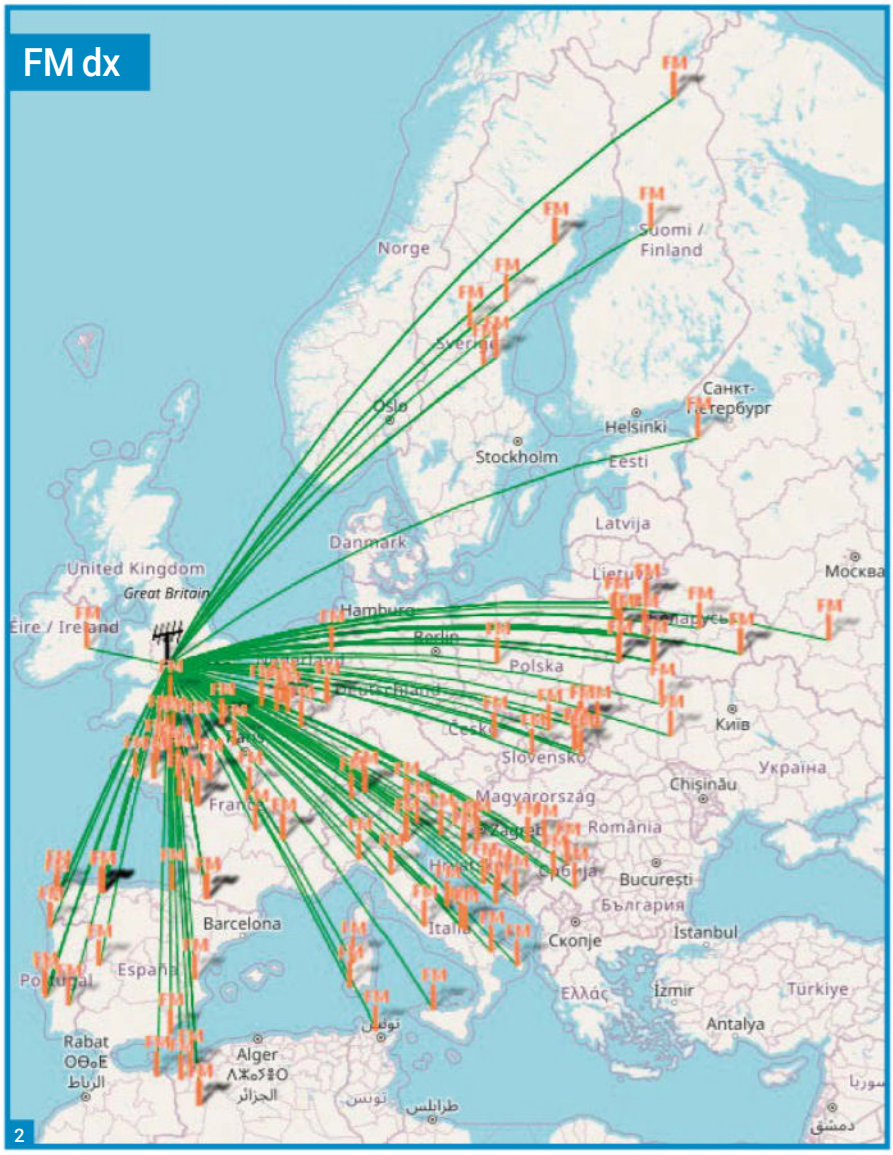
Jef ON8NT (Aalter) sent a log of his stations worked outside Europe. On 18 July, Jef worked UN3M (LO61), OD5KU (KM73) and OD5VB (KM73) and then on the 19th, S01WS (IL46) and EA8/DF4UE. All QSOs with 10W of FT8.

Stewart Cooper G4AFF (Norfolk) was active during the aurora on 12 August. Stewart worked GM4UBJ (IO75), EI2IP (IO52), MM0AMW (IO75), GM4UYE (IO86), M0XVF (IO94), GM4OAS (IO76), EI3GYB (IO53), G4MQL (IO81), 2E0OTM (IO94), M0LDW (IO93), G7SXR (IO93), GW4GNY (IO82), G0ORG (O02), GM4PMK (IO86), GM0OQV (IO85), G3YOA (JO02), G3YED (IO92), GI0OTC (IO65), GM3TAL (IO86), MI0BOT (IO74), EI8KN (IO62), EI4DQ (IO51), MW1CFN (IO73) and G8TZJ (IO84). No-one can say there's no activity on 6m SSB!

Roger Greengrass EI8KN (Co Waterford) caught the aurora on 4 August, working GM4VVX (IO78) and 2M1EUB (IO87). An interesting station worked on 6 August was RA7A (KN94) along with TA4/PE2M (KM66). In the run up to the Perseids, Roger worked a number of MSK144 meteor scatter QSOs on 9, 10, 11 and 12 August. The aurora on 12 August allowed Roger to work G0LGS (IO81) and M0RDX (IO83).

Roger Lapthorn G3XBM (Cambridge) monitored 50.280 MSK144 during one night of the Perseids meteor shower, using his V-2000 vertical, but copied stations from Spain, Italy and Sweden.

Tony Collett G4NBS (Cambridge) has not been as active as he'd have liked, owing to being away from home as well as some enforced antenna work. Tony was on during the UK Activity Contest



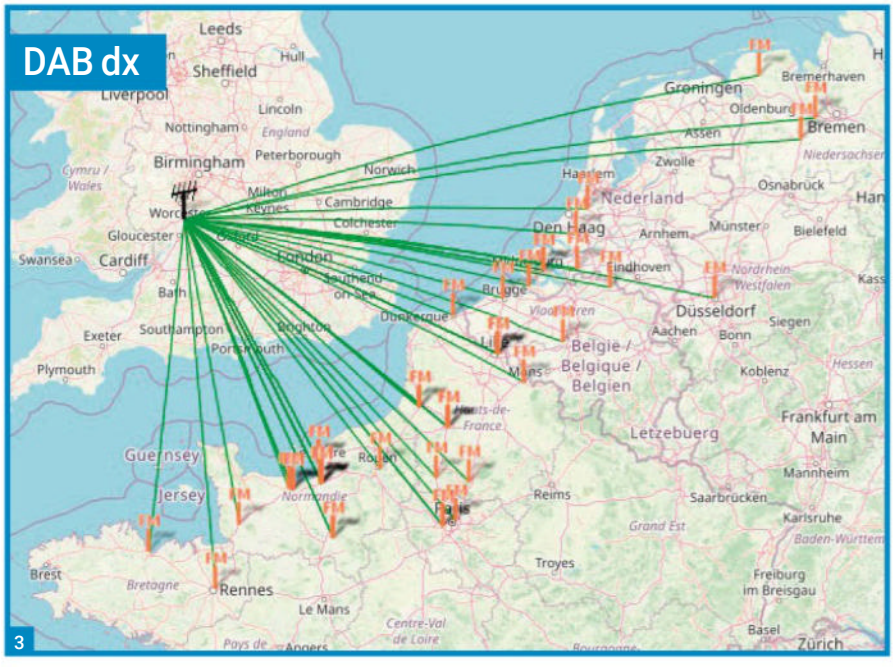


Fig. 4: Adam Wisher's portable receiving a DAB signal from France from the hills near Cheltenham.

on 8 August when he worked GI4SNA, GW0RHC and GW0GEI. 2E0VCC/P was weaker than usual but Tony was able to complete a QSO, as he was with G7RAU although that took a couple of attempts. A nice QSO to the north was with GM4DIJ/P.

Phil Oakley G0BVD (Great Torrington) sent a good log of lots of Es QSOs mostly on the 29, 30 and 31 July. Phil's best DX was RA7A (KN94)

Highlights of the **GW4VXE** (Goodwick) log are UA4HBW (LO53) and RK4FD (LO23) on 29 July; LX2A (JN29) and LX1JX (JO30) on 31 July and IM0/I2KQE worked via MS on 12 August. There's been occasional TEP/F2 to the Indian Ocean with FR8 seen, as well as more 'normal' evening propagation into South America. The photo, **Fig. 1**, shows the aurora over the GW4VXE QTH!

The 4m band

Roger EI8KN worked GM4CXM (IO75) on CW in the aurora on 4 August. On 6 August there was an Es opening and Roger made a good number of contacts to 9A, YU, HB9, DL, ON and ES. Roger made some MSK144 meteor scatter QSOs on 9 August, working DM2BHG (JO51) twice! Around the peak of the shower, Roger worked SM7FJE (JO65), G4DBL (IO91) and OZ1JMN (JO46).

The 2m band

Jef ON8NT lists special stations and stations over 400km from his location. On 3 July, Jef worked GW4HDF (IO81) and EI8KN (IO62) and then on 24 July there was a good opening into France when he worked F1NZC (JN15), F6GRA (JN04), F0IEU (JN16), F5BEG (JN07), F5DYD (JN09), F6DRO (JN03) and F6CIS (IN94).

Ian Bontoft G4ELW (Bridgwater) says that summer activities have curtailed his radio time somewhat but says that his impression has been that conditions have been very variable. Highlights of Ian's log include HB9MOW/P (JN37) and TM5K (IN78) on 29 July. The Swiss station was Ian's first Swiss contact on the band. Then, 1 August EC1A (IN73) and F6EGC (IN98); 4 August F4HBY (IN97) and EA2XR (IN83); 10 August F8BON (IN88), F1MLN (IN99), F5CBU (IN88) and F6CTT (IN97); 11 August F6IFX/P (IN87) and 15 August F6CTT (IN97). Ian says he had a near miss with CT9/OM3RG who responded to one of Ian's CQ calls, but unfortunately fading set in and they could not complete the QSO. It's so frustrating when that happens! Ian says that he remembers working EA8 and CT9 around this time of year last year, but conditions seemed a little better then. All QSOs were made on FT8 using around 15W to a low 5-element Yagi on the Somerset levels.

Roger EI8KN says that the Es opening on 6 August seemed to take a while to reach Eire and when it did, Roger only had a few minutes before he had to leave the house! He did work YU7KB (KN04), YU7MS (KN05), HA1VQ (JN87), HA1KHJ (JN87), OE6MMF (JN77), 9A8A (JN86) and IV3/OE2WAO (JN65)

Tony G4NBS only finished his feeder replacement work in time to catch the last 90 minutes of the 2m Low Power contest on 3 August. Tony found conditions flat and perhaps activity was a little lower. Using 5W, Tony still managed to work 2E0VCC/P in Cornwall. Tony was active for the last part of the aurora on 4 August, working EI3KD (IO51), PA3CWN (JO33), DF7KF (JO30). Most of the DX faded out by 1738UTC although GM4YXI was audible for some time after this.

On 6 August during the FM Activity contest, Tony worked MW0LKX/P and M0BAO/P (IO80), both at good strength, which seemed to bode well for the SSB section. As it turned out, on SSB, Tony didn't work IO80 at all! On the other hand he did work HB9SJV (JN36) who was just above Tony's noise level. OZ1ALS (JO44) was also worked during the session.

During the FT8 Activity session on 7 August, Tony made 81 QSOs in 33 locators and says that conditions were nothing special. Highlights were G7RAU, F8BON (IN86), MI0IHH (IO74), GM4JIB & GM8MJV (IO85), GM4JTJ (IO86), GM0HLV (IO88), EI2FG (IO61), EI4ACB & EI8KE (IO62), OV3T (JO46), OZ1IIL (JO47), DH9OK & DJ6AG (JO51), DH7IF/P (JN49), DK0TR (JO40), DF8XC & DL1DBR JO41) and DJ2KP (JO42).

During the Aurora on 12 August Tony worked OZ1HDF (JO55), MM0CEZ (IO75), GM4FVM (IO85), M0XVF (IO94), DL8DAU (JO40), F1FPL (JN09), SQ4O (KO13), G4RRA (IO80), MW0AXA (IO81), DL1OJ (JO42), HB9FAP (JN47), DL1YAW (JO41), PA2RU (JO32). Tony says *"Had a quick try at Q65-30C. There were very strong signals on the S-meter and SDR display but it was very hard to see on WSJT waterfall to decide where to tune. There was so much spreading from backscatter that I think both these would have been good SSB QSOs taking up much less time to complete. So much so, that I went on SSB and heard SQ4O but who could not understand who was calling. On the same frequency I worked F1FPL who had also been calling him, then DL8DAU both very clear audio. Arranged by KST SQ4O then easily received my CW – it pays to try all modes!"*

Tony didn't find the Perseids a particularly impressive shower and in his words he worked only 15 QSOs and nine DXCCs (CT, EA, E7, HA, I, S5, SM, YO and YU) but EA2DR (IN61) and CT1DIZ/P (IM69) were new squares. Tony says he was about to turn off, he parked the beam to the north-east and then saw a CQ from OG0C who he was pleased to work for a new DXCC and square.

On 14 August, Tony worked CT9/OM3RG on FT8 but Tony notes that others had worked him a little earlier on CW and SSB when signals had been better.

Roger Daniel G4RUW (Newbury) has had a good month, after as he puts it, a 'fallow July'! On 4 August, Roger worked MM6OEC (IO68) for a new square then GI6ATZ (IO74) and GM7PKT (IO76) all via Aurora. Just before lunch on 5 August, Roger found an Es opening in progress and worked YU7KB (KN04), 9A4P (JN85) and 9A8A (N80). During the Aurora on 12 August, Roger worked GM4OAS (IO76) and G8XVJ (IO83).

Here at GW4VXE the highlight was working CT9/OM3RG on FT8 on 14 August. I accidentally called him with about 10W to a vertical and by the time I realised, the QSO was almost complete.

The 70cm band

Jef ON8NT worked GW4HDF (IO81) on 10 July during the FT8 Activity period. Roger G3XBM was also active during the 70cm FT8 activity period, using his 2m big wheel and says that it

receives signals very well over a very wide range and wonders whether he's seeing some sort of troposcatter effect. Roger was very happy to work Tony G4NBS during the FT8 Activity Period.

Tony G4NBS made 47 QSOs in 15 squares during the Low Power contest on 4 August. The only continental DX was F6KCZ/P (IN99) and the best DX was GI6ATZ with the only other stations worked over 300km being MW0DX (IO71) and 2E0VCC/P (IO70).

During the aurora on 12 August Tony worked GM4BYF (IO85), OE3JPC (JN87), DL8DAU (JO40), PA2MM (JO21), PA2RU (JO32), F8DBF (IN78) and DL8YE (JO32). Tony says, *"Having not considered 70cm back in May I was determined to try this time and pleased I did with OE being a new square. The only other 70cm Auroral QSOs I have had were way back in March 1989!"* Tony says that he understands that **Keith G4ODA** worked an I2, 9A2SB and S51ZO.

