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MAY 2023 THE UK'S NUMBER ONE AMATEUR RADIO MAGAZINE SINCE 1932

ROYAL RADIO | Charles coronation callsign plus radio's role in the past

ARRIVING IN THE UK SOON

On sale date and price of the keenly-awaited Icom IC-905 all mode transceiver announced

Loop Antenna Tests

HF & LF types are reviewed by our team of experts

Find an ebay bargain

How to secure the best used kit online, and what to avoid

PEOPLE The face behind the callsign

Nobby Styles G0VJG and his ambitious Rockall expedition

HISTORY The General Coverage Receiver

1970s multimode receiver for the 550kHz to 30MHz range remembered

RALLIES & EVENTS

Hamfest is OFF, but there's still plenty more to do!

YOUR SAY

Letters from fellow readers

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WARNERS

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PA5070-15-9BGP	6m 7el/4m 8 el	£475.95
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PA70-4-1.5B	4m 4 el 8.2dBi 1.46m	£159.95
PA70-5-3B	4m 5 el 3m boom	£189.95
PA70-6-4B	4m 6 el 6m boom	£199.95

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PA144-432-37-7-2CBGB	12/25 el 2 con	£349.95
PA144-432-13-1.5-2CB	5/9 element 2 con	£159.95
PA144-432-17-2A	6 el/ 12 el	£184.95
PA144-432-19-3-2CBP	7 el / 12 el	£226.95
PA144-432-21-3BP	7 el / 14 el	£219.95
PA144-432-13-1.5A	5 el/9 el 1.5m boom	£139.95
PA144-432-34-6-2CBGP	11 /23 el 2 conn	£369.95
PA144-432-38-6BG	11 / 28 element	£299.95

2M Yagis

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PA144-8-3B	8 el 3m boom	£179.95
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PRACTICAL WIRELESS
Incorporating RadioUser

May 2023 Vol. 99 No 5
On sale: 13th April 2023
Next issue on sale: 11th May 2023

ISSN 0141-0857

Practical Wireless
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This publication is printed by Warners Midlands PLC Telephone: 01778 391000

Keylines

I spent four nights away in Fuerteventura this month with my son, which gave me the opportunity to operate from EA8 for the first time. I always knew that it was a good location to operate from but it was fun to experience propagation from there first-hand. On our second day on the island I spent a couple of hours on the 17m band, and made around 130 CW contacts (signing EA8/G3XTT, of course). Then a couple of days later I did the same on the 12m band, making a similar number of contacts. Both sessions were using 'stealth' dipole antennas, that is to say that they were located no more than 7ft above ground and strung along an arbour in front of our hotel room. And using 100W from my Icom IC-7300. On both bands I was able to work Asia, Oceania and North America, so I was very satisfied with how things went. All in all, a lot of fun.

And as this issue goes to press, I am due to give a talk to the Bristol RSGB Group on '40 years as an amateur radio journalist'. Yes, I started writing for *Amateur Radio Magazine* in 1983 and, one way or another, have written for one or more amateur radio magazines quite literally every month since. And here we are, 40 years later (without missing a deadline, I'm pleased to say!). I've very much enjoyed the role – it's certainly not for the money as specialist magazines don't (can't) pay well but it's always been very satisfying.

This Month in PW

We have had a change in the advertised *Face Behind the Call,* because we have the opportunity of profiling **Nobby Styles G0VJG** who, this month, will all being well be operating from the remote Scottish island of Rockall. This is huge challenge but, knowing Nobby as I do, I feel sure he and his fellow expeditioners will manage to pull this one off.

There was a hiccup with *Morse Mode* last month, which has meant that it has been carried over to this month, while I've had to hold over the promised *Trap that Coax* article for space reasons – it will appear next month. I'm pleased to have a contribution this month for my suggested relaunch of the historic *Take 20* articles. I do hope to have more in a similar vein in the months to come. And I'm also pleased to run Part 1 of a constructional article from the 70s by the legendary *PW* author **F G Rayer G3OGR**. While I doubt any current *PW* reader will want to try their hand at building the set featured, I do hope the article will be an interesting reminder of how builders approached construction back then, in the days of discrete transistors, Denco coils and the like.

National Hamfest

I was sorry to learn of the decision to cancel this year's National Hamfest. It seems that the organisers were unable to secure a suitable venue at the appropriate time of the year. The good news is that they have assured everyone that it will certainly take place in 2024. I always enjoy this event, which is a great opportunity to meet traders, readers and amateurs generally and we had already missed two years due to COVID before it returned in 2022. In the meantime, I am booked for this year's Friedrichshafen event at the end of June and, hopefully, won't suffer again from cancelled flights as I did last year. If you haven't been, I can highly recommend it as a great gathering of amateurs from around Europe, a chance to see a wide selection of manufacturers and traders along with a wide variety of club stands and a thriving flea market. The beer garden is pretty good too! See the advertisement in this month's issue for more details.

Martin Lynch

Last but by no means least, I learned recently that **Martin Lynch G4HKS** was in hospital. He did a piece to camera for the regular ML&S YouTube video from his hospital bed. I feel sure all readers will join me in wishing him a speedy recovery. Meanwhile I know the company is in the capable hands of Martin's son **Dan**.

Don Field G3XTT
Editor, *Practical Wireless* Magazine

Contents

Newsdesk

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

I-R InfraSignal Radio: for 'Preppers' and Citizen-Scientists

The InfraSignal Radio is a Long Wave, Extremely Low Frequency (ELF) radio receiver with built-in test and alarm functions. Its makers claim that – depending on the connected signal source sensor – it can be used for several purposes. When used with a vibration sensor, it can detect extremely weak ground vibrations from dangerous local sources such as Tornados touching the ground, Landslides, Rockslides, Mudslides, Flash floods, Tsunamis, Earthquakes and Volcanoes.

When used with an electromagnetic pulse (EMP) sensor, it can detect both Solar EMP and Nuclear EMP. When used with a vibration sensor, you can monitor ground vibrations from oil well fracking, pile driving and tunnel digging. It can be used to monitor vibrations in tall buildings. When used with an infrasound microphone, you can hear and record infrasound signals in real time. It can be used to monitor for meteors, astronauts returning to earth or large explosions. It can aid in the detection and location of mysterious infrasound such as the wind blowing on a vibrating object. It can detect resonant signals and measure their frequency such as helicopters in flight.

When used with an infrasound hydrophone, it can detect pressure waves from large ship propellers and alert small sailboats at sea. It can be used to listen to whales, both in the infrasonic frequency range and the audible frequency range. When used with an extremely large loop antenna it can detect submarine communications and small fluctuations in the earth's magnetic field during solar flares.

https://infrasignal-radio.com

Pure Evoke Spot

Although compact and easy to place, this small-format companion offers a diverse selection of music sources. From Spotify Connect, international radio stations, DAB+ and Bluetooth to FM, the music system delivers perfectly placed sound for any home. Information and entertainment compactly packed on a bookshelf: That's the small-format Evoke Spot music system. Reduced to the most important functions and audio content in an efficient design, the Evoke Spot is a reliable, easy-to-place companion for the home that provides the right background music for your home office, kitchen or bathroom. Whether it's your favourite radio station during work or your Spotify playlist while cooking, the Evoke Spot always provides the right background music. Typically priced around £179.

https://tinyurl.com/bdfvywvk

MFJ-419 CW Elmer

The MFJ-419 is a multi-function training tool for learning to receive and send Morse Code with a straight key. It helps you learn CW and send clean CW all in one little pocket-sized box. Carry it with you to work and time at the kitchen table! Send mode operates like a Code Practice Oscillator allowing you to practice sending. The MFJ-419 will display the characters in code and English. The 'Analyze' setting will display your speed and timing to help you to send better. Receive mode will help you learn characters. It can send in normal spacing or two Farnsworth speed modes sending the characters faster but spacing to the programmed speed. There is a USB text mode where you can use a terminal program to send text either from a keyboard or a short text file to the MFJ-419 so you can listen to real text. There is also an 'Exercise' mode that will help you with training to make correct length dits and dahs and also the proper spacing between characters and words. Available from MFJ for US$159.95 but not (currently) from UK dealers.

https://mfjenterprises.com/products/mfj-419-cw-elmer

Bringing Open-Source HF Digital Voice into the Mainstream

To advance the state of the art in HF digital voice and to promote its use, Amateur Radio Digital Communications (ARDC) has awarded $420,000 to the FreeDV Project. With this grant, the FreeDV Project team will:

- Hire experienced digital signal processing developers to work with the volunteer staff to improve speech quality and improve low signal-to-noise ratio operation, making FreeDV performance superior to single-sideband (SSB) over poor high-frequency (HF) channels.
- Work with commercial HF radio companies to embed FreeDV into at least two commercial radios, greatly reducing set up effort and reducing latency.
- Continue development of a suite of advanced, open-source HF modems, with the goal of making FreeDV's digital performance comparable to VARA at both low and high signal-noise ratios.

  Continue support of the existing software library (libcodec2) and application software (freedv-gui), and embedded FreeDV adaptors (SM1000 and ezDV).
- Better promote FreeDV online and in person at amateur radio clubs and conventions.

The FreeDV Project team believes that the work funded by this grant will:

- Open the path to widespread adoption of a truly open-source, next-generation digital voice system for HF radio.
- Provide a mature, open-source low-bit-rate codec useful for a variety of amateur radio and commercial applications.
- Provide a suite of high performance, HF data modems for open-source data applications usable by any radio amateur.

ALL AT SEA WITHOUT THE SHIPPING FORECAST: Sailors could be left all at sea if they can't pick up the Shipping Forecast when the BBC switches off long wave transmissions, maritime bodies have warned. The BBC, the Met Office and the Maritime and Coastguard Agency are preparing to launch a public information campaign to alert mariners that they need to have receivers able to pick up weather warnings from alternative sources when Long Wave (LW) is switched off.

Many amateur sailors still rely on the Shipping Forecast, broadcast on LW, which can be received far from the British mainland. The shift to digital means the BBC will end AM radio transmissions – including long wave and medium wave – currently still accessed by an estimated 6.5 million listeners each week. The Government is keen to get it switched off.

BBC Radio 5 Live's medium wave frequencies will fall silent by the end of 2027. The BBC plans to stop scheduling separate content for Radio 4 long wave, meaning much-loved offerings such as Test Match Special and the Shipping Forecast, first transmitted via telegraph signal in 1861, will disappear from 198kHz, ahead of the closure of the long wave platform itself. The early morning and late-night shipping forecasts, delivering vital storm and gale warnings, will remain on BBC FM, DAB and online broadcasts but two other current daily shipping forecasts could be lost. A date for long wave switch-off is being discussed with the MCA, which is responsible for the safety of seafarers off the UK mainland.

Although the UK is one of the last countries in the world to still operate a long wave service, and most ships now carry digital GPS technology, an unknown number of vessels, ranging from older fishing boats and small pleasure ships, still rely on long wave signals. International law requires mariners to have a Global Maritime Distress and Safety System (GMDSS) terminal capable of receiving Maritime Safety Information (MSI), such as navigational and meteorological warnings, throughout their voyage.

A new satellite service called Iridium SafetyCastSM, which can broadcast weather warnings and send and receive distress signals from vessels anywhere in the world has been approved for use in the UK's maritime area by the MCA. The planned information campaign will tell seafarers how to access the broadcasts.

Its utility might fade but the BBC will retain the Shipping Forecast, famed for its musical introduction 'Sailing By' and evocative list of locations such as Dogger and German Bight, because of its soothing presence for landlubbers.

Read more radio news and reviews at www.radioenthusiast.co.uk/news

NORFOLK AMATEUR RADIO CLUB PUTS ON SCHOOL DISPLAY FOR NATIONAL SCIENCE WEEK: Norfolk Amateur Radio Club (NARC) took part in National Science Week on 11 March with a display and radio demonstrations at Norwich CNS School, where NARC meets.

The school's 'Super Science Saturday' featured a host of different events and NARC was only too happy to assist. CNS was one of the schools that made an ISS contact with astronaut Tim Peake.

Steve G0KYA and club president Malcolm G3PDH put on a demonstration HF and VHF station using the club call G4ARN (Amateur Radio Norfolk).

NARC also demonstrated a Flex Maestro, which was connected via the internet to Malcolm G3PDH's home HF station, showing how amateur radio has moved with the times. Chris G0DWV and Andy M0NKR demonstrated a Geochron device with real-time weather, flight information, radio propagation, satellite tracks and much more.

Simon M0SIH and Sam M7EBX from the club's 'Bright Sparks' group put on an electronics kit display which visitors could experiment with. Tammy M0TC showed electronic construction and helped 20 youngsters make their own Morse keys and buzzers. They were then able to send their name via Morse code thanks to Jim G3YLA, gaining a special certificate in the process.

Contact was also made with Norwich's twin City of Koblenz in Germany on 40m in a regular monthly net. Other HF contacts were made with the USA, Canada, Finland, Germany, Malta, Russia, Switzerland, Italy and Cyprus via SSB, CW and FT8.

Other displays demonstrated TV, voice, digital and satellite communications and attracted a lot of interest.

The photo shows Ezra Willingham learning to send his name in Morse code with a little help from NARC's Jim G3YLA.

Full Band Radio Receiver ATS-25X2

The new version of the ATS SI4732-Chip Receiver is the ATS-25X2, which is said to offer several improvements over its predecessor model, the ATS-25 (Review: *RadioUser*, February 2022), such as a Wi-Fi interface, spectrum scanning function and a better tuning knob. Currently available for ca. £100 on eBay, e.g. from this seller:

https://tinyurl.com/5fja44ee

CELEBRATING THE CORONATION THROUGH AMATEUR RADIO: The eyes of the world will be on the United Kingdom in May for the Coronation of His Majesty King Charles III. Amateur radio will, once again, celebrate this nationally important event. Through the Radio Society of Great Britain and Ofcom, there will be a various special callsigns and a special, special event callsign. UK amateurs will be able to obtain a Notice of Variation to add 'R' to their normal callsigns.

Cray Valley Radio Society (CVRS) will be the first UK society to use the special, special event callsign, which will then be available on a rota basis through May and June. Through contacts with senior officers in the Royal Borough of Greenwich and the National Maritime Museum in Maritime Greenwich established over many years, Bob M0MCV and Dave G4BUO are organising a flagship station located in the Monument Gardens at the Old Royal Naval College in Greenwich in the shadows of the historic sailing ship 'Cutty Sark', which in itself is an award-winning visitor attraction.

The Cray Valley society is no stranger to organising high profile amateur radio stations for significant national and local events. Readers may remember M2000A, GB50, GB200T, 2012L, GR9RW and more recently GB70E at Windsor Home Park for the Platinum Jubilee of the late Queen.

The operation from Greenwich will begin on Wednesday 3 May once the stations, antennas and exhibition area are set up. Operation will be through to early morning on Tuesday 9 May and will be from a 6m x 12m marquee with two towers supporting antennas for 3.5MHz to 28MHz, plus 50MHz and 144MHz. A QO-100 station is also possible. The station will be open to the public between the hours of 10am and 5pm on 4th, 5th, 6th and 7th May. This will provide an opportunity for visitors to see amateur radio, perhaps for the first time, and engage and inform them of the relevance of radio communications in our lives today. Visitors of all ages will be encouraged to pass a greetings message, and visiting radio amateurs will also be made welcome.

IC-905 Availability

Icom UK is pleased to announce the availability of the IC-905 SHF/VHF/UHF/All Mode Transceiver. The company expects its first deliveries to arrive in early Summer 2023 and anticipate a price of around £3,549.95, including VAT (subject to confirmation). The optional CX-10G 10GHz transverter will follow shortly with a price of around £1,499.95 including VAT (subject to confirmation).

IC-905 Main Features

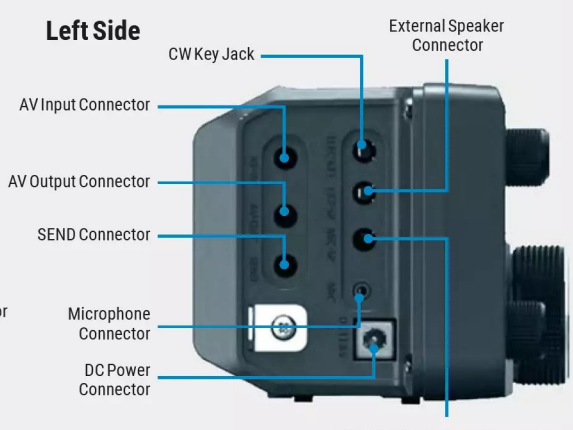
• 10W on 144/430/1200MHz; 2W on 2400/5600 MHz; 0.5W on 10GHz* (*Requires CX-10G transverter) • Large 4.3in touchscreen colour LCD • Real-time, high-speed spectrum scope & waterfall display • Built-in GPS • Easy digital-mode settings • High-performance GPS antenna (supplied) • Full D-STAR functions (DV/DD mode) • ATV (Amateur TV) in FM mode • SD card slot

For further details about the IC-905, you can download the pre-release brochure or watch the following video, which introduces this new radio:
https://www.youtube.com/watch?v=kzGQWmTKNzc

CX-10G 10GHz transverter

Right Side

Left Side



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STUDENTS RAISE OVER £600 IN ROUND THE CLOCK RADIO CHALLENGE: Over £600 has been raised by student radio stations in the South following a Round The Clock Radio Challenge. They've raised money for FareShare, The Journey of a Lifetime Trust, Mind, Stonewall, The Teenage Cancer Trust, and UNICEF UK. The Round the Clock Radio Challenge saw South Regional Officer Joshua Dodd, Pure FM Station Manager Lewis Dodson and Nerve Radio Deputy Station Manager Bronwyn Reeve take on the entire 24 hours, while other students presented special versions of their own shows to help them along the way. Pure FM hosted the event, which also saw presenters from Sound Radio in Winchester, Radio Sonar at Southampton Solent and Nerve Radio in Bournemouth descend on Portsmouth, while Stag Radio in Surrey and Surge Radio in Southampton helped with the organisation of the event – marking the first time a region has got together in such a way in the 30 plus year history of the Student Radio Association. Multiple student radio firsts were also heard during the event over the weekend, with the first Student Radio Song Contest being closely fought by seven stations across the UK, a ground-breaking music quiz hosted by Dodd through Kwizzbit, and interviews with the newly installed Mayor of Winchester, the Lord Mayor of Southampton and South-based comedian Paul McCaffery headlining the day. Joshua Dodd stated: "I couldn't be prouder of the team that has worked tirelessly to make this event work for such great causes and to have raised over £100 for each charity in times of such financial uncertainty and hardship means a lot. The fact we were able to showcase just how much Student Radio allows you to do while leaving our own small mark on the world is something I'll always be proud of, and I hope we've now laid the groundwork for more ideas in the future!"

NEW RSGB YOUTH CHAMPION: Liam Robbins G5LDR has been appointed as the RSGB's new Youth Champion. He gained his Foundation Licence in 2021 and his Full Licence in late 2022. Liam plans to encourage the use of amateur radio with local Scouts and is also keen to revive radio societies at universities and colleges. He is eager to work with younger radio amateurs and to engage with outreach programmes that clubs are already running. Liam is looking forward to working with the current RSGB Youth Team. You can email him at **youth.champion@rsgb.org.uk**

Buddipole Powermini 2

The Buddipole Powermini 2 is described as a compact DC power management system with an inbuilt solar controller. The key features of this device (US$ 165) are as follows:

- High-contrast OLED display
- Power management including current and voltage readout
- Powerpole input and output
- Now with higher-power USB output
- User-definable low-voltage alarm and cut-off
- Solar controller for use with panels of up to 11 amps
- Increased current handling capacity: 32 amps max

www.buddipole.com/powermini.html

A LONG WAVE LOOP TREAT: Georg Wiessala reports, *"I came across a very interesting loop aerial for Long Wave by Australian manufacturer PK's Loop Antennas. This is the PK's HD Series Longwave Loop Antenna for 150 – 550KHz."*

http://amradioantennas.com/catalogue.htm

A UK hobbyist acquired this PK Loop, customised for 150-500kHz, for the monitoring of Non-Directional Beacons (NDB). Only used briefly, the loop found its way onto eBay and I was curious enough to buy it.

The manual describes this as an indoor amplified loop, designed for radio enthusiasts wanting the best in LW reception, with the convenience of an easy-to-use tabletop aerial.

The PK Loop works with 9V but offers better performance with 12V. Its diameter is 40cm; its build is sturdy, with some good-quality connectors. The loop did not disappoint; on LW broadcast signals especially, it was nearly on par with my (outdoor) Wellbrook, delivering high sensitivity, quite sharp nulling-out and low noise. On data signals (e.g. 147.3kHz from the DWD, see above), it was good too; I found that, in this case, moving it closer to a window could make a difference.

Using the loop with my SDRplay RSPduo and the SDRuno proprietary software suite, it was possible to see the effect of tuning the +10dB amplifier gain control knob on the signal, in the shape of a 'wave' visibly travelling across the screen and onto the desired frequency. I undertook some scanning of the NDB band at night and found a few strong stations, but fewer than I expected.

Where this loop aerial does seem to come into its own is when used in conjunction with a portable world band radio. I linked it up to my Tecsun PL-990x and found that LW reception was much improved over the internal aerial or telescopic. The dBµ/dB display in the top-right of the radio's screen is fairly accurate and was, in fact, very helpful when orienting the loop.

https://tinyurl.com/msvspw5t

1

Practical Wireless Rating

★★★★½

Well made and a great performer. Definitely worth the price.

Richard Constantine G3UGF
practicalwireless@warnersgroup.co.uk

4 on 4 – Metres that is

Richard Constantine G3UGF takes a close look at DUAL antennas from Serbia.

Once upon a time in the UK, 4 metre Yagis were plentiful and relatively inexpensive. Back then, the frequency was only a hop, skip and a jump from the VHF TV channels. J-Beam's founder, like so many comm's industry bosses at that time, was a licensed amateur and produced a range of amateur antennas, excluding the 6m band for which the UK had no allocation.

Regular readers will know of my nostalgia for the 4m (70MHz) band of my youth, when most equipment was either homebrew or ex-WD. There's now more off-the-shelf equipment with 4m capability than ever there was. How ironic then, that suitable antennas are still somewhat on the 'endangered species' list.

There's more to life than contesting, or should I say, there's more to amateur radio than contesting. That said, I do like the traditional style of the *PW* 2m and 4m QRP contests. Not too long, reasonably good mannered and paper logs still accepted.

As my ancient J Beam long since became a pile of oxidised dust and all the simple wing nut fixings seized to the rotting boom, it was time to find a replacement so as to once again go contesting. As it transpired, something easier said than done.

The only reasonably priced and reasonably available 3-element model I could find was the Italian made SIRIO antenna. Having spent years in the mobile communications industry, when it arrived I could see that it was well finished and of a heavy duty, commercial grade, alloy/diecast construction. It reminded me very strongly of a tower leg, rear mounting, directional link antenna.

I used it with some success before Covid lockdown but realised that as a one-man, single operator, ideally my antenna had to be something more portable, significantly lighter and with more gain.

I soon discovered that raising a somewhat industrial 3.4kg antenna on my own, on a windy day to an effective working height, 400m above sea level was not for the faint hearted. Keeping it up in the air and pointing in the right direction was another issue.

The SIRIO is a good broadband antenna with 7.5dBi of gain and a front-to-back ratio of 15dB. It has a respectable power handling capability of 350W and is likely better suited for a permanent installation.

Alternatives

Casting around for a more manageable alternative, I obtained what I thought would be its replacement. It was lighter and offered more gain from its four elements. It was also made nearer to home. However, the experience did not go well. The picture didn't really match the reality and the instructions could have been better. Thankfully, I took up the option to return it and carried on searching.

It was then that my attention was drawn to DUAL Antennas made by Antennas-Amplifiers in Krusevac, Serbia. I had heard good things but some of the prices definitely prompted a sharp intake of breath. At around 30% higher than

Photo 1: Pre-assembly parts.
Photo 2: Dipole and balun close up.
Photo 3: Antenna broadside.
Photo 4: Antenna pointing South from Yorkshire.

average and for a first-time purchase, it was likely to be something of a stab in the dark.

I was surprised and pleased to find they produced a choice of 4m antennas ranging from 2 to a whopping 7 elements. As either the 5-element version or the tasty looking dual-band 6 & 4m antenna were clearly too big for a one-man activation, I settled for four elements, as originally planned. It offered 8.2dBi gain, a net weight of just 1.6kg plus a front-to-back ratio of 27dB.

Now, depending on where you are in the UK activity wise, a high F/B ratio in a contest can sometimes be a slight disadvantage when called off the back of the beam. Where I am it's a long way to Scotland and almost everything is South of me so it's not much of a problem.

What really interested me was the idea that every DUAL antenna is assembled and tested before despatch, so as to ensure its performance. I suppose it's part of what you're paying for.

Taking the plunge and for lack of an obvious alternative at the time, I figured that as most manufacturers use many common production parts, it would give an insight into this manufacturer's VHF/UHF range for possible future reference. I ordered the standard 850W version as I really didn't need the 1.5, 2.5 or 7.5kW versions for a QRP contest! I found out later that they are ostensibly the same physical antenna. For increased power handling, the pre-made, common mode choke balun coax is up rated, as and when required.

I'm ashamed to say that when the antenna arrived it languished in its long tube for several months before being unpacked… I kept meaning to do it.

Last Minute Assembly

Despite my best intentions it didn't happen until just two days before the *PW* 4m contest!

I'm glad I gave myself just enough time to evaluate my purchase as assembly took a three-coffee break afternoon, plus quite a bit of thinking time. It was nice to see stainless fittings and a default N-type coax connector that fits snugly into its own neat little boom mounted housing; an early sign of better than average quality, I thought. I love N types, 50Ω and waterproof.

Everything mounts on the underside of a single piece, 1.46m rigid, 20 x 20 mm, alloy boom. The rain runs off easier that way. Elements bolt through the boom and mounting blocks are made from high quality, dielectric constant, polyethylene (HDPE). An M6 stainless mast clamp is provided that mounts through the boom, for horizontal polarisation.


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The rear element is the longest as you would expect, at 2.2m. All of the elements are made from 12mm alloy tubing with 10mm diameter sliding extenders at the tips. Unlike some other manufacturers, there are no lateral cuts in the main tubing or ugly jubilee clips to secure the sliders.

The main and extension elements come pre-drilled for two small, self-tapping securing screws at the ends of each element. Unfortunately, the screws were missing and not found in the packaging. However, all was not lost as the metal end caps on the packing tube clearly used the same screws and there were just enough to complete the antenna temporarily using one screw per element.

At this point, it became clear that the antenna had obviously been assembled before despatch. Each slider had a code label for the corresponding main tube, there was a permanent fitting mark on each small tube for correct installation presumably for matching and gain.

I was a little puzzled that unlike some antennas, the hollow tubing doesn't have

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neoprene type end caps and is left completely open. There is a school of thought that says hollow tubes rot quicker from the inside if they trap water and there is little air circulation, so maybe that's why there weren't any.

The first of the two parasitic directors is close spaced to the driven element. This brings the feed impedance closer to 50Ω, rather than the natural 75Ω ohms of a dipole.

The driven element looked to be somewhat overkill, in terms of fabrication. Giving it some thought and considering the reputation for snow and ice in Eastern Europe, this belt and braces assembly made sense. Eight stainless bolts secure the feedpoint in a custom sandwich between substantial upper and lower custom mounting blocks. The driven element is certainly going nowhere!

Unfortunately, this gave rise to the biggest problem I encountered with the entire assembly, hence the extra coffee break. There is no traditional Gamma or T matching. The dipole is directly fed from the choke balun that attaches by means of terminals and nuts. The terminals are partially recessed within the insulating block assembly. There is little space between them. Being recessed makes it impractical to use either an open or ring spanner to tighten the nuts. The choke balun repeatedly gets in the way. Further efforts using a socket set also failed due to lack of space between the terminals.

Not wanting to deconstruct the whole dipole mount for better access, I resorted to my large, electricians long nose pliers.

Fail to Prepare, Prepare to Fail

It's described as a portable antenna and that's certainly true weight-wise, if you're hand carrying it. For easy transportation to a site, all of the elements need to be removed from the boom, not ideal. Given the issue I experienced, the only practical way was to keep the balun attached, cut the small tie wrap provided, holding it to the boom (carry spares) and unscrew the N connector from its housing, not forgetting to replace the screws for next time.

For /P operation a trip to the DIY store in advance is definitely recommended in order to assemble a bag of extra stainless bolts, nuts and washers. You'll need them to replace those lost in the long grass at the start of the day and those dropped in the dark at the end. It happens. Boy, do I know!

How did it Perform?

Once re-assembled on site, it felt rigid. Mounting was extremely easy and pushing the telescopic mast to full height limited only by weather conditions, not the head load. For such a large antenna the 4-element, 4m Yagi has an acceptable turning radius of 1.25m.

It's reasonable to expect the beamwidth for a typical 4-element Yagi to be around 80° at the 3dB point. Using clever design, computer modelling, precise engineering plus wide spaced directors, higher gain is achievable.

Of course, nothing is a free lunch. Improved gain comes at the expense of reduced beamwidth. This antenna has a beamwidth of 60.6° at the 3dB point. On its first outing I immediately noticed the difference between the earlier three elements, requiring more mast turning than before. Even though the *PW* 4m contest is short, next time I think I will be using a rotator. Leaping in and out of my van in rain and high winds isn't a good career move.

It was evident on the day from speaking to other contesters, that band conditions were really difficult, if not diabolical. Quite a relief to know as the antenna had low VSWR. It appeared to be working quite well. I was able to contact everyone I could hear as conditions rose and fell.

Apart from the minor glitches I've described, having read about and now experienced the product, I have a much better understanding of why this antenna and its stable mates command the prices that they do. It's also good to see that the company offers a range of off-the-shelf replacement parts and support should the worst happen. I'm a satisfied customer. I will be looking favourably on other antennas in their range and would recommend one to a friend.

Available direct from Antennas-Amplifiers in Serbia or via UK agent Nevada Radio. Price at time of press £125.95. inc VAT. **PW**

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Nobby Styles G0VJG

Roger Dowling G3NKH meets Nobby Styles G0VJG, about to embark on a major Rockall expedition.

Roger Dowling G3NKH
practicalwireless@warnersgroup.co.uk

For most of us, the island of Rockall means little more than the name, alongside its neighbours Irish Sea and Shannon, that we have heard for years on the Shipping Forecast. Tiny, uninhabited and in the often-tempestuous Atlantic Ocean 250 miles from civilization, it's not the sort of place you yearn to visit – unless your name is **Nobby Styles**, **Fig. 1**, and you hold the callsign **G0VJG**.

Nobby is an expedition enthusiast with a long list of successful trips under his belt. Based in Dartford, Kent he is a keen long-time member of his local Cray Valley Radio Society, now in its 78th year. *"It's a very active club"*, Nobby enthused. *"We have all sorts of Field Days and other activities, and the Club is always keen to attract new members."* The Club runs regular examination courses and many readers will also know it as the organiser of the annual GB8KW event using the iconic KW Electronic brand of radio equipment to honour the memory of **Rowley Shears G8KW** who set up the highly successful KW Electronics in nearby Dartford in 1956.

It all Started with CB

Nobby has been active on the air since the 1980s, his interest having been stimulated as a youngster by the growing interest in Citizens' Band radio. *"I was amazed to find that I could transmit as far as Dagenham on the other side of the river,"* he smiled. Keen to broaden his horizons he acquired a Class B licence but found this very limiting so he then enrolled for an RAE course at the nearby Woolwich College. *"It was a bit discouraging at first,"* Nobby recalled. *"Working in the wholesale meat trade, I knew absolutely nothing about electronics and I suddenly found myself in a class of A-level mathematics students. On the first day, to get an idea of what they already knew, the lecturer put up ten mathematical questions on the board. I couldn't answer one!"* recalled Nobby. *"I very nearly walked out but the lecturer, to his great credit, assured me that he'd work with me to get me through the examination and he was as good as his word."*

Nobby trained himself on CW with the help of a couple of local Medway licensed amateurs with whom he had regular half-hour practice sessions, and became G0VJG with a full licence in 1993.

Chasing the DX

Nobby told me that he really enjoys chasing the DX. Because of intractable neighbour problems he prefers to avoid operating from his home QTH – instead, he prefers to operate from the local Scouts' headquarters where he has an ex-military 65ft trailer tower *("donkey's years old but it still works fine!")*, which he uses for serious DX-hunting sessions.

At the top of the tower is a two-element cubical quad, **Fig. 2**, and he often spends the whole weekend at a time using his FTdx101D transceiver and an OM2000A linear. Other gear in occasional use at G0VJG is a vintage Yaesu FT-707 and a Yaesu FTdx3000.

Nobby's greatest love is amateur radio expeditions around the world. He has already operated from 26 countries, and no doubt more to follow in the years ahead. He is a great supporter of the RSGB Islands on the Air (IOTA) programme, both under his own callsign and as a member of a group. His many successful expeditions include the Isles of Scilly (EU-011, 11 times), the Treshnish Isles in Scotland (EU-

Fig. 1: Nobby Styles G0VJG. Fig. 2: Two-element cubical quad at 60ft. Fig. 3: IOTA Award for 2018 expedition to Minkies Reef, Jersey. Fig. 4: Rockall in the North Atlantic. Fig. 5: Location map. Fig. 6: Survival pod on appraisal at Goose Rock, Newquay in February 2023.

108), the Farne Islands (EU-109), St Kilda (EU-059) and the Minkies Reef off Jersey (EU-099), **Fig. 3**. His most recent expedition, in February 2023, was to Australia where he made 3000 QSOs. Thanks to the helpful members of the Northern Corridor Radio Group in Perth he was able to operate as VK6/G0VJG at their club station before then heading off to the remote Cocos Keeling Islands in the Indian Ocean to successfully activate IOTA OC-003 as VK9CVG.

Rockall

Nobby's latest expedition, due to take commence on 26th May 2023, is to Rockall, one of the world's most-wanted IOTAs, EU-189, located in the Atlantic Ocean over 200 miles from the nearest land. Its ultimate objective is to raise funds for two major charities.

Rockall is not so much as an island as a tiny rock sticking out of the ocean, miles from any major shipping route. It's about 70ft high and 80ft across, sheer on one side and sloping on the other. Even its ownership is a matter of dispute. In the 1950s, when the UK was using South Uist in the Outer Hebrides as a firing range, **Harold Macmillan's** government became anxious that Russia could use Rockall as a base for spying operations. In 1955 three soldiers and a helicopter were lowered onto the rock and formally laid claim to the island. No objections were raised by the puffin community.