During the UK Activity Contest on 13 August, Tony made 98 QSOs in 28 squares. Contacts over 400km were GM3SEK, PA0WMX (JO21), GM4DIJ/P (IO74), GM4PPT (IO75), PA2RU on CW (JO32), EI8KN and GM4JTJ. Next day on 14 August there was no sign of any enhancement to the south-west and activity from the UK seemed very low. Tony finished up with 69 QSOs in 29 squares. The best DX was DL1DBR (JO41) and DJ2KP (JO42) seemed to be audible wherever Tony pointed the beam! Other notable stations were DF4IAE & DH7IF/P (JN49), OV3T (JO46) and DJ6AG (JO51), EI2FG (IO61), EI4ACB & EI8KN (IO62), GD0TEP, MI0IHH and GM8MJV.

Satellites

Using a low pass out over the Atlantic, **Graham Jones G3VKV** (Cheltenham) worked **Craig EI3FW** (Co Roscommon) through the crossband repeater on the International Space Station in early August. With the ISS well out to the west, across the Atlantic, the repeater was fairly quiet and Graham and Craig were able to have a more lengthy QSO than might usually be possible – the crossband repeater gets very busy indeed when it is in range of mainland Europe.

Patrick Stoddard WD9EWK (Phoenix) writes, *"Between late July and early August, the eight TEVEL satellites reentered, bringing to an end their mission. Of the eight TEVEL satellites, seven of them had their FM repeaters activated. A couple of them - TEVEL-2, and TEVEL-7 - were operational within a few days of their reentry. Not only were they usable as FM repeaters, the TEVEL satellites also relayed D-STAR transmissions.* ***David Greenberg 4X1DG*** *is the one we should thank for having the TEVEL satellites available to us, as he was the command station activating these satellites for our use.*

"David has mentioned that a new TEVEL satellite mission is in the works. The new TEVEL mission will have nine satellites. No word, so far on when these satellites will be launched and open for amateur use.

*"****Jonathan N4AKV*** *has been on a road trip through the northeastern USA and the Canadian Maritimes recently. Along with visiting a few US states and five Canadian call areas (VE1, VE9, VO1, VO2, VY2), Jonathan operated as FP/N4AKV from St. Pierre, a French territory just off the coast of Newfoundland. He has been on GreenCube, RS-44, and other satellites, activating lots of grids for satellite operators on both sides of the Atlantic.*

"Congratulations to ***Endaf N6UTC/MW1BQO*** *for working all 488 grids in the continental USA via satellite from southern California! On 1 August, N6UTC worked N4AKV/VE1 via GreenCube in grid FN64, the last of the 488 grids Endaf needed for AMSAT's 'GridMaster' award. This award uses the same 488 grids as the ARRL's Fred Fish Memorial Award for the 6m band. N6UTC received GridMaster award #67".*

FM and DAB DX

Simon Evans (Twyning) writes that during the Perseids meteor shower, he received his first FM station by meteor scatter; Polskie Radio Jedynka on 92.3MHz from Poznan, **Fig. 2**. Simon explains that normally MS bursts are so short that the TEF radio cannot find the PI code enabling identification of the station. Otherwise, he says, there have been several days with Sporadic E. On 6 August, Simon received YLE-X from Finland on 90.1MHz, a distance of 2367km, and on 16 August, Simon caught a particularly good OIRT band opening to Ukraine, Belarus and Russia, with the best DX being around 2565km.

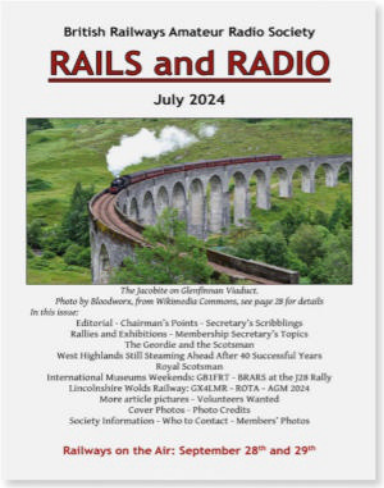
Looking at DAB stations, Simon reports that on 31 July there was an opening to the Lille area of France and Northern Germany on multiplex 8G. There were three identified transmitters, with the most distant being Steinkimmen some 725km away. On 12 August Simon says that he received Caen (5B) from four different sites. Rouen (19A) and Met 1&2 were received from a number of sites. Then on 13 August, the opening had moved off to the East with many Dutch and Belgian muxes being received, the most distant was DR Deutschland (5C) from Dusseldorf 621km away. See **Fig. 3**.

Adam Wisher (Cheltenham) says it's been a fairly disappointing season on the broadcast bands, at least. Adam's best day for Es was probably 6 August when he logged three new countries on FM; Bulgaria (BNR Radio Shumen on 87.6MHz), San Marino (102.7 and 103.2MHz) and multiple stations from Switzerland from the Sāntis and Rigi transmitters.

Adam says that tropo seems to have picked up a little and on 12 August he received several French DAB multiplexes from the Northern and North Eastern France when he was up on the hills to the south of Cheltenham using his little Majorit Eddington portable, **Fig. 4**.

Well, that's it for another month – a huge variety of propagation to report on this time. I wonder what next month will bring? See you then. **PW**

News Extra


British Railways Amateur Radio Society

RAILS and RADIO

July 2024

The Jacobite on Glenfinnan Viaduct.
Photo by Bloodworx, from Wikimedia Commons, see page 28 for details

In this issue:

Editorial - Chairman's Points - Secretary's Scribblings
Rallies and Exhibitions - Membership Secretary's Topics
The Geordie and the Scotsman
West Highlands Still Steaming Ahead After 40 Successful Years
Royal Scotsman
International Museums Weekends: GB1FRT - BRARS at the J28 Rally
Lincolnshire Wolds Railway: GX4LMR - ROTA - AGM 2024
More article pictures - Volunteers Wanted
Cover Photos - Photo Credits
Society Information - Who to Contact - Members' Photos

Railways on the Air: September 28th and 29th

BRARS PUBLISHES JULY RAILS AND RADIO MAGAZINE: BRARS is pleased to announce the publication of the (badly delayed) July issue of its Rails and Radio magazine. The delay was due to problems with a computer used by one of our editors and we have altered the deadlines for our magazine in order to return to our publication schedule.

Our editors have been delighted with the response to our appeal for articles. We have been able to increase the page count for this issue to 32 pages (including covers) with illustrations on twelve of those pages.

Membership of BRARS is open to anyone interested in any aspect of railways (including trams, miniature railways, model railways and suchlike) and in any aspect of amateur radio (whether licensed or listener).

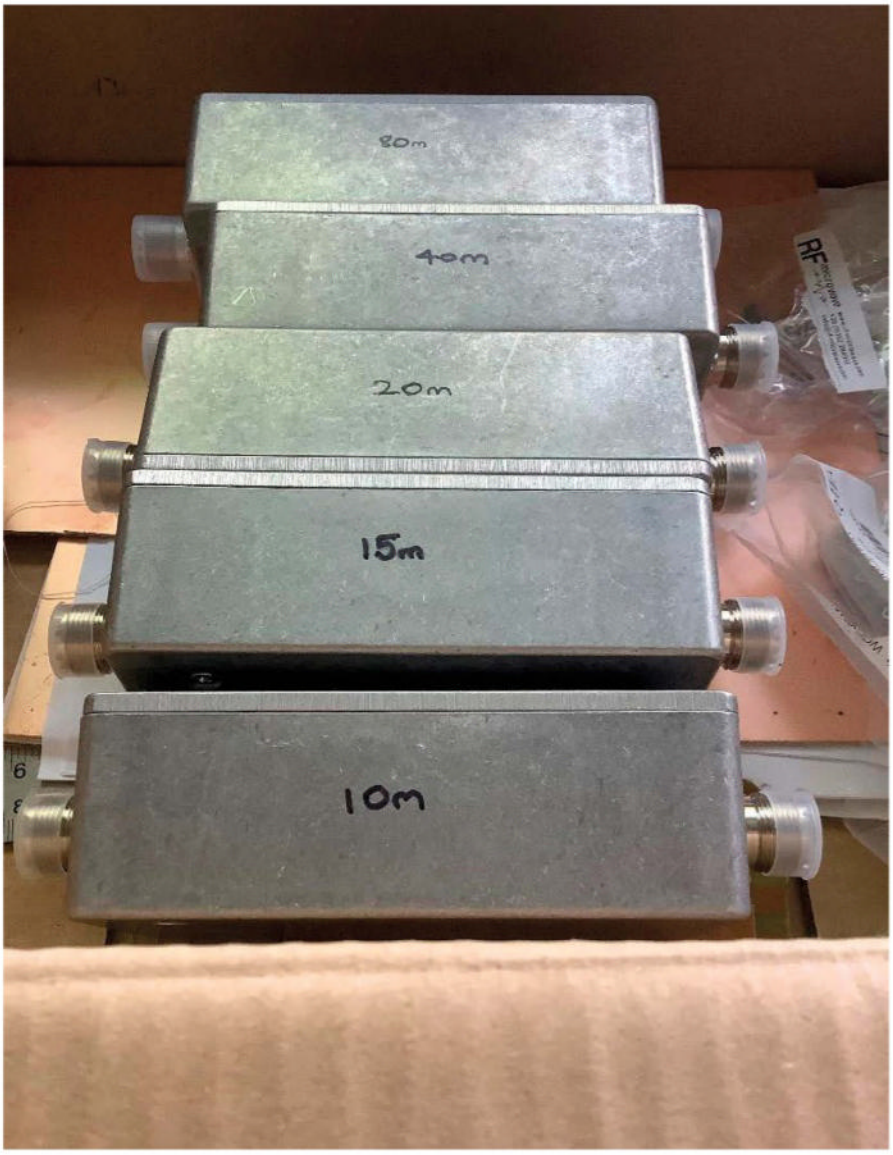
For more information about BRARS go to: www. BRARS.info

or contact the membership secretary **Richard Waterman G4KRW**, 170 Station Road, Mickleover, Derby, DE3 9FJ

membership@brars.info

OFCOM VIDEO ABOUT LICENCE REVALIDATION Ofcom has released a new step-by-step video on its YouTube channel to assist radio amateurs in the process of revalidating a UK amateur radio licence using the online licensing portal. Ofcom does note that whilst it is a requirement to revalidate your licence every five years, it is recommended to do it annually. Make sure you keep your details up-to-date and make a diary reminder to renew each year. You can find the video by going to the licence revalidation page on the RSGB website where you will also find a helpful FAQ prepared by the Society on the topic.

Tony Jones G7ETW
charles.jones125@yahoo.co.uk



Band Pass Filters

We welcome back **Tony Jones G7ETW**, this time with an article about building your own Band Pass Filters.

This is an article about an article. In 1988, **Lew Gordon K4VX** of Missouri, USA, designed and built Band Pass Filters (BPFs) for 160, 80, 40, 20, 15 and 10m using a three-pole Butterworth filter and had his write-up published in *QST*. At some stage the article found its way on to the internet and many people I'm sure have made use of it, now including my new radio club, the Royal Navy Amateur Radio Society (RNARS).

RNARS has a self-contained shack 'aboard' *HMS Collingwood* in Fareham, Hampshire. We have five operating bays, each equipped with an HF radio. (There is lots of other stuff as well, including an QO100 station and two, soon to be three, repeaters. RNARS is a club that believes in operating.)

Fantastic, you may say. And I agree, it is. But there is a problem.

Say I'm operating in one bay on 40m. If someone comes up in another bay on 20m, we give each other interference. When either of us transmits, the other sees a rise in the noise-floor. This makes it harder for both of us to work very weak stations.

K4VX called this 'intrastation' interference'. Any readers who do contesting will know this.

The simplest solution would be to separate the stations, but, generous as the Royal Navy is, asking for more buildings is not likely to end well!

This interference isn't ameliorable by better equipment or improved operating skills, I must stress. RNARS has some fine operators, and every station is as 'clean' as it's possible for Yaesu and Icom to donate. RNARS simply has too many stations, too close together.

Band Pass Filters

The solution was obvious: Band Pass Filters for each bay/band combination.

If I'm on 40m, with a 40m BPF inline, only 40m signals can make it into my receiver. Problem solved; what could be easier?

Well yes, but easy seldom means simple. The logical sequence of equipment would then become: radio, BPF, ATU (if used) then antenna. Each BPF would be band-specific, 'passive' as in unpowered, and quite standalone. A BPF is only needed for RX, strictly speaking, but it is also in circuit for TX, and must therefore be able to handle the maximum output power.

(An intelligent BPF is another kettle of fish. Such a thing could have multiple filters, switched by the band and frequency information provided by the radio. It could utilise much lower power-handling components because it would be switched out on TX. But that is not what we were thinking about.)

Then there is the human factor. If someone were to change bands, without changing BPFs, the new band would be obviously silent as the proverbial grave. Worse still, the radio or ATU looking out would usually see a very nasty load indeed!

(This has since happened. A visiting member, unfamiliar with the filters, experienced just this. On being told his error, he complained, in distinctly ex-navy language, how unintuitive this was!)

Build or buy?

Commercial single-band BPFs exist, starting around £120, with 100W power-handling. As a minimum we needed five, and with 200W power handling. It was therefore decided that we would do this as a club project.

We could have gone back to basics designed these filters in house, I'd like to think. But K4VX had done the work for us, including all the calculations and construction details. His article, well worth a read, is at:

https://tinyurl.com/22tazp4m

Fig. 1 shows the circuit and **Table 1** shows the L and C values.

Proof of concept

The 20m and 80m bands being the most used bands in the shack, we decided to make prototype BPFs for these, as cheaply as possible but true to K4VX's design.

Fig. 1: BPF circuit.
Fig. 2: 20m response.
Fig. 3: 80m response.

As **Stephen Butterworth** wrote in 1930: *"An ideal electrical filter should not only completely reject the unwanted frequencies but should also have uniform sensitivity for the wanted frequencies"*.

A BPF should therefore exhibit a vertical rise and fall capped by an absolutely flat top across the desired section of RF spectrum. **Figs 2** and **3** show the response of these simple filters, made straight from K4VX's recipe.

We did some on–air tests. Without the filters, the interference was low-level but persistently there. With the filters, there was no trace of it. Power-handling was a concern. K4VX's design was for 100W filters but during sustained 200W CW key-downs they barely warmed up at all.

Implementation

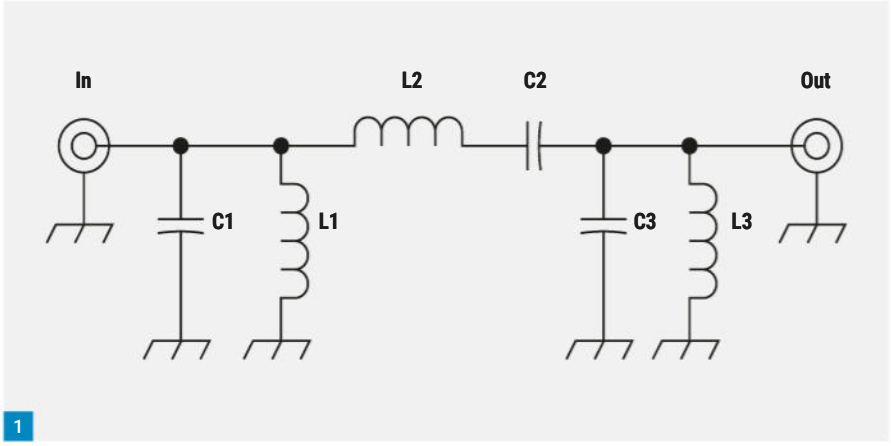
The first problem was the board. For the prototype, we opted for a tetris-like design on copper-clad board made with a Stanley knife and a ruler. Removing the unwanted copper was done using a butane gas soldering iron.

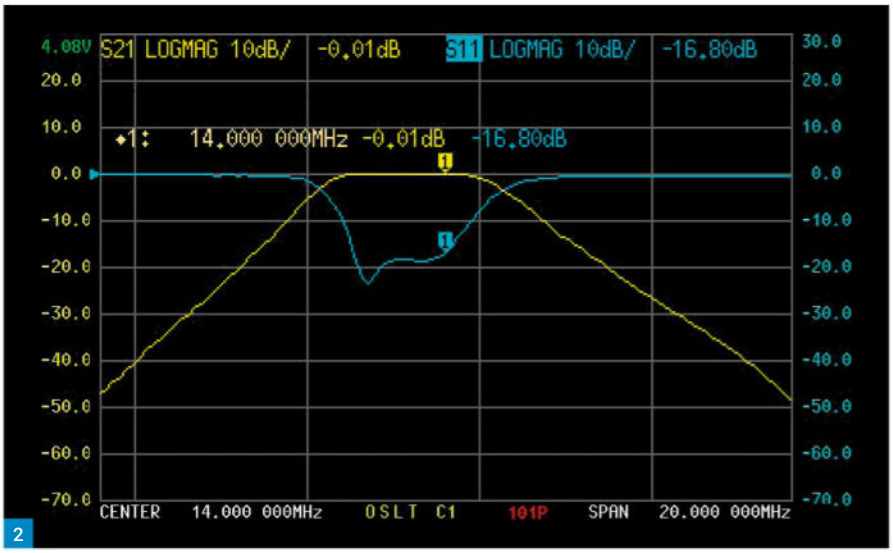
For the production run we needed five identical boards, and this prototype method sounded like hard work. So, we did an etching experiment in the shack with what was to hand, i.e. using a board marker as etch-resist. The 'block' layout was from K4VX's article. See **Fig. 4** – it worked, but getting a clean etch was clearly a hit and miss affair.

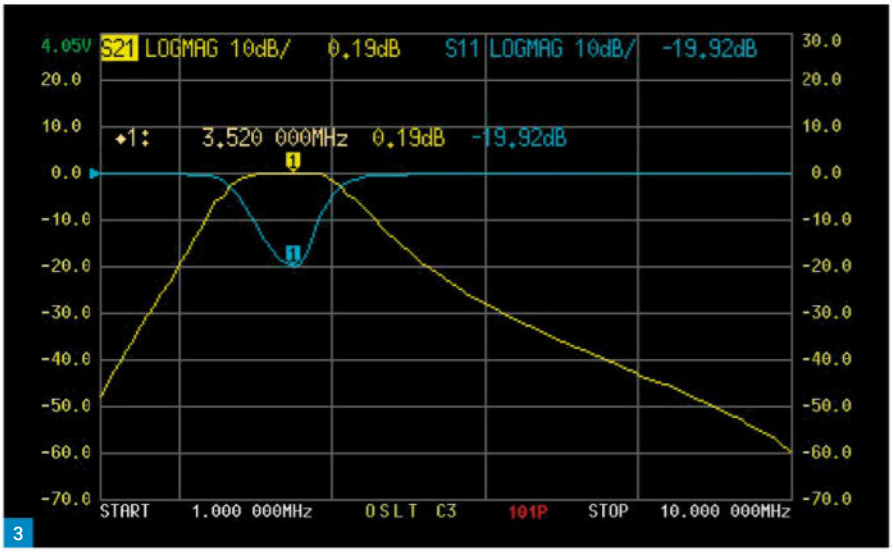
An obviously better homebrew PCB fabrication method was the 'toner transfer' process. This still requires an etch, but the layout can be very precise and no-etch areas are reliably well protected. A laser printer is required, and neither the shack nor anyone involved in the project had one.

Summer came and went; and as so often happens with team projects when the sun shines, progress stalled. I could – in retrospect, I should – have made Gerber files and had these boards done in China, but it seemed OTT for such a simple circuit.

Lacking other options, we fell back on our crude but effective 'cut and cook' process and made the raw boards, being really pleased with the results. The photo, **Fig. 5**, shows one pre-fitted into a box. To absolutely guarantee a good RF earth connection, the board is bolted to the case.





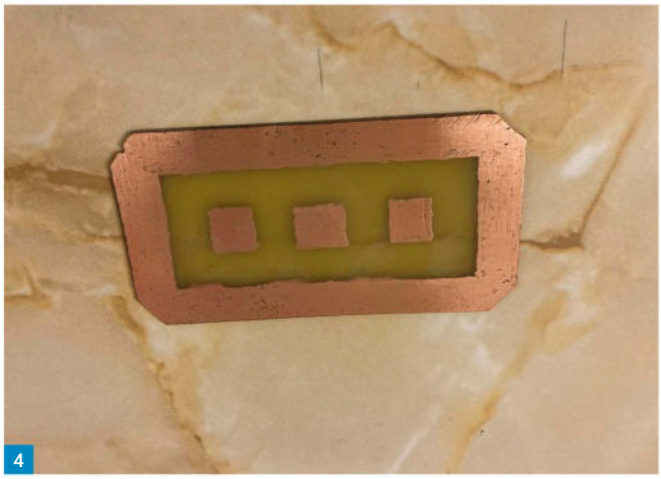


Populating the boards

Each filter has three inductors and three capacitors in a characteristic T-formation. The capacitors, 500V ones by necessity for our power-handling needs, were purchased, but the inductors had to be wound. A coil-winding calculator found on the internet gave us the lengths we'd need (See Table 1). We used T-80s, the slightly larger of K4VX's chosen toroids and two gauges of enamelled wire to make this task a bit easier.

Some of the club members had never wound coils, and for them this was a magical experience. *"We're doing proper radio"*, a new M7 said. Atlas LCR meters did a reasonable job of reading the inductances with the larger values. A VNA was used for the rest. K4VX did an excellent job of specifying these coils – I hate to think how much work went into that.

Fig. 6 shows the final assembly being done. That's the original article underneath.



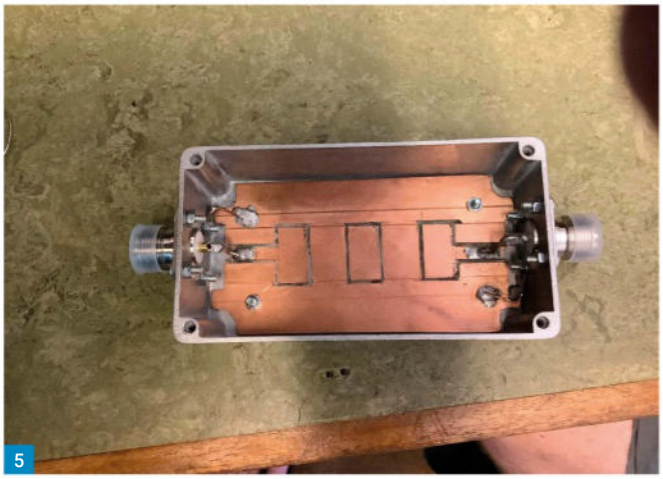


Fig. 4: Block layout. Fig. 5: Circuit board pre-fitted into box. Fig. 6: The final assembly.

Testing

We tested the 20 and 40m filters with two active stations.

With the filters in place – the 20m one on an Icom IC-7300 running 100W USB, the 40m for the Yaesu (FT-1000, 200W, LSB), the 20m station could not tell when the 40m one was transmitting at all. The other way round was not quite so good – there was a tiny noise-floor elevation still discernible on the Yaesu – but the reduction in interference (compared to no filters) was enormous.

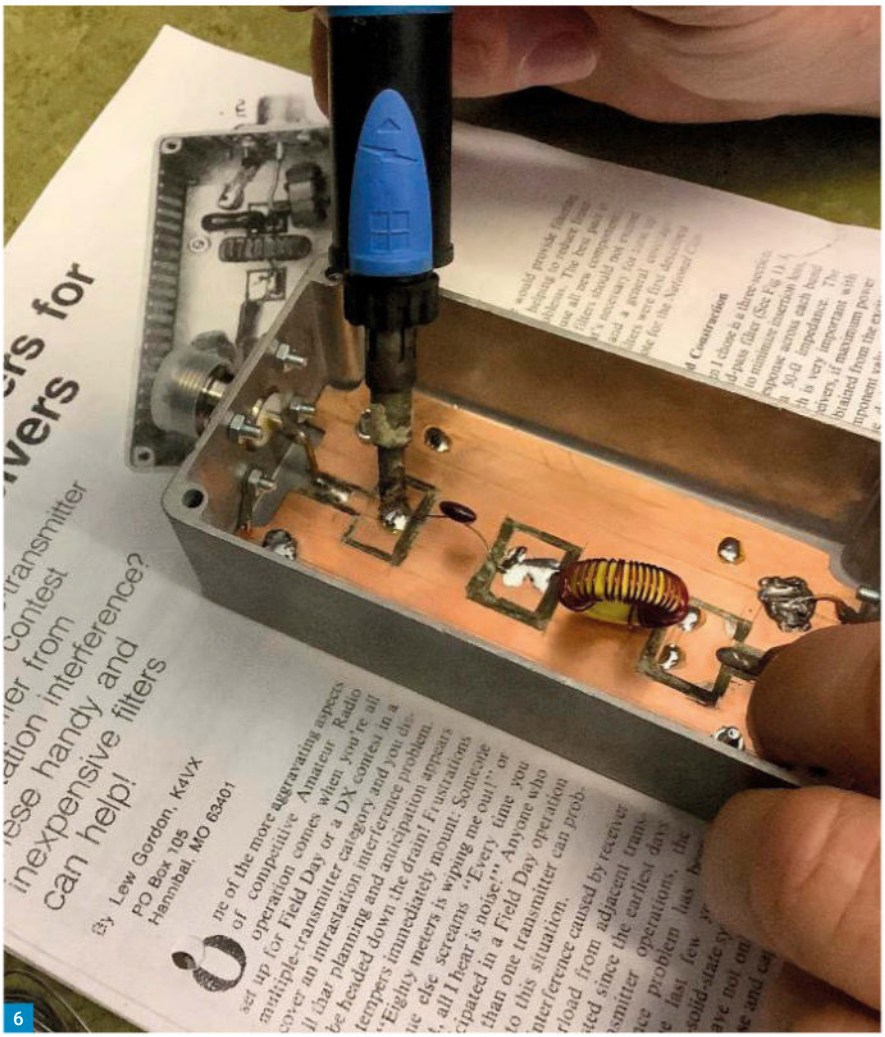
A full-blown test with all bays independently transmitting has yet to be conducted. Should the filters be found inadequate, we have the option to go to five-pole filters, as covered by K4VX in his article. There would be room in the boxes to do that, and copper-clad board is not expensive, so this upgrade need not be a big job.

Conclusion

I enjoyed working on this project with my fellow club-members, and what came out of it is useful and a success.

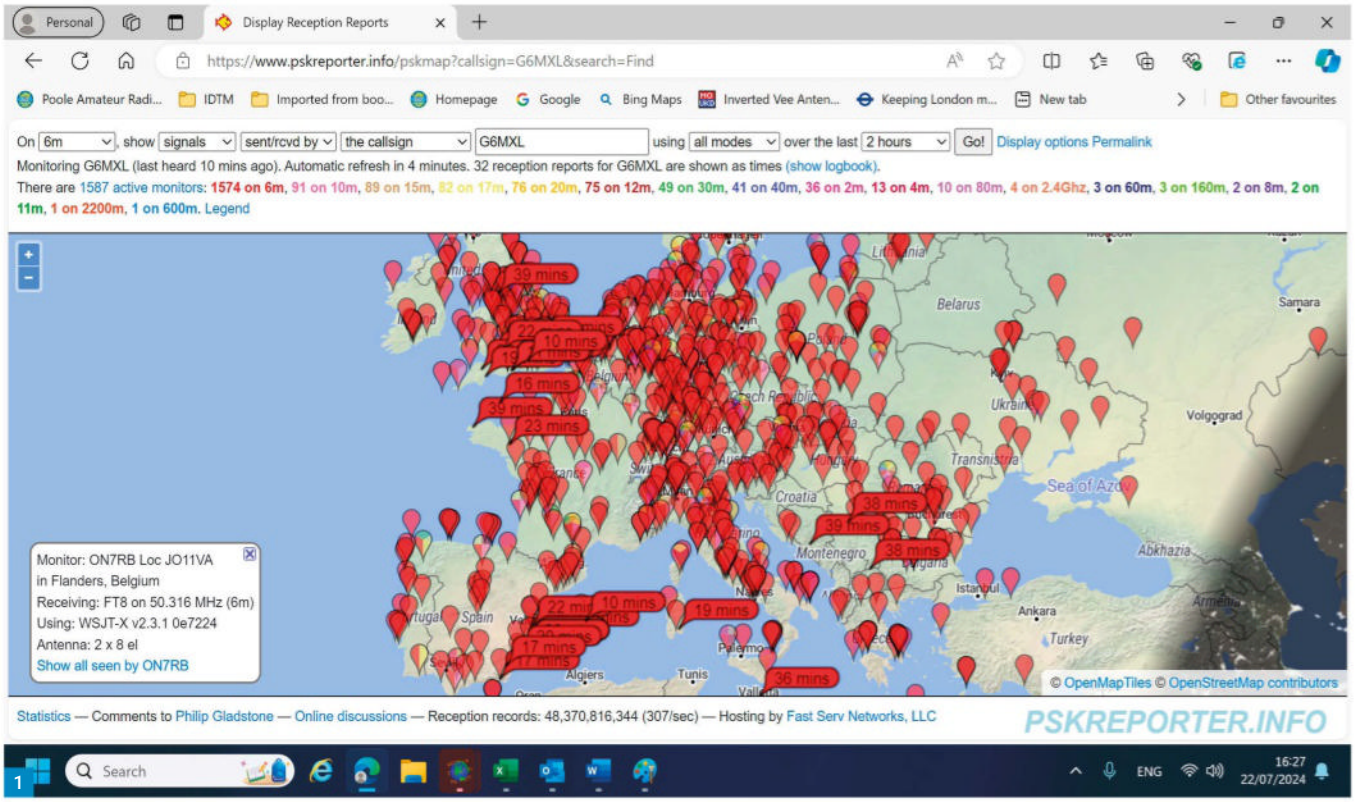
But that's not the point of the article. What strikes me is the way **Stephen Butterworth's** fundamental piece of radio technology, revisited by K4VX when he had a problem to solve, has come to the fore again.