In the 1970s, however, natural gas exploration rights in the area, resulted in competitive claims from Ireland, Denmark and Iceland, and Britain hastily passed the Rockall Act in 1972, which declared that Rockall was officially part of Scotland. But the Rockall Bank dispute continues inconclusively to this day, though the UK's position has not changed.

The Expedition

The Rockall expedition has been a long time in the planning, not helped by the Covid-19 pandemic. A big problem has been locating a suitable boat because suitable vessels tend to be booked up at least a year in advance. A further complication is that any skipper has to have at suitable licence permitting sailing over 200 miles from land. After a long search they now have just the boat they were looking for – the powerful 60ft racing yacht *Taeping* originally built in 1996 to withstand nature's wrath while keeping crews safe during lengthy journeys around the globe.

The team plan to depart *Taeping's* base at Inverkin Marina on 26th May, and the voyage to Rockall is expected to take up to 36 hours depending on sea and weather conditions.


2

The Expedition Team

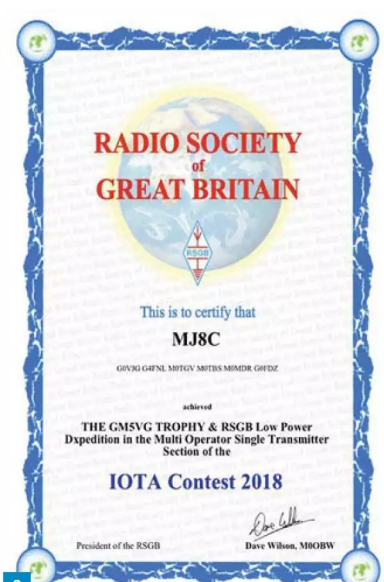
The three-man team is led by Scottish marine biologist and oceanographer **Chris 'Cam' Cameron**, who has been working professionally at sea since 1992. Alongside Nobby as expedition radio operator will be Bulgarian electronics engineer, licensed amateur and keen climber **Emil Bergmann DL8JJ**.

Nobby and Emil plan to spend up to a week on the rock, but then the plan is to leave Cam to stay alone long enough to beat the present record of 45 days set up by explorer **Nick Hancock** in 2014.

Equipment

I was intrigued to know more about the sort of gear required for this sort of expedition.

"What you have to realise," said Nobby, *"is*



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that you have to be self-sufficient throughout. There's no popping over to shore to replace something that gone faulty or fallen into the ocean!" So, everything has to be duplicated or even triplicated for good measure. The team will be taking a pair of tiny Yaesu FT-857D transceivers permitting operations up to 100W on all bands, together with an Icom IC-7300 and an Elecraft KX2 pocket-sized QRP rig. Thanks to Yaesu they will also have an HX890E marine radio, and they are grateful to Iridium for supplying an Indium GO Satellite Wi-Fi Hotspot system

To minimise weight, antennas will be simple wire antennas suspended down the side of the rock. Power will come from a Honda 1kW generator, plus solar panels and a battery to provide further back-up.

4

Life on the Rock

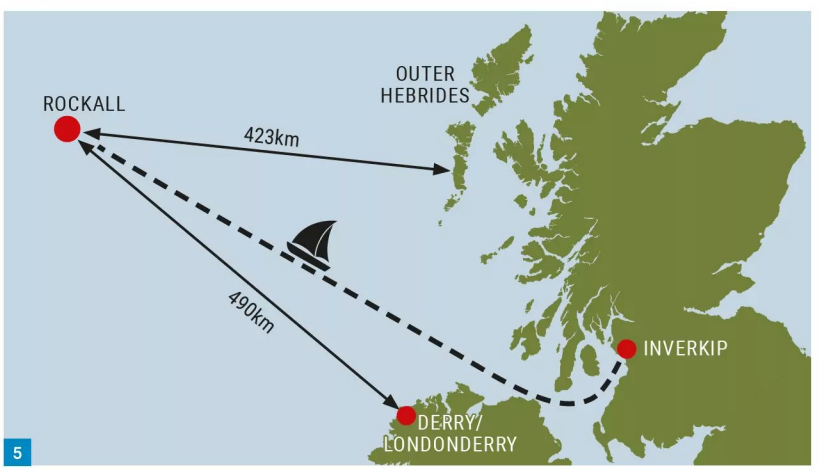
The first problem, Nobby told me, is getting on to the rock. *"If it was in your local park, the kids would be climbing it – no problem!"* he said. *"But in the middle of the Atlantic under unpredictable weather conditions and a sea swell the height of a house, it's an entirely different proposition!"* Landing is by small dinghy and the technique, Nobby explained, is to ride the swell, jump off at the peak and grab on to the rock. Then, if you're transferring gear from the dinghy to the rock, you've got perhaps 20 seconds before the swell brings the dinghy back up again. *"It's an operation that has to be undertaken with extreme care – there's no contacting the Coastguard or RNLI if things go wrong!"* said Nobby.

On the rock, the team will largely be operating unsheltered, though they will have a tiny 'survival pod' that has been generously provided by a Staffordshire company Landpod. It's been specially designed in flat-pack form and the team will have to winch up the panels (along with the rest of the gear) on to the rock and assemble everything in situ. *"It's only big enough for two people at the most and we'll probably improvise a canopy to provide a bit more shelter,"* said Nobby.

For provisions, the team are not expecting Gordon Ramsey-style cooking. For food, they will be living on military-style ration packs of dehydrated food and powdered drinks. They plan to take some 100 litres of fresh water on to the rock, but will also have back-up supplies from a small reverse-osmosis desalination machine they have been loaned, which will enable them to produce drinking water from the sea.

QSOs

The expedition call will be **MM0UKI**, and depending on how long takes to sail to Rockall and set up the station, Nobby is hoping that he and Emil will be of the air for up to a week from 28/29 May. Operation will be on SSB, CW and FT8, probably mainly on 40m and 20m depending on band conditions, and they plan to operate simultaneously for much of the time. *"There are sure to be massive pile-ups"*, said Nobby. *"We'll be confirming all QSOs, with a specially designed QSL card for all contributors to the charities."*



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Charities

The expedition is very much a fund-raising event, which has already attracted much welcome sponsorship and contributions from private individuals. The beneficiaries will be:

The Royal Navy & Royal Marines Charity, the principal charity of the Royal Navy, which exists to support sailors, marines, and their families, for life. It distributes millions of pounds annually to military charities, which care for the children, families and veterans of the Royal Navy and Royal Marines.

ABF The Soldiers' Charity (formerly the Army Benevolent Fund), the national charity of the British Army. Since 1944, it has provided a lifetime of support to soldiers, veterans and their immediate families when they are in need.

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Website

The Rockall expedition website is:
www.rockallexped.com

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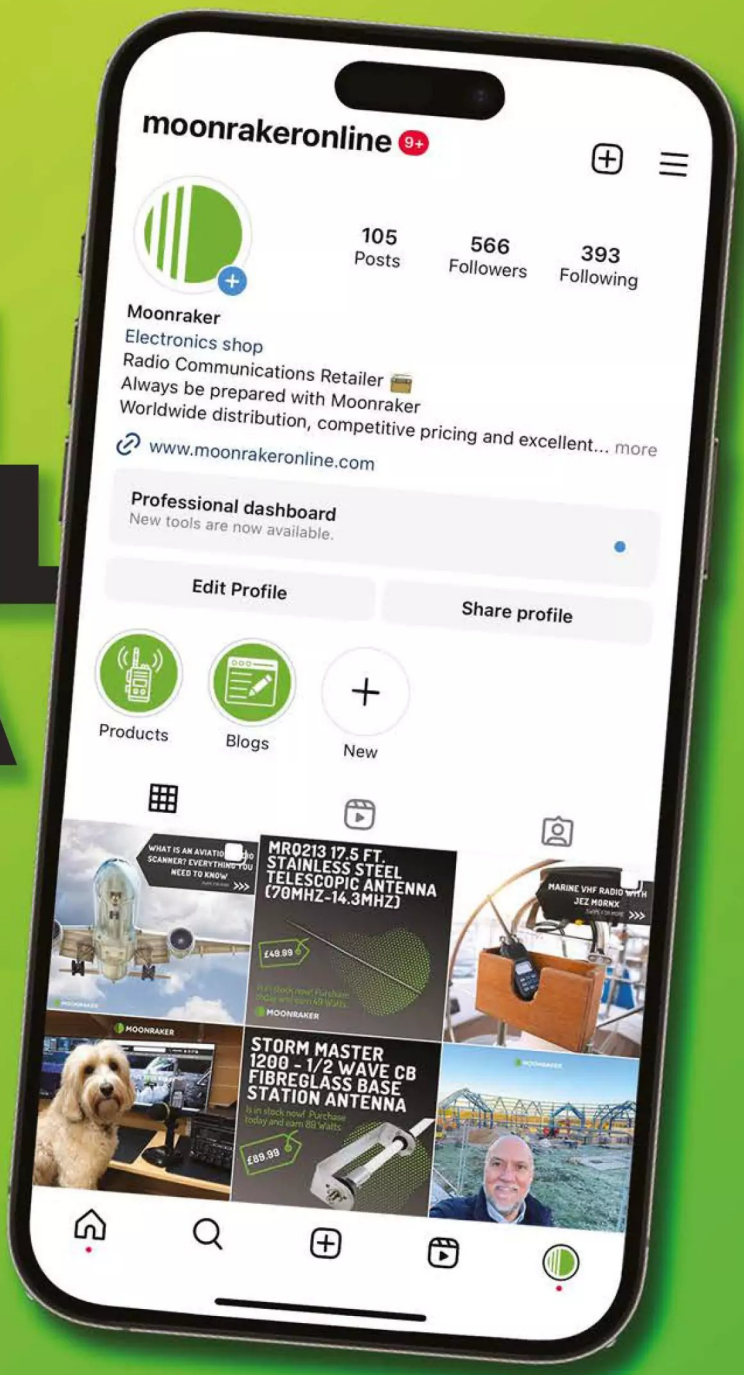

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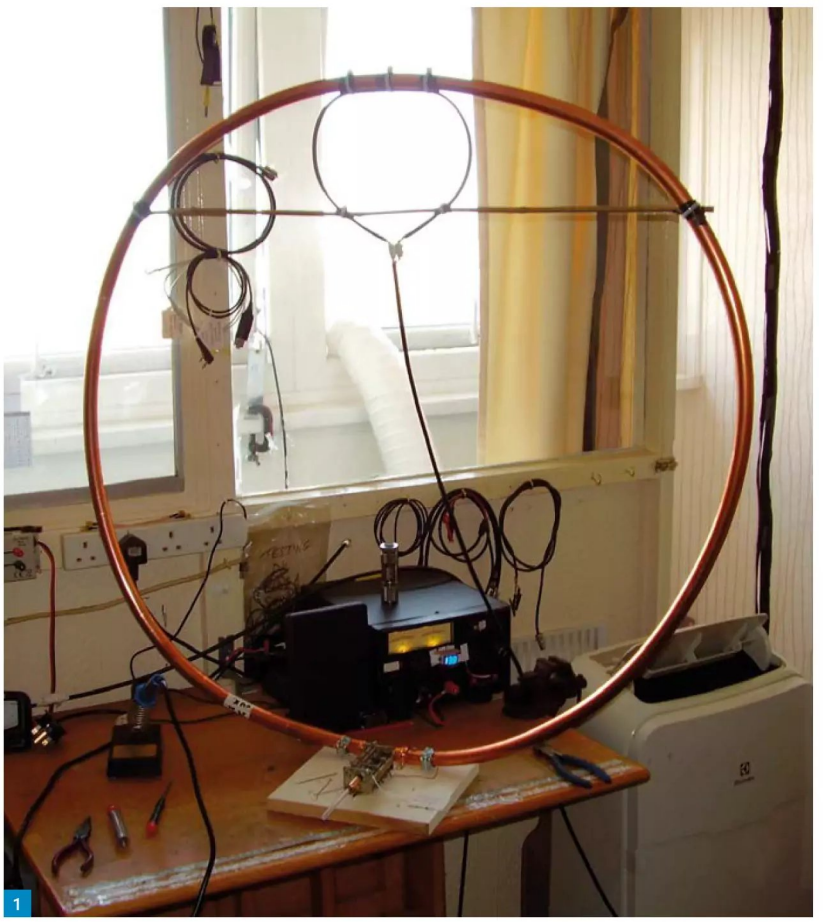
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Double Turn Magnetic Loop for LF Bands

Maurice Webb GW0UGQ returns to the fray, this time with a double-turn magnetic loop.

Deep down inside I was, and I suppose will always be, an 80m boy. When I lived at my old QTH, which was Gronant located just up the hill from the infamous Presthaven Sands Holiday Park in Prestatyn, North Wales, I had an MFJ-1792 dual-band 38ft vertical antenna that covered 40m and 80m. My immediate neighbour also allowed me to run a couple of quarter-wave radials out under his rear garden (NNW), which was overlooking the sea. That really opened up the LF bands for me in those days but sadly they are now just distant memories. Truthfully, though, I had an enormous amount of fun seeing if I could get the WAS (Worked All States) award on 80m. But that all ended when I lost my parents and had to move house due to medical conditions, after having a triple heart bypass operation, and several bouts of severe depression.

My new QTH doesn't permit such an antenna system, so I had to put up with limited operation on the VHF/UHF bands (see *PW* April 2020). Of course, that was just a brief history of things when I appeared at my most recent QTH (see QRZ.com). Since then I have been playing around with magnetic loop principles – see my single-turn loop in *PW* July 2022. Not always with success I must admit, but I have learned a great deal that's not in the antenna textbooks! After all, as a great radio amateur once told me, *"You learn best by your mistakes"!* Anyway, a project that I have always fancied is to try a magnetic loop for the LF bands. It must be appreciated that due to my experimental loop sizes, that the antenna efficiency is going to be well down. But in all honesty I just want to experiment to see what results – if any – I may achieve.

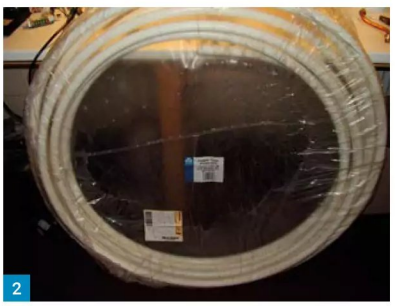
Starting the Project

The start of my new project is shown in **Fig. 1**. My 'Blue Peter special' (from the good old days of decent TV programmes, but without the Fairy Liquid bottle!). The picture shows my tabletop Mk1 version, which as I said, covers 40 – 17m, and has proved very good. The variable capacitor used in the Mk1 is a 343pF triple gang using one gang, with a small jumper connection to parallel another gang when 60m is wanted. On my new project I will be constructing this magnetic loop using the same 22mm bore copper, with probably again usage of a simple broadcast general coverage variable capacitor. My basic starting point was to try and construct something that could be used on a bench or table top within my apartment, with the provision for attempting some portable activity if and when my health allows.

This magnetic loop is, of course, aimed at QRP only. My radio for the test will be a Yaesu FT-920 HF transceiver, using about 2W RF output. I will also be using my own digital interface design unit along with the PSK Reporter software as an indicator of RF distance travelled. Being QRP I use mine mainly on the various digital modes within WSJT-X, the software designed by **Joe Taylor K1JT** and others. This new project is commonly termed a Double Turn Magnetic Loop antenna, which in my case will be aimed at the LF bands, covering 3.5, 5 and 7MHz. Each loop will be approximately 9.5ft in circumference, with an experimental separation distance of four inches (See video by **Jeri Ellsworth AI6TK**, 80m Double Loop, on YouTube).

The new prototype will have a central joining point (or crossover) that continues the loop cycle. That is if you build your loop using two separate individual loops, as I will do on this prototype. The crossover point will then be silver soldered, so as to try and cut down any losses. Because of my slight decrease in loop size my calculations needed to be re-done. I have based my measurements on a single loop of 9.5ft circumference (TC). Also please note that you should be able to purchase 22mm copper tube on a roll. The width of the roll will be about three and a half foot depending on the length of the roll. I got my 22mm copper roll from Rye Oil Ltd [**1**], for £70 post free. That was for a 20m roll, **Fig. 2**.

Don't forget that you can make the size of your loop what you wish, by just changing the lengths to suit your needs. In my loop design,



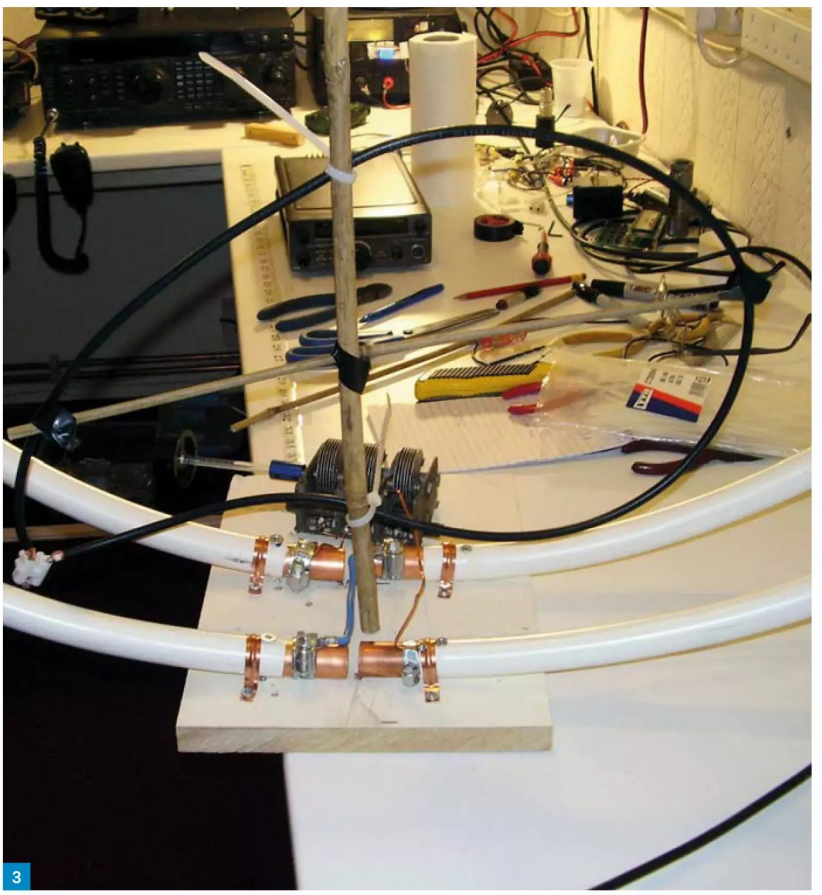


Fig. 1: Single loop tabletop version, which covers 40m to 17m. Fig. 2: Sealed 22mm x 20m Copper Roll from Rye Oil Ltd. [1]. Fig. 3: Basic construction start idea of Double Mag-Loop. Fig. 4: Shoddy simple crude crossover network of LF loop. Fig. 5: Crude method of mounting the Faraday TX loop. Fig. 6: My new variable capacitor in use. MFJ-19 wide spaced. Fig. 7: QSL confirmation of my first ever China station.

the inner transmitting small loop is calculated as (TC(1) × 2/5). I tend to add a little extra length for additional minor adjustments for optimisation of SWR across the wanted antenna coverage. My inner transmitting loop is made from an oddball length of mini-8 coax cable, using both the braid and centre conductor soldered together, then I connect the ends to a simple chocolate block, for ease of testing and adjustments, if any are needed. You can use whatever variable capacitor you have lying around for testing frequency coverage. And do not touch the variable capacitor when transmitting as it is hot with RF currents and will give you a very nasty RF burn, even at QRP levels!

Also don't forget to use an insulated rod between the variable capacitor and the control knob. This is to help minimise any possible hand capacitance effects. The above will also be applicable if you choose to add a motor to control the loop tuning because, as I have already mentioned, the variable capacitor shaft is hot with RF voltage. Of course, you may decide to use a butterfly capacitor, which I found in earlier experiments was a little easier to help dip the SWR. Depending on your wanted power output, it would be better to use a wide-spaced variable capacitor or better still a vacuum variable. However, this will increase the costs of the antenna enormously. Another point that I should mention is that in my antenna designs I have the variable capacitor placed at the bottom (Mk1) single version. This is just for convenience in using and adjusting the antenna. In my designs the inner transmit loop is then placed at the top, 180° from the capacitor. You can see my arrangement of construction in the prototype in Fig. 1. Not the neatest but it's practical and eases construction enormously.

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All joints can then be silver soldered to help keep resistance losses down, therefore helping its efficiency somewhat.

Continuing the Project

Continuing from the above, any length of decent 50Ω coax (such as mini-8) then connects from the chocolate block to your receiver or transceiver. As a general 'rule of thumb' a capacitor value of around 250pF should give you a good starting point for the standard 1m magnetic loop. See **Justin G4ILO's** (SK) website for some good and useful tips on his magnetic loop webpage, using RG213 or similar coax. This saves the expense of copper or aluminium tubing. The latter I feel is the best for magnetic loop construction, but it's not as easily accessible to purchase as copper, cost wise, in the UK. There are lots of various magnetic loop designs using coax cable, the famous one being the Alex Magnetic Loop by PY1AHD. Some other people, such as 2E0ERO, use the harder heavier gauge Heliax cable.

Although not much experimental video tuition exists relating to the magnetic loop principles may I take the time to advise readers to see videos on YouTube, by Jeri Ellsworth AI6TK, as mentioned earlier. She explains – quite simply – the advantages of using a Magnetic Loop antenna, as compared to using, say, an 80m dipole at its correct height above ground! (a half wavelength would be roughly 132ft – this is outside of mine and, I am sure, many radio amateurs' dreams?). She also covers – in great detail – the height above ground needed for a traditional dipole antenna, to produce what is needed for DX stations – low angle radiation. This may be obtained by using a Magnetic Loop antenna, as the proximity to the ground does not have as much effect, therefore making it ideal for an experimental antenna for DX chasing, and you should find a loop quieter than other antennas, but that is dependent on which band you are on (although some people will not agree with that statement!).

The photo, **Fig. 3**, shows my slow start on my Double-turn Magnetic Loop idea. I admit it's not a pleasant sight and it has its faults. Its construction is taking longer because of my poor health, but I hope to finish it. There will be a short crossover connection, which will be shown in another picture, complete with the inner transmit loop. The crossover point just continues the connection to form the Double Loop circuit. I will be using a short piece of 6mm stranded copper wire – but you can choose your own way of doing your connections. On my design I have decided to use an element spacing of 4in. The spacers that I used are just some offcut lengths of wood that I obtained from a skip. A hole is drilled into the ends and a cable tie is fed through producing a reasonable strong

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fixture. The picture doesn't show the variable capacitor or inner transmitting loop.

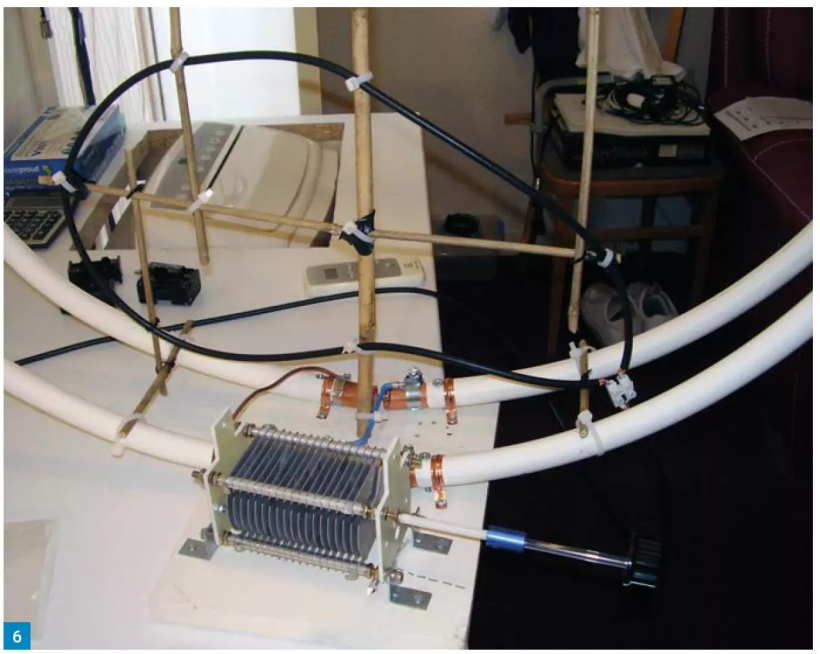
Please remember that my double loop will not be used outdoors on a permanent basis, therefore my use of wooden element spacers. If you plan on experimenting with your ideas outside, then a better form of insulation will have to be used and you will need to enclose the variable capacitor, and any motor, in a weatherproof case. The variable capacitor I will be experimenting with is a triple gang 120pF broadcast type. I will be using two gangs wired in parallel to obtain about 250pF. I have quite a few different types but as I am going to test the loop on 2W or so, then I think a 250pF should be fine.

Again, I will be using the small 1/5th inner transmit loop, as it's more convenient for me. However, you can use any feed method you choose. Some people prefer the Gamma match idea, but I have never had much luck with those. Others use the ferrite ring idea, but I found that in my tests, the ferrite ring got hot, proving some bad loss in that feed method. There is a very good video on YouTube, which goes deeply into the misconceptions of Magnetic Loop theory, and what not to believe. It's a presentation with **John Portune W6NBC**.

Further Thoughts

For the benefit of the reader, I have been thinking of an idea for the best magnetic loop that I may be able to construct with better efficiency. I would like to share some of my thoughts. I am going to try and obtain 4in wide by 1/16th thickness by 10m roll of aluminium flat plate, not foil. According to my research this should produce the best overall efficiency for a magnetic loop construction. I probably will not be doing an article on it unless it proves much better than what I already have. It should be a lot easier to construct compared with using copper tubing, and maybe less costly. My slight thought change is basically due to the skin effect with RF on materials used for antenna design.

The very crude picture, **Fig. 4**, shows my method of connecting the continuation crossover of the loop circumference. All connections after initial tests will be silver soldered. The capacitor, which can just be seen, may be changed as I explain in detail later. The spacing of the two loops is 4in, for starters. As my transmit loop is made of mini-8 coax I had to construct a scaffold type arrangement for testing. I wasn't happy with the look of it, but this feed will need to be replaced with a solid copper or aluminium sturdy wire, which



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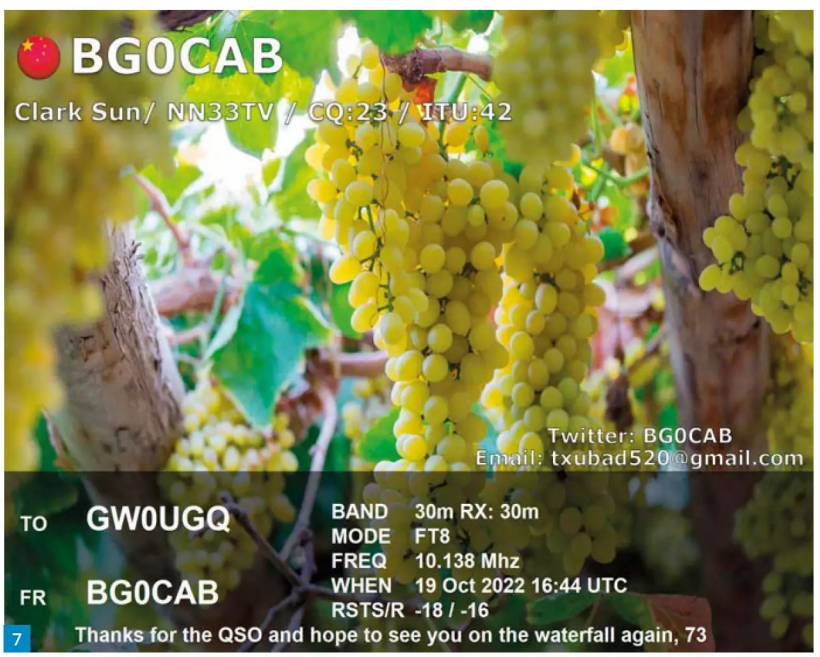

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will ease construction. Also be aware that the transmit coupling loop – in this case – will be positioned just above the blue crossover wire shown in the photograph, centre.

Faraday Loop

The next picture, **Fig. 5**, shows my very crude attempt at trying to mount the transmit Faraday loop. Because I chose to use mini-8 coax the above idea proved very flimsy and sagging badly. It would be better being constructed using 4 or 6mm aluminium solid wire. Sadly I never had any at the time of my project. With a little playing around you should be able to obtain a very low SWR. My SWR over the wanted bands was 1.1:1 or less. 3.5MHz (80m) proved way too noisy for me with quite a few sproggies, which I put down as being generated internally in my tower block. So, this band was not included in my tests. Coverage of my Heath Robinson antenna came out as 10MHz (30m) – 5MHz (60m). Because of the absence of 3.5MHz I changed my variable capacitor to an MFJ-19, which is high power and wide-spaced. I think it's around 120pF. However, I will still be only doing my evaluation using an RF power output of between 2 – 3 watts. I will also be checking the noticeable differences between a same size single loop, Fig. 1, against the above double loop.

Fig. 6 shows my adopted variable capacitor for my double-turn loop tests. As I said, it's a high-voltage wide-spaced one made by MFJ, which I obtained quite a while ago from a UK stockist. It was, however, quite expensive. The capacitor, as I said previously, was in case I decided to do some portable work with the assistance of a friend. Obviously, I will have to clean up the Faraday loop assembly with stiffer solid wire. The results I have obtained so far have been very rewarding, considering my Heath Robinson construction. As expected there is a difference between a single loop construction and my shoddy double loop attempt. I am seeing the increase in radiation when using the double. By how much I cannot say, as I do not own the necessary test equipment to give exact figures. My thrill came, during testing, when I worked China.

I have never heard China in all my SWL days, but to manage a two-way contact, albeit using FT8, was really well worth the time and effort to try and achieve – in theory – what may be said as impossible, with only 2 watts RF output. It really makes me feel proud. I doubt it being a record, but it certainly is, for me! (see QSL confirmation, **Fig. 7**). Bamboo canes and other hardware parts were obtained from [**2**] and [**3**].

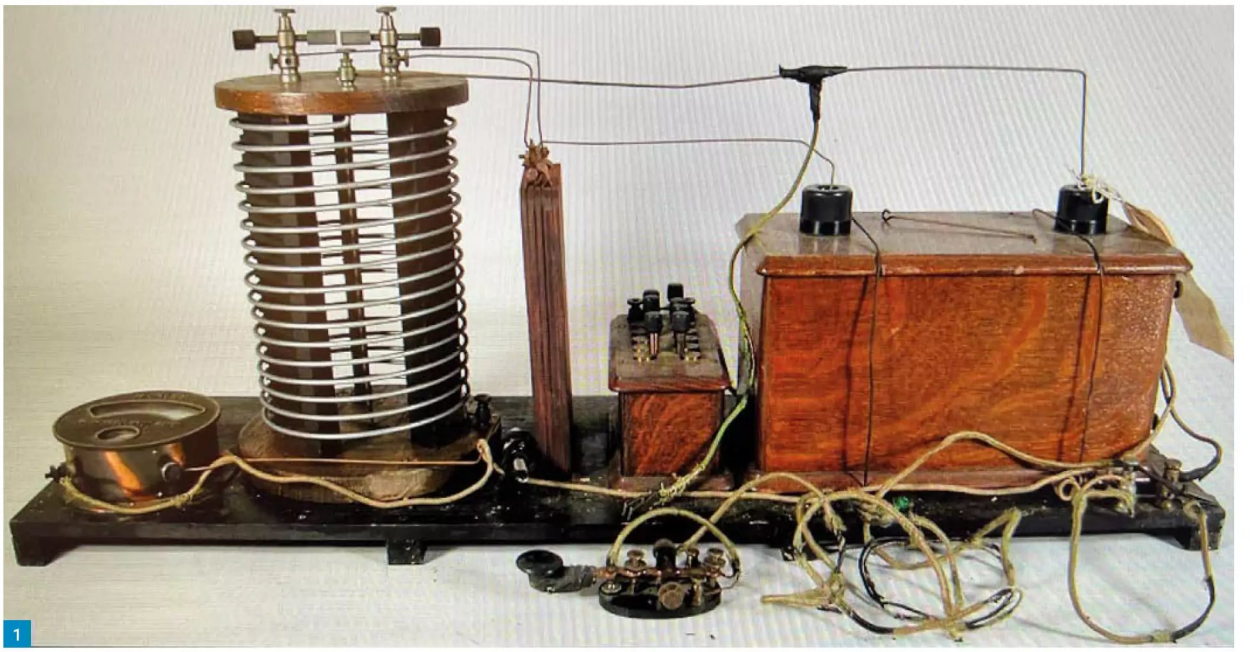
Thanks

I would like to finish by thanking all the people who have read my articles that have appeared in *Practical Wireless* and the many emails I have received from people who – like me – are willing to experiment to try and improve their antenna system, and who are not fortunate to own a great deal of real estate. My results remind me of something that the late **Alexander Graham Bell** once said, and I quote. *"When you take away the lonely experimenter who spends hour upon hour trying to achieve his or her dream. Do that, and you stop the clock of progress"*.

I would like to thank all the staff at *PW* for their kindness in correcting my very poor grammar. Keep up the great work. My special thanks are dedicated to **Andy G3PKW**, without whose encouragement I would never have finally finished my quest. And always remember that great proverb, *"If you fail, no matter how bad, then try, and try again"*. 73 & 88 to you all, Moe.

References

[1] Rye Oil Ltd, Harbour Road, Rye, TN31 7TE.
[2] Bevan's, Church Street, Fflint or any good hardware store.
[3] Bargain Savers, Church Street, Fflint. New and excellent hardware store. **PW**



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Aircraft Radio

Joe Chester M1MWD gets excited by aircraft communications during a visit to the Smithsonian museums.

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Which was the first aircraft to transmit voice from air to ground and vice versa? And what equipment did they use? And when? OK, it's not Trivial Pursuit, but these are interesting questions. Today we think nothing about aircraft use of radio, and some of us even have scanners to listen in to the fly boys and girls, out of interest. We also understand the use of HF frequencies by transocean flights, of course rapidly being replaced by the use of satellite data.

However, the early days are full of interesting ideas, full of earnest development, ambition, and competition between solutions. And there are consequences today of decisions taken back then. One of them about government regulation of the airwaves.

What's to See?