In a digital age, this may all seem a bit old fashioned. But classic RF designs like this still work and can be used. And the hobby is all the richer for that. **PW**



Band MHz	C1/C3 pF	C2 pF	L1/L3 µH	L2 µH	T-80 Core Turns L1/L3	L2	Wire Length (cm) L1/L3	L2	Wire Gauge L1, L2 & L3
1.8	4000	400	2.2	22	23	70	56	156	24
3.5	2000	200	1.1	11	16	50	41	118	24
7	1000	100	0.55	5.5	11	35	31	85	24
14	500	50	0.28	2.8	8	25	23	62	20
21	330	33	0.18	1.8	7	20	20	51	20
28	250	25	0.14	1.4	6	17	18	45	20

Table 1: Component values & coil turns.



PSK Reporter & Exam Books

Colin Redwood G6MXL looks at a useful tool for checking how well you are getting out, before returning to the revised licence exams.

Colin Redwood G6MXL
practicalwireless@warnersgroup.co.uk

Welcome to this month's *What Next*. I'm starting by looking at PSK Reporter which works with FT8, RTTY, PSK and other data modes. I'll then return to the exam theme to look at the various books that are available for those taking the exams after 1 September 2024.

What is PSK Reporter?

One statement that I've often heard from newly licensed amateurs is, *"I'm not sure if I am getting out"*. Well, if you aren't making contacts, you need to know if your transmitting system is working. You could measure the power coming from your transmitter when connected via a power meter into a dummy load. Ideally, you'd like to get reports from other stations. But if you aren't hearing them, what can you do? Another way that might be worth investigating is using PSK Reporter. If you thought that PSK31 etc. had all but died out, don't worry, as PSK reporter also works with multiple data modes, including FT8 and RTTY. Effectively you have an army of radio amateurs around the world automatically monitoring the bands and sending in reports electronically in real time to a central database, which you can interrogate to see where your signals are being received.

I imagine many established amateurs will have received QSL cards from Short Wave Listeners (SWLs) over the years. While these can be useful, the fact that they are usually some months or longer after a QSO makes them of relatively little use to most amateurs. Imagine receiving multiple SWL reports from all round the world in almost real time with a 'real' signal report, and you'll start to understand the potential benefits of PSK Reporter.

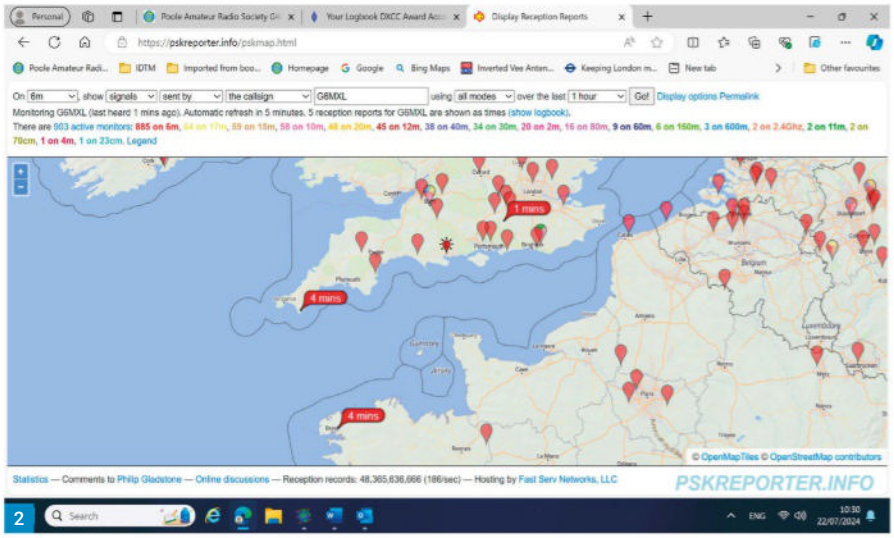
Perhaps you're an antenna experimenter who would like to compare results between two antennas. Just getting multiple reports from all round the world with 'real' signal reports after a few minutes of operation, and then switching to a different antenna, would be really useful. Does the new antenna get better reports that the old one? Does the new antenna allow you to work further or into different countries? And does it work better or worse on the various bands? It's also a great way for a QRP enthusiast to see just how far their precious few Watts are getting from their transmitter.

Maybe you like to assess the propagation on various bands? If you compare the two screenshots of where my 6m signals were received with an absolutely identical setup, you can see the difference in how far the signal travels when the band is open (**Fig. 1**) to when the band is closed (**Fig. 2**). If you hover your mouse over a particular monitoring station on the map, you can see some basic information about the monitor and a report of your signal.

Having a try

If you want to get a feel for PSK Reporter, which is free to use, I'd suggest visiting the PSK Reporter web site, there's no need to register: **https://www.pskreporter.info**

Enter your callsign and you'll see a map of the world. You can then select an HF band that you've operated on the last day or so, a relevant time period and your own callsign. If you haven't operated on the band for a while, you won't see anything, in which case you'll need to transmit using a popular data mode such as FT8, FT4, PSK31, PSK63 or RTTY, which are all supported as are a number of others. I'd suggest keeping your power really low (no more than 5 Watts initially). After a few minutes, you'll hopefully start to see reports coming in from around the world. If you don't, it could be due to poor propagation on the band you are using. You



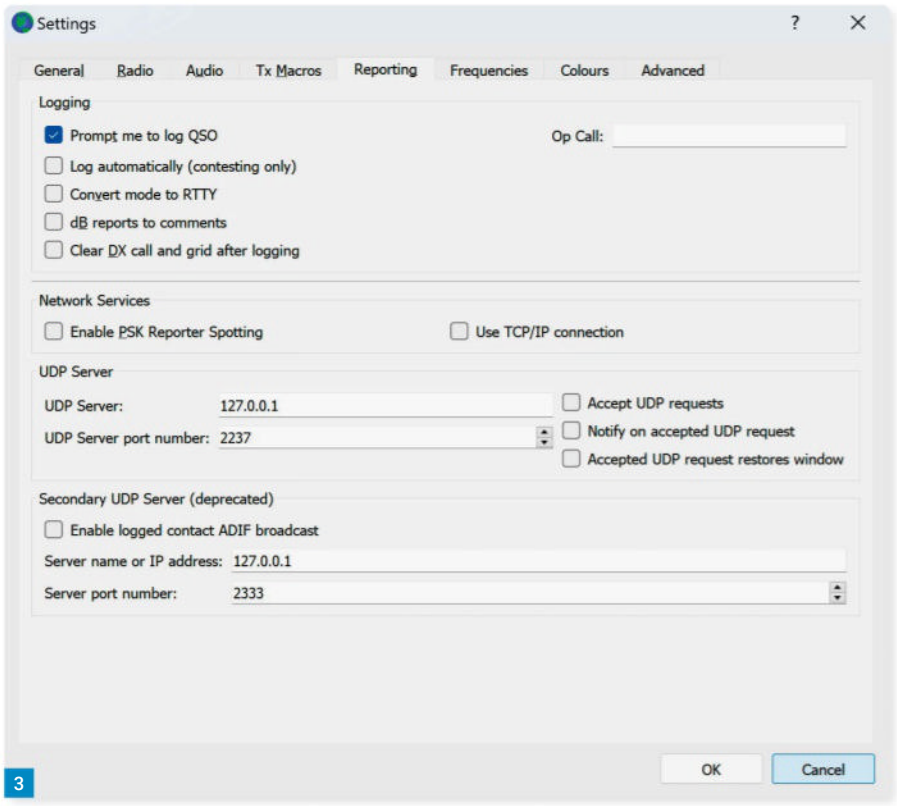


Fig. 1: PSK Reporter screenshot showing the 6m band open. Fig. 2: PSK Reporter screenshot showing the 6m band closed.
Fig. 3: WSJT-X Settings tab with the PSK Reporter checkbox.

could perhaps try a different band or mode or increase power.

Monitors

A monitor is a station (could be an SWL) that automatically reports signals received to the central PSK Reporter database. There are numerous monitors around the world. While the numbers vary by band, in total over 4,400 were active at one point during every hour over a recent five-day period in mid-July 2024. As might be expected, monitoring is largely focused on the HF, 6m and 2m bands, with much reduced numbers on other VHF/UHF/SHF bands – hence my suggestion to try HF first.

Becoming a monitor

If you are considering becoming a monitor, I'd suggest giving some serious consideration to which band(s) to monitor. I doubt if there is any real merit to adding to the numerous stations in the British Isles already covering the main HF, 6m and 2m bands. If, however, you want to provide a monitoring station on other VHF/UHF/SHF bands, then I think that you'll be providing a useful resource to your fellow amateurs. The website lists various data mode programs, including WSJT-X, Digital Master 780 (part of Ham Radio Deluxe), fldigi, Airlink Express, that can be integrated with PSK Reporter. To submit spots all you need is an internet connection and make a configuration setting in your data mode software. For example, the setting in WSJT-X version 2.40 is made on the Reporting tab of Settings (**Fig. 3**). Note that the exact location of the field may be slightly different in other versions of WSJT-X. When you next visit the PSK Reporter website, you should see your station visible on the map after a few minutes.

New syllabus

I'm returning to the subject of the new exam syllabus this month, as there are a number of updates which readers planning to sit exams from 1 September 2024 may wish to be aware of. Firstly, the RSGB have made a small correction to the syllabus for the Foundation exam, affecting item 1H1, which requires candidates to answer questions regarding the schedule to the licence. The link to the corrected syllabus (version 1.6A) is:

https://tinyurl.com/5n6hf3m7

RSGB training books

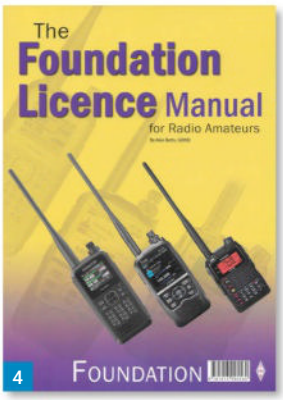
The RSGB published updated training books for Foundation and Full in mid-July 2024 for the new syllabus for exams sat from 1 September. When the syllabus has changed previously, the RSGB were rightly criticised for issuing the books too close to the implementation of the exams and not making it clear on the cover of the book which version of the syllabus the book applied to. The RSGB have certainly addressed these points, with the Foundation and Full books issued about six weeks before the new syllabus implementation date, and the front cover of all of the books coloured yellow – making them easily distinguishable from all previous editions (**Figs 4, 5** & **6**).

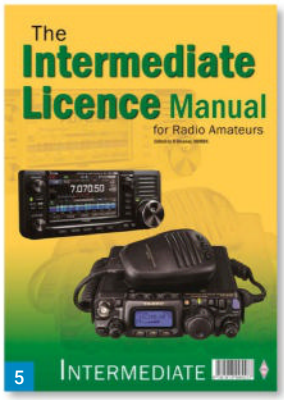
If you purchased the new Intermediate book, please check that it is the updated version. Apparently, a small number were printed and distributed without the updates being included. At the time of writing there's no updated version of the *Exam Secrets* book, although I understand that a new edition may be forthcoming. Make sure that you have the updated booklet that includes the updated licence schedule before sitting your exam!

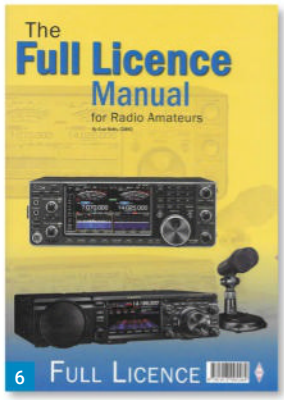
https://rsgb.org/main/clubs-training/forms

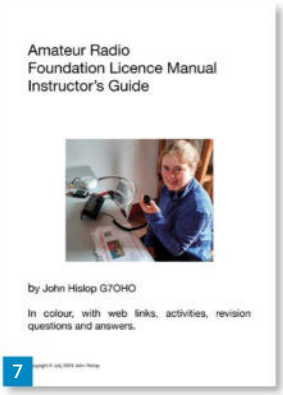
Hilderstone Radio Society books

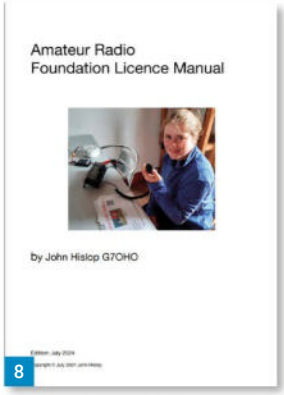
John Hislop G7OHO has updated his excellent training books, which can be downloaded for free from the Hilderstone Radio Society website. These have all been updated for exams taken

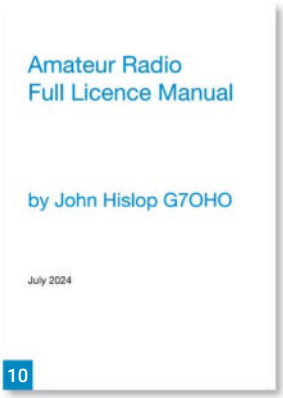


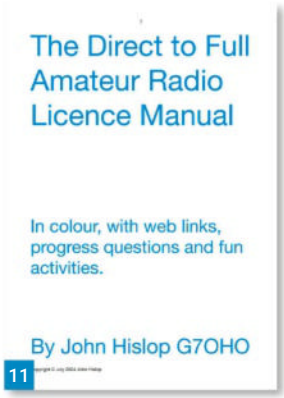












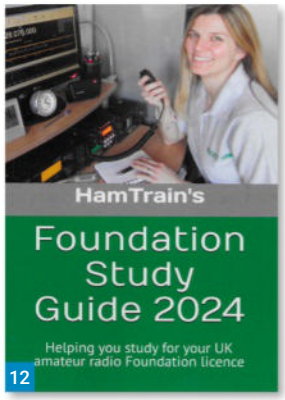


Fig. 4: The RSGB Foundation Book – The yellow cover is for exams from 1 September 2024.
Fig. 5: The RSGB Intermediate Book - The yellow cover is for exams from 1 September 2024.
Fig. 6: The RSGB Full Book - The yellow cover is for exams from 1 September 2024.
Fig. 7: John Hislop's Foundation Book for tutors (July 2024 edition). Fig. 8: John Hislop's Foundation Book for candidates (July 2024 edition). Fig. 9: John Hislop's Intermediate Book (July 2024 edition). Fig. 10 John Hislop's Full Book (July 2024 edition). Fig. 11: John Hislop's Direct to Full Book (July 2024 edition).
Fig. 12: HamTrain Foundation Study Guide 2024.

after 1 September. In case you are wondering why there are two books for the Foundation exam, one is intended for tutors (**Fig. 7**) and the other intended for candidates (**Fig. 8**). John's Intermediate (**Fig. 9**) and Full (**Fig. 10**) books are really good.