So, let's start with this. Visitors could see *"...a revolutionary new device called a radio telephone; every afternoon, an Air Service operator would hold scratchy conversations with aviators in wireless equipped DH-4s circling overhead"* [1]. What year? Let me keep you guessing for a bit. And of course, the year probably defines the equipment in use. Probably. Because it was an era of very rapid development, especially in radio terms. Let me give you a hint. DH-4s were in use in combat on the Western Front during World War 1. An early prototype can be seen in the Smithsonian Museum, Udvar-Hazy, near Dulles Airport, Washington DC.

But let's start with something else I also found in the Smithsonian. It is labelled *"Transmitter, Spark, Oscar Roesen, McCurdy early airplane radio"*. There is a date too. Go on, have a guess. It's in a glass case, but despite being quite well known as a visitor by several volunteers there, the Smithsonian's policy is that no one touches anything. *"They want the artifacts to last for ever"*, said one of my friends there. So, all I could do was peer through the glass. That's the spark gap, and coil, and the brown box is a battery, and that's a Morse key. Wow! Imagine it!

All aircraft of that era were string-bags. Biplanes many of them, with pilots frequently sitting on cans of fuel (in the DH-4, the fuel tank was conveniently located as the bulkhead between pilot and copilot). So, you are flying this machine, while the guy behind you is generating sparks with his Morse key, right next to the petrol tank. I repeat, just imagine it! **John McCurdy** was a Canadian pioneer, who used this equipment with a trailing wire antenna to demonstrate the use of radio in aircraft. A sort of early /M operator?

The Smithsonian record says: *"Designed and built by **Oscar C Rosen** in 1911, this wireless transmitter is the oldest known surviving example of airborne radio. It was carried aboard a Curtiss aircraft piloted by **J A D McCurdy**. The airplane could not carry the additional weight of Rosen, so the telegraph key was attached to the control wheel, and McCurdy sent the message"*.

So probably /M or maybe /A then? But callsigns were not a big thing back then. I'm looking at an original Curtiss over there, and I still can't quite believe that McCurdy was able to fly the thing and send Morse code at the same time. It's in the same scale of unbelief I get when I look over, towards the end of the enormous hall, at the Mercury space capsules from the early 1960s. Those guys were strapped into these tin cans, possibly for hours or even days at a time, then sat on top of a firework and were blasted into the void. But I digress.

Frequency? Well, it's spark gap stuff, so any frequency you like. Basically determined by the coil. Probably long wave then. And that other 'box' on the device is undoubtedly the 'coherer'. So how was he hearing the return signal? I think the reality is that he wasn't. He flew up a few tens or hundreds of feet, sent the message and then landed to ask if anyone heard his signal. QSOs in that system must have taken days! That was 1911.

But the DH-4 was using voice. In 1919. 1st of March, at Madison Square Garden, New York, at the world's first Aircraft Exposition, a sort of hamfest for winged wonders. Equipment? Maybe an SCR 68 (Set, Complete, Radio, in military jargon). Around the 400m wavelength, 750kHz, in frequency, and quite short range. Maybe 5-10 miles, or so. The set was powered by a generator,

Photo 1: Earliest known aircraft spark gap radio.
Photo 2: Circuit of early modulator.
Photo 3: SRC 68, the first voice aircraft radio.

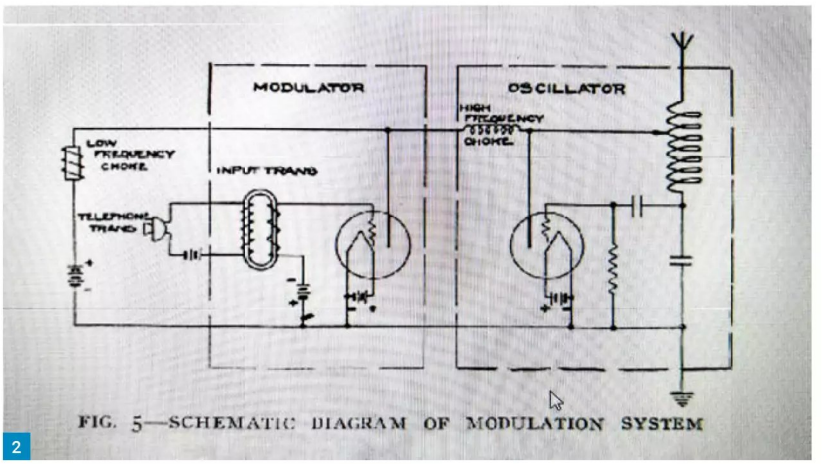
located on the wing braces. The aircraft had to travel at speed to generate enough current to run the radio. So, just a few years to get from CW to voice, presumably AM.

And since you have got this far, I have done some more digging for you. And found this [**2**], *"Development of Airplane Radiotelephone Set"*, by **H M Stoller** of the Western Electric Company, published in the *Electric Journal*, about the same time as the Exposition. It describes in detail the circuit used, and the results of trials going back to 1916. It looks a readily understandable circuit to my eye (anyone fancy building a replica?). A microphone modulates a three-element valve, which then passes the signal to the oscillator stage, which also uses a three-element valve. Apparently it delivered a power output of 0.75 watts! There is a larger circuit diagram in the reference. To summarise, we went from CW to voice in aircraft in about five years. The author describes his first flight to test this transceiver in 1918, at Langley Field, Virginia, with the first production model. It was a quite sophisticated model, with an integrated intercom, and a transmit/receive switch. Up at 3000ft, he unspools the antenna, and then hesitates. *"One of the difficult things is to know what to say on occasions of this sort"*. But he got over it, described the scenery below and spoke to another operator in another aircraft a couple of miles away. The test flight seems to have lasted nearly an hour, and would undoubtedly have been described as a great success. So, the answer to the quiz is around 1916-18, in Virginia, using SCR-68 sets.

Consequences

But I promised you consequences. I came across this document as well [**3**]. It's over 700 pages of a detailed history about how the US Navy got into radio, land, sea and in the air. Let's deal with Chapter XXII, entitled *"Development of Aircraft Radio Equipment"*. Let me start with a humorous quote: *"When **Hooper** became the Head of the Radio Division, one of his first acts was an endeavour to interest the Aeronautical Division, then a part of the Bureau of Steam Engineering ....."*

Sorry, I just find that line hilarious! But the report is full of fascinating stuff about how things developed back then, and in a sense today as well. There are references to the DH-4, and the SRC 69, and its later development. But the scary chapter is XII, entitled *"Achievement of Federal Regulation"*. OK, I'm being facetious. But there was a serious effort back then to give the US Navy monopoly control of radio transmission and reception, because of the growing use of radio in ships. The chapter details the problems the Navy had with interference, from commercial and amateur operators of the period. This was debated as far back as 1910, at a conference in Berlin. I could quote at length, but I think it sufficient to say that we are still discussing this topic today, in one form or another. Here's a short taste, *"In its editorial comment.....the* Electrical World *noted that.... the Government radio station....was little used; the one available private station operated under difficulty due to interference from the Government station; nothing had been accomplished to permit tuning to allow two nearby stations to operate without interference; the amateurs were using more powerful equipment and were thereby adding to the chaotic condition and should be controlled by Government regulation"*.



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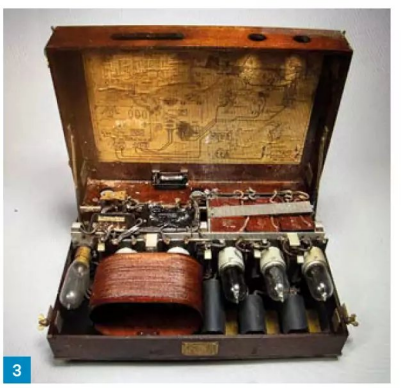
Sound familiar? And this is 1910!! But it gets worse: *"the editor again deplored the lack of accurate tuning to help in alleviating the problem. While receiving stations might be able to tune out interference from certain transmitters, they could not remain in contact with shipboard apparatus over any considerable distance if bothered by numerous amateurs operating on a wide variety of frequencies"*.

The point I am raising here is that the issue of interference between transmissions is as old as radio itself. And we are still working on this problem over a century later. I have written extensively on intermodulation issues in modern transceivers in previous pieces in this magazine. And also about the interference widely believed to be from transmissions by xDSL modems. Now while all these problems are technically different, the call is the same – regulation. The report goes on to blame irresponsible operators for the need for new regulations. Yeah well, we have them today too.

Of course, the rest of the story is well known. The *Titanic* disaster, and the failure to more effectively use shipboard radio equipment in that tragedy, brought into being what would in time become the ITU, and a global but nationally administered system of licensing of operators of radio equipment, in order to avoid interference issues.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A Fabulous Experience

So, a few days in the Smithsonian has been a fabulous experience. It's spread over two sites, one in downtown DC, the other, with the larger collection of aircraft, is called Udvar-Hazy, and is out beside the airport. I spent four days there recently, between the two sites. The sight of the actual early American space capsules is just awe inspiring. And I had the great pleasure to meet **Phil**, who flew the SR71(lots more details in the Wiki [**4**]), which is now sitting beside us in the hall. Great guy, and totally blasé about flying this machine at 85000ft, and Mach 3.5. Did you know that it leaked fuel while sitting on the runway? Because the fuel tank panels were not sealed. They only sealed up at high speed due to friction with the thin air. An aircraft with a deliberately leaky fuel tank? Extraordinary. Another must do? The Smithsonian? Definitely.

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[1] The great air race, Lancaster, John, Liveright Publishing, 2023 ISBN 978-1-63194-637-0.
[2] **https://tinyurl.com/2znwdp5r**
[3] History of Communications-Electronics in the United States Navy, **Captain Linwood S. Howeth**, USN (Retired), 1963, available here: **www.earlyradiohistory.us/1963hw01.htm**
[4] **https://tinyurl.com/2yz2pr38**

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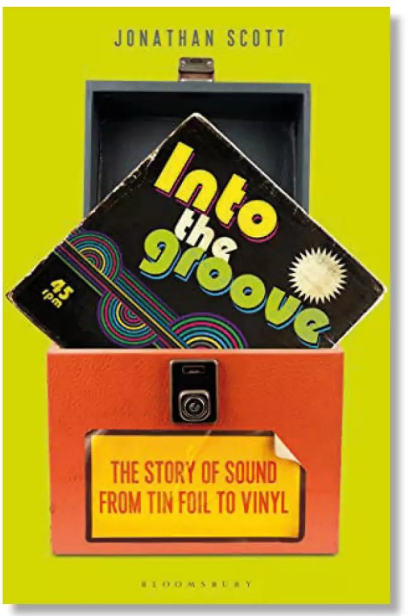
Sound Recording and WRTH

David Harris has two more book reviews, a story of the evolution of sound recording and the latest incarnation of the World Radio TV Handbook.



Into the Groove. The Story of Sound from Tinfoil to Vinyl
Jonathan Scott. Bloomsbury Sigma. 2023
Hbk. 320 pp. £17.99. ISBN 9781472979827
www.bloomsbury.com

Jonathan Scott is a British music journalist who has previously written *The Vinyl Frontier* (2019), a book about how NASA sent a golden record about Earth and mankind up in space on the Voyager probes of 1977. He is a vinyl enthusiast and this book is a very detailed and well researched history of the gramophone. The book begins with him asking the question, *"How does it work?"* He writes in a non-technical way but fully explains how sound recording has evolved. He begins with **Thomas Edison** (1847 -1921) who invents sound recording in 1877 by recording on tinfoil cylinders. The very first recording was of the words, "*Mary had a little lamb*". He then develops the wax cylinder and later experiments with flat discs made of various materials, including rubber, glass, paper and shellac. Edison held over 1,000 patents and also developed the light bulb and cine camera.

Edison saw his invention as a Dictaphone that could be used in an office for taking notes or perhaps as a means of recording talking books for visually impaired people. The idea that music could be recorded was something of an afterthought. Prior to the wax cylinder, music was performed live in concert halls or in people's homes. The ability to record music that people could buy and enjoy at home gave rise to a huge global industry. Like any other complex device the gramophone drew upon technology that had been developed for other purposes such as the telegraph and telephone. In the 1880s **Alexander Graham Bell** (1847 - 1922), who is best known for the development of the telephone, experimented with sound recording on glass and brass discs and produced the graphophone. In the 1890s recordings were one-offs as the concept of a master disc had not yet been invented. Therefore, to record 100 wax cylinders the musician had to play the same piece of music 100 times.

The father of the modern disc was **Emile Berliner** (1851 – 1929), a German American inventor who in 1887 was granted a patent for recording sound using horizontal modulation of a stylus on a rotating surface. By the late 1890s the 78 rpm record had taken off and was competing with the older wax cylinder. The origin of using 78 rpm was due to the availability of electric motors that ran at 3,600 rpm, which could be coupled to a 46:1 gearing to produce 78 rpm. The new records could also be mass produced from masters. Discs were originally made of rubber but later shellac was used. This is a resin secreted by the lac insect, which is found in India.

In the period 1900 - 1914 there was a battle of the formats between the cylinder and the disc. Sound quality was very similar but discs could play for up to four minutes and some were also double sided. The cylinder could only play for two minutes. This was not a problem for popular songs but lovers of classical music had to buy several records or cylinders to enable them to hear a whole symphony. The experience must have been very disjointed as the listener would have to keep changing records. The cylinder remained in production until 1929 when it finally gave way to the record.

The 1920s saw the birth of radio broadcasting, particularly in America where there were 500 stations by 1922. With no real restrictions on content the US public turned away from recorded music and embraced the new-fangled radio, which enabled them to hear music all day long.

In addition to providing a detailed history of how the gramophone developed Scott also looks at the history of recorded sound. He breaks it down to four periods: acoustic recording 1877 - 1925; electric recording 1925 – 1945; magnetic recording 1945 - 1975 and digital from 1975 onwards. In the acoustic period performers had to play or sing into a horn that was directly linked to the cutting apparatus. This setup was unsuitable for low frequencies below 200Hz. This meant that instruments such as the double bass had to be replaced by the tuba and recording of the organ was not feasible. Electric recording using condenser microphones enabled all instruments to be recorded and signers no longer had to sing very loudly to come over on record. From 1900 onwards opera was a popular format and in 1917 the first jazz record was recorded.

Edison saw his invention as a Dictaphone that could be used in an office for taking notes or perhaps as a means of recording talking books for visually impaired people

Two major developments of the gramophone came in the 1940s. In 1948 **Dr Peter Goldmark** (1906 -1977), who worked for Columbia records, unveiled the 33 rpm microgroove long playing record. Finally classical music symphonies could be heard if full. The LP also had less surface noise and did not wear out as fast as the 78. In 1949 RCA developed the 45 rpm single and marketed gramophones with auto-changers to enable long pieces of music to be heard without any significant break. The immediate post war period was a battle of speeds with sales of 45 rpm records finally overtaking 78s in 1954. The new 33 rpm LP opened up new markets, particularly for soundtracks from musicals. In

the 1950s *West Side Story*, *Oklahoma*, *South Pacific* and *High Society* were big sellers. The first stereo LPs were released in 1958.

The 1960s saw competition from magnetic tape formats such as the 8-Track cartridge, which was launched in 1965 and was mainly used in cars. The compact cassette was invented by Phillips in 1963 and soon became very popular for both home and car use. The cassette remained popular until the early 1990s when it was usurped by the compact disc, developed by Phillips and Sony in 1982.

In recent years vinyl has made a big comeback securing the future of the gramophone for another generation. In 2022 vinyl sales exceeded those of CDs for the first time since 1988.

In December 2021 it was announced by the British publisher of *WRTH* that *WRTH 2022* would be the final edition, thus bringing to an end this well-respected publication, which was an essential tool for generations of DXers. It seemed unlikely that a saviour could be found but in September 2022 the German company Radio Data Center announced that they had acquired *WRTH* and would bring out the 2023 edition. There was quite a long wait but *WRTH* was finally despatched in late February. *WRTH* was normally published in mid-December each year.

One of the strengths of *WRTH* was that it did not change over the years. You always knew what to expect and where to find information. The new publishers have adopted the same format and typography, which means that the new book should gain immediate acceptance from previous users. The new owners have even kept the same British printers with the only obvious change being that it is now 26% bigger with 848 pages.

After some initial introductions from the new production team *WRTH* kicks off with in-depth reviews of the ELAD FDM-S3 SDR communications receiver (£950), Stampfl active Dipole (£150), Reuter RDR 52 communications receiver (£1370) and the pocket sized Belka DX radio (£145). If you are not tempted by any of these new products, then you will be able to choose a new communications receiver using the receiver guide on p.24. This valuable feature of *WRTH* lists over 40 world band radios, communications receivers and SDRs ranging in price from £45 for the Tecsun PL-310ET to £5,000 for the AOR-ONE.

There are some interesting features on radio in Andorra, the Falkland Islands, RDS traffic information and mining DX data. The 12-page world atlas showing the location of shortwave broadcast transmitters has also been carried over by the new publishers.

The bulk of the book (some 558 pages) is devoted to listing virtually all domestic broadcast stations in every country in the world transmitting on MW, FM and DAB. Previous editions of *WRTH* had imposed a cut-off for some large countries by only listing stations above a certain power. The new *WRTH* seems to be much more inclusive with only a few low power stations being omitted. These more detailed listings account for the increased size of the book. For example, *WRTH 2022* had only 10 pages devoted to French domestic stations but the 2023 edition now has 18 pages. In 2022 the cut off was 1kW but the 2023 editions lists all stations above 0.5kW. Every country from Afghanistan to Zimbabwe is listed with station names, frequency, transmitter power and location. *WRTH* is not just a DX publication but is also a mine of information for travellers and radio industry professionals. If you are thinking of taking a holiday in Malta, then bring a FM/DAB radio because this island has three state run FM stations, 10 private FM outlets and around 70 different DAB stations. The new 2023 *WRTH* dispenses with listing the postal addresses of radio stations but with almost every radio station having its own website this is no longer necessary.

If shortwave listening is your passion, then *WRTH 2023* still manages to provide 40 pages of international broadcasting stations (down from 52 in WRTH 2022) listing broadcasts from 78 countries (down from 82 in 2022). China is still the major international broadcaster with the USA and its many religious stations not far behind.

An increasing aspect of SW broadcasting has been clandestine stations, which broadcast mainly anti-government propaganda towards their target areas. Countries with repressive regimes or who have been involved in civil wars are the main objects of these broadcasts, which often originate in Europe or the USA and are beamed from transmitters around the world. Ethiopia, Eritrea, Iran and North Korea are all well served by such broadcasters.

The T in *WRTH* stands for television, which takes up 50 pages. *WRTH* only lists terrestrial TV stations. Given that television is a truly multi-platform medium using terrestrial transmitters, satellite, cable and internet to reach viewers, then perhaps it is an area of broadcasting that could easily be omitted from *WRTH*.

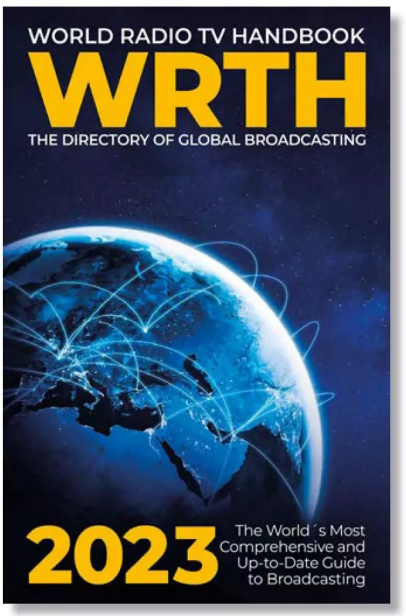
WRTH also has full listings in frequency order of all MW and shortwave stations.

The books rounds off with a country index, area codes, abbreviations, transmitter sites, DX clubs and time signal stations.

Radio Data Center are to be congratulated in taking this venerable publication forward and hopefully ensuring its continued publication for the foreseeable future.

There are a few issues, which may have been due to the very tight timescale in getting the book published. The listing of domestic broadcasters for Ireland only includes RTE stations and omits Ireland's numerous commercial and community stations. The attempt to list most US AM and FM stations is commendable but this has resulted in duplication between the listings under United States and the repetition of American stations in the MW frequency list for North America. The North America MW frequency list omits all Canadian stations, which is an unfortunate oversight.

The important thing is that *WRTH* has been saved and this indispensable guide to global broadcasting has found a safe home for the foreseeable future. If you have been a regular user in the past, then then *WRTH 2023* will be like greeting an old friend. If you are new to the world of broadcast DXing, then *WRTH* will be a regular companion to help you really enjoy the world of radio. **PW**



World Radio TV Handbook. The Directory of Global Broadcasting. (Vol. 77)
Editor: Gunter Lorenz.
Radio Data Center GMBH, Germany. 2022.
848 pp. Pbk. £40.
ISBN 9783982501703
www.wrth.org

The new book should gain immediate acceptance from previous users

Tim Kirby GW4VXE
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1

LORA Trackers & Gateways

Tim Kirby GW4VXE has another packed column, with some great openings on 8 and 6m in particular. But he starts with a discussion of LORA.

Always doing something interesting, **Jef Van Raepenbusch ON8NT** writes, "***Thierry ON2ACO*** *made me a LORA iGate, to put on my balcony, and a Lora tracker, which produced less than 100mW* [**Figs 1** and **2**]. *I power them both from a 5V powerbank, which makes it very portable... The results are amazing: with the tracker in my car, and a mobile antenna on the roof of the car, I could follow my route even at a distance of 15km from my QTH/iGate without any problem! I am planning more tests in the future as WX is improving...."*

Jef notes, "*LoRa is a chirp spread spectrum technology. As a result of this novel modulation having process gain LoRa can receive signals far below the noise floor. Conventional APRS is limited by having to copy signals above the noise floor. The frequency worldwide is 433.775MHz. The LoRa Trackers and iGates can be built from readily available consumer off the shelf hardware. Source:* **https://tinyurl.com/2cvx47v4**

I included some details of experiments with LORA in the column recently, which **Andy G7GQA** and **Jayne M0JNE** had been carrying out. I wonder whether anyone else has been trying it. It looks interesting, but I am not sure whether I should find anyone to 'play with' out here in West Wales! Maybe LORA satellites, which also look very interesting, might be a better option for me!

Eddie Ashburner G0EHV - Silent Key

I was very sorry to hear that **Eddie G0EHV** had passed away in February. Eddie had been very active indeed from the northeast coast on VHF/UHF for many years. Although we'd not spoken on the air for a while, I was able to keep up with his activities on Twitter. Thinking of Eddie, his family and friends at such a sad time.

The 8m Band

Kevin Hewitt ZB2GI has been monitoring the 8m band with great success. For example, on 12 March Kevin saw signals from PJ4MM, WM2XEJ, G8BCG, G9PUV, EI4GEB and EA1TX.

Tom Mix ZS1TX received EI2IP on 11 March at around 1330UTC. Tom can't currently transmit but says he's looking at YouTube videos of how to open up his IC-7600 for transmit on the band.

On 7 March, **Bernard Bastien VA2CY** was testing using WSPR and was heard in Australia by several stations, including VH5A (PF95) at a distance of 17160km, on the path over the Pacific Ocean.

Roger Lapthorn G3XBM (Cambridge) writes, "*I was spotted several times in the Caribbean, USA and Canada, but things are a little quieter now. I am still using 2.5W and the low dipole. OFCOM have renewed my 8m permit until April 2024. I am now up to four continents and 21 countries spotting me on 8m FT8 with the 2.5W*".

On 9 and 10 March, **Tom K6EU** near San Francisco reported hearing both **Robbie EI2IP** and **Paul G9PUV** on 40MHz FT8. Also, **Chris N3IZN** near Los Angeles reported decoding EI2IP and G9PUV.

Peter Taylor G8BCG (Liskeard) found very good signals on the band on 6 March from Canada, USA as well as the Caribbean, G and EI. Peter was particularly pleased to work 4X1TI taking his country total to 11 on 8m.

On 19 February at **GW4VXE** (Goodwick) I heard VA2CY for the first time on the band, on FT8, using the FT-847 and the V-2000 vertical antenna.

The 6m Band

Kev ZB2GI has had a successful month on the band, with a lot of contacts made via TEP, using his monoband whip and a counterpoise wire poked out his apartment window. Stations worked include 9Y4D (FK90), 9Z4Y (FK90), EA7JCR (IM67), EA7YV (IM76), EA8CHC (IM67), EA8CHC (IM67), LU2GPB (GG03), LU5FF (FF99), LU8GMM (GG02), PP2RON (GH53), PP5BK (GG51), PV8DX (FJ92), PY2BS (GG66), PY2BT (GG66), PY2GG (GG66), PY2MOR/P (GG66), PY2ND (GG67), PY2VZ (GG58), PY2XU (GG66), PY5EW (GG46), PY7AN (GH28), PY7ZZ (HI21), TT8SN (JK72), ZP6/N3BNA (GG14), ZP9HTL (GG24), ZS6NK (KG46) and ZS6OB (KG44).

Roger Greengrass EI8KN had a good day on 6 March, working ZS6NK (KG46), 3C3CA (JJ43), ZS6NJ (KG33), ZR6K (KG46) and TZ1CE (IK52). On 8 March, Roger worked C5C (IK13) giving Roger DXCC #107 since getting his EI callsign in 2017.

Talking of TZ1CE, who was operating from **Jeff TZ4AM**'s QTH, **Don G3XTT** reckoned that he was in a sweet spot to hear TZ1CE as, for some days, signals were very strong and almost continuous! It wasn't quite that good here at GW4VXE, but I did manage to work TZ1CE using 100W and a vertical on 2 March. Even on the vertical, signals reached +13. Unfortunately, **Jeff ON8NT** was not quite so lucky, hearing signals from TZ for hours on end but unable to make a QSO.

Steve Telenius-Lowe PJ4DX said that "*6m has been both exciting and frustrating this month. Overall it has been an excellent month, starting on 19 February when there was another opening from the Caribbean to Indonesia with YB0AZ, YB1TJ, YC2XCD and YE1BON worked. VK8AW near Darwin was also worked during this opening, the first time I have worked the Northern Territory on 6m.*

"*Three days later was a widespread F2 opening to Europe and Asia. Many Western European stations were worked (including PW Editor Don G3XTT!) although there was nothing here from Central, Northern or Eastern Europe. But the best DX for me was HZ1TT in Saudi Arabia. My wife* ***Eva***

Figs 1 and 2: The LORA tracker and iGate made by Thierry ON2ACO for Jef ON8NT.
Fig. 3: Pictures from Patrick WD9EWK normally include sunshine and blue sky. Not this month!
Fig. 4: Jim Ryan EI3DP has a neat dish for QO-100 and a very attractive garden!

PJ4EVA *took over operating the station in order to work HZ1TT and was then called by VU3WEW for a 6m All Time New One ('ATNO'). VU would also have been a new one on Six for me, but unfortunately, he was not heard or seen again here.*

"On 22 February, I worked more Western European stations plus D4L and ZD7BG. I received multiple decodes from KH6/NA2U between 2029 and 2055UTC but unfortunately, I was out of the shack so I missed out on this 6m ATNO. The following day a whole string of stations in California were worked but unfortunately the band did not open as far as KH6.

"Yet more openings to Indonesia occurred on 25 and 26 February. Quite extraordinarily, YC0BAS, at over 19,200km distance, peaked close to S9 on the 25th and would certainly have been strong enough to work on CW or SSB though I believe he remained only on FT8. Another Saudi station was worked, HZ1SK, on the 25th and also decoded again on the 26th. On the 26th I worked YB1AR at 1808UTC: that's 1.08am in Jakarta, so it is worth checking propagation on Six at almost any time of day or night.

"By early March, the band was opening all over the place: D2UY, TR8CA and 3D2AG were decoded on the 1st and 2nd, while on the 4th, Eva PJ4EVA worked ***Remi FK8CP****. I was out at the PJ4G contest station for the HF ARRL DX contest, so this is another DXCC entity I missed on Six. After returning home the next evening, hoping to catch Remi, I called "CQ OC", and was called by* ***Warwick E51WL*** *on Penrhyn Atoll in the North Cook Islands. Unfortunately, I could not decode Warwick's signal so this was yet another 'gotaway'! Thanks to active 6m DXer* ***Juan TG9AJR*** *for letting me know that I was being called by E51WL.*

"On the 7th there was a big opening to the W5 to W7 call districts, with many stations in CA, AZ, NV and NM worked, plus a single Mexican, XE2CQ. I also decoded S01WS and HZ1SK again. The following day the band opening to southern Europe again, plus HZ1TT yet again and in the evening both Eva and I worked ***Antoine 3D2AG****. So, while it was a fantastic month for DX it was also frustrating to miss out on VU, KH6, FK and E51, but this is all part of the fun of DXing on any band."*

In another email, Steve comments on the regular nature of the openings to ZL and YB and says that 6m is open somewhere almost every day! He says, though, that apart from PJ4DX, the YBs were also working 9M6, 9K2, VU, 4X, HZ, SU, EA8, BY, A6, 5B and LZ but that the only one of those that he decoded was the EA8.

Phil Oakley G0BVD (Great Torrington) has seen some of the DX being worked but has struggled to make some QSOs, which was a surprise, as Phil gets out well. Phil asked me to take a look at his WSJT-X settings and I suggested that in his Radio Settings tab, he made sure that under Split Operation, he had 'Fake It' selected. I would recommend this to everyone too. It means that you always call a station with a tone around 1500Hz, which works well, compared, for example with a very low tone around 400Hz as the filters will start to be rolling off the audio and therefore, your power will decrease. Also, there is a danger of harmonics causing interference in the passband. If your tone is around or above 1500Hz, then any harmonics will be outside the passband of the audio filter – ensuring that your signal is as clean as possible. So, the 'Fake It' option is definitely one to set, if you haven't done so already.

Tony Collett G4NBS (Cambridge) made a couple of QSOs on 18 February; TZ4AM on CW at 1257UTC with nothing else on the band, although Tony worked LX1JX on FT8 a little later in the afternoon. Tony found a couple of stations to work on CW during the aurora on 27 February at around 1745UTC; GM3POI (IO88) and GM3WOJ (IO77). On 6 March, Tony worked TZ1CE on FT8 at 1737UTC, as he says, having watched him for several hours!

Peter G8BCG sent a very interesting email with lots of detail about the openings on the band. On 18 February Peter worked 3B9FR on Rodrigues, on an apparently dead band. **Robert 3B9FR** went onto work a number of very happy stations in North America. There was an interesting opening on 21 February, when Peter saw most signals from the west on a 'skew' heading from around 190 – 220 degrees., including VE, W, KP4, 8P, V25, 9Y, FG, HC, HI, J3, J7, PJ4, YV, PY as well as 3C, TT8 and 3B9 who were all loud on the direct path. On 27 February 27 Peter had TEP into Africa, with ZS, Z21, C5, V5, FR4 and 3B9 coming in along with a nice QSO with **Nader ST2NH**. In early March, Peter was finding that the afternoon TEP into Africa was making it to the UK with good strength, but the evening TEP was not quite strong enough, even for FT8. 6 March was a very good day with the highlight for Peter being a QSO with Z21ML. 10 March saw XV1X audible via F2 in the late morning with a whole day of TEP to Southern Africa. Peter worked ZA on backscatter, which was a nice one. On 11 March EL2BG was around giving a new country to many and there was TEP to South America and the Falklands in the evening, with VP8NO creating a great deal of interest.

The 2m Band

Jef ON8NT reports a 2m QSO with F0EUI (JN16) on 8 March.

Read more radio news and reviews at www.radioenthusiast.co.uk/news

Ian Bontoft G4ELW (Bridgwater) says that around the middle of February, there seemed to be openings on 2m every couple of days or so. Highlights from Ian's log include F6APE (IN97) and F6FGQ (IN78) on 11 February, EC2BBS (IN93), F5LMG (IN88), EI3KD (IO51), F6APE (IN97), F6FDR (JN19), PA2M (JO21) and OV3T on 12 February. On 13 February, Ian worked F4DJG (JN09) and then on the 16th F6IFX (JN07). On 19 February, Ian worked F5DYD (JN03), EA2XR (IN83) and F4BKV (IN95). Finally, on 3 March, Ian worked DG6AG (JO30). Ian runs 15W of FT8 to a 5-element about 4m off the ground.

Simon Evans G6AHX (Twyning) reports, *"I did the 144MHz UKAC on Tuesday 7 March. I was only giving points away but had 16 contacts in 11 squares. My best DX was F5RZC in JO10AR 323kms away. My only other 144MHz contact worth mentioning was on 13 Feb with F1LHC (IN88).*

"In local news, my friend ***Martin G7KPR*** *has taken over the licence for GB3NW, which used to be at the Hospital in Worcester. It's now up and running in a new location in Great Malvern, with great views to the East. It's a Fusion only repeater now with an internet connection making Wires-X access possible".*

Tony G4NBS caught the aurora on 27 February and made some CW QSOs, GM4PPT (IO75) and GM4ILS (IO87) around 1245UTC and GM4VVX (IO78) at 1755. During the FT8 Activity contest on 1 March Tony says he shared operation with the 80m UKEICC contest – a different type of SO2R (single-op, two radio) operation, perhaps! He made 72 QSOs in 28 locators on 2m and found UK activity good. To the east, Tony worked DG6YID (JO42) and OV3T (JO46) as well as EI3KD, EI8KN, MM0CEZ, GM4JIB (IO85), GM0HBK (IO77) and GW4VXE (IO71).

Here at GW4VXE conditions seemed above average to the east, or perhaps there were more beams pointing this way, as I made a lot more QSOs during a spell during the FT8 Activity session than I normally would. Best day here was 3 March when I worked ON6AB (JO21) for a new country as well as seeing stations deep into Germany from time to time, presumably by a combination of tropo and aircraft scatter.

The 70cm Band

On 8 March, Jef ON8NT made a 70cm QSO with GW4HDF (IO81).

Tony G4NBS has sent an, as usual, very interesting report on his activities on the band. On 13 February, Tony made a single QSO with DF4VAE (JO64). Next day during the UK Activity Contest there were tremendous radar signals from the North, which made signals hard to read. Signals from IO93/IO94 were very strong but not from Scotland, owing to the weather front to the north of Tony. Tony was able to make several QSOs on CW, including OV3T (JO46), LA0BY (JO59) and


4

GM4BYF (IO85). On SSB, Tony worked GM4PPT and GM4JTJ along with EI8N and the 'usual' GD/GI stations. On 3 March, Tony worked DJ8MS (JO54) and G0MOH (IO70) on FT8. During the FT8 Activity period on 8 March, there was heavy snowfall, which affected the SWR on Tony's beams to the extent that he could only run 30W, but Tony worked 56 QSOs in 24 locators, with the highlights being DL5FCW (JO40), DG6YID (JO42), DL8QS (JO43), OV3ZT (JO46), DF2VJ (JN39) as well as EI8KN, GI6ATZ, MM0CEZ and GM8MJV.