I really like John's books, as all of them include lots of practical things you can do to help you really understand some of the basic technical principles. The Foundation book, in particular, is designed to be suitable for primary school children, so the language used should not present a challenge to anyone working towards the exam. I recommend all candidates to download the relevant books. They each provide really helpful ways to get a better understanding of topics that some candidates struggle with, and offer a refreshing different approach to covering their respective exam syllabus.

www.g0hrs.org/g7oho-training-manuals

In addition to his books, John has produced some basic PowerPoint slides for those working towards the Foundation exam, which I found clear and to the point.

Direct to Full

This exam is designed for those who wish to obtain a full licence without going through the Foundation and Intermediate licence stages. Typically, it might suit someone who's studied electronics or physics etc. at A-Level or higher. The start date for the revised Direct to Full syllabus is for exams taken after 1 October 2024. Exam questions can come from topics in all three licence areas. The RSGB expect direct to full candidates to purchase all three of their books (Foundation, Intermediate, Full). John Hislop G7OHO has written a book aimed specifically for those studying for the Direct to Full exam (**Fig. 11**). It may be downloaded from the same website.

New Foundation Study Guide 2024

Until now, most candidates studying for their foundation licence and requiring a book to support their learning have generally turned to the *Foundation Now* book from the RSGB, perhaps supported by the RSGB *Exam Secrets* book, which provides some additional material for all three exams. Now HamTrain have produced the *HamTrain Foundation Study Guide 2024* (**Fig. 12**), written by **Peter Sipple M0PSX** of Essex Ham fame, who over the years have been responsible for training over 11,000 candidates!

The book covers both the pre-1 September syllabus and the revised syllabus for those taking their exam from 1 September, with changes clearly highlighted in grey boxes. There is also a summary of the changes in an Appendix. This makes it particularly useful for those who have trained on the pre-September 2024 syllabus and need to update their knowledge for the new syllabus or use on the air. It would also be an excellent refresher for those progressing to an Intermediate training course some years after taking their Foundation exam.

Having looked through the well-presented book, I think it is an excellent revision aid rather than a textbook for self-study from scratch. It includes some example questions, which I always think helps candidates get a feel of how well they are getting on.

The *Foundation Study Guide* can be obtained from Amazon either in traditional book form (£5.79) or a version for the Kindle (£3.99), prices correct early-August 2024.

Online

The Bredhurst Receiving and Transmitting Society hadn't updated their helpful on-line training material at the time of writing in early August 2024.

Nevertheless, in the areas of the syllabus where there's been no change, it is a useful resource, with material for Foundation, Intermediate and Full (used to be Advanced):

https://www.brats-qth.org/brats

1

Restoring a Heathkit HW-9

Daimon Tilley G4USI
practicalwireless@warnersgroup.co.uk

Daimon Tilley G4USI gets great satisfaction from bringing an old favourite back to 'almost new'.

First licensed as a teenager in the early 1980's, although my first HF rig was a second-hand Kenwood TS-520, I always had a keen interest in QRP. I remember, very well, the Heathkit HW-9 being launched in 1984 and looking at the ads in *Practical Wireless* with envy. I knew that as a schoolboy, I was not going to be able to afford the HW-9 kit, which was, to me at least, very expensive. I cannot seem to find the purchase price for 1984, but when *Ham Radio Today* reviewed the rig six years later, in the June 1990 edition (see link below) it was £250 for the basic version and just under £300 if you wanted to add the WARC bands kit – a long way out of pocket money range!

https://tinyurl.com/59pnx75z

Life moved on but my interest in QRP kept bubbling away just under the surface, then, some time ago, I spotted a HW-9, complete with WARC band board, on eBay. I bid on it while on holiday in Cornwall and managed to get it for £75 including postage. As you can see from the BEFORE pictures (**Figs 1** & **2**) it sported a few modifications! These included two holes on either side of the front panel, one for a potentiometer (number 7!) that was unconnected internally, and one for an 'ON' LED on the right-hand side. The original brown dial was also missing, with a handwritten white dial in its place. The top and sides of the case were also full of holes, which were not even round! These included holes for an internal speaker as well as other holes on the top and sides that seemed to serve no purpose.

Powering up

The rig powered up and sprang to life. Tests into a dummy load and watt meter indicated reasonable levels of power, which were: 80m = 4W, 40m = 5W, 30m = 4W, 20m = 4W, 17m = 2.5W, 15m = 2.5W, 12m = ZERO watts and 10m = 2W. A number of QSOs were made.

I decided that I would undertake a full re-alignment, and would attempt to fill the holes and re-paint. I know that some people might find that re-painting a classic rig like this is sacrilege, but it was already so 'modified' that I felt justified.

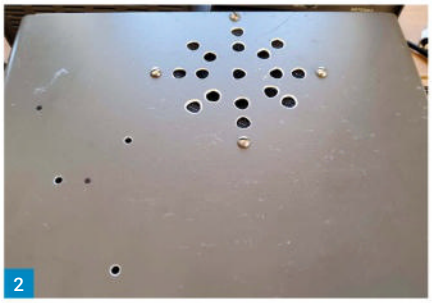
First, though, the re-alignment. Internally the rig was very clean and relatively unmolested (**Figs 3** & **4.**) I will summarise only here, but the original Heath manuals are readily available online and I followed the manual meticulously, realigning all the bands from start to finish. That gave me the following outputs into my power meter: 80m = 6W, 40m = 6W, 30m =5W, 20m = 5W, 17m = 3W, 15m = 3W, 12m = 1.5W and 10m = 2.5W. It was good to get some power out on 12m, but I was not satisfied with it.

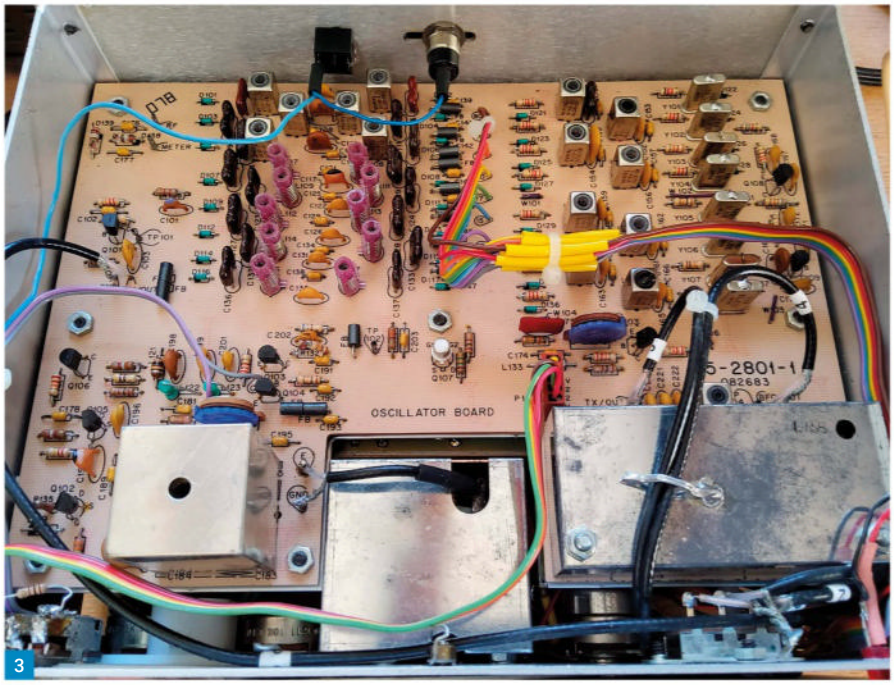
I went through the process again, but no change. Asking around on the HW-9 Facebook group, it was suggested I probe around the low-pass filters with my oscilloscope. I had considered these might be the issue, but that seemed unlikely when you consider that both 10m and 12m share the same filter.

The oscilloscope just confirmed what I knew already – the signal into the LPF on 12m was considerably less than any other band.

I then focused on the oscillator circuit board, realigning again. Through this process I must have turned the band switch hundreds and hundreds of times throughout the day.

After many hours poking and prodding, and turning that damned band switch, I decided to measure again for good measure. This time, as my power meter read to either 30 or 300 watts, and therefore I could not be sure of QRP accuracy, I decided to connect the oscilloscope to my dummy load. By measuring the peak-to-peak voltages, I was able to convert them in a spreadsheet to an accurate power output. Output was: 80m = 5.5W, 40m = 5.75W, 30m =5.3W, 20m = 5.75W, 17m = 4.6W, 15m = 4W,





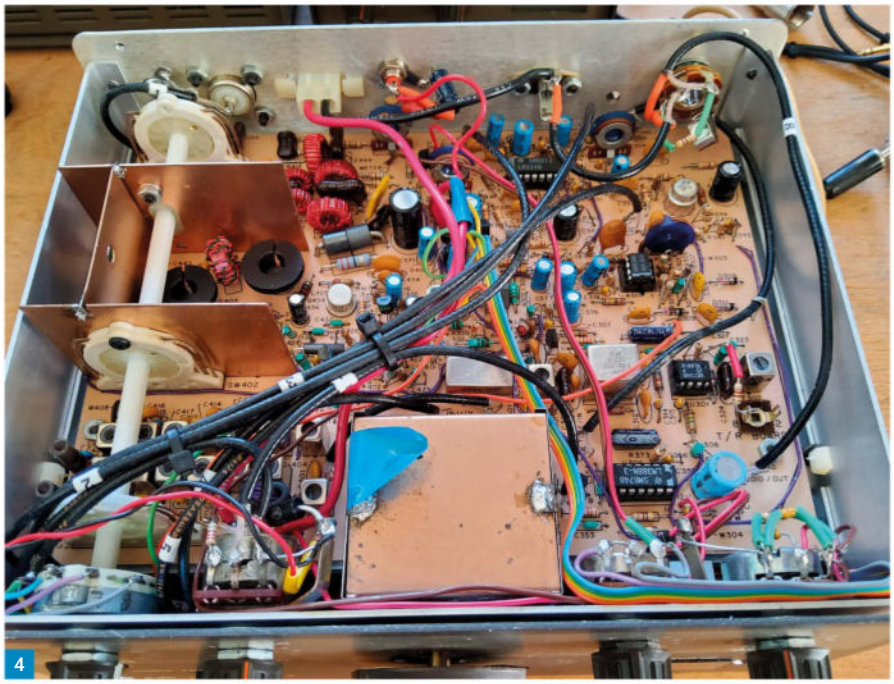


Fig. 1: Front before restoration.
Fig. 2: Top before restoration.
Fig. 3: Internal view, top.
Fig. 4: Internal view, bottom.
Fig. 5: Preparing the top cover for filling.
Fig. 6: Filling and sanding.

12m = 3.4W and 10m = 3.23W.

Success! I was very happy with that and decided to leave it there as it was pretty much in line with the original specifications. But what had improved things further, particularly on the 12m band?

Clearly alignment had improved 12m band output in the first place. After that, how did the further improvement come about? My conclusion, not that I will ever be sure, is that the rig had been mainly used on 80 through to 20m and that the band switch had oxidised on the higher bands. Through the re-alignment process, turning the band switch hundreds of times, I think I might have removed that oxidisation, allowing more current to flow to the oscillator board and improving output. That may be pie-in-the-sky, but it is the only theory I have!

Bodywork

Having taken care of the electronics, I turned my attention to the 'bodywork'.

The first step was to sand away the paint from the repair areas and to leave a smooth transition from paint to bare metal in these areas (**Fig. 5**). I applied a thin aluminium tape to the inner of the case holes and fascia holes I wanted to fill, to provide a little support, and clamped the piece to some plywood for the filler to push up against. Then I used Isopon P38 car body filler and various grades of wet and dry paper to sand it smooth. Most holes required a second layer of filler to make the imperfections just melt away. (**Figs 6** & **7**.)

Now to the paint! I went to a couple of local paint stockists and had the light and dark brown colours scanned. When the suggested colours from the machine were looked at on the colour cards and compared to the panels, I was not happy with the match. Instead, I spent half an hour or so poring over the thousands of colours in the DULUX and JOHNSON range of paints. I found two DULUX colours that I felt were excellent matches and ordered two tester pots.

7

8

Fig. 7: Front fascia filled. Fig. 8: The completed restoration. Fig. 9: The HW-9 'stack'.

Back home I sanded and primed some scrap aluminium in exactly the same way I did the case, let the paint dry and compared results. I have to say they were very good. As the area on the fascia was so small, and because of all the decals, I tried to use the dark brown test pot with an artist's brush to touch in. It didn't work. While a close match, it was a big enough area, and the difference sufficient, to look a complete bodge! I also noticed that Matt was not the correct finish – I needed Satin. But the colours were close enough and having looked at other colour ranges I was not going to do any better. What to do?

Well, the touching in on the fascia by hand had increased the size of the repair around the original hole area too. I was becoming concerned I had bodged the job and wondering if I should have just 'loved' the holes on the front fascia! I couldn't leave it as it was. I had to do better, so I decided the whole dark brown area needed respraying. But what to do about the decals and the light brown inset?

Well, after a very careful hour or two, with masking tape and a new craft blade, I managed to entirely mask off the lighter brown area and the decals on the dark brown. Some of the bits of tape were minute!

Next, using the chosen colour codes, I was able to order aerosol cans of the correct colour in a satin finish, from an online retailer. Several very careful coats of grey primer and the final colour were applied to both the front fascia and the outer case, over a couple of days. Oh, *"what are the colour codes?"* I hear you ask. How could I forget! The paint is DULUX Satin, the lighter brown case is 10YY/14/080 and the dark brown on the fascia is 30YY/05/044.