The 23cm Band

Roger EI8KN says that he continues to be very active in the 23cm activity contests and often manages QSOs out to around 600km on a flat band, although, as he says, aircraft reflections are often very helpful. Roger's log includes QSOs with G0JJG (JO02), G4ZTR (JO01), G4ODA (IO92), M0SAT (IO91), G8CUL (IO91), GD8EXI (IO74) and G3XDY (JO02) as well as many others a little closer.

Satellites

On AO-91, Kev ZB2GI worked DL5GAC (JN47) using a manually tracked log periodic antenna.

Patrick Stoddard WD9EWK (Phoenix) writes, *"AO-91 has had its issues, and on some days, or during some passes on a given day, it has been silent. For the most part, it continues to operate. At this point, the satellite is on the low side of its slightly elliptical orbit, meaning the passes are only 10 to 11 minutes in length. At the end of 2022, the highest AO-91 passes were around 15 minutes in length, and we should be back to that by June – as long as the batteries hold on...*

"Around the end of February and the start of March, the areas around my city Phoenix at higher elevations received snow. Some snow fell early on 26 February, and again on 2 March. The second round of snow brought more of that white stuff to the mountaintops, and some of the suburbs northeast of the Phoenix city center and the near-by Tonto National Forest. And I just had to drive out there! After taking lots of pictures, I worked some satellite passes, two AO-91 passes, and in between the AO-91 passes I also worked the ISS crossband repeater.

"After those passes, I drove a few more miles into the forest for more pictures, then went back home. It's nice to see the snow, but it is also nice not to have it at home". [**Fig. 3**]

Peter G8BCG bagged 3B7M on QO-100, having been a bit disappointed that they didn't operate on 6m. Another nice DXpedition contact was with VU4M (Andaman) worked for DXCC #152.

Jim Ryan EI3DP is close to 100 DXCC entities with 97 worked on CW using QO-100 having worked 3B7M and VU4M, **Fig. 4**. I'm looking forward to hearing that Jim's made it to 100 very shortly.

Broadcast Band FM and DAB DX

Now that *Practical Wireless* has absorbed *RadioUser*, I thought it might be interesting to report on Band II (88 – 108MHz FM) and Digital Audio Broadcasting DX, as I think it would be of interest to many readers who are fascinated by VHF/UHF. So, if you have an interest in this area, please drop me a line with any loggings that you make and I will do my best to encourage a couple of people who I know are active in this area!

There's lots of interesting propagation possibilities on these bands, from tropo to Es, to meteor scatter to even TEP. On John EI7GL's blog (URL below) he reported an interesting opening on 7 March when Radio Justica from Sao Paulo in Brazil was heard in Portugal on 77.9MHz. It's a frequency that will be surprising to enthusiasts, perhaps, but Brazil is migrating Medium Wave stations into an extended FM band, which runs from 76.1 to 87.3MHz.

https://ei7gl.blogspot.com

You can read a full report on the logging at: https://tinyurl.com/6yphwb5w but one of the interesting things about this is that the geometry of the opening is unusual. Normally, particularly at higher frequencies, such a path will cross the geomagnetic equator at 90°, but this is not the case here. Maybe the new Brazilian FM band will be an interesting target for European DXers looking for South America.

Closer to home, Simon G6AHX reports, *"I have had good FM openings into France using SDR# and my RTL dongle. I have a half-wave dipole in the loft facing East, which gives me Lille France Musique on 88.7MHz most days. I have experienced a couple of decent openings for DAB. I have a 4-element DAB aerial in the loft facing East coupled to my Ocean WR10 receiver. I scanned the DAB section to find a local mux for Cologne and on another occasion Belgian and French DAB".*

That's it for this month. See you next time – thanks to everyone for your interesting contributions! **PW**

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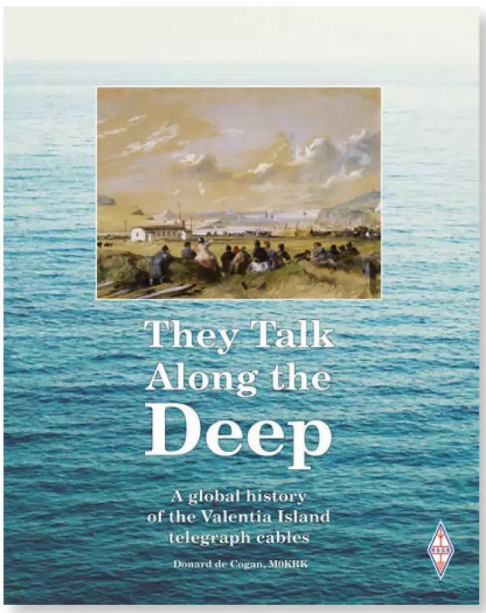
They Talk Along the Deep

A global history of the Valentia Island telegraph cables

By Donard de Cogan, M0KRK



The development of deep sea trans-Atlantic cables was one of the great Victorian technologic developments. But its tenure as the main technology from trans-Atlantic communications was only a few decades. This book looks at both the huge technological developments behind the cables and the importance of a tiny station on Valentia Island on Ireland's Atlantic coast. Both of which were pivotal in the development of the business and technology of international communications.

They Talk Along the Deep takes a global view of the history and considers how external factors aided the development and eventual decline of cable telegraphy. The trans-Atlantic telegraph attracted some of the greatest names in Victorian science, commerce and politics. However, that story largely now forgotten was one of international importance and is retold here. Not only this, but the book looks at how the electric telegraph simplified the control of the developing rail network, a system of uniform time, synoptic meteorology, remote control of warfare (Crimea war), rapid dissemination of news, insulation of copper with gutta-percha for cables and much more. The trans-Atlantic telegraph cable at Valentia Island in Ireland can also lay claim to many 'firsts', including the demonstration of the need for high purity copper for cable core, clarification of the theories of electricity, the development of uniform systems of electrical units, establishment of transmission and reception procedures, study of earth currents and their diurnal variation, discovery of photoconductivity, improvements in electrical earthing to name just a few.

Originally written as part of the push to have Valentia Island declared a UNESCO world heritage site, this book is concerned with how this all came about, the people who were involved and what the wider effects of these innovations were. There is no doubt that the telegraph cable station at Valentia had an enormous impact on both sides of the Atlantic and this book details the story in fascinating detail.

Size: 205x254mm, 304 pages, ISBN: 9781 9139 9534 8

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Don Field G3XTT
practicalwireless@warnersgroup.co.uk

General Coverage Receiver (Pt I)

F G Rayer G3OGR describes a multimode receiver for the 550kHz to 30MHz range.

This receiver employs twelve transistors and four semiconductor diodes in all, but can be built in simpler form to begin, extra stages being added later. Proceeding in this way has several advantages. A useful, working receiver is obtained as soon as possible, then additional features can be provided in due course. It can also be helpful to check that portion of the receiver already wired, before fitting further stages. Excellent reception is in fact possible over all frequencies with the basic circuit having only six transistors and two diodes.

Coverage is for medium waves and three short wave bands, or about 550kHz to 30MHz in all. The receiver is self-contained with battery. It is capable of long distance reception with the telescopic aerial, though range is naturally greater with a conventional external aerial.

Block Diagram

The simplified block diagram in **Fig. 1** will make stages clear, and also clarify which may be omitted during early or intermediate construction. Trl is the r.f. amplifier, a panel trimmer allowing peaking of this circuit with any aerial. Tr2 is the mixer, Zener stabilised by diode D1. Tr3 and Tr4 are intermediate frequency amplifiers, with double-tuned transformers. VR1 allows manual control of r.f. and i.f. gain, which is often useful. Diode D2 furnishes automatic volume control bias, and also detection for a.m. only, if required.

Tr5 is the S-meter amplifier, working a small meter of the ready calibrated type. Tr6 and Tr7 function in the common-emitter product detector circuit, with Tr8 as beat frequency oscillator. This permits reception of a.m., s.s.b. and c.w., a "function switch" controlling this part of the receiver, and also a.v.c.

VR2 is the audio gain control, followed by audio amplifier Tr9, driver Tr10, and push-pull pair Trl11 and Tr12, which will give plenty of loudspeaker volume. Phones may be used when wanted. Diodes D3 and D4 function as audio limiters, considerably reducing interference of static and similar type and avoiding sudden bursts of uncomfortable volume with phones.

In the completed receiver, Trl and Tr2 are under the metal chassis, with bandswitch, coils, etc. Tr3, Tr4 and Tr5 occupy a paxolin panel, forming the i.f. and meter amplifier section.

Tr6, Tr7 and the b.f.o. Tr8 are wired on a separate panel, and a.m. reception over all bands may be had even if this part of the receiver is wholly omitted, so it can be constructed later.

The audio section, Tr9, Tr10 and Tr11/12 occupy another insulated panel. These various panels are attached to the chassis and grounded to it.

To take advantage of the step-by-step method of wiring, sections are tested as completed. This enormously simplifies the process of locating any fault.

The following is probably as good a way to proceed as any, especially for a beginner, though there is naturally no reason why the whole circuit should not be used from the beginning by the more experienced constructor.

Wire mixer Tr2, i.f. amplifiers Tr3 and Tr4, and diode D2, with coils for one band. Feed phones from D2. This will give many transmissions at good phone volume, and allow initial alignment of the i.f. amplifier.

Build the a.f. amplifier, Tr9, Tr10, Tr11/12. Those signals previously heard with phones should now give excellent speaker strength. If a little simplification is wanted, Tr9 can be temporarily omitted.

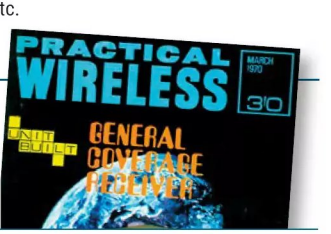
Add the r.f amplifier Tr1, with aerial coil for the single band chosen, and check working.

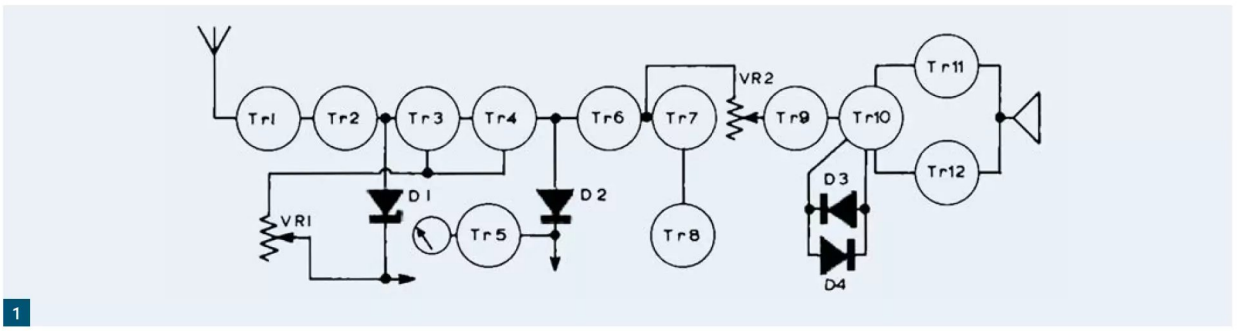
Wire Tr5 and the S-meter. The i.f. panel is so placed and arranged that Tr5 can be wired without removing the panel.

Wire the sets of coils for the other three ranges to the wavechange switch, testing and roughly aligning each range as it is added. This will avoid errors in switch wiring, which could be troublesome to locate.

Wire the product detector and b.f.o. panel, insert and wire it. This is also the time to add the a.m./a.v.c./c.w./s.s.b. switch, and minor extras such as p.u. input, tape output, phone jack, diode limiter, etc.

For this month's dip into the PW archives, we reproduce a constructional article from the late F G Rayer G3OGR, one of the most prodigious authors in this magazine (and elsewhere) for many years.





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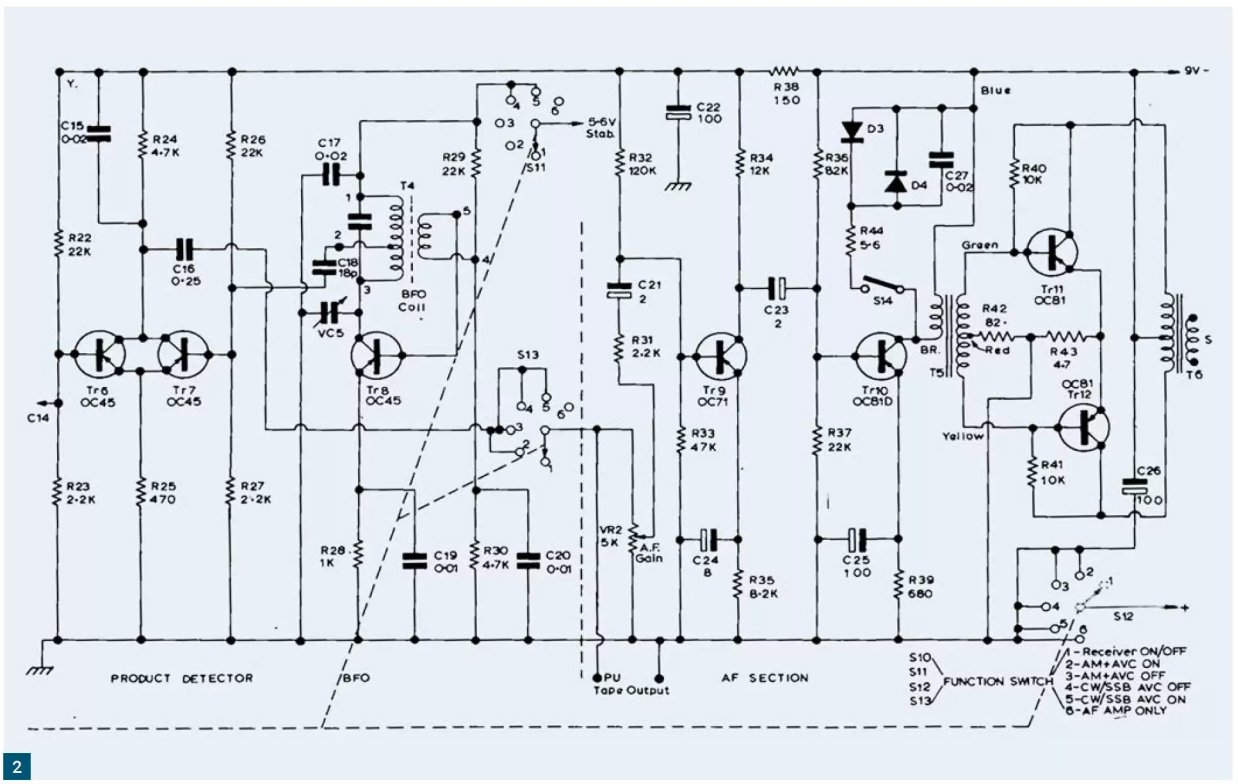

2

Coils and Coverage

The bands are approximately as follows:

- S.W.1. 30-11 MHz. 10-27 metres.
- S.W.2. 14-5MHz. 21-60 metres.
- S.W.3. 5-1.6MHz. 60-190 metres.
- M.W. 1400-550kHz. 210-550 metres.

If a pre-set trimmer were used with each coil, there would be twelve in all. The number of trimmers is reduced to five by having a single trimmer common to all oscillator coils, and an individual trimmer for each mixer input coil. Then the aerial circuit is adjusted with a panel-mounted capacitor, so giving maximum efficiency with any aerial.

There is clearly no reason why a separate trimmer should not be used for each oscillator coil, if preferred. There will then be eight trimmers, plus the panel capacitor.

Circuit Details

Notes on the various stages should prove useful at various periods during construction. Almost no changes to existing circuitry are needed when adding other stages, but there are a few points which must not be overlooked.

Figure 2 shows the r.f., mixer, two i.f., and meter amplifier stages. Band changing is accomplished by using a switch having three wafers, each three-pole four-way. Figure 2 shows coils for one band only. In the aerial section, SI switches the aerial, S2 Trl base, and S3 the tuning capacitor VC1.

The central wafer on the spindle has S4 for Trl collector, S5 for Tr2 base, and S6 for VC2. The rear wafer uses S7 and S8 for collector and emitter switching of Tr2, and S9 for the tuned windings of the oscillator coils.

Tag P of the oscillator coils is different for each range, as is the value for the related capacitor P. For S.W.1 (highest frequency band) connect pin 6 to chassis, as no padder is required. With range S.W.2, the padder P is 3,000pF, from pin 4 to chassis. For S.W.3, the capacitor is 1,200pF, from tag 3 to chassis. With the m.w. range, the padder is 350pF, and connected from tag 2 to chassis.

To avoid difficulty in wiring here, it is wise to check that the receiver works correctly on one band, before adding the coils for other bands.

The receiver can be tested without Trl and associated circuitry by taking' S4 to the aerial, and temporarily connecting 8 to chassis, instead of C3. Results should be good.

Tr 1 and Tr2 operate on a stabilised 5.6V line, from D1. D1, i.f.t.1, and the other items shown are on the i.f. panel.

Tr3 and Tr4 are the i.f. amplifiers, operating on the supply Y obtained from the audio amplifier.

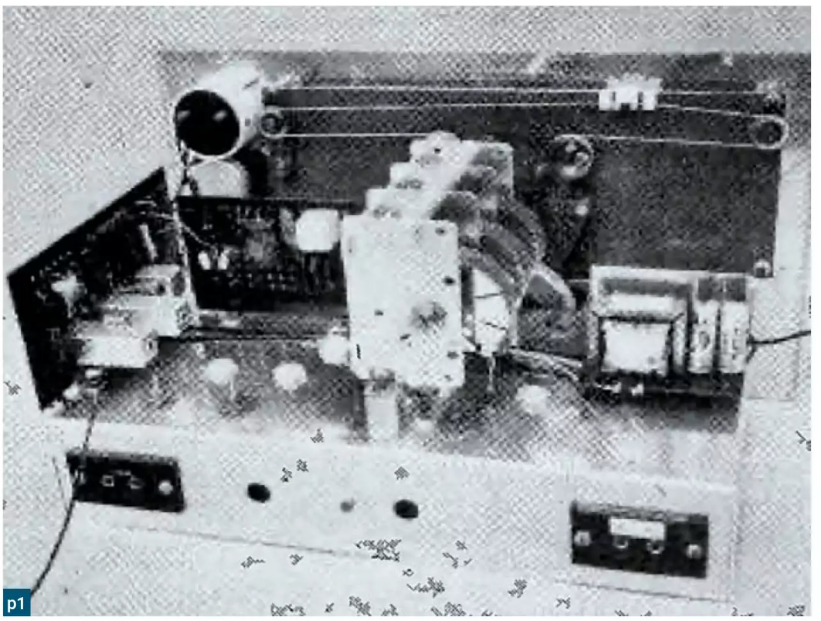
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Fig. 1: Block diagram of the complete receiver. Fig. 2: R.F., mixer, i.f. and meter amplifier stages. See text for values of padder condenser P. Note: S6 should be shown as ganged to S8. Fig 3: Product detector, b.f.o., a.f. and output stages. The 5.6 volt stabilised line is taken to the junction of D1/R9 (Fig. 2). Photo 1: Rear view of the receiver.

Sectional Components List

Coils

Aerial (T1): "Blue". Mixer (T2): "Yellow". Oscillator (T3): "Red". Denco miniature transistor type.
S.W.1: Range 5. S.W.2: Range 4. S.W. 3: Range 3. M.W: Range 2.
VC1/VC2/VC3 Jackson E3 three-gang or similar.
VC4 Jackson C804, 50pF.
Eddystone C898 drive.

R.F. Stage

Tr1	OC170	R4	1kΩ
R1	10kΩ	C1	0.01μF 150V
R2	2.7kΩ	C2	0.05μF 150V
R3	1kΩ	C3	0.01μF 150V

Mixer Stage

Tr2	OC170	R8	1kΩ
R5	10kΩ	C4	0.02μF 150V
R6	2.7kΩ	C5	0.01μF 150V
R7	1kΩ	C6	0.01μF 150V

Padders: 350pF, 1,200pF, 3,000pF
TC1 to TC4, each 60pF miniature compression trimmer.
TC5 30pF beehive trimmer.

I.F. Amplifier

D1	5.6V 1 watt Zener, Z1104
D2	OA81
Tr3	AF117
Tr4	AF117

I.F.T.1 Denco I.F.T.18/465
I.F.T.2 Denco I.F.T.18/465.
I.F.T.3 Denco I.F.T.14.
VR1 miniature 1 watt wire-wound, 2kΩ (Home Radio VR25)

R9	150Ω	R14	4.7kΩ
R10	68kΩ	R15	1kΩ
R11	680Ω	R16	5.6kΩ
R12	8.2kΩ	R17	5.6kΩ
R13	22kΩ		
C7	0.5μF 150V	C11	0.04μF 150V
C8	10μF 6V	C12	0.5μF 150V
C9	0.04μF 150V	C13	0.01μF 150V
C10	0.04μF 150V	C14	100pF silver mica
Cx	0.25μF 150V required for "A.M. only" circuit.		

Meter Amplifier

Tr5	OC81		
R18	68kΩ	R20	4.7kΩ
R19	10kΩ	R21	470Ω
VR3	Pre-set or panel linear 5kΩ wire-wound 1W.		

1 5/8 in. sq. 1 mA S-meter.

Product Detector and B.F.O

Tr6	OC45	Tr8	OC45
Tr7	OC45		
R22	22kΩ	R27	2.2kΩ
R23	2.2kΩ	R28	1kΩ
R24	4.7kΩ	R29	22kΩ
R25	470Ω	R30	4.7kΩ
R26	22kΩ		
C15	0.02μF 150V		
C16	0.25μF 150V		
C17	0.02μF 150V		
C18	18pF silver mica		
C19	0.01μF 150V		
C20	0.01μF 150V		
VC5	15pF variable		

B.F.O. coil, Denco IFT14 (T4)

A.F. Section

VR2	small 5kΩ log. pot.		
R31	2.2kΩ	R38	150Ω
R32	120kΩ	R39	680Ω
R33	47kΩ	R40	10kΩ 5%
R34	12kΩ	R41	10kΩ 5%
R35	8.2kΩ	R42	82Ω 5%
R36	82kΩ	R43	4.7Ω
R37	22kΩ		
C21	2μF 6V	C24	8μF 6V
C22	100μF 12V	C25	100μF 6V
C23	2μF 6V	C26	100μF 12V
Tr9	OC71		
Tr10	OC81D		
Tr11/12	Matched pair OC81/NKT251/AC128 or similar OC81 types.		
T5	Osmor QXD1		
T6	Osmor QX02		

Limiter

Two GD9 diodes.		R44	5.6Ω
On-off switch S14		C27	0.02μF 150V.

Miscellaneous:

12 x 7 x 7in. Type W cabinet, H. L Smith Et Co, 289 Edgware Road, W.2. 10½ x 6½ x 2in. Type I chassis (three-sided plus flanges), H. L. Smith & Co, 289 Edgware Road, W.2. WS27A (Home Radio) switch assembly with three WS29 three-pole four-way wafers, studding and spacers (see text). WS27 switch assembly, with two WS29 two-pole six-way wafers, studding and spacers. 1½ x 2½in. 16 s.w.g. heatsink, knobs, sockets, tags, 6BA bolts , etc. (Home Radio).

VR1 controls emitter bias of Trl, Tr3 and Tr4, and its main use is to reduce the strength of powerful signals, which may overload some stages. It must also be used when the a.v.c. is out of action.

S10 is one pole of the "function" switch. Two positions give a.v.c. from D2, while two substitute R17, eliminating a.v.c. This is primarily of use with some s.s.b. and c.w. signals. The receiver may initially be operated without S10, by connecting R12 to D2. The six positions of the switch are (1) Receiver off, (2) A.M. reception with a.v.c., (3) A.M. reception without a.v.c., (4) C.W./S.S.B. reception without a.v.c., (5) C.W./S.S.B. reception with a.v.c., (6) A.F. amplifier only in use.

When the product detector and b.f.o. panel is not ready, Cx from D2 is taken to the audio gain control, giving a.m. reception only. For general broadcast s.w. listening, the product detector may be permanently omitted. When it is employed, it is of a type which furnishes a.m. detection with no b.f.o. injection to the emitter pair.

As mentioned, Tr5 and the S-meter may be omitted until some later date. When in use, increased bias from D2 moves Tr5 base positive, reducing current through R20. The collector voltage of Tr5 thus moves negative, due to reduced voltage drop in R20. This operates the meter. With the aerial removed, VR3 is adjusted until the meter reads zero. Readings then rise with signal strength.

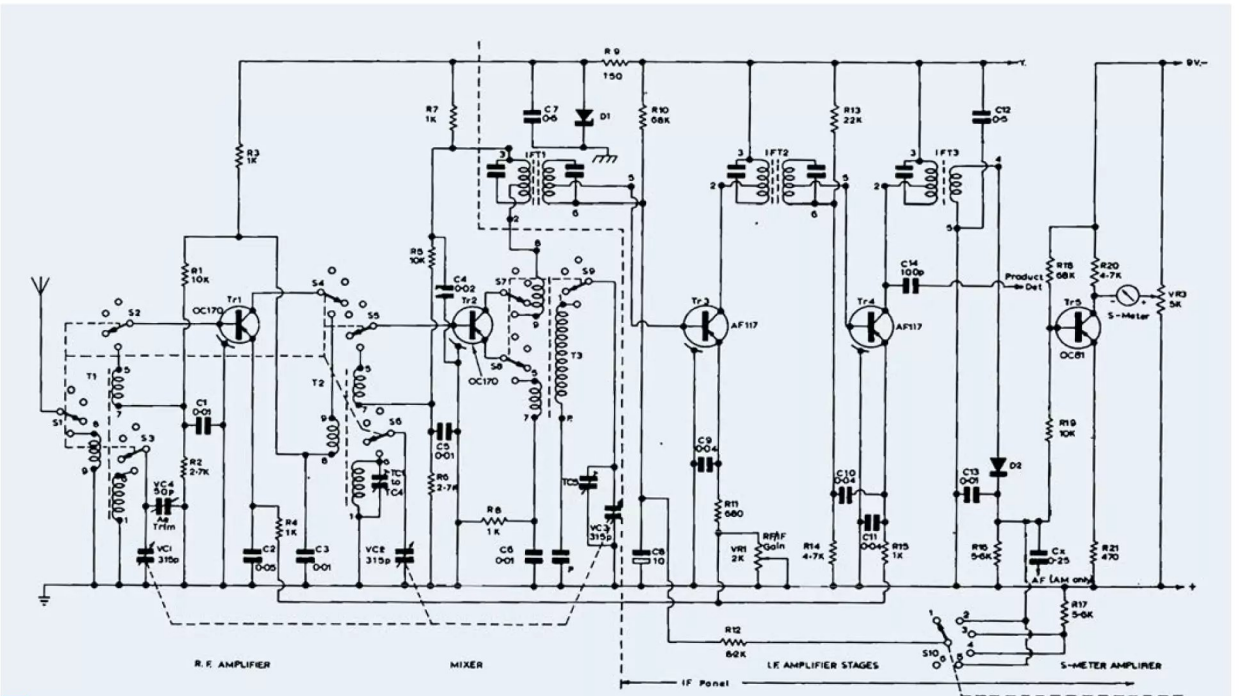
This is a lively S-meter circuit, operating with a.v.c. on or off, and not upset by b.f.o. injection. With a steady signal, from a signal generator or BBC transmitter (with extremely short aerial) the S-meter can be used to aid alignment. All trimmers and cores, including those of the are peaked for the best S-meter reading.

In normal use, the meter shows any improvement in signal strength, as from changes to aerial or earth, adjustments of an aerial tuner, peaking VC4, or the relative strengths or improvement to amateur signals, etc.

Band Notes

In order to reduce damping on m.w., a 1kΩ, resistor is placed between S2 and tag 5 of the coil for this range only. To avoid squegging, a 100 ohm resistor is wired between S7 and tag 9 of the oscillator coil for this band.

For a similar reason, a 470 ohm resistor is placed between S7 and tag 9 on the S.W.1 and S.W.2 (higher frequency) ranges.



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The need for these resistors depends somewhat on the actual transistor Tr2, and also on the run of wiring. If excessive oscillation, shown by hissing and whistles, does not arise on a band, no resistor is required. When resistors are fitted, they are best of the lowest value which will prevent this trouble, and values such as those mentioned give no apparent reduction in sensitivity.

Product Detector and BFO

This is built in a panel holding all components except the pitch control VC5, Fig. 3. This item is connected to the metal chassis, and to 3 on the b.f.o. coil.

When this panel is made, Cx in Fig. 2 is not required. D2 now provides a.v.c. only, and signals go from C14 Fig. 2, to Tr6 Fig. 3. Tr6/7 act in such a way as to provide a.m. reception when no input is available from the b.f.o., Tr8. With the b.f.o. in use, mixing gives reception of s.s.b. or c.w. signals. The function switch wafer S11 brings the 5.6V stabilised supply to Tr8, in s.s.b./c.w. positions. In each case audio passes from CI6 to the audio amplifier.

This circuit was found particularly easy to adjust for s.s.b., and though VC5 must be correctly adjusted, it is of small value, so not critical to operate. VC5 and Tr8 are completely out of use for a.m. reception, in the usual manner. About 7V is available at Y, which also supplies the i.f. amplifier.

It is often convenient to have an audio amplifier. The last section of the function switch breaks the circuit from CI6 to VR2, in the 6th position. A rear socket strip gives input across VR2, so the a.f. section can be used as an audio amplifier. The same socket provides tape output, VR2 being turned to zero, or adjusted to monitor signals.

Function Switching

The operations described are carried out by a four-pole six-way rotary switch. This gives one control, for all modes of use. But there is no reason why separate switches should not be fitted, if preferred.

If VR2 has a switch, this can be wired for "on-off" in the usual manner. A small rotary or slide single-pole two-way switch can substitute for S10, Fig. 2, for a.v.c. on, a.v.c. off. A further on-off switch may replace S11, so that the b.f.o. can be off for a.m., and on for s.s.b./c.w.

AF Section

This is also shown in **Fig. 3**. A lead runs from C16 to VR2, via S13, mounted on the panel. VR2 is earthed to the chassis, and its slider tag wired to the audio panel input point.

Tr9 is the first audio amplifier, Tr10 the driver, and Tr11/12 the output pair, with individual feedback. This is a very straightforward type of circuit, with the direct current operating conditions of each stage separate from other stages.

If necessary, the first stage Tr9 can be tested by placing phones across R37, while Tr10 can be checked with phones across the primary of the driver transformer T5.

The exact value of R42 considerably influences results. If Tr11/12 draw almost no current with no signal, and reproduction is distorted, R42 may be slightly increased in value. But if Tr11/12 draw much more than 4mA to 5mA or so, with no signal, R42 should be reduced in value. This depends somewhat on the actual transistors and R40 and R4I. The values given should usually be suitable.

Output from the secondary of T6 is taken to a 5in. or other reasonably large 2-3 ohm permanent magnet moving coil speaker, which should occupy a cabinet.

For headphone listening, we may use a jack with contacts which open when the plug is inserted, these contacts being in series with one speaker connection. The loudspeaker is then silenced when the phones are plugged in. Alternatively, T6 secondary may go to a jack outlet, so that-speaker or phones can be plugged in, as wanted.

Audio Limiter

This is optional, and formed by D3 and D4, Fig. 3, with C27 and R44. With S14 open, results are normal. With SI4 closed, the diodes place R44 across T5, to limit output. VR2 should not be so far advanced that all signals are constantly limited, but only those of excess level, such as static crashes, or the sudden bursts of volume sometimes uncomfortable when tuning with phones. Actual results can be modified by changing the value of R44. **PW**

TO BE CONTINUED

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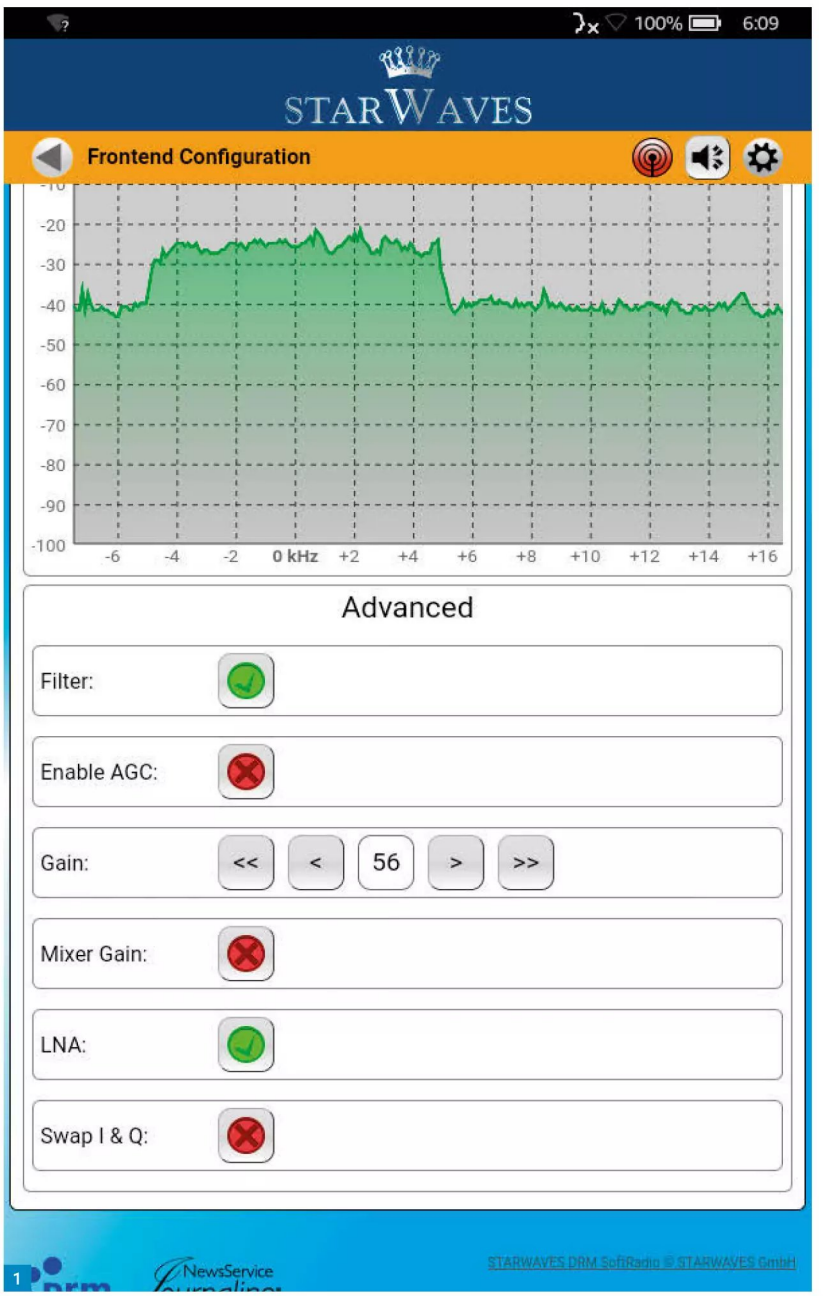


The DRM Challenge

Kevin Ryan takes a look at DRM from receiver mod to software app.