The case came out really well, albeit maybe a fraction lighter than before, but I know from the accessories that the colour from the factory really did vary a bit in any event. The holes had completely vanished and it looked like new. I then turned my attention to the front panel, and painstakingly removed the masking tape. I was very relieved. It was a vast improvement on the Mark 1 bodge and the holes had completely vanished without trace. If you want to be really picky, then close up you feel a slight difference (microns) of height difference between the paint under the original decals and the new paint. There is also a tiny amount of bleed from the grey primer onto the edges of the lighter brown inset. I tried to remove these but in the end decided to leave it rather than undo the good work thus far.

The final bonus? Remember that tatty white, handwritten dial. Well, when I took it off, it was nothing more than the reverse of the original brown dial! I touched up some white chips on the brown dial and realigned the dial on the VFO for accurate frequency display. Putting it all back together was a joy and I soon worked some stations on 80m with my EFHW antenna. This little radio is looking decidedly more healthy and I love to use it. **Fig. 8** shows the completed renovation, and comparing it back to Fig. 1 leaves me feeling rather satisfied.

And, finally, while undertaking the work, I was hugely fortunate to come across the matching SP-99 external speaker (which I now needed, having done away with the internal mod), the HM-9 QRP Watt Meter, the HFT-9A Antenna Tuner and the HD-1422-A Noise bridge. Sadly, the latter is more of a dark blue colour than Heathkit brown, but it is still a nice addition. The restored rig and accessories are shown in **Fig. 9**. The small box on the top left of the HW9 is a CW keyer, sprayed to match. All I really would like now is the original PSA-9 Power Supply – if anyone knows of one, in any condition, please do get in touch.

9

The rig, although definitely old-tech, is a delight to use (for me anyway) and it transports me back to those teenage dreams of owning one. I now own literally dozens of commercial and homebrew rigs, and at some point I will need to downsize, but this one? This one is a keeper for life!

My thanks to members of the HW9 User Groups on Facebook and GroupsIO for their support during this restoration. Lots of HW9 information is freely available on the web, and there is a March 2022 *PW* article by **Ian Liston-Smith** on the HW9 and its features, flaws and modifications, which makes good reading. **PW**

Steve Telenius-Lowe G4JVG
teleniuslowe@gmail.com


1

Lots of sunspots but …

Steve Telenius-Lowe G4JVG reports that while solar activity has been high, solar disturbances have rendered the HF bands somewhat variable this past month.

As a (mainly) HF operator, I have always considered HF DXers and contesters to be the 'international ambassadors' of amateur radio, promoting friendships across the world. This was brought home to me recently when I received an email from **Yoshihiro Shoji JG7AMD**, who I had last met 31 years ago when we were both working in Papua New Guinea. I was licensed as P29DX and Yoshi became P29JA after he took the PNG licensing exams – no mean feat when English is not your mother tongue and you don't even use the Latin alphabet! (In those days there was no reciprocal licensing agreement between Japan and Papua New Guinea.)

In early August Yoshi was on a business trip to the UK and on his way back to Heathrow he diverted to Exmouth to meet **Eva ex-PJ4EVA** and me. We were pleased to invite him to lunch (**Fig. 1**) and spent a very pleasant day talking amateur radio and reminiscing about our experiences in Papua New Guinea. Yoshi is a keen DXer and contester and has 'guest operated' from the DF0HQ contest station and HV4NAC in the Vatican. During this visit he operated QRP from his hotel in Newport as MW1AMD.

Solar cycle 25

In mid-July the sunspot number rose to 272 and remained above 200 for much of the rest of July and into August before dropping back below the 200 level. But by 7 August it was back up at 250 again, just in time for the start of the Jarvis Island DXpedition, while the following day it had risen to 322 with the solar flux at an incredible 303 units, although this was associated with an X-level solar flare.

While this all sounds like great news for HF DXers, operators found that propagation was not as good as it *should* have been at the peak of a solar cycle. I think there are a couple of reasons for this. Firstly, propagation during the summer months is never as good as it is in the autumn, spring or even winter. Secondly, the high solar activity led to many flares and coronal mass ejections which depress HF propagation. As noted in the July *HF Highlights*, though, following the 'summer doldrums' conditions should improve dramatically and (without wishing to tempt fate!) by the time this issue of *PW* is read in September / October there should be some excellent propagation on all the higher HF bands.

Yet more on SuperFox

The K8R American Samoa DXpedition in July provided the first test-bed for the new SuperFox mode (see the August and September *HF Highlights*). This test operation revealed a bug in the software, which was quickly fixed with a new release, WSJT-X 2.7.0-rc6. This (or later versions) will be required by operators wishing to contact any DXpedition using the SuperFox mode. The software is available from:
https://wsjt.sourceforge.io/wsjtx.html

Yet more on the UK – NZ centenary

In last month's *HF Highlights* we provided details of the special event stations that will be on the air to celebrate the 100th anniversary of the first trans-global communications between the UK and New Zealand. There is now a really excellent website that includes plenty of details about the run-up to the historic contact being made in October 1924, with biographies of the individuals involved and photos of them and their equipment, e.g. **Fig. 2**. It's well worth a look.

A reminder that GB2NZ and ZM100DX will be on the air from 29 September to 26 October, while G2SZ and ZL4AA will be active from the original locations between 14 and 18 October. A certificate, the 'Goyder-Bell Award', will be available to stations who make contacts with the special event stations. Full details are on the website:
www.gb2nz.com

The month on the air

The 'big one', N5J operating from Jarvis Island, IOTA OC-081 (**Fig. 3**), started activity on SSB, CW and FT8 on 7 August and by the 11th had already made over 50,000 QSOs with about nine days more to go. All QSOs with N5J will count for DXCC, but for IOTA purposes only those QSOs made with the operators located at the island count. Those QSOs made with operators who were activating the N5J stations remotely over the internet do not count for IOTA (the callsign of the operator at the time of the QSO will be made clear with the verifications).
jarvisisland2024.com

What to look for in September-October

Although this is the *PW* October issue, many readers should receive it before or during the September 6O3T operation from Somaliland, part of Somalia. Activity is planned on all bands but with an emphasis on the low bands.

Likewise, between 7 and 11 September, five Irish operators will be active as EJ7NET from the Aran Islands, IOTA EU-006, on SSB, CW and FT8.

A major DXpedition to Nauru in the central Pacific has been announced by the German group that put on P29RO (Papua New Guinea) in 2022 and T2C (Tuvalu) last year. They plan to be active as C21MM using multiple stations, 24 hours a day from 11 to 27 October, on SSB, CW, FT8 and RTTY on all bands from 1.8 to 50MHz.
c21mm.mydx.de

A combined UK-US team consisting of **Rich M5RIC**, **Martin GW4XUM**, **Charlie K1XX** and **Marty W1MD** will sign TO2X from Guadeloupe in the CQWW SSB contest. Before and after the contest the operators will sign FG/own calls.

Look for TY5C (Benin), operated by **Luc F5RAV**, from October until February 2025 by **Gerard F5NVF** on CW and FT8.

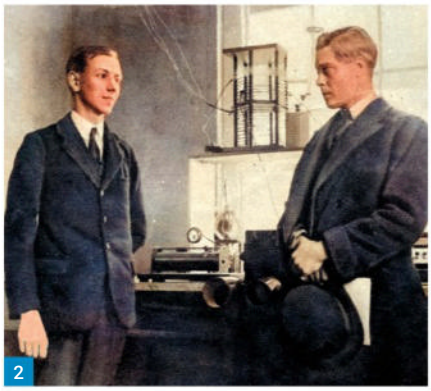


Fig. 1: Eva ex-PJ4EVA, Yoshi JG7AMD, and your columnist, August 2024.
Fig. 2: The then Prince of Wales (later Edward VIII) met Cecil Goyder 2SZ at his station at Mill Hill School (photo: www.gb2nz.com).
Fig. 3: Jarvis Island, home of N5J (photo: Wikipedia).
Fig. 4: The sack trolley station of Ken EA5/G4VZV at the Costa Blanca salt lagoons.
Fig. 5: What a great location! Operating site of 2M0HPI/P from the Isle of Mull.

Brian GW4DVB was scheduled to operate as J88PI between 12 and 21 September (see last month's *HF Highlights*) but the operation was cancelled. In early July the Palm Island Resort suffered serious damage from Hurricane Beryl and the island is now closed. Nearby Union Island was almost completely destroyed by the hurricane.

www.palmislandgrenadines.com

The MM0UKI Flannan Islands operation was also cancelled due to the weather conditions.

Readers' news

Tim Kirby GW4VXE said that he had not worked N5J although he had heard them, weakly, on CW a couple of times. *"Even on FT8, the signals have been sufficiently weak that the new SuperFox code wasn't decoding consistently. It's clear that efficient though the SuperFox mode is, you have to be receiving the DX station fairly well to get decent decodes. I was starting to think that my station wasn't working very well on account of very few decodes from N5J, but when I went over to the WAE CW contest, and had some fun late night QSOs on 15m with ZM1A, VK2GR and VK1A, it gave me more confidence that things were, after all, working OK."*

Etienne Vrebos OS8D admits to having been curious about the new Belgian Bunkers On The Air (BOTA) programme, which started on 1 July and which he believes was inspired by the UK version (see feature in this month's magazine – ***Ed***). *"We have here more than 1000 bunkers – that's a lot! I didn't know that we built such strong defences... I worked about 30 Belgian BOTA and activated 20 of them – it's easy as I have here in my direct neighbourhood 50 of them. But I think I will continue my castle activations; you can't be everywhere. The main importance is that BOTA brings a lot of new guys on the air and it seems those newbies prefer BOTA than castles – no idea why! – but it's nice to have new life in /P activities."*

Ken Churms EA5/G4VZV wrote that he was active from the salt lagoons on the Costa Blanca coast of Spain in July and early August. He was active on SSB using a modest home-made sack trolley station, **Fig. 4**, and worked many VK and ZL stations on 14, 18 and 21MHz. The salt lagoons are rare counters for Parks On the Air (POTA).

Carl Gorse 2E0HPI operated as **2M0HPI/P** during a five-day trip to the Isle of Mull from where he activated GMFF-0151 and POTA reference GB-0848. He made 249 QSOs, *"logged during some pretty harsh conditions. I had managed to catch an opening on 15m FT4 running 10W with the small portable vertical antenna by Mad Dog Coils* (**Fig. 5**)*... I also did the Isle of Iona HeMa summit GM/HSI-089 and managed 22 QSOs on 40 and 20m SSB. In total, despite the conditions, I worked around 316 QSOs and got bitten quite a few times activating by the Scottish midges. Other than that I had a fantastic time running the Xiegu G90 10 to 20W with the Mad Dog Coil antenna on SSB, FT4 and FT8."*

Jim Bovill PA3FDR wrote that *"Despite the generally favourable predictions about improving propagation in the upper HF bands for this month I only managed two DX QSOs in the 10m band, both in the last two days of the month. Most DX activity was in the 15m and 17m bands. My highlight of the month was the QSO with the UN New York headquarters station (4U1UN) which I have been trying to contact without success for some years. Special event stations are quite common on the air, some of general interest to me, others less so. Although not DX, one Polish station celebrating a*

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Fig. 6: The St John's Amateur Radio Club, Newfoundland, emergency command centre during ARRL Field Day. Fig. 7: Mark M0UFC/P operating QRP on FT8 / FT4 and WSPR.

Festival of Roses caught my attention (HF0ROSA) as I am a passionate rose grower."

Owen Williams G0PHY reported *"very little activity here this month; the summer doldrums must be here or maybe after working FT4GL I'm having trouble motivating myself to get on the bands. The only DX I worked was 5B4AIF on 21MHz during the IOTA contest; apart from that I managed a few of the French Olympic SES. The solar flux has been high but so has the A index. Early this morning there were stations form western USA at good strength on 14MHz and I've also heard VKs on 14MHz most mornings when I've been listening."*

Normally a CW man, this month **Carl Mason GW0VSW** decided to use FT8 and FT4 *"so I could dip in and out operating depending on how I was feeling. It was nice to pick up a few 'new ones' during a week or so's activity."* As a result, Carl now has only five to go to achieve DXCC on digital modes using QRP.

Reg Williams G0OOF and his wife spent a month during June and July touring Newfoundland. At Signal Hill, where in 1901 Marconi received the first transatlantic radio signal, there is an amateur radio station, VO1AA. Unfortunately, no-one was in attendance when Reg visited, but the following day he met members of the St John's Amateur Radio Club who were operating in the ARRL Field Day from a mobile emergency command centre near Signal Hill (**Fig. 6**). **Chris VO1CH**, a British ex-pat, told him that any amateur visiting Newfoundland who would like to operate the VO1AA station at Signal Hill should contact him via email at info@sonra.ca

It's been a few years since we have heard from **Mark Bryant M0UFC**, so I was pleased to receive a detailed report on his recent digimodes holiday operation from near Filey in Yorkshire. *"This year, my specific aim was to learn more about FT8 / FT4 and WSPR using my kit-constructed QRP Labs QDX hi and lo-band digital transceivers. Digimodes are family friendly, with WSPR offering opportunities to test propagation whilst allowing time for domestic duties... I took my I-Pro Traveller antenna for 20 – 10m, a 10m pole and a selection of EFHW wires. Most contacts were made on 30m with 15m of wire and a SOTABEAMS Pico Tuner. In the photo* (**Fig. 7**) *you can see the tuner is held just above the grass in order to achieve a 1.1:1 SWR at 10.136MHz. The laptop is a cheap netbook running WSJT-X on Linux Mint and the QDXs are run from a 12V power pack with SM converter at 7.5V to achieve 2 to 3W output on all bands 80 – 10m.*

"For QRP modes, an oft-quoted line is to exercise patience, and I found that to be true with FT8 / FT4. Answering a CQ call did not always get an immediate reply, as the caller may have had multiple responses and I had to wait for several passes before my call was picked out. My signal is on average about 10dB down and replying to stations who are -15dB is possible but restricted with QSB. When I called CQ, on occasions I had multiple replies and lost some of those waiting. Manual replies after the first caller sometimes worked but calling CQ again usually brought them back. Changing TX frequency often helped complete contacts. With varying conditions, at times the waterfall would show only faint signals, but calling CQ seemed to pull out closer European monitors. Throughout the week I made 135 contacts, none in the UK and mostly on 30m where there was no FT4 activity at all."