Digital Radio Mondiale (DRM) is the best solution to update AM and FM broadcasting to digital. Listeners to HD Radio in North America may disagree! The idea of upgrading shortwave and medium/longwave to stereo broadcasting plus data such as digital text or weather maps, etc. attracted the broadcasters, some of whom invested a lot of money upgrading transmitters. The lack of affordable receivers meant that decoding the signals was a real challenge even for technically savvy listeners.

Today listening techniques have moved on but there is nothing stopping the experimenter using a receiver modification. Creating my own receiver helped me understand the DRM technology and the detrimental effects of noise, propagation and interference that stop DRM producing audio and data.

Radio Mods

The number of commercial DRM receivers produced totalled in the low hundreds and they were snapped up by the broadcasters. I purchased the DRM Software Radio program that decoded the digital signal into audio and data but it needed a 12kHz IF feed into a PC soundcard. Two decades later DRM still relies on this type of solution.

Many enthusiasts came up with instructions on how to install the Sat-Service Schneider down-converter board inside various receivers. This was (recently discontinued) a compact design and the board used an SA612A, a low-power double-balanced mixer with on-board oscillator and voltage regulator. I successfully decoded DRM nearly 20 years ago by adding the SAT-Service Schneider board to an underused Tatung TMR7602 multiband radio, a clone of the Sangean ATS803A. It helped that I had a full service manual and circuit diagrams that made the task of finding where to tap into the IF chain much easier.

There are one or two alternative designs for such converters on the internet using transistors. I also experimented with the Radi0kit-2 converter that is still available but the results were never as successful as the Sat-Service Schneider implementation.

https://tinyurl.com/yc3478hy

The receiver modification website is still online and most articles are comprehensive and include detailed notes and photographs.

www.drmrx.org/receiver_mods.html

Software App

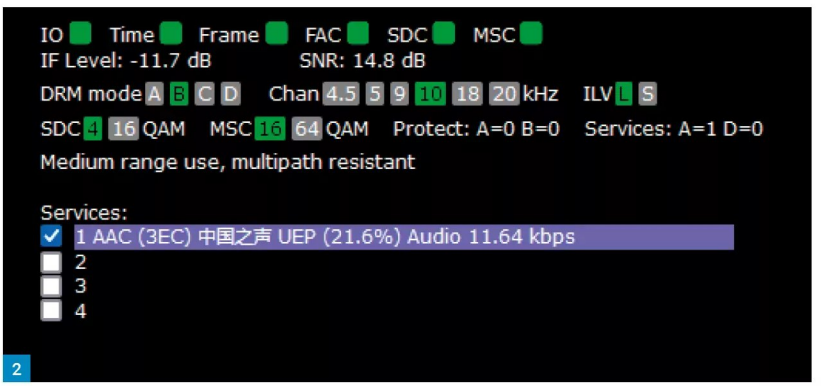
Nowadays there is no reason to use a home-brew solution with the availability of cheap SDRs and the Starwaves DRM SoftRadio app, **Fig. 1**. The paid-for app is available on the Google Play Store and the Amazon App Store. I use it on my Amazon Kindle with either the RTL-SDR.Com V3 SDR or the SDRPlay RSP1A that are both supported by the software. Other RTL2382 based SDRs tend not to work very well with the app. The device also needs a driver to interface the SDR to the app.

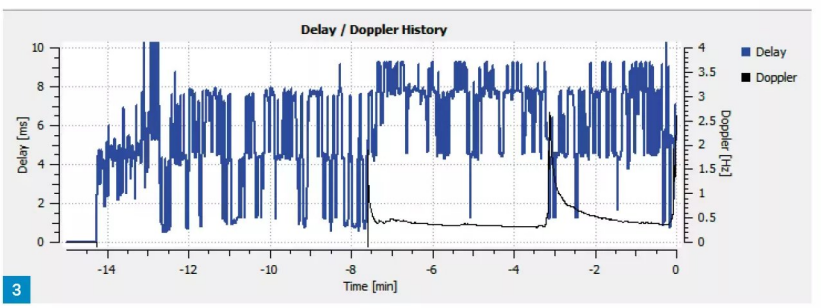
There is plenty of information on the web.

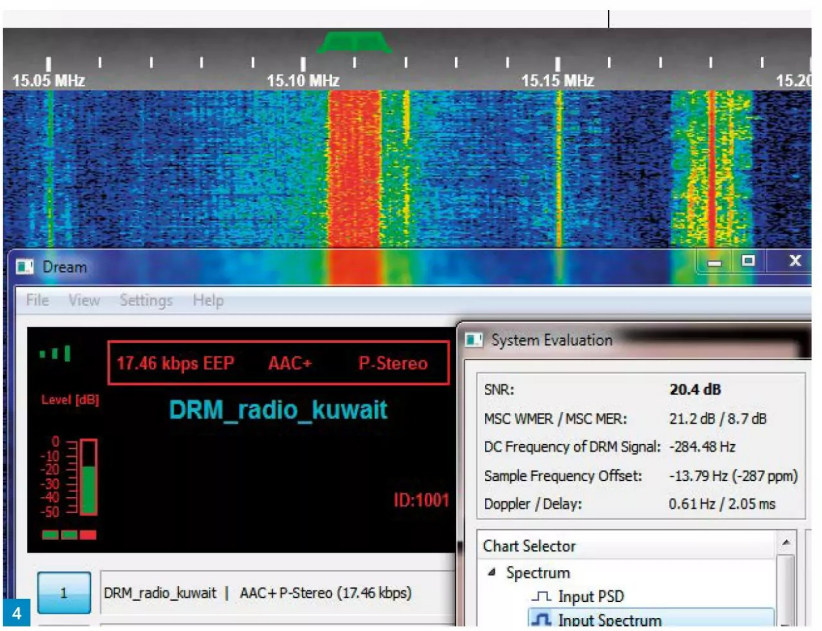
The app works well and I have decoded the BBC World Service on 3955kHz, Radio Romania International on 7350kHz and Radio Kuwait on 15110kHz.

https://tinyurl.com/3cy4db5k

Fig. 1: The advanced screen for the Starwaves app when connected to the RTL-SDR.com V3 SDR using the RTL2832U/R820T2 chipset. Apart from changing the gain, I used the app's suggested settings. Fig. 2: One of China's domestic DRM services using a typical bit rate of 11.64kbps captured using a remote SDR in Vietnam. Fig. 3: The delay and Doppler effects calculated by the DReaM decoder from the RRI service to France on 9720kHz. Fig. 4: A montage of Radio Kuwait on 15110 kHz showing the spectrum from a KiwiSDR and two screens from DReaM. The evaluation screen has a real-time display of MER/WMER/SNR figures as well as delay and Doppler. Fig. 5: The Funklust trial DRM service from Germany with 250W on 15785kHz monitored on my SDRPlay RSP1A using the drm plugin.







DRM Reception

When everything such as minimal interference and good propagation conditions come together DRM is a joy to listen to and much more interesting if the broadcaster includes data services or images or is in dual-channel mode. Unfortunately, I've found this is the exception although the KiWiSDR network has opened up many more possibilities through monitoring the transmissions in their target areas.

I use the worldwide map of the SDRs rather than the list of the most frequently used radios. The DRM extension is available on most installations but use is limited.

http://rx.linkfanel.net

DRM Problems

There are a number of factors that seriously degrade a DRM signal, especially if the broadcaster opts for a configuration to carry the maximum amount of data. A DRM signal uses Quadrature Amplitude Modulation (QAM) to encode the audio and data bit streams onto OFDM carriers.

A DRM receiver tries to find the basic information to begin decoding the data (in the Fast Access Channel or FAC), then builds information on audio and data channels (Service Description Channel or SDC) and after that it starts to decode the audio and data packets that are in the Main Service Channel (MSC).

The most robust configuration for shortwave broadcasting is a 4/4/16 QAM (FAC-SDC-MSC) setup and China's domestic transmissions use this to successfully broadcast stereo using an overall data rate of just 11.64kbps or lower for mono using xHE-AAC, the latest audio codec, **Fig. 2**. European broadcasters took a long time to work this out and still opt to use 17.46 or 20.96kbps that needs a 4/16/64 QAM configuration. Radio Romania International responded to listener pressure and uses lower bit rates in the morning transmissions to Western Europe and Spanish to South America.

KTWR with transmitters on Guam experiments now and again with the 64 QAM mode to broadcast a dual-channel service in two languages and a third channel carrying images usually of their transmitter site. KTWR posts news of special broadcasts on their DRM blog.

http://ktwrdrm.blogspot.com

Signal Quality

A commonly used measure in radio is the Signal-to-Noise ratio (SNR) or Carrier-to-Noise Ratio (CNR), depending on the measuring point in the RF chain. I frequently use the DReaM decoder that gives readings in SNR. My own experience is that an SNR ratio of about 12dB (using the measurement by DReaM decoder either on a PC or in the KiwiSDR extension) is needed to obtain audio for a 4/4/16 QAM signal.

If the signal uses 4/16/64 QAM, then it is much higher at about 14-15 dB SNR and KTWR recommend a still higher value of 17dB for their transmissions.

MER and BER

Other measures are Modulation Error Rate (MER) and Bit Error Rate (BER) and these quality measures are usually found in DRM receivers. The MER is measured in decibels (dBs) and calculates the difference (the error) between the received symbol and the ideal target symbol on a QAM constellation. I've read that MER should be about 24dB for a 16 QAM signal and 27dB for a 64 QAM one but think these figures are too high by about 10dB.

WMER is weighted MER usually displayed by professional monitoring receivers. It is a complex calculation but gives an estimate of the ratio of the total signal power to total noise power at the input of the equaliser.

The DReaM decoder displays both MER and WMER for the MSC packets along with SNR and all three are usually within a dB of each other, **Fig. 2**.

BER is a measure of the number of errored bits found in the transmission and should be around 4 per million (4×10^{-6}).

Noise

The biggest source of noise nowadays tends to be locally generated RF signals caused mainly by broadband routers, televisions and using the mains to extend the internet in houses. We can do something about the noise in the local environment such as replacing the broadband router with a more modern device, using shielded cables and ferrite beads on cables.

I also think that the phase noise generated by the local oscillator of the receiver may play a part in the decoding of DRM but I expect it is a minor factor.

Noise impacts individual OFDM carriers and a DRM signal has more than you might think. Mode B in a 10kHz bandwidth has 206 carriers spaced 46⅞Hz apart. DRM uses various pilots and reference OFDM carriers, many of which are contained in a 4.5kHz area in the upper sideband along with the FAC and if too many of these carriers get damaged, then the receiver can't be configured properly.

DRM uses Coded (COFDM) that adds a forward error-correcting code to make DRM more able to handle things such as selective fading and multipath interference.

Multipath and Doppler

There is a lot of published information about how DRM is particularly affected by multi-path delays and Doppler effects. DRM field tests eventually meant DRM30 (AM bands) had four modes for long/medium waves (A), shortwave (B), difficult shortwave paths (C) and NVIS (Near Vertical Incidence Skywave) broadcasts (D).

Multipath and Doppler are interesting but I haven't tried to correlate the data displayed in DReaM with propagation conditions. I've seen

spikes in the graph, **Fig. 3**, that happen at the same time as the audio drops out but I don't know if that is just the calculations breaking down for another reason such as interference.

Interference

One thing that I have found out is that analogue signals wreak havoc with their DRM counterparts and they don't have to be very powerful to do this. Sometimes they are not even visible on a spectrum display.

Take the Radio Romania International signal on 9720kHz at 1700UTC and you notice that it spans 9715-9725kHz. An analogue signal on any of these three channels will potentially 'destroy' reception of the DRM signal. You will get bursts of text but not much else.

Radio Kuwait's Arabic service to Europe on 15110kHz used to be a very reliable DRM signal. During the A22 season decoding was difficult because of a co-channel China Radio International signal. The CRI signal is not visible or scheduled in the B22 season but Kuwait is still the most difficult DRM service to get audio from.

Looking at the spectrum, **Fig. 4**, at 1130 UTC there is an unmodulated carrier on 15120kHz that operates from 1230-1330UTC. This signal seems to be from the other shortwave transmitter site in Kuwait run by the USA. It shouldn't impact the DRM transmission so the problem might be at the Radio Kuwait transmitter site and looks to be in the DRM modulator.

DRM for Europe

DRM transmissions aimed at Europe are all on HF and there is usually good reception from the BBC World Service and Radio Romania International (RRI). There are other more challenging broadcasts from WINB in the USA and Funklust, **Fig. 5**, in Germany. The former uses a DRM configuration where the 10kHz bandwidth is split between DRM and an unknown data system; the latter experiments with different DRM configurations.

WMLK, another private shortwave broadcaster in the USA, started DRM tests on 9275kHz in December using their new 300kW transmitter. This group of broadcasters is very interested in using DRM but want to wait until there is a supply of receivers.

https://shortwave.org

KiWiSDR

This network of SDRs is worldwide and lets you tune in DRM transmissions aimed towards China, Japan, Korea, the Pacific and India. The control panel has a DRM extension, based on DReaM that decodes DRM audio only. I use this as a guide to reception and if it looks good, I usually use the I/Q output via a virtual cable as the input to the DReaM decoder.

Antennas

All the DRM receivers I purchased gave very poor results on their telescopic antennas. The Morphy Richards 27024 has a 9-segment antenna that proved inadequate for most signals. They had plans to add a 'boot' adapter so that an external antenna could be connected to the retracted telescopic one but the receiver was discontinued before any work was done. I found that the telescopic antenna had a standard RF connector internally and it was easy enough to add an external socket to override the internal antenna.

I also experimented with an HF amplifier (LNA4HF from Passion Radio) that helped overcome losses in cables and splitters but didn't improve reception of DRM signals. It is not a criticism of this well-designed unit but more a function of my noisy electrical environment.

https://tinyurl.com/2p8nxkzp

More Information

The DRM consortium provides updates on developments, transmission tests and new receivers most of which sadly never make it beyond a few prototypes.

https://www.drm.org

The DReaM decoder has its own area on Sourceforge but development has all but stopped. I use a modified version that handles the xHE-AAC audio mode as well as the original AAC codec. There is a thread on the drmrx forum where the latest version can be downloaded.

https://sourceforge.net/projects/drm
https://tinyurl.com/4c5k7zk7

I refer to many online sources for information on DRM stations but several monitors post information on this website. This website is extremely useful source of schedules and technical information and the schedule data is used by the KiWiSDR network.

https://www.drmrx.org

My own website has selected information on DRM especially the testing of new uses of the technology.

https://www.radio-digital.co.uk/wp

(All figures are by the author) **PW**

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For more information see HamRadio.co.uk/SV6301A

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Package also includes:

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For more information see HamRadio.co.uk/SteppIR3

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30W Tuner with Yaesu FT-817/818 Integration

Antenna tuner which operates on 1.8-54MHz, 0.5-30-Watt. With Yaesu FT-818/817 integration, it controls the tuning process for FT-818/817 with the CAT cable supplied with the unit. For other radios, CS-818 is used as a regular tuner (make sure you do not operate more than its maximum power limit). CS-818 features a 1.3" OLED display indicating the SWR and Power input readings. That means it can be used not only as a tuner but also as a SWR meter, and a Power meter.
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See HamRadio.co.uk/FTM500

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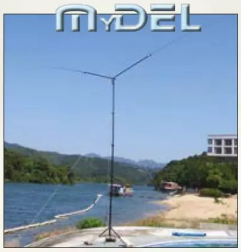

MyDEL JPC-7 (Dipole Version) covers 40-6m, 100W PEP. All contained in a small carry case for ideal portable use. Beautifully manufactured to a very high standard. Super portable antenna kit that can be set up within 5 mins – perfect for field operations, SOTA, POTA.

JPC-7: £340.00

See MLandS.tv for our full video review of this antenna.

New MyDEL JPC-12 Portable Shortwave Antenna

MyDEL JPC-12 (Vertical Version) covers 40-6m, 100W PEP. All contained in a small carry case for ideal portable use. Beautifully manufactured to a very high standard.

JPC-12: £199.96

See MLandS.tv for our full video review of this antenna.

See HamRadio.co.uk/JPC

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- Five-channel, coherent-capable RTL-SDR, all clocked to a single local oscillator
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- Direction-finding software for Android (free for non-commercial use)

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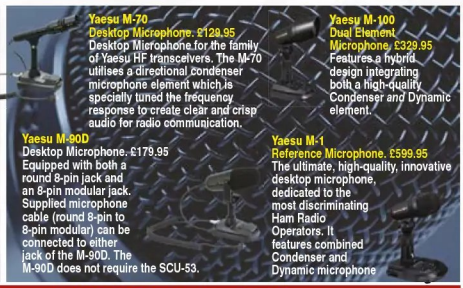

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For more details see HamRadio.co.uk/DigiRig

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Tested by our own Richard 2E0SXX

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Roger J Cooke G3LDI
roger@g3ldi.co.uk

1

Morse Test

Roger Cooke G3LDI describes an online learning facility for Morse Code, before reporting on recent successful candidates.

Try taking an online Morse Test. Measuring your progress through your own learning is always encouraging and can also be enjoyable, leading to further progress and ability.

Using this facility, you can take a simulated short test, in fact several tests, at varying speeds. This helps to give the student confidence in (1) copying ability and (2) having confidence in examination conditions. Go to this page:

https://tinyurl.com/v8e8hp7b

Here you can start as low as 5wpm. This is so basic as to be painful, but you can increase speed as you become more proficient and again, more confident. Your answers are given after the test with a tick if you copied correctly.

As the level increases, the difficulty increases. With each higher level, the speed of the Morse code you hear will be faster and the words or phrases become lengthier. There is no time limit on these tests. However, you will lose your progress if your browser session expires due to an extended period of inactivity.

These tests are free and you can take each test as many times as you like. A random set of words or phrases will be selected each time you take the test. Practising all three levels takes you up to 17wpm. Using this is an ideal medium that you can use on your own. It gives you the necessary standard to have live QSOs on the air with a good amount of confidence.

You can also take the RSGB Morse Proficiency Certificate as well, also at any speed. It will give you a nice Certificate to keep, frame and display on the shack wall. If you are interested in doing that as well, go to:

https://tinyurl.com/2p85rkbk

You can choose a Morse Assessor who will test you or you can even take the test online. You will be asked to complete an application form in which you can select either option.

Following a successful test, the assessor will notify the Morse Test Coordinator who will email a Certificate of Competency to the candidate.

Hopefully this will improve operating on the HF bands in general and guide the newcomer to the hobby in the right direction and correct procedures and behaviour.

DX

That leads nicely to the inept and disgusting behaviour of some displayed on the 3Y0J Bouvet expedition frequencies. If you have been listening to that DXpedition, you will know exactly what I mean. Don't be led on by this awful demonstration of deliberate QRM. Unfortunately, the horse has bolted now and very bad operating is prolific. Having said that, compared to the number of normal operators calling as viewed on my Panafall, those that like to cause havoc are very few. Ignoring them is the best policy. The operators on the DXpedition are shrewd enough to monitor their own frequency and will move from side to side if necessary, so beware of that and use a fairly wide filter.

All the advice in the world seems not to be heeded by these LIDs. Their sole enjoyment is not working the DX but taunting and preventing those that want to. Don't be tempted to become one of the UP brigade, or the SPLIT SPLIT so-called helpers, tempting though it may be because all you are doing is increasing the QRM. Think of it this way: Don't try wrestling with a pig. You will both become extremely muddy, filthy and smelly. However, the pig loves it!

Take a pride in your own operating ability. If it gets too unbearable, go away and do something else. If you cannot read Morse and are one of those that use a reader, do not take part. CW is a nuanced mode and a reader cannot give you that capability. It exists in that grey matter between your ears.

DO download, print, read and KEEP the DX Code of Conduct:

https://tinyurl.com/2jm3nxnm

Show respect for those that give their time, spend a huge amount of money and sometimes risk their lives in order to provide YOU with a QSO.

News of Morse Test Successes

Eric Arkinstall M0KZB sent me the latest news regarding Morse tests. *"Thank you very much for my mention and photo in your column, also thanks from **John Stevenson MW7WJS**. Just to keep you up to date, we have five more results, unfortunately, they only amount to three applicants – see **Table.***

*"It's interesting to note that **Michael Topple 2M0GUI** passed all three tests in under a week. This was made possible with the help of the Assessor **Tam Brown MM0TGB**. Interest in Morse seems to be increasing at this end, even if the testing is sparse. I am very interested in running Boot camps here, I am confident I can get enough interested parties. We have discussed it in the past, perhaps you or one of your members could give me some more detail of what's involved.*

"What becomes of the end product, do they take a test? Could we have one of our Assessors on site to issue a Pass Certificate just to put icing on the cake?"

I have given Eric details on running a Bootcamp. Assessors can give tests at the Bootcamp. We have had three take tests here in Norfolk in that way. It's great to hear that interest in Morse is increasing. If your club is interested in running a Bootcamp and you are not quite sure how to go about it, email me and I will let you know how we

Fig. 1: Pump handle key at the Museum.
Fig. 2: A larger version of a pump handle key.
Fig. 3: Samuel Morse in his younger days!

have been doing it for the last few years.

Also, if anybody is interested in running Morse Classes on the air, you should be using GB2CW. Let me know and I will forward you the details on how to go about that. As the RSGB GB2CW Coordinator, I can then issue you with a letter of authorisation to use the call GB2CW. We desperately need a lot more volunteers as we have lost a few in the last couple of years.

A Morse Pump-Handle

The pictures, **Figs 1** and **2**, show an enormous pump handle key housed in the New England Wireless & Steam Museum

Do you know why straight keys are sometimes referred to as 'pump-handles'? Well, a couple of theories here. One is that an operator could wear large winter gloves and still use the key! Although the key pictured may not have been the exact key used in the very early 1900s when this building sat on Point Judith, RI, the idea seems legitimate because there was not much heat that made it up to the second floor where this room is located.

The other thing of importance is to remember that these keys were used with high power spark transmitters, typically running 1kW or several kWs. It seems more likely that the long handles are because of the high voltages on the keys, partially to allow a firm grip of the key, but more to protect the operator from accidental electrocution. Although I expect the managers of the companies building such commercial spark stations didn't want their operators electrocuted, I doubt that they cared a whit about their comfort in cold weather. I wonder just how many operators were lost by electrocution from using one of these keys?

In subsequent years, the keys evolved into a somewhat smaller size, and instead of the handles, the key included a 'Navy knob' under the smaller knob to protect the operator from high voltages, but voltages not as high as used with these 'pump handles'.

Also, the keying speed on the 'pump handles' would have to be quite slow.

I personally favour the idea of the 'Navy knob' or skirt under the main knob. This enables the operator to position his fingers correctly on the key. If you are buying a straight key, always look for one with both knob and skirt.

Mr Morse

Sam (**Samuel Morse**) is shown in the picture **Fig. 3** as a younger man. However, there is no evidence that he had a girl friend by the name of Dot.....

Please send all your comments, offerings, information and especially pictures to:
roger@g3ldi.co.uk
73 and may the Morse be with you! **Roger G3LDI. PW**

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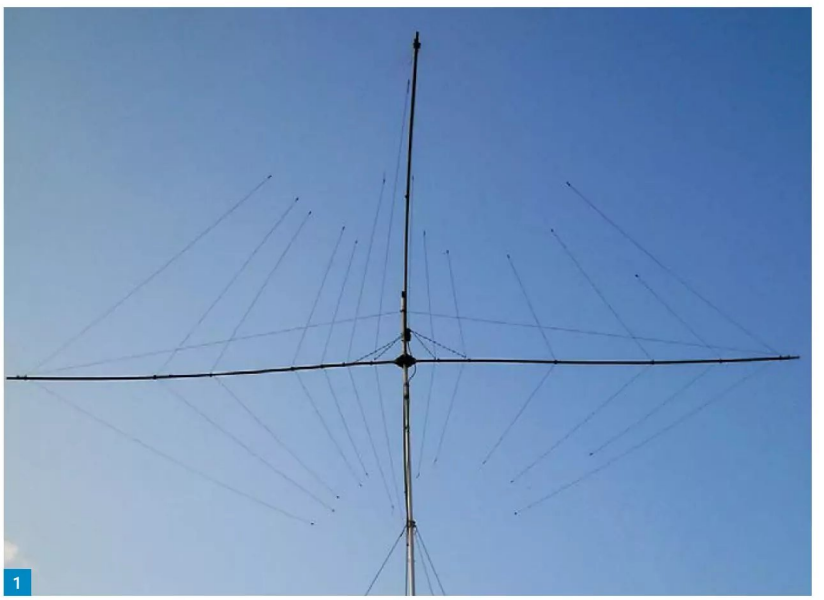
Name	Callsign	Assessor	Date	Speed
Dr. Edward Byrne	G1RUZ	Andy Kersey G0IBN	29/12/2022	10WPM
Michael R. J. Topple	2M0GUI	Tam Brown MM0TGB	06/01/2023	12WPM
Michael R. J. Topple	2M0GUI	Tam Brown MM0TGB	13/01/2023	15WPM
Michael R. J. Topple	2M0GUI	Tam Brown MM0TGB	16/01/2023	20WPM
Jason Woodman	M0NYM	Peter Sobye G0PNM	17/01/2023	12WPM

Table: Recent Morse successes.

Steve Telenius-Lowe PJ4DX
teleniuslowe@gmail.com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The Good Times Continue

Steve Telenius-Lowe PJ4DX reports plenty of DXpedition activity during February and March, fortuitously coinciding with some excellent propagation.

Welcome to the May *HF Highlights*. During February both the solar flux and sunspot numbers peaked above 200, leading to some excellent propagation on the higher HF bands, particularly 24 and 28MHz (the SFI was 210 and the SN 203 on 12 February). On 18 February the SFI hit an incredible 343 even though the SN was only 99. This very high solar flux measurement, however, was recorded while a solar flare was taking place and is therefore a completely inconsistent measurement. The following day the SFI was at a more normal 167.

The 28MHz beacon report for February was compiled by **Neil Clarke G0CAS**. Excellent 28MHz conditions continued from January into February until the 26th when a geomagnetic stormed started. Paths to North America were very good with beacons in all the W call areas heard on many days. Beacons from USA call area 6 and 7 were logged on 15 and seven days respectively. No USA beacons were heard from the 26th to the 28th. South American beacons were heard every day, even on the 27th and 28th. To the Far East and the Pacific: on 28200 VR2B was heard on 14 days, while VK6RBP and VK8VF were both heard on 16 days. Back to 28200, and ZS6DN was heard on 22 days. A number of European beacons were heard such as IT9EJW 282250 and IQ8CZ 28230, heard on 23 and 21 days respectively with signals peaking 599 some days. OH9TEN 28267 peaks S9 around midday, but only when geomagnetic activity is quiet: on the more disturbed days it's not heard at all. SV5TEN 28189, SV2RSS 28265 and SV6DBG 28269 were logged every day of the month.

The Month on the Air

After making around 21,000 QSOs between Christmas Day and 14 January, **Thierry FT8WW** (Crozet Island) returned to HF operation on 10 February after receiving an extension to his transmission permit. He was active, mainly on FT8 and CW but with a little SSB, on the bands between 14 and 28MHz. With around 48,000 QSOs in the log, this single-operator DXpedition will no doubt move Crozet Island down the 'most-wanted' list from its number 3 position behind North Korea and Bouvet Island.

The 3Y0J Bouvet DXpedition closed down earlier than planned on 13 February with 18,845 contacts in their log. Here in Bonaire their signals varied from extremely weak to totally inaudible, shielded as they were by the bulk of the mountain on Bouvet between their operating location on the south-east of the island and us. I thought I had made one 18MHz FT8 contact but this turned out to be one of the many pirate stations that were operating with the 3Y0J callsign.

Vlad 9U4WX and **Elvira 9U5R** from Burundi were active from 4 February until early March. Operating independently but sharing the same antennas, including a 5-band Spiderbeam, **Fig. 1**, between them they made over 70,000 QSOs and I worked one or other station on all the bands between 7 and 28MHz.

C5C from Gambia was also active for around a month, from 14 February.

Nobby G0VJG made a welcome appearance from the Cocos (Keeling) Islands, **Fig. 2**, as VK9CVG and was a good catch here on 7, 10 and 21MHz FT8 as well as on 21MHz SSB.

The CQ 160m SSB contest took place over the weekend of 24 to 26 February but topband conditions were very poor, at least here in the Caribbean area. Only three European signals were heard and only one of them (LZ5R) could hear me! Even the US stations were a lot weaker than normal.

The Czech and Slovak 3B7M St Brandon DXpedition, **Fig. 3**, started on 25 February and their stations had some big signals, particularly on the higher-frequency bands. They were worked easily enough in the UK on CW, SSB and FT8 and closed down on 8 March with over 128,000 QSOs in their log.

The 2023 RSGB series of 90-minute FT4 contests on 3.5, 7 and 14MHz kicked off on 27 February. Further sessions take place through the year, including on 27 April and 22 May. Participants' scores are summed and overall winners announced at the end of the series in November, **Fig. 4**.

May DXpeditions

At the time of going to press there are no major international DXpeditions planned for the month of May, though one operation a little closer to home is worthy of mention. An attempt to land on Rockall (IOTA EU-189) is planned for the end of May. Nobby G0VJG (see above) and **Emil DL8JJ** plan to be active as MM0UKI for one or two days after 26 May with two stations using SSB, CW and digi (presumably FT8).

Other members of the expedition plan to stay on the islet for a week and raise funds for UK military charities.

www.rockallexped.com

ARRL VIPs in Bonaire

The President of the ARRL **Rick Roderick K5UR**, ARRL CEO **David Minster NA2AA**, Board Director **Bill Lippert AC0W** and **Bob Inderbitzen NQ1R**, the ARRL's Director of Marketing and Innovation, came to Bonaire in March to operate in the ARRL DX SSB contest from the PJ4G contest station, **Fig. 5**. Station owner **Noah K2NG** and local operators **Peter PJ4NX** and I completed the team. Conditions from Bonaire to the USA and Canada were excellent, particularly on 28MHz, and we put in a good score with over 11,600 QSOs (using two stations).

Fig. 1: The five-band Spiderbeam antenna, as used by 9U5R and 9U4WX. Fig. 2: Nobby G0VJG operated as VK9CVG from the Cocos (Keeling) Islands. Fig. 3: A view of St Brandon in the Indian Ocean. Fig. 4: Operating with Eva PJ4EVA, PJ4DX was the non-UK, 100W section winner of the 2022 RSGB FT4 Contest series. Fig. 5: ARRL VIPs at PJ4G: left to right Bill AC0W, Bob NQ1R, David NA2AA and Rick K5UR. Fig. 6: Hartlepool ARC club members and Guides at Thinking Day on the Air. Fig. 7: 2E0HPI's POTA Outstanding Operator award. Fig. 8: Etienne OS8D/P with MP1 antenna, activating another Belgian castle.
Fig. 9: 28MHz SSTV picture from WB4OFN

Readers' News

First to report this month is **Kevin Hewitt ZB2GI**, who was one of the lucky few to work 3Y0J on Bouvet Island. Kev wrote: *"I was pleased to work fellow contributor **Etienne OS8D** on 12m SSB. This month I operated from my home station and the GARS club station. Operating 10m SSB from the club station on the 19th, I made 100+ QSOs and worked 28 states."*

Reg Williams G0OOF wrote just before the 3B7M DXpedition was to close down, saying: *"Last ditch attempt for me trying to work 3B7M on 10m. It is early evening 7 March, the band is disappearing into oblivion so no hope. At least I have worked them a few days ago on FT8. What a saviour mode!"* Reg had some problems with his electronic log this month, including an issue uploading some 200 QSOs to Logbook of The World, which resulted in the response 'no logs to upload'. Reg said *"Texting the ARRL about the problem was useful. They sent me a link to download software that would analyse the ADIF file of my log entries. The fault was found with the six-character Locator of my QTH. Somehow the last two characters did not relate to my present QTH but a previous QTH. This was corrected to the present and all was well."* Reg spent most of his radio time this month trying to work the recent DXpeditions. Unfortunately, as of 8 March Reg had been unable to contact FT8WW on Crozet Island due to the weak signals. It was the same story with 3Y0J: *"The DXpedition experienced many problems, which have been well documented. It was soon clear I would not be able to work them on SSB because of them only being able to use 100W transmit power. Also the erection of all the antennas was not possible. The DXpedition did use FT8 as it appeared to be the best mode to use. This was another occasion I could not decode their signals on any band, day or night. I did spend some hours over the few days they were on the island but did not end up with a contact. Again, similar to FT8WW, the pirates were present and there were FT8 timing issues."* Reg ended his report on a philosophical note: *"Not the best month for me, but that is the way chasing DX can be with its ups and downs."*


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Carl Gorse 2E0HPI reports that the Hartlepool Amateur Radio Club took part in the Girl Guides' 'Thinking Day on the Air', **Fig. 6**, using the callsign GB0HG. *"We worked a number of stations across the bands and most of the DX was worked running my setup with the Yaesu FT-891 and the Chameleon MPAS 2.0 antenna on FT4/FT8... I also managed to get out portable on the Hartlepool seafront GFF-0208 and worked VK2CPC, VK3EY and VK7JON/P on 20m SSB and JR7TKG on 17m SSB."* Carl has just received the Parks On The Air Outstanding Operator award, **Fig. 7**, having made over 23,000 QSOs to date. He has also made over 33,000 QSOs in the WWFF programme since 2014.