28MHz beacons

Neil Clarke G0CAS reports on the 28MHz beacons logged during the month of July although he noted that *"unfortunately, this report has five days with no beacon observations taking place, from 8 to 12 July"*. There was a continuation of poor Sporadic E conditions during the 2024 summer season. As in June, openings took place every day but very few were widespread and lasting for most of the day. On the 29th, 24 European beacons were logged and on the 5th 20. These were the only two days when more than 20 beacons were heard, compared to eight days in July 2023. One other observation was that there were more openings taking place in the morning as opposed to the late afternoon and evening period. South American beacons were good as expected, with LU2DT 28193 heard on 26 days and PY4MAB 28270 on 16 days. Other than 4U1UN 28200, which was heard during the afternoon on the 25th, no other beacons were logged from North America. ZS6DN 28200 in South Africa was logged on 13 days. Still on 28200, 4X6TU and OH2B were heard on 14 days. No beacons from the Pacific or Far East were logged.

Band highlights

Key: Q = QRP, M = 100W, H = >100W, S = Single-element antenna, B = Beam (see January *HF Highlights* for a more detailed explanation.)

Tim GW4VXE (MS): 10MHz FT8: CE4HUS, CO8LY, HC7AE/1, JW/WE9G, K6VHF/HR9, LU5FF, NP3DM, PY5XT, plus VK2, 4, 5, 7. **18MHz FT8:** 3B8CW, BG8TFN, HI8ML, JA2, 4, 5, UN7QAT, XU7GNY. **24MHz FT8:** FM4LV, LU7HN, UN7CBY. And, as **GW4MM (MS): 14MHz CW:** BG0DLA, VK1A, WP3C. **18MHz CW:** CE2SV, ZA1RR, XQ6CF. **21MHz CW:** FY5KE, TA2/DL2JRM, VK1A, VK2GR, ZM1A.

Etienne OS8D (HB): 14MHz SSB: HK4X. **21MHz SSB:** HD1QRC93, JA7NVF, TO7K, TO7PX, YH3AA, YH7OA.

Carl 2M0HPI/P (QS): 21MHz FT4: AA4AZ, NX5E, W6NWS, VE9CF.

Jim Bovill PA3FDR (MS) 10MHz FT8: 4J3DJ. **14MHz FT4:** KS4OT. **14MHz FT8:** 4U1UN, BA3KY, HS5NMF, JY5IB, UN7LEW, VK2FZR, VK3SIM, YC2FZR. **18MHz FT4:** 9K9WWA. **18MHz FT8:** 4K3ZX, CX6TU, BD5CAM, JH4ALY, JA5SLV, K7OGW, KL7J, PY2NF, UA9KBC, XU7GNY, ZS4JAN. **21MHz FT4:** 8E1YB, JA1WPX, R9WJ, W5XO. **21MHz FT8:** 5Z4VJ, A92AA, BA7LUI, BG5CAH, CR3GPDX, A61QQ, D2UY, HL3EFM, HS72KING, JA5BDZ, JR2SHA, PY2ZZ, R9SR, UN7IV. **24MHz FT8:** 4L4CR, A61QQ, HS0ZOQ, JE2UFF, JF8QNF, PP5TG. **28MHz FT8:** CX3VB, PP5CF.

Carl GW0VSW (QS): 7MHz FT8: CO8LY. **10MHz FT8:** TF5B, W3UA. **14MHz FT4:** EA8CZ. **21MHz FT8:** 5X25HV, KP2BH, ZS1WO. **21MHz FT4:** FR4OM. **24MHz FT8:** A41VT, A71UN, PU2UTY, TA9J/P. **28MHz FT8:** 7Q5BM, 9K2HN, A41VT.

Mark M0UFC/P (QS): 10MHz FT8: CT3MD, RA0LQ/MM, RW9JZ, SQ24TSR, W3UA, Z380ASNOM. **18MHz FT8:** EK/RX3DPK, K5EK.

Signing off

Thanks to all contributors. Please send all input for this column to teleniuslowe@gmail.com by the 11th of each month. For the December issue the deadline is 11 October. Photos of your station, antennas or you in the shack are always welcome. 73, Steve G4JVG. **PW**

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Rallies & Events

All information published here reflects the situation up to and including **22nd August 2024**. Readers are advised to always check with the organisers of any rally or event before setting out for a visit. To get your event on this list, email the full details, as early as possible, to: **practicalwireless@warnersgroup.co.uk**

21/22 September
EAST MIDLANDS HAM & ELECTRONICS RALLY: Beckingham Village Hall, Southfield Lane, Doncaster DN10 4FX. Although the venue has a Doncaster postcode, please note that it is in fact very close to Gainsborough and well connnected to road networks. We invite traders, special interest group exhibitors and visitors with an interest in any aspect of radio - whether amateur, CB, PMR, Meshtastic or in computers and electronics to attend and make this a fantastic weekend! As this will be a 2-day event, we are offering overnight camping on Friday (20th September) and Saturday (21st September), and a Saturday evening barbecue. Refreshments are available on both days. Strictly no dogs (except assistance dogs) allowed at this venue. Doors open for visitors: Saturday 9.30 am until 4 pm, disabled 9.15am; Sunday 9.30 am until 12 pm (noon) disabled 9.15am. Admission: £3 per person per day Doors open for traders: 7 am, floor and walkways to be clear by 9am; inside tables £10 per day per table; outside pitches £8 per day (boot sale, tables NOT supplied) Overnight camping is available Friday 2pm till Sunday 2pm, £10 per night, toilets and showers provided. Onsite bar: Friday 6pm -10pm (for overnight campers only), Saturday 2pm – 4pm (all visitors) and 6 pm -10 pm (for overnight campers only). For booking call John or Chris 07767 146574 / 07579 775717 or
http://www.g0raf.co.uk/rally

22 September
9TH RADIO & ELECTRONICS RALLY: The Campus Community Centre, Worle, Weston super Mare BS24 7DX. Organised by Weston-Super-Mare Radio Society. Admission: £3. Opening times: 10 am - 12.30 pm.For further information and to book a table please contact:
westonradiosociety@gmail.com

27/28 September
THE NATIONAL HAMFEST: Newark Showground. NG24 2NY. Main gate opens at 0930 for admission to the flea market and 1000 for the main hall. See also this month's News pages.
www.nationalhamfest.org.uk

5 October
CARMARTHEN ARS SURPLUS EQUIPMENT SALE: Cwmduad (pronounced Cum-Doo-Ad) Community Hall (which is located on the A484). All radio amateurs and SWL are welcome, including non-members. Parking outside the hall is limited, so visitors are recommended to arrive early. There is a bus service available to and from the village (Number 460) which runs between Carmarthen and Cardigan, via Newcastle Emlyn. Light refreshments are also available. Come along and pick up a bargain. Sellers will be welcomed from 0800 to set up, and doors open to the public from 1000 until 1500. Disabled visitors may enter from 0930 onwards. Vistor entry will be £2 per head. Large tables are available to rent at £10 each and small tables are available at £5 each.
Andy, GW0JLX 07768 282880

5 October
DX FÉILE: Temple Gate Hotel, Ennis, Co Clare. Presentations on CY9C, 8R7X, 7P8EI and N5J.
David EI9FBB: ei9fbb@gmail.com
Tel: +353877444777

6 October
49TH WELSH RADIO RALLY: Llanwern High School. Hartridge Farm Rd, Newport NP18 2YE. Easy access from the M4 J24. Then follow the A48 to Newport. At 1st roundabout straight on, 2nd roundabout first off. Up a winding hill and take the first left to Llanwern High School. Traders From 7:00am. Doors open 9:30am, Free Parking, Entrance £3.00 per person. Traders, Bring and Buy, RSGB Books, Raffle, Refreshments, 10:30am, A talk by Eric Edwards GW8LJJ. Test Equipment for the (modern) Ham Shack, Is it needed? This will cover multimeters, signal generators, oscilloscopes, and more. 11:30am. A talk about digital radio by Andy Taylor MW0MWZ, The developer of Pi-star software. Contacts: Mike Rackham GW4JKV. welshradiorally@gmail.com Mob:07976 368250. Land line:01495 226149.
https://www.gw6gw.co.uk

11 to 13 October
RSGB CONVENTION: Kents Hill Park, Milton Keynes. Once again, the event will be sponsored by Martin Lynch & Sons and AMSAT-UK will be holding its Colloquium during the Convention again this year. For more information, check the website at:
https://rsgb.org/main/rsgb-2024-convention

13 October
DARTMOOR AUTUMN RADIO RALLY: The Yelverton War Memorial Hall, Meavy Lane, Yelverton. Devon, PL20 6AL. Free Parking. There will be the usual Bring and Buy, Trader Stands and Refreshments available. Doors open at 10:00hrs. Admission £2.50. Contact Roger: Tel: 07854 088882, 2e0rph@gmail.com . Always check the Club website before setting out:
www.dartmoorradioclub.uk

27 October
GALASHIELS RALLY AND OPEN DAY: This is the last weekend of October so the morning of the clocks changing back an hour. Venue as usual is the Volunteer Hall, St John Street, Galashiels TD1 3JX. Admission will be £3 per person, with free entry for under 16s accompanied by an adult. CASH ONLY at the door. Change will be given but we appreciate having correct change for faster entry. A sticker will be provided for exit and re-entry. Doors open for general admission at front doors at 11:00 BST. Disabled/accessible entry and early book-in of Bring and Buy items only at 10:45 BST at rear door. (Table traders entry at rear door from 08:00.) Bring & Buy Stall. Catering with hot and cold refreshments. New email for traders queries: rallytraders @ galaradioclub.co.uk (The address rallytables was mistakenly given out but will also redirect automatically to rallytraders.)
rallyqueries @ galaradioclub.co.uk

3 November
HOLSWORTHY RADIO RALLY: Holsworthy Leisure Centre, Well Park,Western Road, Holsworthy, Devon EX22 6DH. There will be Traders, a Bring & Buy and Catering. The venue also has disabled access and free parking. Open to Traders from 8:00am. Doors open to the public at 10am, entry £3 per person.. Traders online booking form here:
https://forms.gle/8h8aNNJZHHcGQSKw8
www.qsl.net/m0omc/holsrally24.htm
Chris Bolton M0KNF: boltonbicycles@gmail.com

1 December
WILTSHIRE RADIO WINTER RALLY : Kington Langley Village Hall, Kington Langley, SN15 5NJ, just off Junction 17 of the M4. Opens 09:00 close 13:00. Admission £3.00. Indoor tables £10.00. Car Boot Car size Pitch £10.00 Van Size Pitch £15.00. Hot and Cold refreshments available on site.
Chairman@Chippenhamradio.club

8 December
MID-DEVON AMATEUR RADIO & ELECTRONICS FAIR 2024: Winkleigh Sports & Recreation Centre, Mid-Devon EX19 8HZ, from 09:00 – 13:00. Entry £3 per person, no charge for partners & under 16s. Easy access from the A3124, free parking, free WiFi, hot food and refreshments available. A chance to pick up hard-to-find electronic components, two-way radio and computer hardware. Traders £5 per 6 foot frontage (tables supplied), pre-booking in advance recommended. Mains electricity available on request. Traders - please pre-book ASAP
Phil G6DLJ 07990 563147
wrg2024@hotmail.com
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Your Letters

Send your letters to: Practical Wireless Letters, Warners Group Publications plc West Street, Bourne, Lincs PE10 9PH
E-mail: practicalwireless@warnersgroup.co.uk

Various

Dear Don,

I am enjoying reading the August *PW*, which I ordered via your main office by post. I must compliment Warners on their helpful service. I normally buy around six copies per year depending on when I visit a Smiths shop in local towns in the West Country. My first *PW* was bought by my father in 1960 to find a valve for the old Marconi all-band radiogram that we had at the time. He found the output valve, a KT42, listed by the Bentley Acoustic corporation, which he bought, by sending a postal order. There were numerous lists of valves and early transistors available from dealers in those days in the magazine. I bought my first *PW* in 1961, which at the age of 11 was the year I built my first crystal set, and received the Home service from Start Point in Devon on AM. Five live is transmitted from there nowadays, but probably not for much longer.

The August *PW* contains a good balance of interesting articles, since it now combines *RadioUser*. The field strength meter is something I might build as it is an active version of one that I have in the shack. When all the hullaballoo surrounding emissions erupted a while back, I measured my outputs from my aerials in the garden, using a wave (field strength) meter recorded with a video camera whilst transmitting. The results were relatively low emissions, so I informed Ofcom whilst updating my licence which should be done regularly.

Whilst on the phone I offered to send a report of my tests. They said that they did not need any report and that I should keep it with my station records. That would be the logbook that I am no longer required to keep as per the new licensing conditions! Totally ludicrous really and I do keep a logbook of activity, including transmission accuracy and bandwidth test that should be conducted 'from time to time'.

The article about the ISWL was of interest to me especially as I am on the committee, which I was invited to join many moons ago when I was on an annual visit to their stand at the Flight Refuelling Wimborne Rally. This rally was and still is the next best thing to the sadly missed Longleat Rally, although the organising club still do the annual Frome rally. Longleat was in the seventies a wonderful day out for all the family, even those not interested in things radio. There was always the big house and gardens and a tour

to see the lions and those pesky monkeys who wanted to nick your windscreen wipers. I visited the ISWL stand at Longleat.

Due to the ageing demographic, the ISWL and many other exhibitors no longer keep a stand at shows. For those who cannot visit a local radio club, the ISWL is an ideal alternative. There is a useful website, and a monthly magazine (*Monitor*), both in paper and digital format. There is also the opportunity to take part in contests and there are fine cups and certificates available. My QRZ page has a direct link to the club website. As with many clubs and societies in our hobby, the ISWL is run purely by the work of volunteers, and long may it continue.

Best 73 and good listening.

Peter Lewis G4VFG/G6NSU/ ISWL g20322
Ivybridge, Devon

On-air activity

Dear Don,

I have just read the September edition in which two points were made.

In the editorial you appealed for more correspondents for the *Letters* column, and then I read about the lack of 2m activity and how there must be lots of handheld rigs being sold, but where's the activity.

So here's my contribution to both causes.

Firstly, let's talk about on-air activity. As you mentioned, 2m activity is nothing like say the 1980s when you practically had a book a repeater a week in advance just to get an 'over' in! During the day the local repeaters were full of travelling sales reps, CCTV, alarm and TV service engineers travelling between calls and nattering about their experiences with said equipment or customers, often with interesting stories to tell.

And the rise of the PC would provide many QSOs regarding operating systems, software and hardware information. That's all gone now, these sales reps and on call engineers barely exist since no one repairs anything anymore. Repeaters could easily be active with traffic for as much as 20 hours a day – happy days!

But we are spread out more these days. In addition to traditional analogue activity we have D-STAR, hotspots and various digital voice modes.

The second point about where are all the handhelds that are being sold.

Well, I can kinda see why this question has been asked, we should in theory be seeing a crazy amount of activity, but the usage model has changed somewhat. I observe small groups of social friends simply using them between themselves only half a mile apart but not taking part in generalised 'outward' ham radio activity. Or a few guys on tourist style activities keeping in touch between their cars especially in the summer months.