Jim Bovill PA3FDR wrote that 22 February started as a bad day for him, with little DX activity and even European stations had poor signals, making contacts difficult. *"I was on*

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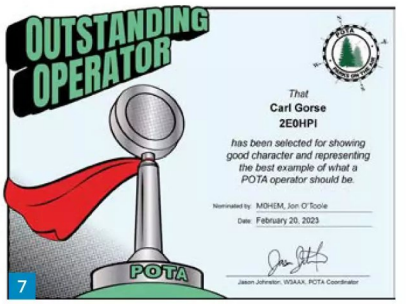

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the point of giving up when I noticed FW1JG calling CQ from grid square AH16 on 20m FT4. A quick check gave his location in the Wallis and Fortuna Islands in Oceania. My response to his CQ was rewarded by an immediate answer followed by RR73, a new QSO for me from this small remote island almost 16,000km distant in the Pacific Ocean. This confirmed my belief that amateur radio is an excellent way to improve one's knowledge of geography as before I had never heard of these islands. Other new DXCC entities this month were Antigua and Barbuda (V26K), Panama (HP1RY), Vietnam (XV9K) and Kenya (5Z4VJ). And finally two other QSOs I want to mention, this time from Europe. Since I was a teenager, I have always been interested in astronomy, so a couple of special event stations from Poland (SN550O, SN550R) celebrating the 550th anniversary of the birth of ***Nicolaus Copernicus*** *(1473 – 1543) caught my attention. Copernicus was a renowned Polish astronomer and mathematician who was the first to provide scientific proof that the sun, not the earth as previously thought, was the centre of our solar system."*

Owen Williams G0PHY wrote that *"There was less activity this month with the main activity being during the French contest, the ARRL DX phone contest and chasing band slots from 3B7M. The French contest provided contacts with the usual French Overseas departments; FR, FG, FM, FM and FY. With the general improvement in conditions I was hoping to hear some FK stations but alas nothing this year. I operated with 20 watts during the ARRL contest with many contacts with East Coast stations. The best contacts were with Alabama, New Mexico, Washington state and Montana. The month ended with two new band slots from 3B7M. The first contact was on 12m but unfortunately, the band was very noisy here and there was some QSB so I ended up in the log as G0PVY. Things were more clear-cut on 10m as on their final day of operating they were very strong all day; peaking at S8 in the afternoon. On both bands they were listening from 5 to 10 up but only announced this infrequently. On 10m they had spells of calling for North America so it was possible to work out operating patterns that seemed to be to call 5, 10, 15 and 20 up.*


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I had three band slots from the Five Star DXers Association visit in 2007 although I don't recall that the pile-ups then were as big as those for 3B7M."

Tim Kirby GW4VXE, operating as **GW4MM**, enjoyed the ARRL CW contest. Although he had limited time, conditions were good and he enjoyed making a few contacts on 21MHz, with a single-band entry. Tim also enjoyed the 3B7M expedition to St Brandon. He made CW QSOs with the group on 10, 15 and 40m. Tim writes, *"I realised that I had never tried out FT8 Fox and Hounds functionality to work an expedition, so having the group in the log on CW, I wondered how the F/H features would work. As it happened, very well! I worked 3B7M with my first call on FT8 on 15m. I then thought I would try some other bands and was able to make QSOs on 12, 17 and 30m, all using 100W and a non-resonant antenna. Although the CW QSOs were perhaps more satisfying, they were hard work, with the large splits being used by the group, so it was hard to know where to call. For someone with a smaller station, certainly I would have no hesitation in recommending that they try working expeditions on FT8. Although I see some negative views expressed about FT8, for me, it's good to see DX working being made a little more accessible to those with a smaller station...*

"I was particularly pleased to work K0SN/KH6 in one of the CWOps CWT sessions at around 1930UTC, a time when I really hadn't expected the band to be open in that direction. Another evening, I was listening on 15m to a W station working a JA station, who was just audible to me, the JA coming to me via the long path, over South America. Exciting propagation!"

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Etienne Vrebos OS8D had *"A very active month: 1080 QSOs, mostly as OS8D/P activating nearly 30 castles this month and ranking second in Belgium... My personal pleasure is still being at the active side of the pile-up nearly every other day, even when we have cold temperatures and snow. I'm in love with castles, I think I should move in the next days and I have some 'friends' living in huge castles, but of course we are not 'playing' in the same 'game'."* When operating portable, Etienne uses a Yaesu FT-710 and an MP1 antenna, **Fig. 8**, but recently bought a SOTAbeams lightweight dipole for 20/40m which he hopes to use on a 10m fibreglass pole. However, he says *"where I'm activating castles mostly it wouldn't be discrete to pull up a 10m mast and erect 2 x 12m legs."*

Band Highlights

Kevin ZB2GI: 5MHz FT8: GU4YBW. **7MHz FT8:** EA4/YY5BCD. **18MHz FT8:** 3Y0J. **24MHz SSB:** K7KHZ, KC6SEH, VA2CZ. **24MHz FT8:** CO2KR, K0AP, K6JDC, K7BFI, VE5SR. **28MHz SSB:** CA3JEI, CO8RN, CX2BAH, CX3AT, K7NN, KG6N, KP3AV, KP4PK, LU9HAT, NP4KZ, PU2TDY, PY3VK, VE3RVZ, WP4HSZ, ZX89L. **28MHz FT8:** AL7KT, BD3CB, CA3HXY, CD3VLN, CE1PTT, CO8TS, HK4J, JA1QJI, JA8CVH, JO7WXN, JR4ABB, K6SKI, LU1EFX, LU2ELH, LW9DDW, N7RP, OA4DFF, PP5JLA, PT7CG, PU2YOZ, PY1KN, VE4YH, W7PC, ZS6GUS. **28MHz SSTV:** WB4OFN (see **Fig. 9**). **29MHz FM:** PY4CEP, PY7XAF, W9CAZ.

Reg G0OOF: 7MHz FT8: TI8MCC, ZC4GR. **10MHz FT8:** 9M2MRS, VK7E. **14MHz FT8:** ZL1MYL. **18MHz FT8:** RV9CX. **21MHz FT4:** JG1SYK. **24MHz FT8:** RA9CCU.

Hartlepool ARC GB0CG: 18MHz FT8: VK6AL, YB8XOB. **21MHz FT4:** 4E1FKB, HS3NBR, WA6YOU, YD1EOM.

Jim PA3FDR: 7MHz FT8: 5Z4VJ, A65DR, CO8MCL. **10MHz FT8:** N9AW, V31MA, VK7DG, XE2J. **14MHz FT4:** PY5EJ, UN7FU, V26K, VK2WJ, VK7NET. **14MHz FT8:** PY1SX, VK1MA. **18MHz FT4:** FW1JG, JH5FTY, UA9UIS, VE3KI. **18MHz FT8:** JR5JAQ, K9MK, PY2IQ, R9UIW, UN7LAN, VR2XYL. **21MHz FT4:** 7X2TT, BG0BBB, BG3RZA, FR4OO, HL3WAT, JA6SUY, JO1QNO, N4ZZ, PP5HR, PT7AZ, VE5SF, WY0V, YB1MAE, YC4AOK, YD2ULK, ZS6ZA. **21MHz FT8:** D2UY, JA7FLK, JE6XWE, RZ0SW. **24MHz FT4:** 4S7KKG, A41DX, AA9RR, JS1IFK, PU2TXZ, PY5ZHP, R0AS, VE3EK, WD6BNY. **24MHz FT8:** 7Q7EMH, 9K2OF, HC1BI, JG7EHM, NR0Q, R0AJQ. **28MHz FT4:** 4S7AB, A41ZZ, A65DR, BI8DTL, DS3CHK, HL2IFR, HP1RY, J69DS, JA5AQC, JH7MEV, KB9AWS, RQ9O, TR8CA, UN2PA. **28MHz FT8:** 7Z1WW, 9K2YM, A65DR, BG4ACY, BG7IDX, HS2KYA, HZ1CY, RK9UM, WA8LRW, YB1BA.

Owen G0PHY: 7MHz SSB: W4AAA (NC). **14MHz SSB:** FG4KH. **21MHz SSB:** P4/EA7X, FR4QT, TO1A, K7LR (WA). **24MHz SSB:** 3B7M. **28MHz SSB:** 3B7M, FM8QR, TO1A, N2IC (NM), N9RV (MT).

Tim GW4MM: 21MHz CW: 3B7M, CO8NMN, K0SN/KH6, PJ7AA, V4/G0TLE. **28MHz CW:** 3B7M, 9J2BO, 9Z4Y, C5C, FM/F6BWJ, P4/EA7X, PJ2/K5PI, V31RK.

Etienne OS8D: 14MHz SSB: EP9IXF. **18MHz SSB:** 4UNR (Vienna). **24MHz SSB:** 9U5R, UK7AL, ZB2GI. **28MHz SSB:** 3B7M, 6W7/ON4AVT, CO2XN, J52EC, J69BB/44, J72IMS, J8/AJ4YX, NP4VM, P4/EA7X, VP8KCA, UN7TX, XV1X, YV7MAY.

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 July issue the deadline is 11 May. 73, Steve PJ4DX. **PW**

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A Field Strength Meter Reviewed

Dr Colyn Baillie-Searle GD4EIP reviews the latest offering from Kanga Kits.

Dr Colyn Baillie-Searle GD4EIP
practicalwireless@warnersgroup.co.uk

When you transmit, an electromagnetic wave travels to the antenna via the transmission line. If the antenna is perfectly matched, then all the energy should radiate and there will be no standing waves. If, on the other hand the antenna is not perfectly matched, there will be standing waves. In this case there could be RF in my shack due to these standing waves. It is sometimes interesting to know if you have RF in the shack while operating. If you don't have a field strength meter, then there is no knowledge of its presence. Ofcom now recognise that Electromagnetic fields can be harmful so they have produced a spreadsheet for every amateur to work out the closest distance from a radiating antenna to be safe.

In my early days, just after I received my licence in 1962, I used to have a bulb near the output of my transmitter and I tuned the transmitter for maximum brightness. Later, I built a simple field strength meter and then tuned it for maximum deflection. Today we have a power/SWR meter where we tune to maximum power with minimum SWR.

A simple field strength meter is only a guide to indicate the presence of RF but it can be a useful piece of equipment in the shack.

The Assembly

Kanga Kits, manufactured by **Paul M0BMN** with the assistance of his devoted wife **Ann**, produce excellent kits for the amateur and short-wave listener. I am sure readers will recognise their well-known FMT Morse tutor, reviewed in *PW* June 2021. I do recommend the FMT Morse Tutor to amateurs asking my advice on learning Morse code again. Paul has now produced a Field Strength Meter. When I contacted Paul concerning the kit, he kindly offered to send me one to see what I thought of it.

Within a few days a large box arrived with the Field Strength meter kit. I opened the box to find a small box and a black plastic instrument box, **Fig. 1**.

In the small box was the meter and all the components to assemble the unit. There was, as with all Kanga kits, detailed instructions, printed in black and white. The instructions were easy to follow but looking on the Kanga website, where you can view the instructions for all Kanga's kits, I came across the Field Strength Meter in colour. I printed these instructions and found the colour photos much easier to follow. I used the list of components to check they were all there and I found them all to be of good quality. I have been told that Ann does all the checking and packing. **Fig. 2** shows the meter and all the components.

The first task is to work on the meter as the meter scale has to be changed as well as replacing the rear cover with a PCB. This can be daunting as you will be close to the delicate pointer. You need to remove the two rear mounting screws and then carefully lift the back of the meter and unsolder the two wires. Later you will solder these wires to a PCB.

Next, you undo the two nuts holding the plastic front meter cover. Then carefully unscrew the two screws attaching the meter scale, which is to be replaced with the new one. A steady hand is needed when sliding the new face under the pointer to avoid damaging it. Then screw the new front panel in place and replace the front cover, checking that the little black meter adjuster is in the slot. If you find the pointer is not at zero, then this can be adjusted using a small screwdriver and rotate carefully the black slot in the front of the meter.

Next you assemble the one PCB with the diodes and capacitors on one side and the potentiometer on the other side of the components. There are two diodes, which are mounted back-to-back. The diodes have a little red mark at the end that indicates the cathode and these must be at opposite ends when mounted on the board. After the capacitor has been soldered on the board it is now completed.

The other PCB has two long pads and two

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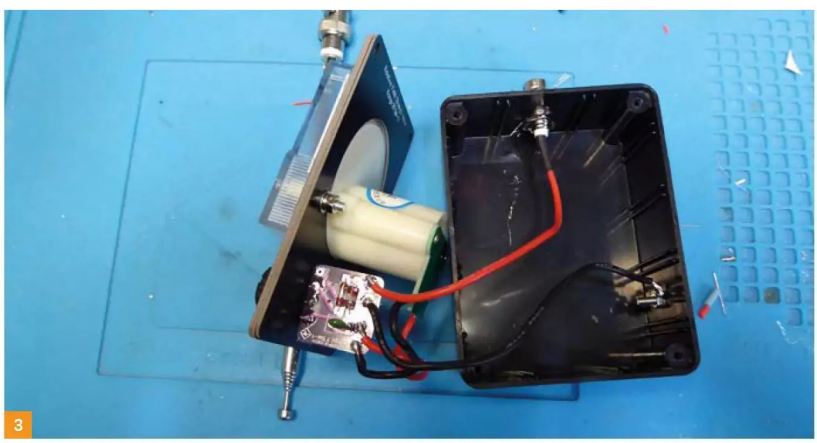

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Fig. 1: The kit on arrival.
Fig. 2: The complete set of components.
Fig. 3: The completed kit before attaching the front cover to the box.
Fig. 4: The completed Field Strength Meter.

small pads, which have to be tinned. The two wires, which were earlier unsoldered from the meter, now have to be soldered to the small solder pads on this board making sure the red wire is on the correct pad and the yellow on the other. This board is now attached to the rear of the meter using the two screws previously removed. There are two lengths of red and black wires, which are now soldered to the large strips on the underside of the board and then soldered to the positive and negative on the board with components.

Once you have mounted the BNC and the M3 nut and bolt to the top and side of the box, a longer red wire is soldered to the BNC and the black wire to the M3 solder lug. The red wire is now soldered to the ANT pad and the black wire to the GND pad on the component board.

All that is now required is to attach the meter to the box. There are a number of spacers and I found I needed all three so that the meter fitted nicely in the box. **Fig. 3** shows the completed kit before the front is screwed to the box.

The Field Strength Meter is now complete, **Fig. 4**, and needs testing. I placed the meter on top of a transmitter, transmitted a short 100W carrier into a dummy load and got a small deflection. Adjusting the potentiometer, it resulted in a bigger deflection. I reduced the output power to around 15W to simulate QRP (low power operation) and hardly saw any deflection but, by touching the M3 screw on the side, a deflection was observed. This M3 nut and bolt has been added for QRP operation when there is little RF.

Conclusion

I found this kit easy to build and I think it is a nice project for Foundation amateurs as well as established amateurs who would like to construct one of these well assembled kits.

I thank Paul for sending me the kit to try out. His website is at the URL below, where you will see all of his kits.

www.kanga-products.co.uk

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Rod Angel G4ZUP
practicalwireless@warnersgroup.co.uk

A Transmission Monitor for the Ascom 550

Rod Angel G4ZUP describes a handy wavemeter for monitoring the output of the popular Ascom 550.

Converted PMR radios are undoubtedly a cheap and easy way to get started on the amateur VHF bands. One very common model, the Ascom 550 (loaded with PA4DEN's bespoke software) has become almost a standard on the 4m band. This rig is functional and robust but, because of its PMR lineage, it has one or two 'features' that the discerning operator might seek to avoid in a more expensive radio.

One such 'feature' is automatic (but unannunciated) shutdown of the transmitter, typically after a few minutes on high-power transmit. This occurs when the radio senses an overheat condition, which it is prone to do more with amateur-style operation than with the PMR-style operation for which it was designed.

Fans blowing on the radio's external heatsink do help, but it's not always convenient to use them. Most fans generate noise (acoustic and/or electrical) and, for a small portable station, they consume precious battery power.

An alternative approach is to monitor the radiated signal with a simple absorption wavemeter. The basic instrument can be improved by backlighting the meter, in a way that closely mimics the built-in panel lighting of the radio itself.

Circuit Operation

The monitor circuit has two distinct parts – one RF, the other DC – with a common earth. **Fig. 1** is a complete circuit diagram of both parts.

The RF circuit (L1, D1, C1 and M1) forms a simple wavemeter. There is no attempt to tune the RF sensor, so any nearby transmitter (on almost any frequency) could cause deflection of the meter needle. If this is found to be a problem, L1 can be brought to resonance at about 70MHz with a parallel 10pF capacitor (C2 in Fig. 1). This should increase the monitor's sensitivity to 4m-band transmissions, and reduce its sensitivity to transmissions in other bands – something that was successfully demonstrated on the prototype, but found to be unnecessary in the G4ZUP shack.

The DC part of the circuit is all about backlighting. Central to that function is an RGB LED (LED1 in Fig. 1) which, for a minimal current drain, provides a good level of light output at the right colour. This, together with its wide viewing angle, makes it an ideal light source. LED1 is actually three LEDs in one package: One red (called 'hyper orange' on its datasheet), one green and one blue. By applying different levels of drive to each of the three elements, virtually any colour light can be generated – much as different colours are generated by the trichromatic pixels on a colour TV screen.

In this application, only the green and blue elements are used. The red element is left unconnected. R1 and R2 are ballast resistors for the blue and green elements respectively. In the prototype monitor, the values shown in the circuit diagram produced just the right hue of turquoise (when viewed through the translucent green meter housing) to match the Ascom 550 frequency display; but the values of these and other resistors should be regarded as 'select on test'. It is the ratio R1:R2, rather than the absolute value of either, which sets the perceived colour of the emitted light.

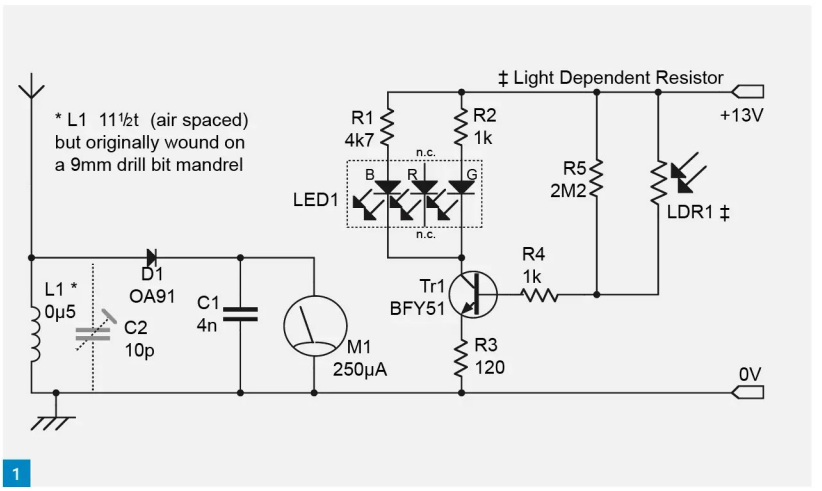
The LED elements, together with their ballast resistors, form the collector load of Tr1. The emitter resistor, R3, sets the maximum brightness. Decreasing the value of R3 will increase brightness without changing colour, but it will be remembered that power dissipation is inversely proportional to resistance. With the values of R1, R2 and R3 shown, both Tr1 and LED1 work well within their design limits.

Base bias comes from the supply rail via R4, R5 and LDR1. R4 protects both Tr1 and LDR1 by limiting the maximum base current. This has no noticeable effect on dimmer range, and there should be no need to reduce its value below the 1kΩ shown in the circuit diagram.

Automatic dimming is controlled by LDR1. In the prototype monitor, the resistance of the (junk box) LDR varied from less than 50Ω in full daylight to something over 2.5MΩ in a really dark room. Even with a low-gain transistor, this dynamic range is more than enough to give the full range of dimmer control, between 'full on' and 'off'. Only a part of this range is needed if the transmission monitor is to dim like the radio.

While the Ascom 550 is switched on, its display is never completely extinguished. There is a minimum brightness point below which it will not dim any further, even in complete darkness. This effect is reproduced in the transmission monitor by shunting LDR1 with

Fig. 1: The circuit has two distinct parts: one RF, the other DC. Fig. 2: Most of the circuit is built on three small boards. Fig. 3: The boards are held together with soldered wire links.
Fig. 4: The completed assembly ready to fit into its project box. Fig. 5: Connections at the rear of the Ascom 550 radio.



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R5. R5 sets the maximum amount of dimming (ie minimum brightness), and may be selected on test to match the minimum brightness of the transceiver frequency display.

One further adjustment is needed if the meter illumination circuit is truly to mimic the action of the Ascom automatic dimmer. This final adjustment sets the light level at which dimming begins. In the prototype, this point was set by sticking small discs of ordinary photocopier paper over the outside face of LDR1; but the choice of masking material is something else that should be regarded as 'select on test'. This is because the LDR may respond to infrared (IR) radiation as well as to visible light. If IR is not effectively masked, meter illumination may be noticeably brighter than the Ascom 550 display in twilight conditions.

Selection of Component Parts

In the prototype monitor all components were run at a small fraction of their maximum rated values. This reduces the probability of component failure, and thus of having to reopen the project box; something which is best avoided where a cheap plastic box is held together with self-tapping screws. For the same reason, I generally prefer LEDs to filament lamps.

Derating is less of an issue in the RF part of the circuit, but care should be taken to avoid overdriving the meter. The length of the antenna rod, and the inclusion (or not) of the capacitor, C2, will be design considerations. D1 is a germanium point-contact type. Diodes of the type intended for use in power supplies should be avoided, because they invariably have higher junction capacitance and higher forward-biased voltage drop than signal rectifiers. What matters here is effectiveness at RF. In a similar vein, the wire used to make L1 should be relatively thick. 20SWG enamelled copper wire was used in the original.

The LDR used in the prototype monitor was of unknown type, but its measured dynamic range (five orders of magnitude) was ample. Here again, performance and rating are the important factors, not type number. Any LDR that controls the selected transistor in the desired fashion will do.

Construction

Provided reasonable care is taken, the monitor should not be unduly difficult to build. If a mix of junk box components is used, it is advisable to breadboard the complete design before committing it to circuit board.

The back of the LDR is covered with opaque electrical tape to ensure that no light from the LED shines on the sensor.

Most of the circuit is built on three small pieces of perf-board. **Fig. 2** shows the layout of components on each board. **Fig. 3** shows how the boards fit together to form a rigid frame, which sits snugly in the project box behind the meter. Internal wiring is secured with cotton ties to prevent it from flexing up and casting shadows on the meter.

The coil, L1, is air-spaced but is initially wound on a 9mm drill bit or similar former. 11½ turns should be spread over a length of 2.3cm.

Fig. 4 shows the complete assembly, ready for fitting into its project box.

Almost any piece of metal will do for an antenna. In the prototype, a short length of steel rod was cut from a discarded PMR antenna and brazed onto a small brass bolt. The antenna bracket was fabricated from an old brass terminal, which had been salvaged from a scrapped mains socket. To reduce the risk of stabbing injuries, the top of the antenna rod should be formed into a loop, or thickened (eg with a small globule of brazing material). An example of the latter can be seen in the header photo.

Connection to the Ascom 550

The only direct connection to the radio is the monitor power lead which, in the original, was made from a twisted pair; one red and one black. The red wire is inserted into Socket 3 of the 4-Pole Terminal Strip, B2 (X111) [**1**] which is marked with an engraved + sign. Other terminals in this block are left unconnected. The black wire is 'earthed' through the terminal block retaining screw. Even if meter illumination is not required, the black wire should still be connected to the radio chassis. Leaving this connection unmade may reduce markedly the sensitivity of the RF detector.

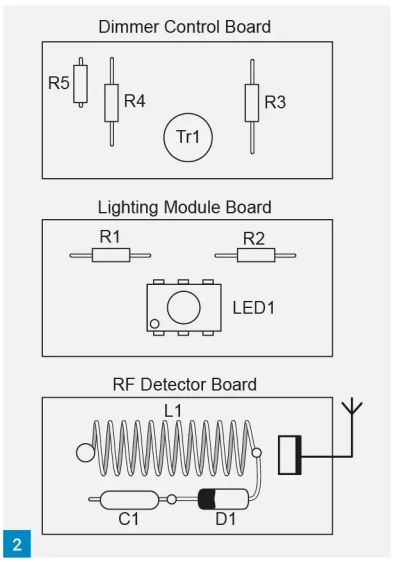

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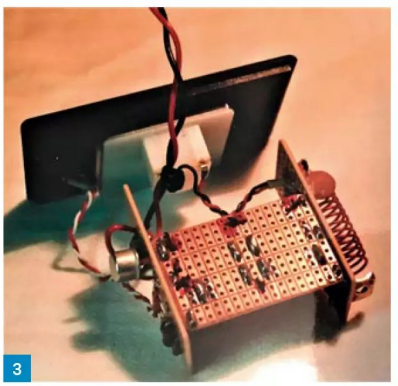
Fig. 5 shows the connections at the rear of the radio.

Functional Checks

It is wise to check, before screwing down the box lid, that the monitor is working properly. With an antenna fitted, and the monitor power lead connected, transmitting on 'high power' should cause near-full-scale deflection of the meter needle. Covering the LDR aperture with a piece of thick card should cause the meter illumination to dim fully.

Operation

Transmitter output can be observed continuously with the finished monitor. No adjustment or maintenance of the monitor itself is needed. For /P operation, it has been found



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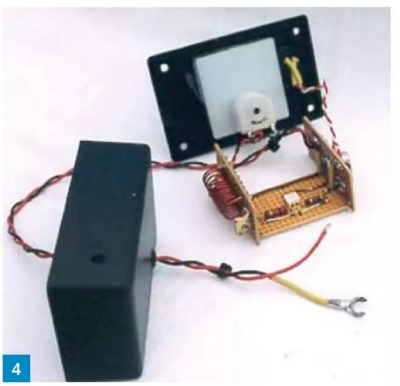

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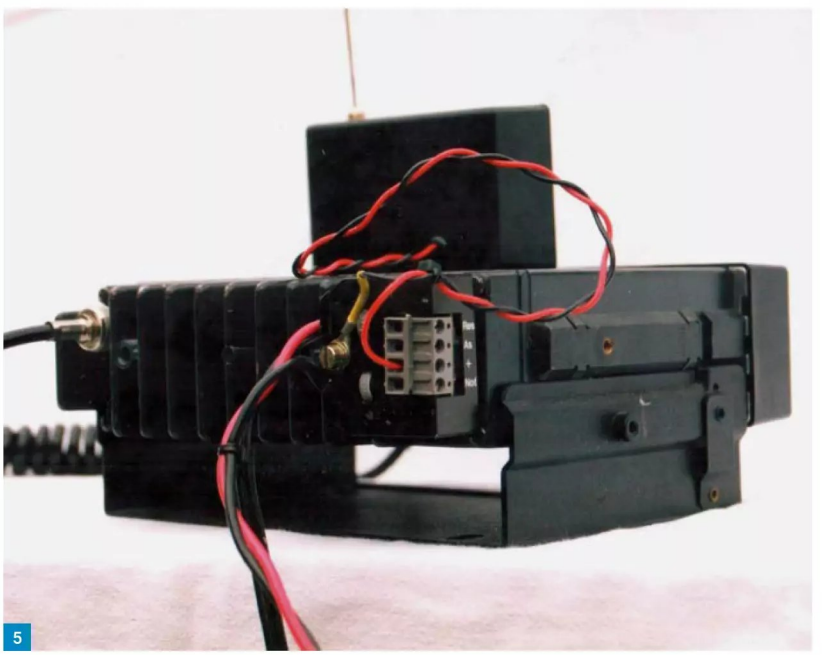

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convenient to have available a choice of short (10cm) or long (15cm) antennas.

If the transmitter overheats during an over, rapid end-to-end swings of the meter needle will give an unmistakable indication of automatic shutdown. If this happens, simply release the PTT.

A suspected overheat can be confirmed by placing a bare hand on the heat sink fins at the back of the radio. These will feel very warm to the touch but should not be hot enough to cause skin burns. A few minutes on 'receive' is all that is needed to restore full transmitter function.

Monitoring your transmitter in this way certainly encourages you to keep the overs short – and it might save you searching for faults that don't actually exist!

Conclusion

This transmission monitor is a simple but useful accessory for the Ascom 550 radio, and potentially for other converted PMR rigs too. It has only a few parts, so the cost is never going to be very great. Even so, cost can be minimised with a good junk box and a little improvisation. Almost nothing in the suggested design is critically sensitive to layout.

The general techniques of colour-matched illumination and automatic dimming should also be applicable to a wide range of other projects.

In its suggested form, the transmission monitor can help us to get the best from our converted PMR transceivers, by encouraging sympathetic operation, and by avoiding nugatory effort in hunting down non-existent faults.

Reference

Ascom GmbH Technical Handbook, SE 550-08-25-1, Part 3, Functional Description, (*diagram*) X111 Terminal strip 4-pole (B2) – available via:
www.rrg.org.uk

News Extra

THE VOICE OF CHATGPT : AIs can now apparently carry on a passable conversation, depending on what you classify as passable conversation. The quality of your local pub's banter aside, an AI stuck in a text box doesn't have much of a living, human quality. An AI that holds a conversation aloud, though, is another thing entirely. The concept is straightforward, if convoluted. A D-STAR digital voice transmission is received, which is then transcoded to regular digital audio. The audio then goes through a voice recognition engine, and that is used as a question for a ChatGPT AI. The AI's output is then fed to a text-to-speech engine, and it speaks back with its own voice over the airwaves. The result is that radio amateurs can call into ChatGPT with questions and can receive spoken responses from the AI. We can imagine within the next month; AIs will be chatting it up all over the airwaves with similar setups. After all, a few robots could only add more diversity to the already rich and varied amateur radio community!
(SOURCE: ICQ Amateur/Ham Radio Podcast | Colin Butler)
https://tinyurl.com/4kp6pmtn

BBC WORLD SERVICE DOCUMENTARY: In celebration of World Radio Day 2023 (13 February 2023), David Goren has produced another amazing *World Wide Waves* episode with Maria Margaronis presenting. The audio was due to be linked to The Documentary website once it had aired. The programme celebrates four vibrant community radio stations on four continents, tuning in to their sounds, their music, and their missions. Northern Malawi's Rumphi FM supports the Tumbuka tribe while giving young women a space to speak out against early marriage and for education. From Budapest, Radio Dikh broadcasts 'about the Roma, but not just for the Roma', presenting Romany culture in its own distinctive voice. In Nunavik, Northern Quebec, Inuit radio beams Inuktitut music and talk shows to 14 remote villages, helping to keep an ancient language and threatened tradition alive; and in civil-war-torn Myanmar, brave journalists risk their lives to resist the military dictatorship with news and views sent out from portable transmitters, sometimes under fire.
https://tinyurl.com/5b5zt8nm

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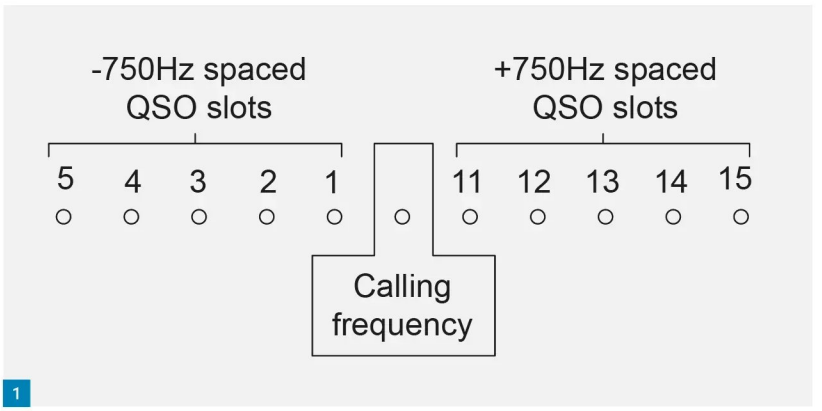

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VarAC and more on SDRs

Mike Richards G4WNC has an update on the popular VarAC, plus the second in his series looking at the workings of a modern SDR rig.

The new chat mode VarAC is going from strength to strength thanks to a very active development community. In fact, the calling frequencies have got so busy that we really ought to start QSYing more frequently. In the early days of the mode, where there were very few active stations, it was fine to hold short QSOs on the calling channel. This helped to make the limited activity visible to new operators. However, I've noticed several occasions when I've had to wait quite a while before I could put out a CQ call. This has been due to QSOs taking place on the calling channel. Even when that QSOs finishes, there's often a rush of CQs, Pings, etc, so you inevitably get a few collisions that further delay the process. The VarAC system has a very effective cure for this problem in the form of its integrated CQ process. For those new to the mode, the current frequency allocations for VarAC comprise a calling frequency plus ten QSO slots spaced at 750Hz intervals above and below the calling frequency. I've illustrated this in **Fig. 1**. When you put out a CQ call, you are directed through a menu-driven process to determine and test which slot to use for the QSO. Once that's decided, the CQ is transmitted on the calling frequency with the desired QSY channel embedded in the CQ call. VarAC then retunes your rig to the QSY frequency to wait for a response. Any operator wanting to respond to your call simply double-clicks your call in the CQ panel. This will retune their rig to the appropriate slot and start the connection. This CQ method has the benefit of only requiring a very short transmission on the calling channel, while the rest of the QSO takes place on a dedicated QSO slot.

If you do find yourself engaged in a QSO on the calling frequency, VarAC has an easy QSY process so you can move to one of the QSO slots without breaking the link. The QSY is activated using the QSY buttons, see **Fig. 2**. For the simplest QSY, you can hit the Up or Down arrows to move in 750Hz steps through the QSO slots. When you do this, VarAC maintains the link and sends a QSY invitation to your partner. If they accept, both rigs automatically retune to the new frequency. For a more sophisticated QSY, hit the # button to bring up the QSY panel, **Fig. 3**, which is similar to the QSO panel. Here you can choose your QSO slot and use the slot sniffer to ensure the slot is free. You can also use this panel to QSY to any specified frequency, even in a different band. For example, if you're in QSO on 20m late in the day, you might need to move to 30m or 40m to maintain the link. This can be handled seamlessly through the QSY panel.

SDR Receive Chain

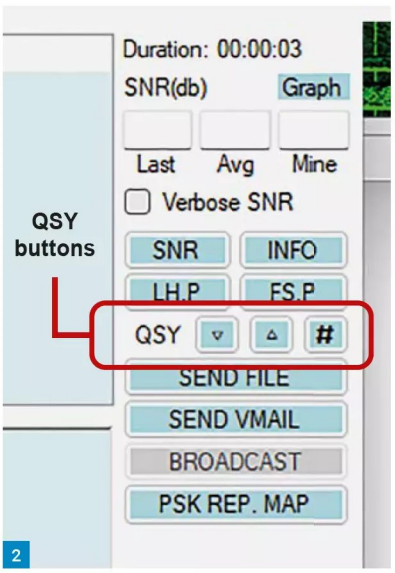
This month I'm looking at arguably the most important component in a modern SDR, the analogue-to-digital converter (ADC). The quality of this component largely defines the RF performance of the receiver, so the choice is critical. If you look at a few high-end SDRs, you will see that the ADC is often located close to the antenna input, and fed by a few front-end components, **Fig. 4**. In most cases, there will be a variable attenuator that's used to tame excessively large signals. There will also be an RF preamplifier in the form of a PGA (Programmable Gain Amplifier). This is an amplifier with gain that can be controlled by a digital signal from the receiver's microcontroller. This is usually tied to the receiver's AGC (Automatic Gain Control). You may also find RF bandpass filters ahead of the ADC but there will always be an anti-aliasing filter immediately before the ADC. I'll cover this in more detail later, but this is required to prevent out-of-band signals appearing in the digitised passband.