But you can still have some real fun by going hill topping in the summer months. I often travel to local high spots and bother to call CQ on 2m, 70cm and sometimes 23cm SIMPLEX and get interesting QSOs. You do need to ensure that you are at least using a decent rubber duck. Not the usual junk that acts like a dummy load. I prefer to use an antenna such as the Nagoya 701 or 771 to get sensible performance. A 5W handheld from a good hilltop will easily result in 30-50 mile simplex QSOs. And during tropospheric conditions I've used a measly 500mW from Kent to have simplex QSOs to Scotland on 70cm.

Also, it's worth looking beyond the UK repeater scene. For those of us at least in the south-east of England we can get into French, Belgian and Dutch systems, and those guys often appreciate a QSO, and some of their repeaters are quite a bit more technically interesting than ours.

Some use diversity reception, or can be linked by DTMF to other repeaters too. Maybe it's time to get out of the shack, get some exercise in and go walkabout with a handheld?

Now for my gripe. This is simple stuff. It's also legitimate QRP activity too, but do we ever see mention of it amongst QRP clubs or newsletters – nope! These groups seem obsessed with ancient stuff like building trashy two transistor transmitters on 40/20m CW and G5RVs – boring! Same stuff year after year. Now let's get off our respective backsides and put those handhelds to good use.

Andy G0FTD (currently enjoying his Quansheng and Egzumer firmware)

*(**Editor's comment:** Thanks Andy, some good points. Of course, it's not just on the VHF bands where day-to-day ragchewing is in the decline - it's definitely the case on HF too. I suspect WhatsApp and essentailly free (just a monthly tariff) mobile phones have largely replaced it. So we are left with contests, DX chasing and, thank goodness, all these '... On the Air' activities, along with special event stations to take up the slack. And your mention of groups of social friends reminds me of chatting with some Air Cadets who were directing traffic at the McMichael Rally some years ago - they all had Foundation licences as parts of their comms training and were using amateur radio handhelds, but none were interested in becoming part of the wider world of amateur radio, unfortunately. However, as **Jon** says (next but one Letter), there is still activity on 2m, for example, but nowadays it's dispersed between a much wider selection of modes and activities than used to be the case.)*

Dear Don,

With reference to the letter '2m Activity' Sept 2024, one of the things that killed off most of my operation was the ban on use of handheld microphones while driving. I used to have great delight in operating /M with a whacking great magmount whip on the roof. Never had a problem driving and operating at the same time. I once had a bloke jump in front of me thinking I was a taxi!

I had a few years away from amateur radio then came back and thought my rig had packed up as, like Richard, nothing heard on 2m. What happened to all the repeaters?

I too took a 2m/70cm rig to Devon this year and made no contacts. On previous years I used to get local event info over the air, and got nagged by the XYL for nattering too long.

I built the noise cancelling project by **Keith G4MIU** hoping I might re-live some of my old ragchews on Topband, but although the noise has been tackled, I don't hear anyone on that band either. Bring back AM……my first Tx was from *PW* many years ago, two valves for RF and a double something for the modulation. An untuned long wire and homebrew ATU, and I used to chat for hours. I find digital modes OK for antenna testing but they leave me very dissatisfied for QSO work.

Where are all the handhelds? I bought a little Baofeng UV-5R and quite often leave it scanning all the old repeater and simplex channels, but I probably have had only a handful of contacts on it.

Maybe we need to revise some old AM (transistor) 160m designs to get us all chatting again?

Ken May G4APB
Dartford

Dear Don,

I was sorry to read **Richard White G6NFE's** note in the September magazine concerning the lack of activity in the simplex and repeater area of the 2m band. My impression is that he is correct, but that area is not all there is to 2m.

This past week I gave my local club a presentation 'My VHF Journey', explaining how I started out in the seventies, and my VHF history to where I am now. I have quite a modest setup but obviously with Yagis for 2m, 70cm and 23cm. I get a great deal of enjoyment from working DX on tropo, Sporadic E and aurora, and in-between can comfortably work stations as far away as Manchester etc. from Essex and am able to have ragchews up to a couple of hundred miles on 2m and 70cm.

If Richard could listen during a shower on 144.360, he would hear many stations calling looking to complete meteor scatter QSOs. That is the MS calling frequency and it could be in use day or night throughout the year for random meteors. Otherwise he could resort to FT8, but I believe real radio is SSB and CW.

There could be more activity between contests and favourable conditions, because I hear dozens of no doubt well-equipped stations during the contests. The issue is how do we encourage them to come on the radio and talk to us at other times?

My club talk has given rise to a provisional booking for me to do it at another club, so I seem to have initiated some interest. Maybe I can convince more of my locals to have a go at what I do.

Richard need not worry about the 144MHz band being taken away by OFCOM. It is quite well used if not at the top end.

Jon Stow G4MCU
Hockley, Essex

More thoughts from Ray

Dear Don,

Now there's the thing (**Richard G3UGF**, September 2024). I learnt the hard way too, about not testing stage by stage building homebrew projects. It was a constant source of frustration that after I'd spent hours building this or that, only to find out when I applied power that it didn't work – then more hours to find out why! So, I soon cottoned on to the idea of testing one stage at a time. My success rate considerably improved. A Eureka moment.

As Richard pointed out, these simple crystal-controlled CW only rigs are (maybe in the heat of the moment) liable to tempt you into jumping into the end of a QSO with a disappointing result. And they are, of course, strangely mesmerising. Their tiny proportions and power output can, in the right hands, provide many fruitful hours of unbridled HF fun. I was addicted to them at one time. However, my attraction for their obvious virtues has waned over the years. Oh, and using your 'ears as additional filtering' is something I recommend.

Like G6NFE, I always used to pack a couple of VHF/UHF handies whenever I went off on a trip somewhere in the UK (I've still got an FM rig in my car, but can't remember the last time I switched it on). But sadly now, I don't bother, mainly because the silence is deafening on many VHF/UHF FM repeaters. And isn't it ironic, that it was the ham radio community who instigated the mobile phone service that has, as G6NFE says, *"killed VHF/UHF simplex and repeater use stone dead"*. So, when one considers the lack of activity there is on repeaters or simplex FM, why are so many handhelds being sold if they're not going to be used? Are they trophies? Or like those people who collect commemorative ceramics or whatever, handheld transceivers have become sought after collectibles – put on a shelf to be admired?

Emergency communications. Yet another scenario where amateur radio rarely gets the oxygen of media publicity that it deserves.

I'll make a prediction. I reckon it won't be long before OFCOM either sells off a chunk of our VHF/UHF ham bands, or worse, flogs off the entire 2m and 70cm ham radio allocation to the usual suspects. Methinks it will be the former which will happen first. Hope I'm wrong. Well, there have been various stories and rumours that continue to circulate that commercial interests have approached OFCOM for discussions and clarification about our VHF/UHF frequencies (ditto, our microwave allocations too). And then, there are the covert activities that are being performed by those who have avaricious intentions to monetise the VHF and UHF ham bands. No smoke without fire, right?

Ray Howes G4OWY/G6AUW
Weymouth

*(**Editor's comment:** Always good to hear from you, Ray. Emercomms is actually big in a number of countries, usually where natural disasters*

are common - not just the USA but places like the Philippines and Indonesia, for example. Here in the UK, though, we really don't seem to have a story to tell - RAYNET, at least in the presentations I have seen, still hark back to the East Coast floods on the late 1940s, I suspect because they really haven't had a significant emergency event since.
As for Ofcom selling off our bands, given the international nature of radio, I can't see that happening as such, but I do know there is strong lobbying at the international World Administrative Radio Conferences for handing over some of the amateur radio spectrum - a slower process but one that is potentially more dangerous.)

Nostalgia

Dear Don,
You are quite right about the printed word stimulating interest in unthought of areas. I have read and appreciated the article on the CR100 by M0PBM and, as they say, *"it takes me back a bit"*.

In the late 1960's my then colleague **David Hall G8CLI** decided that he would rebuild his. This he did and the aesthetic considerably improved. He also changed the mixer valve to the deservedly legendary 7360, a more than perceptible improvement. With the saving in space gained by the use of all glass valves it permitted the commissioning of a receiver with a pleasing appearance. In particular, the S-meter was in the right place.... and rather than a cube with 'a lot of air in the apparatus' a properly proportioned front panel with all the controls properly to hand.

One might suspect that this was not the only CR100 to meet such a fate. If you take a look at the original G2DAF receiver, the IF transformers at least came out of a CR100.

Nowadays my CR100 is an ornament. Purchased for the dial-drive and the IF transformers it was to donate parts to a G2DAF RX with 7360 mixers. I procrastinated.... so it yet exists.

On mixer valves....

A lot of design is 'custom and practice'. There can be a lot of pressure on design teams so if it comes in a red bottle marked ECH35 and called a 'mixer', that settles that, especially if it is inexpensive! By the by, the HRO pentode mixer used grid two driven at high level for local oscillator input.

We knew about a lot of things then but they seemed to be the 'elephant in the room'. I remember my mentor, **G V Buckley**, giving a tutorial on oscillator noise and reciprocal mixing was mentioned but not described in those terms.

The more things change: the more they stay the same!

William Blankley G8CMK
St Leonards on Sea

Dear Don,
The article about the CR100 brought back memories as it was my introduction to amateur radio. When as a young teenager we visited my mother's cousin in Wigan I found a small bedroom full of radio equipment. This cousin was **Bob G3EPQ** (SK) and I spent many happy hours listening to AM stations on his CR100. I can't remember anything about the transmitter except it was black, and I think had removable coils for band changing.

And the smallest room in the house contained many copies of *Short Wave Magazine* and *The RSGB Bulletin*!

David Griffiths G4DMG
Alresford

Magazines

Dear Don,
Thank you very much for mentioning BARTG in the UK magazines paragraph in September's *Keylines*. However, it is an honour that we do not deserve given that our magazine (*Datacom*) was superseded by the BARTG web site some years ago and thus ceased publication.

You can add the British Railways Amateur Radio Society (BRARS - *Rails and Radio* magazine) and Radio Amateur Old Timers' Association (RAOTA - *OTNews* magazine) to your list of club magazines. They each publish their magazines every quarter.

Perhaps you and **Tex** could call it a tie if we say that *PW* is the only remaining amateur radio magazine available at newsagents and the club magazines are mostly available only to members.

Ian Brothwell G4EAN
Nottingham

Next Month

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

REFURBISHING AN SB200 AMPLIFIER: Martin Evans GW4TPG describes the challenge of refurbishing a classic Heathkit amplifier to make it suitable for use in a modern shack.
FACE BEHIND THE CALL: Roger Dowling G3NKH meets Bob McCreadie G0FGX, a presenter of amateur radio's own popular television show 'TX Factor', as it celebrates its tenth birthday.
A MAGNETIC LOOP ANTENNA: John Piątkowska-Vooght MW1CFN has a design for a homebrew magnetic loop.
A TRIBAND ELEVATED VERTICAL: Billy McFarland GM6DX returns with a design for a simple portable antenna.
THE PROTOCOL WARS: Joe Chester M1MWD has a personal take on the 'wars' between the various VHF/UHF digital voice modes.

There are all your other regular columns too, including HF Highlights, World of VHF, Antennas, Vintage TV & Radio and Data Modes as well as your Letters, Rallies, the latest News and more.

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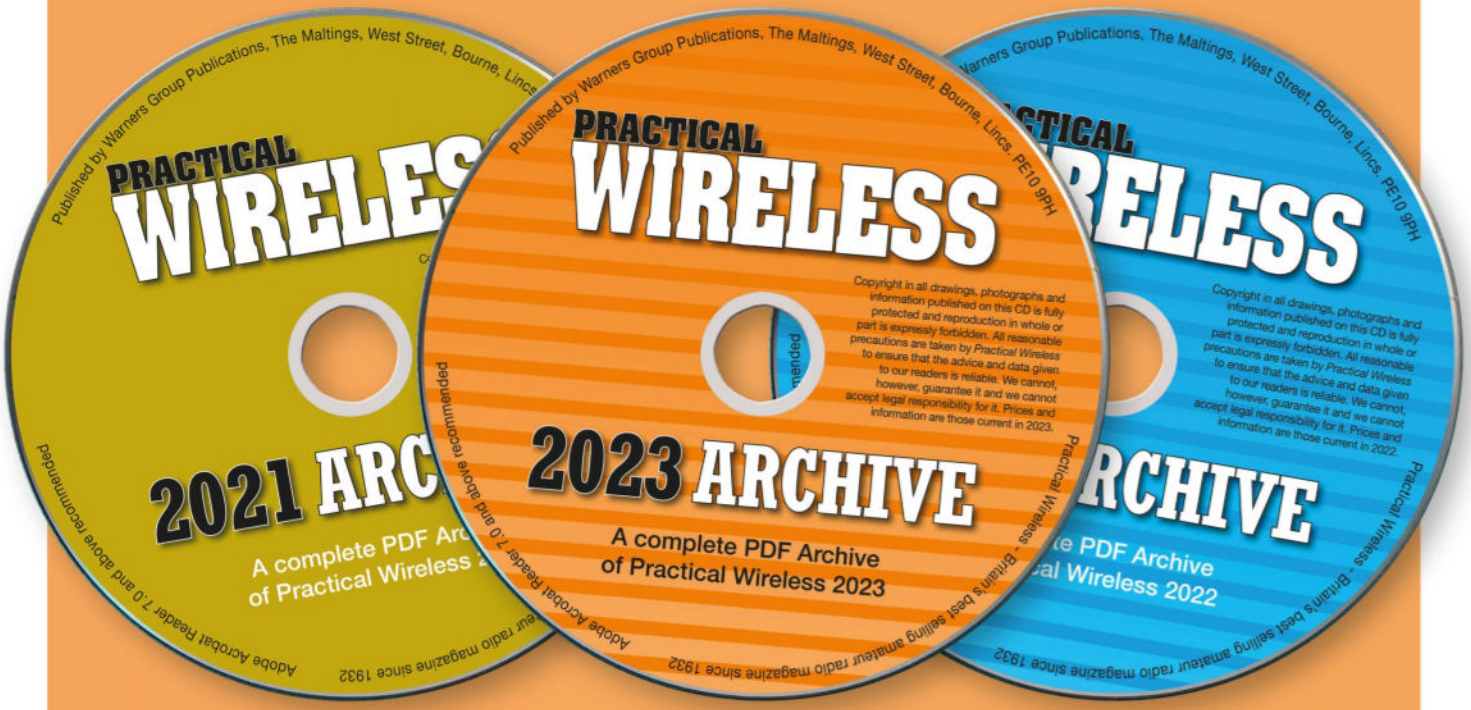

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