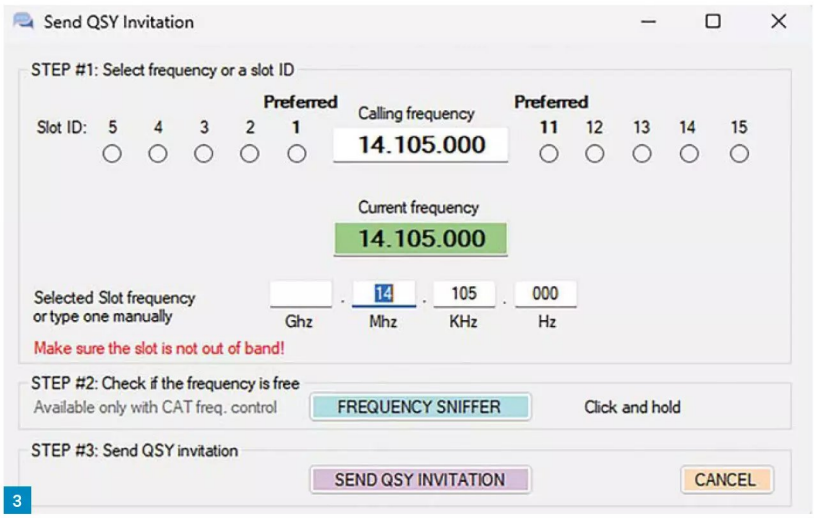
Let's now take a closer look at the ADC. The task is to convert a continuously varying RF signal into a stream of numbers that faithfully represent that RF signal. The technique for this is surprisingly simple and involves taking periodic voltage measurements of the incoming signal. It is these voltage measurements, known as samples, that form the stream of numbers that are the ADC's digital output. There are two fundamental factors we need to consider. The first is the sample rate, i.e. how frequently we take the measurements, and second, is the resolution of the voltage measurements, i.e. how many decimal places. The problem of calculating the best sample rate is solved using the well-known Nyquist-Shannon theorem. This states that the sample rate should be at least twice the bandwidth or frequency range to be digitised. If you look at a typical top-end SDR, the frequency range is usually LF through to 55MHz. That would demand a sample rate of at least 110MHz (2 x 55MHz). In practice, most rigs use a 122.88MHz sample rate. This seemingly odd value is used because low phase-jitter clock generator chips and oscillators are readily available for this frequency.

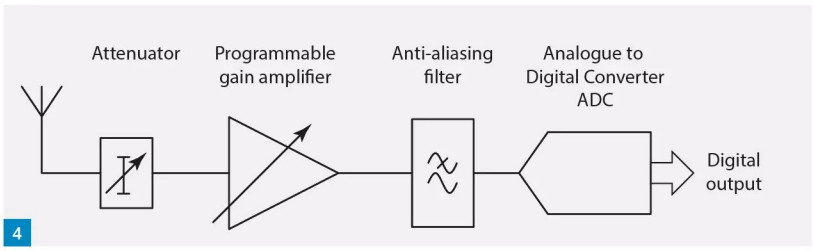
Having established the sample rate, we can move on to the ADC resolution. For those uncomfortable with data bits, you might find it helpful to imagine the ADC measurement system as a fixed-range voltmeter. With this in mind, the smallest voltage we can accurately measure would depend on the number of meter graduations, **Fig. 7**. A meter with very fine graduations and a mirror scale would provide better resolution than one with a coarse scale. In the digital world of binary numbers, we use bits to define the number of graduations. For example, an 8-bit ADC has 2^8 or 256 graduations in steps from 0 to 255, **Fig. 5**. This is the ratio between the smallest and largest signal that can be accurately measured simultaneously. If we express that voltage ratio in dB, we get 20 x log(256) = 48dB, not very impressive, but it shows the principle. Not surprisingly, high-end SDRs use many more bits, with most settling on 16 bits.

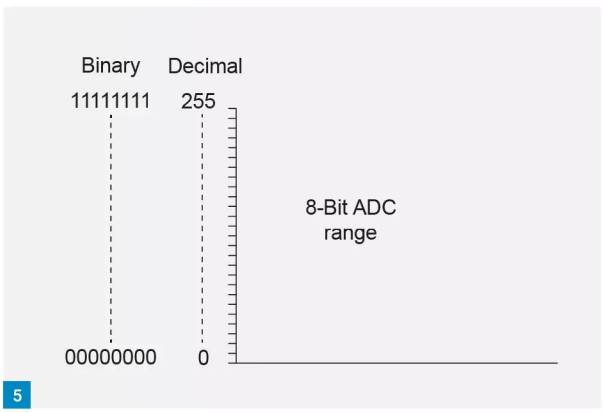
That provides a much finer resolution because 16 bits gives 2^{16} or 65,536 graduations/steps. If we convert that to dB, we get 20 x log(65536) = 96dB, which looks a lot more respectable. However, that is a simplistic view of the conversion process as several performance issues will affect that figure. One that is specific to ADCs is quantisation distortion. When the ADC samples the incoming signal the allocation of a voltage value is called quantising, i.e. we assign a voltage quantity to each measurement. However, our ADC operates in fixed steps, so every measurement must be assigned to the nearest

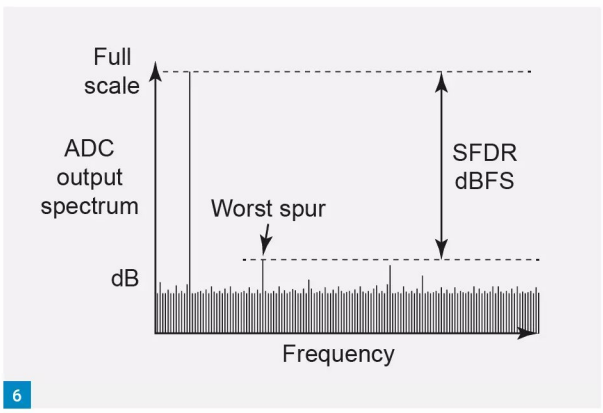
Fig. 1: VarAC QSO slots. Fig. 2: VarAC QSY buttons. Fig. 3: VarAC QSY panel. Fig. 4: High-end SDR front-end. Fig. 5: 8-bit ADC resolution. Fig. 6: SFDR measurement. Fig. 7: Analogue voltmeter graduations. Fig. 8: Varying front-end gain to match incoming signal.











available step. That slight misalignment distorts the original signal and creates noise in the ADC output known as quantisation noise. That noise raises the noise floor in the output of our ADC so the smallest signal we can detect will change. There is a standard formula for estimating the theoretical dynamic range of an ADC which is:

SNR (dB) = 6.02 x ADC bits + 1.76

From this formula, our 16-bit ADC-based receiver would have a theoretical dynamic range of 98.08dB (6.02 x 16 + 1.76). In addition to quantisation noise, the digital conversion process produces other spurious signals. These are captured in the SFDR (Spurious Free Dynamic Range) measurement. The SFDR is arguably the most important measure for an ADC in an SDR receiver as is focuses on the worst spurious response regardless of what caused it. The SFDR is measured at the output of the ADC, so we're working on the digital output stream. With a test signal applied that's close to the full scale (usually 1dB below to avoid clipping), the level of the worst spur in the output is recorded, **Fig. 6**. The difference between the test signal and the worst spur is the SFDR and is quoted in dBFS, because we're measuring against a full-scale signal. The SFDR is sometimes measured at other signal levels, but in that case, the reading will be with reference to the test signal carrier, so shown as dBc.

When designing an SDR receiver, a crucial question is how much dynamic range is necessary. The answer depends on where the ADC sits in the receive chain. This inevitably links to a balance between analogue and digital filtering. If the ADC is close to the antenna connection with very little filtering, it will be exposed to a wide range of strong interfering signals. For example, our high-end receiver covering 100kHz to 55MHz would be exposed to all the strong broadcast stations in the medium and short-wave bands.

The signal levels reaching the ADC must be controlled, so those strong signals don't overload the ADC and cause it to clip. In this example, the dynamic range will determine the weakest signal that can be handled by the ADC. The role of the attenuator and programmable gain amplifier is to adjust the incoming signal so that the strongest

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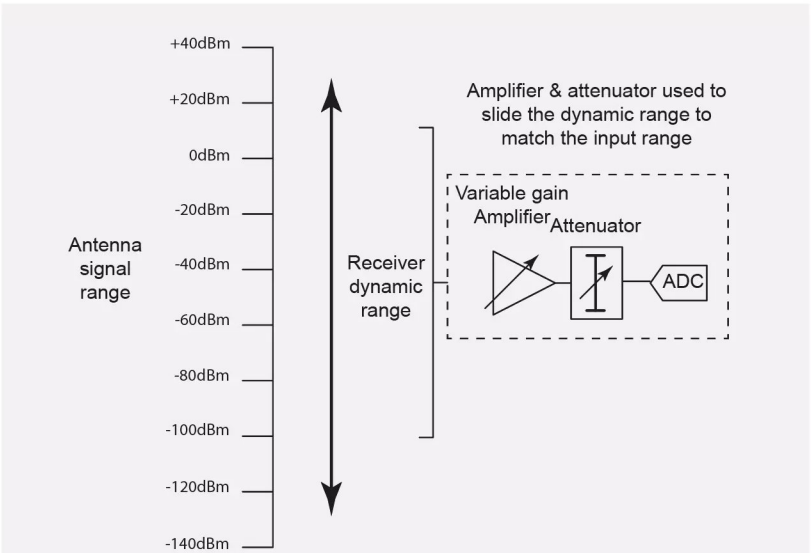
signal never exceeds the FSD of the ADC. You can visualise this as a sliding scale where the receiver's sensitivity is adjusted, so the top end of the dynamic range is set just above the strongest signal arriving at the antenna, **Fig. 8**. Using this system, all the filtering and down conversion to our desired signal is done digitally using the high-quality digital filters that are so easy to produce.

An alternative approach, that's used by lower-cost SDRs, is to employ carefully chosen switched analogue filters ahead of the ADC to filter out the strong out-of-band signals. That approach enables the lower-cost receivers to deliver excellent performance with lower-resolution ADCs. The penalty is the need for analogue resonant circuits to create the filters.



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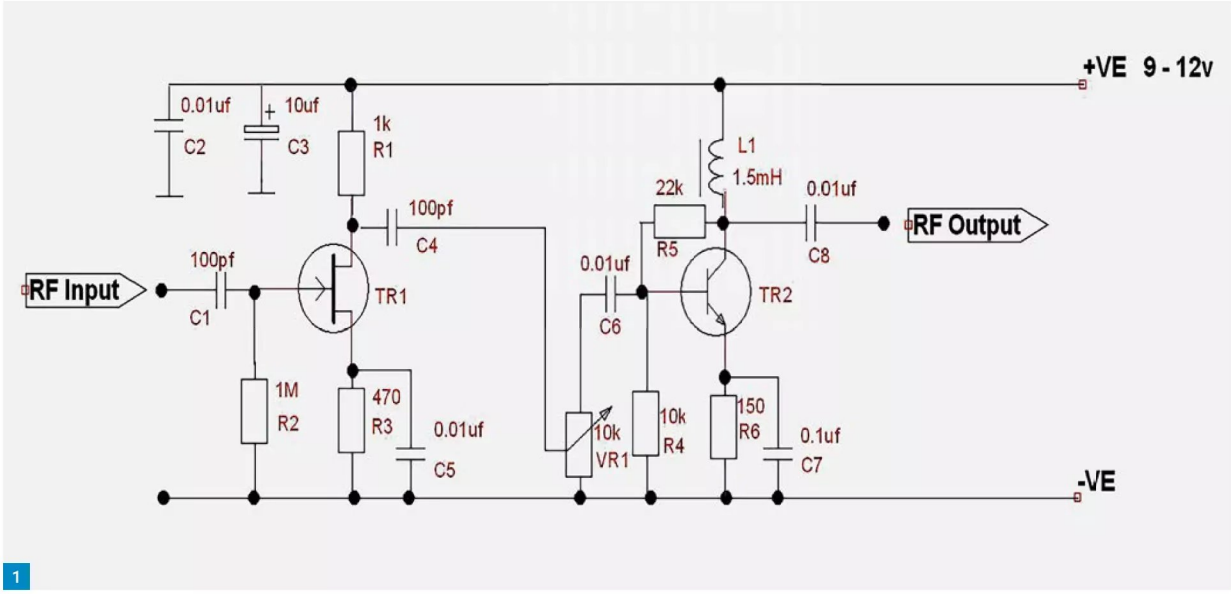
Summary

In this section, I've introduced the use of ADCs in modern rigs and explained some of the measurements. I'll wrap-up ADCs next time and explain the different types of ADC and explain how they are selected. For those that would like more detail, I've provided a couple of references that may help.

References

ADC dynamic range: Analog Devices MT-003 Tutorial:
https://tinyurl.com/4jw6pp6s
Understanding Receiver Sensitivity in HF radios (Flex Radio):
https://tinyurl.com/4kcn4b7y



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A Simple Two Stage RF Preamplifier

Shades of PW's Take 20 series from the past, as **Steve MacDonald G4AQB** offers a simple preamplifier to build.

Back in the 1970s building a small project for under 20 shillings was quite a challenge as components were relatively expensive compared to today's. Components such as FETs and bipolar transistors had only just come on the market and could be restrictive for a 14-year-old such as myself with just pocket money to spend.

I always enjoyed building some of **Julian Anderson's** *'Take 20'* projects. They were ideal to learn about simple circuits as well as learning about construction methods such as tagstrips and Veroboard and making simple PCBs.

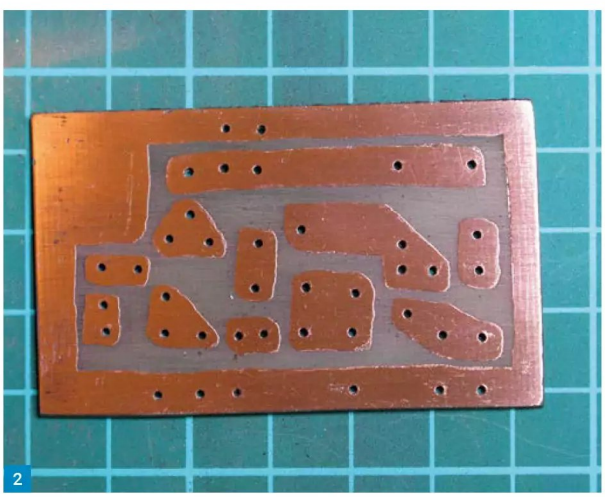
Taking a leaf out of Julian's book, here is a simple project that uses fewer than 20 components and would cost less than £20. Of course, you can just build the circuit to add to another project, or build it into a suitable box with connectors.

I have used this circuit many times over the years in different projects. The latest was my modern version of a G4CLF transceiver that I completed recently using modules for each part. Some readers may remember the G4CLF SSB exciter back in 1980 and before that the G3ZVC board. The Two Stage RF Preamplifier was used as the receive preamplifier and transmit amplifier along with SOTAbeams bandpass filters. I also have one in a box with sockets that I use with some of the older valve receivers that I have restored over the years, but are still somewhat deaf or need an extra RF preamplifier.

The RF preamplifier is wide band with gain up to 30MHz or more and could be used with any antenna on the HF Bands for receiving stations.

Circuit

The circuit consists of two stages, the first is an N channel FET followed by an NPN bipolar



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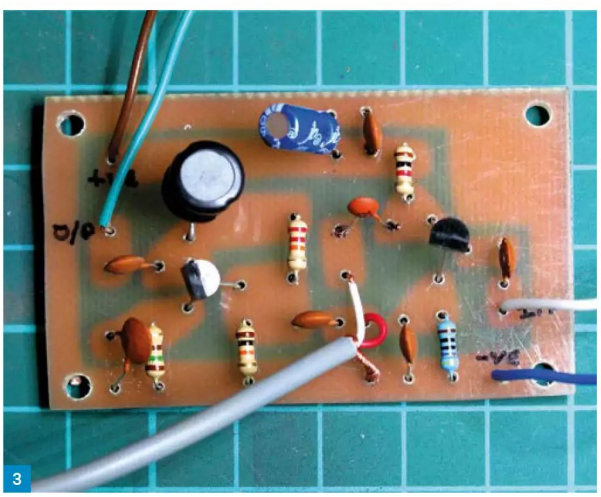

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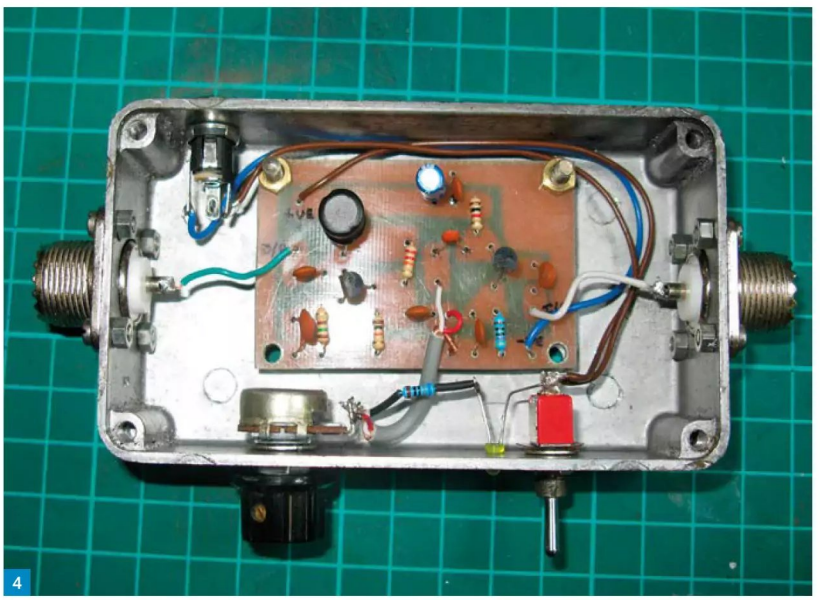

Fig. 1: Circuit diagram of the RF amplifier.
Fig. 2: Simple Printed Circuit Board.
Fig. 3: Components fitted on PCB.
Fig. 4: Circuit board fitted into a box.

transistor, **Fig 1**. For the FET a J310, 2N3819 or BF256 would be suitable.

The bipolar transistor is any general purpose NPN transistor such as a BC547 or BC108. The FET is very sensitive and the gate has a very high input resistance. They are also sensitive to static electricity, so care must be used when handling them.

A resistor is used on the gate of the FET to provide a suitable input load R2. The output of this stage feeds an RF gain potentiometer, which sets the gain of the bipolar transistor in the second stage. An RF choke is used instead of a tuned circuit in the collector so the amplifier remains wide band. The choke is not critical and a value of about 1.5mH is suitable. Negative feedback and bias is applied from collector to the base through R5. This ensures that the circuit is stable.

Construction

The circuit was constructed on an easy-to-make printed circuit board using the traditional method of an etch resist pen and ferric chloride, **Figs 2** and **3**. The board is approx. 6 x 3.5cm, which fits nicely into a standard small diecast box if required.

Two SO239 sockets can be used for the input and output of the amplifier. I also added a DC socket to power the circuit externally along with switch and LED, but a PP3 type 9V battery would suffice and could be mounted inside the box. Again, these are optional. See **Fig. 4** for a photo of the completed project.

Components List

Resistors

R1 1kΩ
R2 1MΩ
R3 470Ω
R4 10kΩ
R5 22kΩ
R6 150Ω

Capacitors

C1 100pF
C2 10nF
C3 10µF
C4 100pF
C5 10nF
C6 10nF
C7 100nF
C8 10nF

Miscellaneous

TR1 N Type FET (J310, 2N3819, BF256)
TR2 Bipolar (BC547, BC108)
Choke 1.5mH or similar
VR1 10kΩ Linear Potentiometer

Conclusion

The circuit is very stable and gives useful gain on all the HF bands, particularly on the lower bands. Adding a simple Aerial Tuning Unit (ATU) would tune the front end of the circuit enabling it to be 'peaked' on the frequency in use and can be used as a preselector for a receiver.

The circuit can also be used with bandpass filters on the input or output of the circuit to select certain bands or frequencies. **PW**

News Extra

CDXC CONVENTION: The CDXC (The UK DX Foundation) Convention will take place on Saturday 13 May at the Link Hotel, Loughborough. CDXC is delighted to announce that Kenneth Opskar LA7GIA, Team Leader of the 2023 3Y0J Bouvet DXpedition, will be the key speaker at the Convention. This will be the first time UK operators will be able to hear first-hand the real story of the adventure that was 3Y0J. There will be ample time to ask Ken questions throughout the day and at dinner that evening. Other speakers include PW editor Don G3XTT, who will talk about historic amateur radio magazines in the UK. The event is open to everyone and full details can be found at: **www.cdxc.org.uk**

ECHO OF BBC'S FIRST BROADCAST IN SCOTLAND 100 YEARS AGO IS HEARD FROM CENTENARY EVENT AT PACIFIC QUAY: (from *ICQ Podcast*) An echo of the BBC's first broadcast in Scotland 100 years ago today has been picked up internationally by radio amateurs in a special event to mark the centenary.

From an attic in Bath Street, Glasgow, on 6 March, John Reith, the general manager of the British Broadcasting Company – as it was then known – announced that *"5SC was calling"*. That was the callsign for listeners to Station 5SC, a radio service which launched the broadcaster's programming in Scotland.

To celebrate the anniversary, the BBC Amateur Radio Group and West of Scotland Amateur Radio Society have been running an event that features the original callsign for that first audience who were listening on their crystal radio sets.

More than 300 fellow radio amateurs from 37 different countries as far afield as India, China and Brazil have made contact with the special event callsign GB5SC on HF, VHF, UHF and the geostationary amateur satellite QO-100.

The callsign event has been running from a temporary radio base on the fifth floor of BBC Scotland's Pacific Quay centre since Saturday 4 March. Andy Britton, Engineering Manager, BBC Scotland, says: *"We're delighted with the responses we've received from so many countries. We had no idea how much interest there would be when we planned the event, but it has been a great success."*

Tim Davie, BBC Director General, who was visiting BBC Scotland as part of the centenary celebrations, met BBC Scotland apprentices and radio amateurs at the temporary radio base and sent out a 5SC call which John Reith had announced a century before. The centenary of the BBC in Scotland is being celebrated with a range of activities and content, including a landmark documentary. Presented by Kaye Adams, *Tuned In: 100 years of Scottish Broadcasting*, on Sunday 12 March on the BBC Scotland channel is an archive-rich look at the decades of programming and the broadcaster's place in Scotland's cultural life.

Read more radio news and reviews at www.radioenthusiast.co.uk/news

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Georg Wiessala
wiessala@hotmail.com

Cross Country Wireless HF Active Loop Antenna

Georg Wiessala investigates a new loop antenna from popular manufacturer Cross Country Wireless. The CCW HF Active Loop Antenna v4 is a compact, versatile and affordable solution for DXers and Broadcast Listeners.

Cross Country Wireless (CCW) is a well-known name among radio enthusiasts; we have introduced several of their past and current antennas and radio/HF accessories in previous issues of *RadioUser* magazine and on the *Radio Enthusiast* website.

At the time of writing, **Chris Moulding** at CCW is offering – through his website and eBay shop (*cross_country_wireless*) – this antenna, on its own (£150) or in a bundle, with the highly recommended CCW Wireless HF Coupler (£382).

CCW's product palette also includes, for instance, a Wireless Mains Filter, a Receiver Front End Protection Unit, and amplifiers for High-Z-Loop, along with Beverage-type antennas.

www.crosscountrywireless.net/index.html
https://tinyurl.com/yc6s2y94
https://tinyurl.com/5cuw2fru

I was interested to hear about one of the company's new offerings, the *Cross Country Wireless HF Active Loop Antenna v4*, and I sent out vibes and waves to Chris Moulding to get a review unit. This arrived, well-packaged and in no time at all. In what follows, I offer a brief user evaluation.

As before, this is written from the point of view of (mainly) broadcast listeners on LF to HF, who might undertake some occasional forays into data signals and HF data reception.

Out of the Box & Basic Information

The HF Active Loop Antenna v4 is a double loop with a variant of CCW's own *Loop Antenna Amplifier ++* with tight RF filtering. It comes with a versatile, pre-drilled, aluminium bracket, a bias-Tee unit, to be inserted between the antenna and your receiver, and a short power cable, with bare wire on one side and a standard 12V PSU connector on the other.

In terms of size, Cross Country Wireless HF Active Loop Antenna v4 is smaller than, say, the Wellbrook outdoor loops, and roughly on a par with the PK's Loops C-Loop (HDLSM150-550kHz) Long Wave Indoor Loop, which I have recently tested elsewhere (for a comparison, see **Fig. 1**).

A bias-T (or 'tee') is a form of star-circuit, i.e. a three-port network used for setting the DC bias point of some electronic components without disturbing any other linked electronic components in an assembly.

There was no additional coax cable in my parcel, but two short lengths were easily procured, from the radio equivalent of a 'dressing-up box' in my shack.

First of all, I was surprised at how lightweight and compact this double loop is, **Fig. 2**. It measures just 350mm (or 14in) in diameter – this was more of a portable device than I anticipated. I rigged it up on one of those ubiquitous

Fig.1: The CCW HF Active Loop Antenna v4, compared to other popular loops (Wellbrook & PK's Loops). Fig. 2: Small form factor: the CCW HF Active Loop Antenna v4. Fig. 3: Very acceptable and stable DWD Weather Facsimile (WXFAX) reception in rather stormy times … Fig. 4: … plus, good-quality RTTY reception with the CCW loop, and making use of *SeaTTY*. Fig. 5: The 22m band. Fig. 6: The 41m band, received with the CCW Loop and displayed with *SDRuno*. Fig. 7: A quick Medium Wave (MW) display from the CCW antenna. Fig. 8: *Shannon VOLMET* (5505kHz) on the *Deepelec Deep SDR 101* connected to the CCW Loop. Fig. 9: The matching CCW Bias-T Unit (L) run off a rechargeable Lithium-Ion battery (R).

Moonraker tripods – and away I was!

These tripods come in conveniently for anything, from radios, antennas and environment monitors to weather stations. I used the PAM-KIT-M – Mini-Portable Tripod Antenna Stand *(SKU76-101)*.

Specifications

According to the various bits of information collated from Chris Moulding and the CCW website, the HF Active Loop Antenna v4 offers the following technical specifications:

- Coverage: 500kHz to 55MHz; output impedance: 50Ω; OIP2: >+70dBm; OIP3: >+32.5dBm
- Gain (head and base units Loop Antenna Amplifier ++): 25dB at 14MHz; Noise figure: 0.79dB
- Supply voltage (the head unit): 9 to 15V from a bias-Tee feed, via the coaxial cable; supply current (head unit fed with 13.8V from bias-Tee): 100mA
- Loop antenna outdoor unit connectors: BNC female (RF out 50Ω and DC power input)
- Loop antenna amplifier bias tee board connections: BNC female (RF input and DC feed to outdoor unit), BNC female (RF output to receiver), DC connector (for 9-15V DC power input).

The full technical specifications for this antenna can be found on the CCW website.

www.crosscountrywireless.net/index.html

The Cross Country Wireless HF Active Loop Antenna v4 is marketed towards professional MW and HF monitoring; its frequency range runs from 500kHz to 55MHz. The loop can be mounted vertically (for bi-directional high-angle NVIS reception) or horizontally (for lower-angle, omnidirectional, operation). I deployed mainly the first (vertical) variant for my tests here.

The antenna is isolated from the amplifier, and the latter is housed in a weather-resistant polycarbonate box. The loop elements are made from heavy, low-loss coaxial cable (*Unispectra S400*), and there are three transparent polycarbonate pre-cut spacers. The RF output port on the base unit has a BNC female connector.

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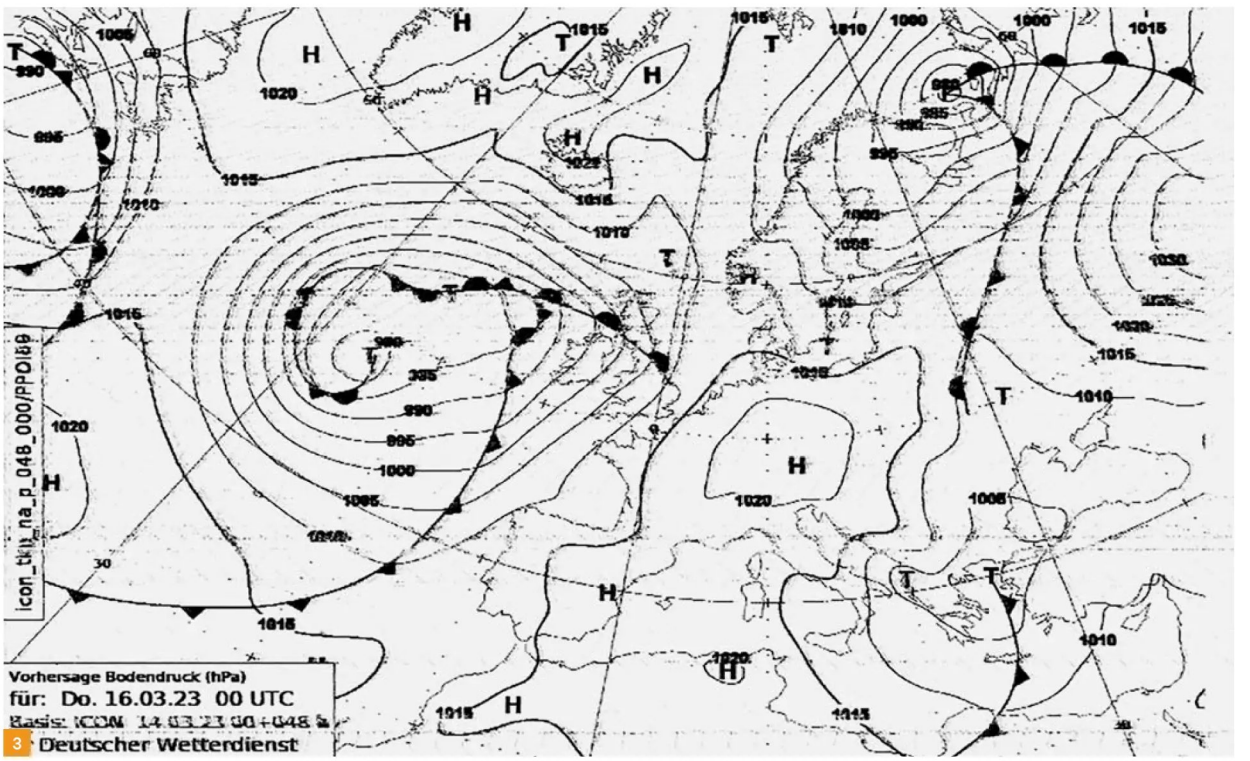
A common mode choke on the amplifier output attenuates RF noise travelling up the coax cable. Therefore, you should not need an additional standing wave barrier or isolator with this antenna.

The nifty aluminium bracket included allows the antenna to be placed on a tabletop for casual short wave (SW) listening, which is very practical indeed, as the entire kit is very lightweight. The antenna could also be mounted on top of a rotatable HF beam for low noise diversity reception. The built-in RF over-power protection on the antenna and RF output allows the antenna to be placed close (at a distance of at least 2m) to transmit antennas without damage.

CCW can supply this loop antenna with an HF Multi-coupler with a bias tee built in, to power the antenna (see above). This provides five RF outputs for multiple receiver monitoring.

Characteristics & Performance

Loop antennas, such as this new one, continue to be popular with both SW enthusiasts and DXers. In general terms, an RF current-carrying coil – given a single turn – can be used as a loop. The currents through this loop antenna will be in phase, and the magnetic field will be perpendicular to the whole loop carrying the



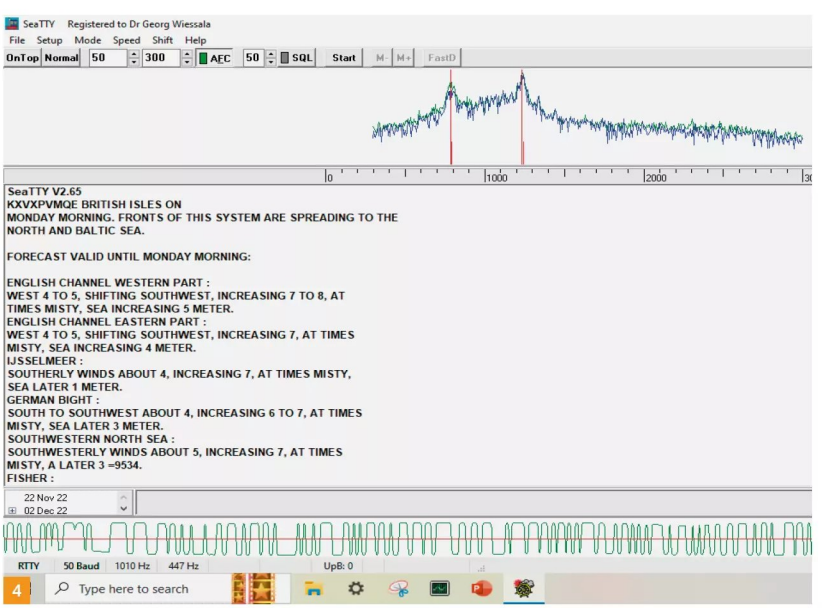
current (Source: *tutorialspoint*). Loop antennas are strongly directional and can 'null out' any interference. They do not 'draw in' or 'channel' magnetic field lines in their proximity; as do, by contrast, ferrite bar antennas.

In the October 2021 issue of *The Spectrum Monitor*, and the February 2023 issue of *PW*, I have offered some more thoughts on both lops and ferrites. Besides, the *ARRL Antenna Handbook* and *Rothammel* represent some excellent background resources in this field.

RadioUser/Enthusiast:
https://tinyurl.com/yc3rxjpm
ARRL:
www.arrl.org/arrl-antenna-book-23rd-edition
Rothammel:
https://tinyurl.com/mszy7h2v

For this short review, I used three different ways of reception:

- My old *AOR AR7030*, linked to a laptop and using software (*SeaTTY, Black Cat, Zorns Lemma*) .
- An *SDRplay RSPduo* 'black-box' receiver with the proprietary SDRplay *SDRuno* Software.
- A hybrid *Deepelec Deep SDR 101* with waterfall touchscreen display (cf: *PW*, April 2023: 20).
- In all cases, the CCW Loop was connected, through its Bias-T (see above) to the respective receiver(s).
- Copies of some of the software used (*SeaTTY* and *Black Cat*) were downloaded from here:
www.dxsoft.com/en/products/seatty
https://tinyurl.com/3fekvx8h



Three-Way Listening

I began with my trusted **AOR AR7030** HF Receiver for a brief spot of weather monitoring, targeting the Weather Facsimile (WXFAX) and Radio Teletype (RTTY) frequencies of JOMOC and the German Weather Service (*Deutscher Wetterdienst, DWD*), especially on 7880, 7646 and 8038kHz.

www.jomoc.net
www.dwd.de/DE/Home/home_node.html

In both cases, the CCW HF Active Loop Antenna v4 delivered excellent results. **Fig. 3** shows a Fax from the DWD showing the large Low approaching the UK on 14 March.

The image in **Fig. 4** is a screenshot of a clean RTTY synoptic and unencoded reception with the loop, using the *SeaTTY* software package – still one of my all-time favourite RTTY decoders.

Moving on to working the **SDRplay RSPduo**, with *SDRuno*, and placing the antenna outside, I

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did not notice any significant difference to my Wellbrook ALA1530; therefore, the CCW, in my opinion, is a serious contender for the hearts of data monitors, and has the advantage of compactness.

In terms of broadcast station DXing, this loop shines as well, and I was able to hear radio stations in the 22m band during the daytime, which I had not encountered for a while, **Fig. 5**. My (daytime) lynchpin broadcaster – *Saudi Radio International* on 21670kHz – came in strongly here in the Northwest.

At night, stations, naturally, proliferated, and the loop brought in a plethora of legal and pirate broadcasters as well as many other signals. **Fig. 6** shows the 41m Band at night. Furthermore, **Fig. 7** is a screenshot of a quick Medium Wave bandscan.

I found that the combination of the flexibility of the settings in *SDRuno* with the sensitivity of the CCW loop was very enjoyable; if you like to tease out the very best in receivability and DXing, this a loop you should consider. I will surely take this on my next DXpedition to *Bouvet Island* (only joking, I mean Scotland!).

For a further excursion, I connected a small portable: the **Deepelec Deep SDR 101** radio to the loop, via the latter radio's BNC connector.

https://tinyurl.com/56ts7at9
https://tinyurl.com/c4ye2shb

What I was looking for here were voice signals from amateur radio operators, aeronautical or maritime sources (e.g. VOLMET) and others. I was not disappointed, with, for example, Shannon VOLMET (5505kHz) coming in strongly here in the Northwest, **Fig. 8**.

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In Conclusion

The *Cross Country Wireless CCW HF Active Loop Antenna v4* with its bias-T unit, **Fig. 9**, is a capable performer that will appeal to listeners, DXers and general radio enthusiasts across the board.

You can confidently use it, indoors and out, to pull in that elusive DX signal, data or voice transmission, weather map, music radio station, and much more.

The loop's small dimensions and solid general construction work are to its advantage. You can keep this antenna in your shack, as a good all-round performer, mount it outdoors or take it away on your journeys and DXpeditions. In all of these cases, you will find CCW's latest offering delivers good to very good results and invites some hobbyist experimentation with different receivers or shack setups.

Highly recommended – I confidently give it five stars.

My thanks go to Chris Moulding at Cross Country Wireless for the kind loan of the review model. All illustrations are by the author. **PW**

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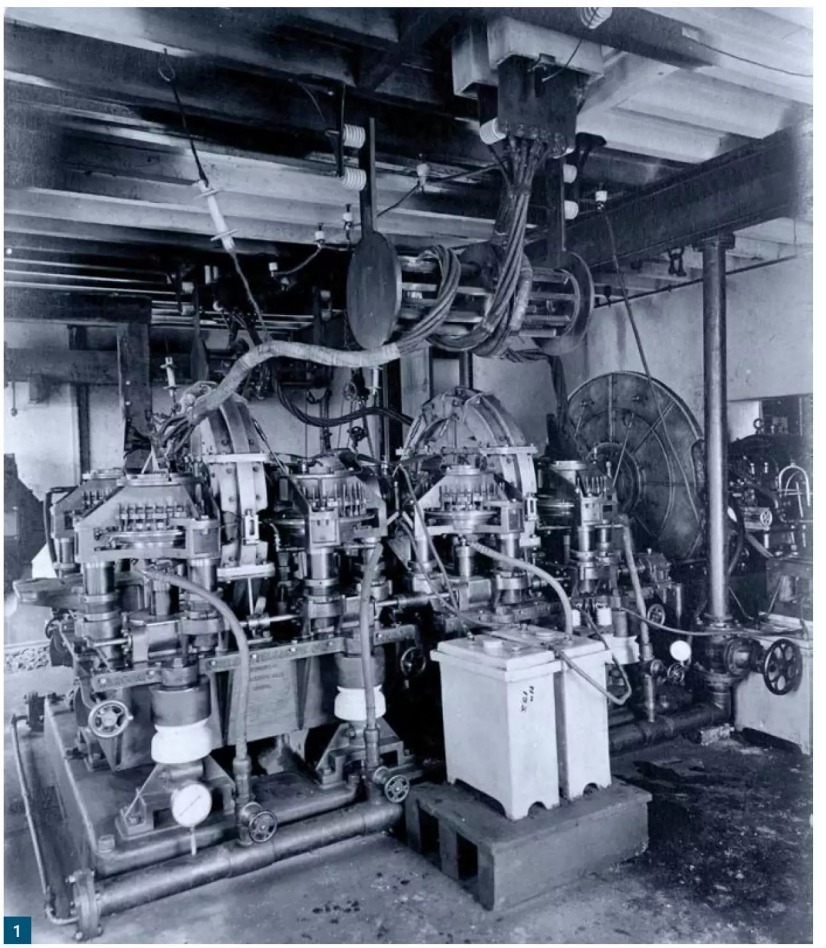

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Carnarvon Revisited

John Rowlands MW1CFN goes digging to the past to discover the secrets of an early wireless station.

In 1913, great iron pinnacles of a Marconi wireless telegraphy station started to grow to the east of Caernarfon, north Wales. Within a year, the wild slopes of Cefn Du mountain, with Yr Wyddfa (Snowdon) as a backdrop, had been transformed into a site hosting the very cutting-edge of 'trans-ocean' wireless technology.

Then universally known to the Marconi company as the 'Carnarvon' station, ten 400ft (122m) sectional iron tube masts held aloft the 32 silicon-bronze wires of a roughly 3847ft (1173m) long 'inverted-L' antenna. The antenna at this stage consisted of a roughly 752m sloping section from the transmitter hall, running up to steel ropes ('triatics') strung between the first line of three masts, the rest of the length being gently-sloping, horizontal wires running up the slopes of Cefn Du. It operated under the callsign of 'MUU', initially with a simple spark transmitter using 27kHz during the day and 52kHz at night.

Carnarvon's big claim to fame was in achieving the first ever direct, non-relay message between the UK and Australia, on 22 September 1918 – though tests for this public stunt took place over several months earlier; it took 200kW from a timed-spark transmitter operating at 21kHz, **Fig. 1**. And this is what most know about this site – one 'directional' inverted-L antenna, the transmitter hall, power house and an engineers' accommodation block at the western end, **Fig. 2**.

If you just found yourself thinking 'hang on, an inverted-L isn't directional!', then you immediately hit on a big controversy that raged through the early wireless community. Antenna theory was, naturally enough, not well understood at this stage of development.

Marconi and **Ambrose Fleming** (inventor of the valve) were adamant that the inverted-L exhibited quite strong directionality. Their plots of the radiation from their antennas are similar to what we would expect of a two-element beam. All Marconi antennas were set-up, wherever they were in the world, aligned with the great circle path to their intended receiving stations. Fleming, a scientific advisor to Marconi's, noted as early as 1916 that 'German writers' did not accept the directional nature of the antenna and Marconi engineers came to publicly agree with their German counterparts by no later than 1920.

Commercial advantage available from directionality was one factor, and there was certainly a lot of competition for the lucrative business. The other factor that misled Marconi was his use of extremely low, essentially Beverage antennas for receiving and plotting the strength of signals of his transmitters from various directions. This was linked to Marconi's efforts to come up with a 'mastless' antenna intended to cut out the most expensive element of a wireless station. At this stage, the Beverage design was unknown, not being patented until June 1921. At least in part, the directional claims for the inverted-L arose not from the properties of that transmitting antenna, but of the receiving antenna (**Fig. 3** shows a plot made by Marconi). Marconi should have realised this was the case, but he was not himself, of his own admission, very scientifically-minded, and was always looking for something – anything – that could promote his system over another.

I'd visited the Carnarvon site several times in the past, when the local (Dragon) amateur radio club met there to celebrate International Marconi Day. In 2016, I took a walk up the hillside, and was amazed at the vast concrete stay anchors and mast bases, **Fig. 4**, that are still prominent and, for the most part, in good shape. But the official records for the site were poor, having recorded the obvious remains but made little or, worse, incorrect effort to relate those remains to function. One official record contained the laughable assertion that the antenna was called an inverted-L because it looked a bit like this shape when viewed from satellite and aerial images! The photo, **Fig. 5**, is from the felling of the masts in 1939.

Field Work

Last summer, I thought: *"I can do much better than that!"* I'd spend some sunny days (which turned out to be mostly wet, windy and foggy) doing some 'upland' archaeology, to see if I could get a clearer picture of what once operated here, sending financial markets data, world news and even photographic images across the world, 24 hours a day.

Fig. 1: The timed spark transmitter at Carnarvon that made the first direct, non-relay transmission between the UK and Australia on 22 September 1918. (Oxford Bodleian Libraries)
Fig. 2: Marconi's Carnarvon station, as it appeared during the WW1 period.

I gave myself a ridiculously short two weeks to walk the hillside and record what I could find. But could I make sense of it all? I didn't have very much to go on: an RCAHMW map and a couple of not-very-good surveys done between 2007 and 2016.

An initially bewildering array of small concrete bases, when plotted on *Google Earth,* slowly started to create a pattern. Not that it was as easy as that. The hillside is mostly covered in either bog, thigh-high heather and Bilberry bushes, or both. The occasional sheep ticks would hitch a ride on my hairy legs. And then there was the weather, where 'four seasons in one day' takes on an entirely new, more extreme meaning!

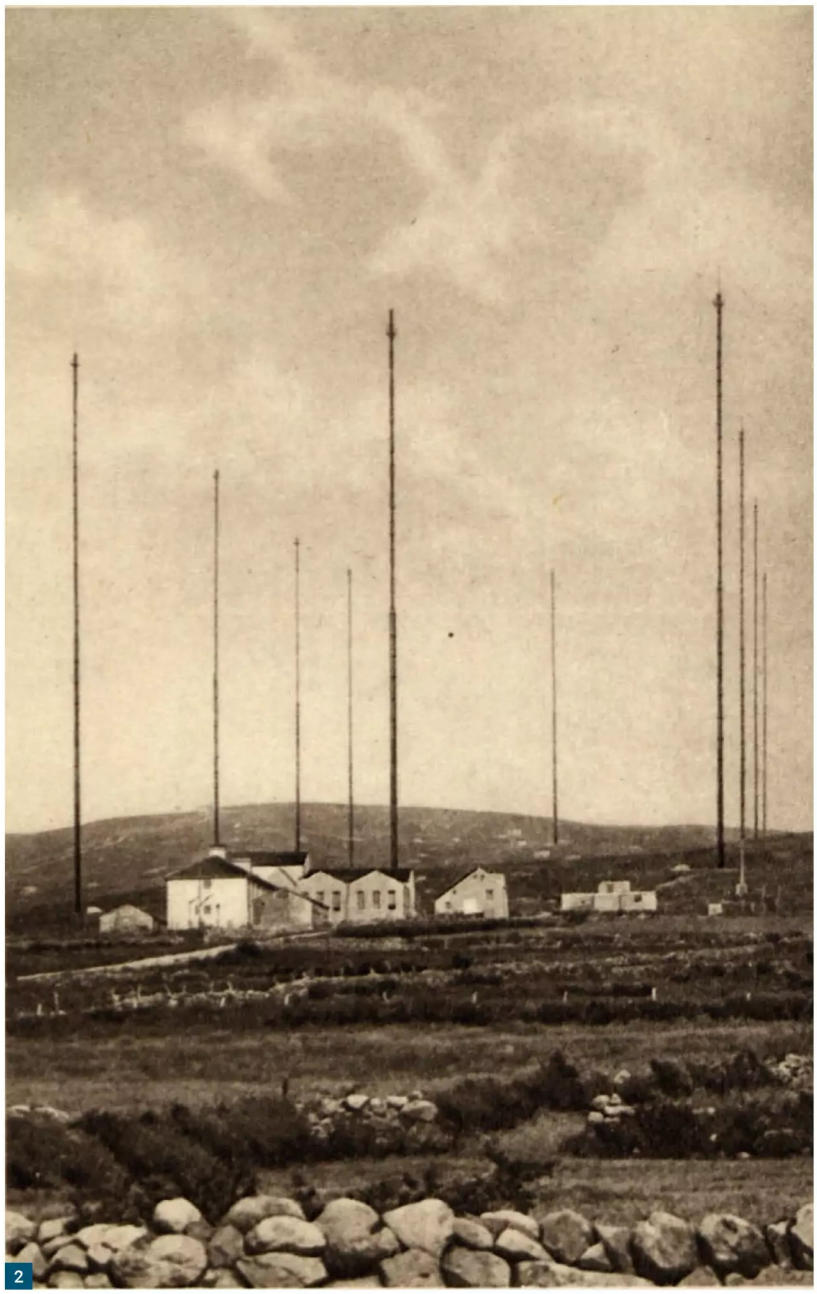
My understanding of Carnarvon was helped along by comparison with Marconi stations in the United States and, to a much greater degree, by the Marconi archive, now held at Oxford Bodleian Libraries. Almost none of the fabulous photos relating to this particular station have ever been published since the antenna was in operation, a century ago. A number of professional engineers and amateur radio operators with a special interest in early wireless also made invaluable contributions.

The movement of boggy ground is quite something to behold. Already, in just 83 years since the station was closed, one of the massive concrete bases – 9 feet on a side – has been consumed by the moving soil and vegetation. The pattern of tiny, 2 foot-square bases of the counterpoise system could only be figured-out by finding a few where they were obvious, drawing 'educated guess' lines away from them, and slowly finding more, using nothing more sophisticated than the GPS receiver of an ageing mobile phone.

This system worked very well. I was in many cases able to pace out expected distances between masts, hit the ground with the blade of a spade and, very satisfyingly, hear it ring on contact with concrete, hiding from view beneath the moss.

The first important realisation – which 'official' archaeologists had begun to understand in 2007 – was that the Carnarvon site didn't just consist of a single antenna. By 1925, a total of three VLF antennas faced into the wild winter storms of north Wales. Other antennas braved the same elements as part of the receiving site, around 30 miles to the south, in Towyn (since the late 1960s, known as Tywyn).

The original earth screen system was a run of wires buried 6in in the boggy ground, extending beneath the whole width and considerably beyond the far end of the antenna above. Mistakes in the description of the original earth screen have plagued understanding of the site since at least 1933. One of Marconi's engineers claimed it extended 800ft beyond the radiating wires, which was subsequently repeated in a reprint in 1973, and a 1999 book by another author. In fact, the screen only extended, at most, as far as the outer stay anchors. The 800ft almost certainly came from the diameter of the outer earth ring around the transmitter hall.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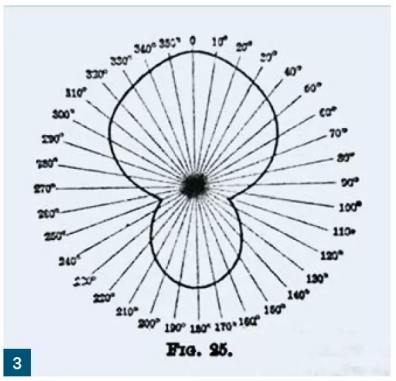
Marconi knew of the importance of moist ground, which increases efficiency, but conceived of it as being a rather mystical 'direct connection with the ocean'. This buried system was rather lossy so, as part of the first major modifications of the original antenna, was replaced sometime between 1919 and early 1921 with a vast counterpoise web of wires, elevated at around 24ft by masts, 30ft high. This was reported, as we might expect, to significantly reduce losses. After a series of very long walks, for the first time, the layout of this counterpoise has been fully worked out, **Fig. 6**.



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Exploring the History

By this time, chaos had come to reign with transatlantic communication as a result of the seizure by the new Irish Free State, of two cable stations in County Kerry. This immediately left the financial markets producing an enormous backlog of communications that Marconi's struggled to keep up with. Possibly in response to this development, Carnarvon's antenna was extended by 900ft, held up by two vast, self-supporting pylons of 60ft per side. Sadly, no photograph of these pylons has been found. Alexanderson alternators were installed at this stage, and valves were making an experimental appearance at the station.

By early 1923, the pylons and the 900ft extension were already gone. Marconi's had decided on a new, much more extensive, 2900ft-long extension, also with an elevated counterpoise system, to the first, 1914 antenna. This ran from the summit of Cefn Du and the rear of the 1914 antenna, down the steep slopes of the other side of the hill, towards Llanberis, then, as now, a popular tourist destination. Again a broadly inverted-L design, it was held up by six steel lattice towers, also 400ft high. One – unlucky mast 13 – collapsed after completion, **Fig. 7**, necessitating a rebuild and a new, luckier identification as mast 17! One man died in a separate mast-erection accident.

In the middle, between the two arrays of the extended antenna, a striking 'double ATI' (antenna tuning inductor) house was built, **Figs 8**. The curious, perforated ceramic insulators found lying around here were found, thanks to one photograph, to be for keeping the thin wires of an inductor separated. At the lower, Llanberis end of the 1923 array, a single ATI house containing more inductors was put up.

About a year later, further change was thought necessary. The two arrays were now split from one another, and a new feed was run from the transmitter hall up to the double ATI house, **Fig. 9**. During this summer's fieldwork, the cut remains of the feed were found, running into the concrete base of the double ATI building. The 1923 antenna now operated (from valves) under the callsign 'GLC', while the original, 1914 antenna continued as 'MUU'. The overwhelming volume of traffic for both was to America, despite GLC being completely unaligned with that direction – evidence that Marconi had by then understood his inverted-L antenna was not, in fact, directional in any meaningful sense. His engineers had accepted this in articles they wrote a couple of years earlier.

By 1925, a further antenna – operating as 'GLT' – was reported to have been put up. The only reference to it was by **R N Vyvyan**, a senior Marconi engineer, in a book he wrote in 1933. No detail was provided then, and no remains of any bases are to be found at the site, nor any reference to it made in the archives. Until, one day, an obscurely indexed folder was found, revealing 127 pages of detailed technical discussions about this 'lost' antenna. It became clear that 'GLT' was in fact 'GLJ'. It was apparently built very close to MUU


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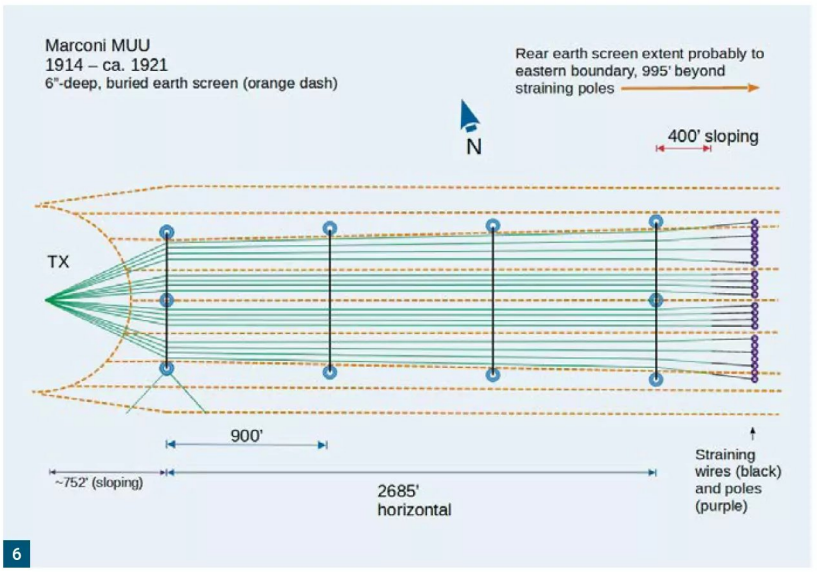

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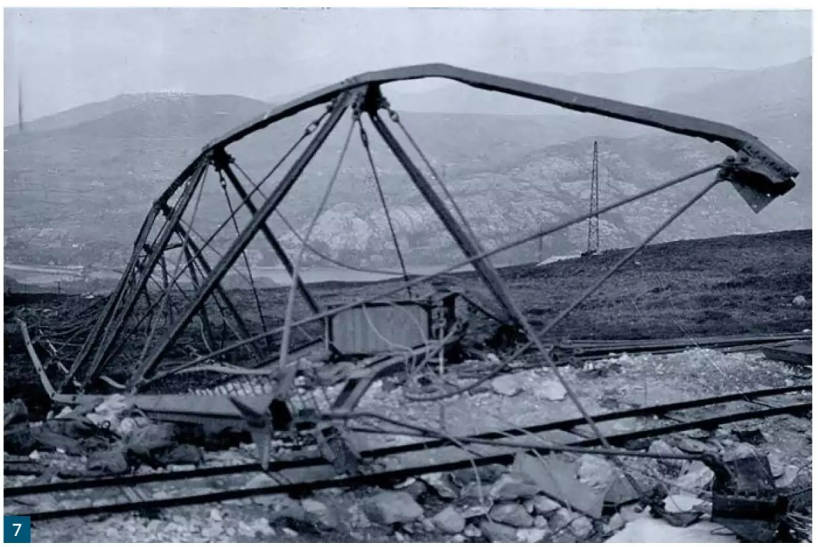

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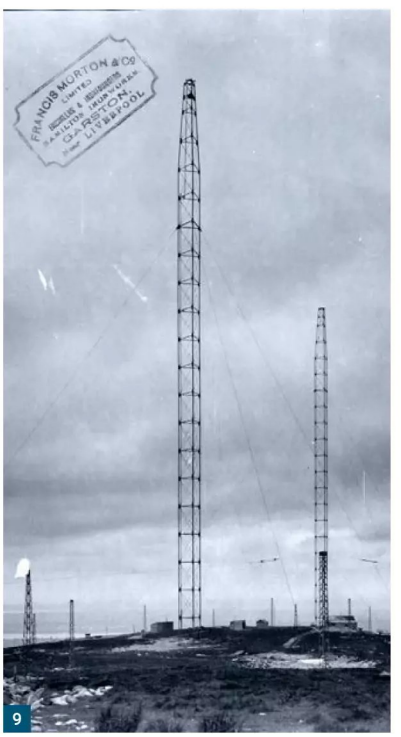
Fig. 3: Polar plot of radiation pattern of the Marconi inverted-L antenna, made by Marconi himself. Published by Fleming in 1916.
Fig. 4: One of the huge, 98-ton concrete stay anchor blocks. Wide steel bars splayed out into the body of the concrete, while they merged at the surface, bolted to the two L-section steel seen in the photo, providing the anchoring points.
Fig. 5: Detail from a newsreel of June 1939, showing the stay turnbuckles, about to be blown with explosives for mast felling (© *Reuters via British Pathé*, under licence). Fig. 6: Schematic form of the first, 1914 antenna at Carnarvon. Green indicates the radiating wires, which were almost entirely horizontal, with steeply-sloping wires converging on the transmitter house, at 'TX'. Dashed orange indicates the buried ground screen. Fig. 7: 1923 collapse of mast 13, probably due to poor installation of stay cable fixings. A large remnant of the mast was found by chance where the top of the tower came to rest (extreme left). The replacement mast was re-assigned as mast 17! Fig. 8: The strikingly angled and substantial 'double ATI' (antenna inductor) house, built between the 1914 antenna (seen running downslope to the left), and the 1923 extension, out of shot to the right.
Fig. 9: This invaluable image was found wrongly filed in an archive folder about Marconi stations in England. It shows lattice masts 11 (left) and 12 (centre) of the 1923 extension to the 1914 antenna, a rear steel tube tower of which is seen at lower far left. The small masts were for supporting an elevated counterpoise.



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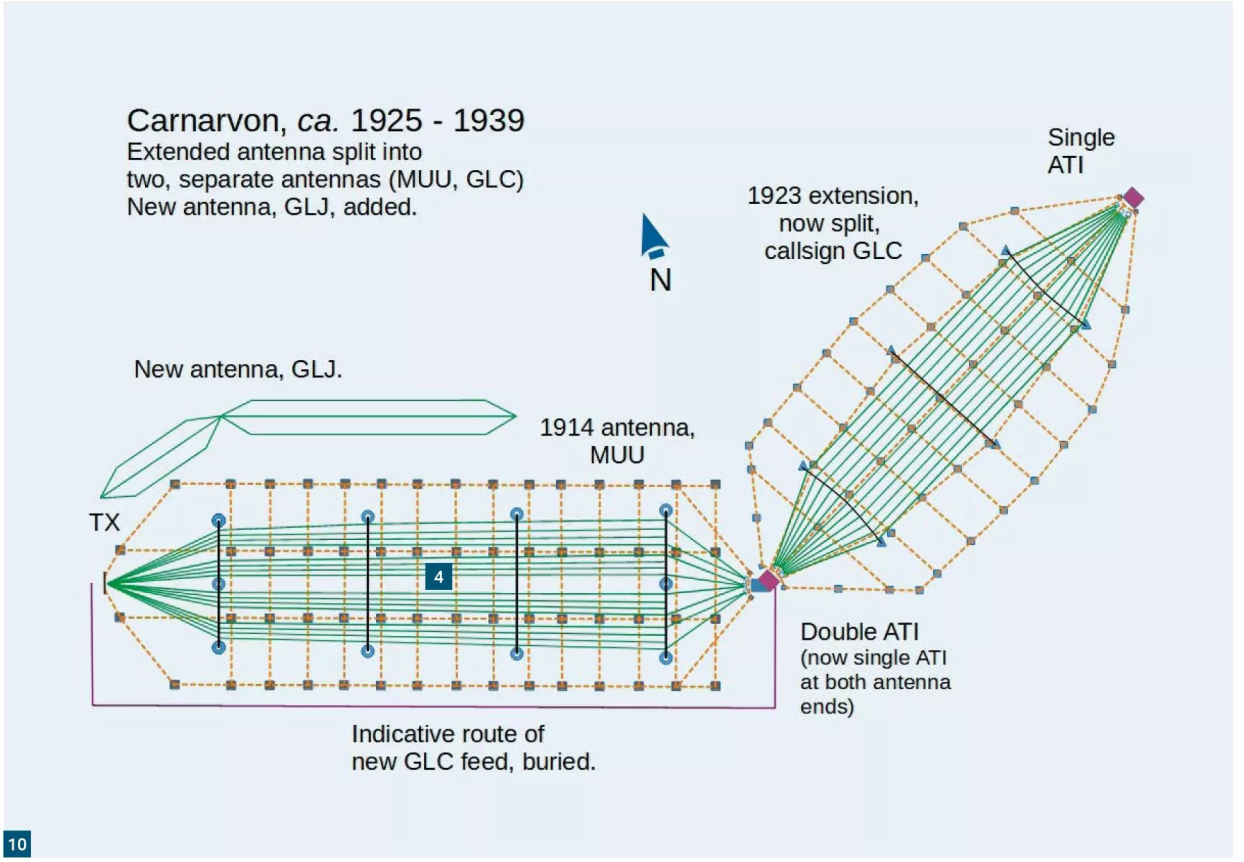

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and, unsurprisingly, serious difficulties were experienced due, in part, to strong interactions with the other two arrays. This led to a furious, months-long exchange of ideas between the Carnarvon Engineer-in-Chief – who, at times, sounded rather overwhelmed by the problems – and Marconi HQ in an attempt to resolve matters. It took until early 1927 to achieve satisfactory performance. **Fig. 10** is a schematic showing all three antennas.

VHF Experiments

Very early VHF beam experiments also took place at Carnarvon, which saw ranges of just a few metres achieved in experiments conducted in Rome being extended to the point where communication between Carnarvon and Dublin was possible.

The work was then moved to Portsmouth, to further whet the appetite of an already-interested Admiralty.

Last Transmission

In November 1938, Carnarvon made its last transmission, though all staff remained at their work at the notionally still-operational site. A few months later, with VLF having been entirely superseded by short-wave beam systems, Carnarvon was dismantled by Ward's of Sheffield, materials salvaged to the point where little remained. The BBC planned to use the site for a new TV relay mast in 1960, but it came to naught. The relay was installed at Nebo, a few km to the south where, ironically, Marconi had, in 1912, planned to install the receiver system that was ultimately built in Tywyn.

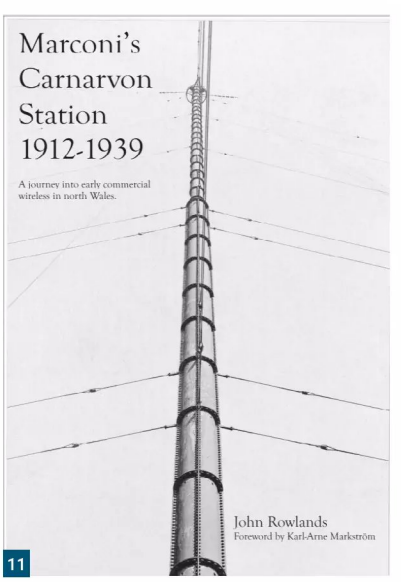
Fig. 10: Schematic of all three antennas at Carnarvon. Fig. 11: The author's book about the Carnarvon station.

Summing Up

I'm glad to say that, after not two weeks, but five months of fieldwork and archive searches, the site is now substantially better understood. I finished-off the work, by now 190 pages long, with some newspaper archive work. Stories of accidents, deaths, marriages and funerals all featured the north Wales Marconi stations, many due to the wartime presence of a fairly large contingent of soldiers guarding them. Even some 'audio archaeology' was discovered – a Welsh poem entitled 'Chwefror' ('February') told of a harsh and worsening winter, where those ten great iron pinnacles of Marconi's 1914 antenna groaned in the strong winds.

My work, including a *Google Earth* overlay file of the site, has been deposited with the Royal Commission for Ancient and Historic Monuments in Wales and the Gwynedd Archaeological Trust, and the site has been proposed for scheduling. I have also published a book (Paypal link below!), **Fig. 11**, going into more detail than has been possible here.

py.pl/DaUnV



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Keith Rawlings G4MIU
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Evaluating Cheap Antennas from eBay

Keith Rawlings G4MIU has Part 1 of a look at evaluating cheap antennas before bringing news of the latest AN-SOF release.

Shortly after I started writing *Aerials Now* for *RadioUser* in 2018 a reader contacted me to ask if there was an easy way to compare/test a dual-band antenna he was using with his 2m/70cm handheld. It was purchased on eBay in the hope it would improve the performance of his radio over the much shorter stock antenna supplied with the set. Unfortunately, he found that results were disappointing and the stock antenna returned similar results across the bands.

To improve coverage we often seek to try other antennas and quite often these will be aftermarket types so it is understandable to be disappointed if there is no improvement, as the reader had found.

The antenna type in question was a 'Nagoya NR771', which is a 144/430MHz dual-band antenna some 396mm long. The fact that it was bought from eBay and originated from China introduced questions about its authenticity as I believe that Nagoya are based in Taiwan.

Comparing Antennas

On air tests between antennas are probably the best and most obvious way of comparison but we could also check the antenna by measuring the field strength while transmitting using a Field Strength Meter (FSM) to monitor signal levels. Ideally, at the same time, holding the radio in the same posture in an attempt to keep results consistent. Another option could be to use a remote receiver to monitor the Signal-to-Noise Ratio (SNR) obtained between antennas.

In the case of the reader's NA771 we know that on-air results over a period of time appeared to be poor so in this case checking the matching/VSWR of the antenna would be in order, but replicating the circumstances given by a particular handheld to the antenna can be difficult.

As I'm sure most readers will be aware, the 'rubber duckies' supplied with the average handheld can be short with respect to the wavelength they are operated on, especially at 144MHz for example, where a quarter wave will be around 19in/480mm long and most stock antennas would be less than half this length.

An antenna intended for a specific model of handheld would hopefully be designed and built for best results on that radio and I believe that some manufacturers strive to do this even though the majority will be deliberately short with respect to wavelength. This is usually achieved by incorporating a matching section within the antenna.

Short is ideal for use when wandering around a crowded rally but sometimes there are benefits in fitting a longer and hopefully more efficient antenna for times where coverage needs to be greater.

Each handheld model will be different. They have differing case styles and different construction methods and this will affect the loading that the antenna will be looking at. Also, how the radio is held, such as in the hand close to the body or head, in a pocket with speaker mic, stood on a table and so forth will also affect how the radio will 'see' the antenna. Other factors to consider may be connecting a power lead or indeed a speaker/microphone itself.

Factors to Consider

If we were talking about a dual-band base antenna, for example, a meaningful measurement of how it is matching may easily be made without worrying about any outside interaction affecting the readings, when it is mounted up in the clear.

While I was developing an antenna for use on UHF covert personal radios (basically a handheld that would be concealed) the only way I could think of to check the matching of both the prototypes and then the production devices was to use a discarded radio body of the type being used as a test jig. This consisted of just the chassis with no PCBs fitted and connecting a coaxial cable directly to the set's QMA connector, **Fig. 1**. This technique obviously fell foul of the effect of the coaxial cable but not being able to operate the radio type in question it was the best way I could think of doing things.

The radios would be strapped to the body anyway and this is how they were adjusted to resonance with the test jig connected to a VNA. I later used an FA-VA5 analyser with the antenna connected directly to the BNC socket on the unit without a cable and found that I was getting similar results as when using the VNA. Consequently I believe that it is possible to get better than ballpark figures by mounting the antenna on an analyser and hold it as if it was a handheld.

Getting back to the NA771, I ordered one for myself off the same eBay seller and while I was at it, to amuse myself, I bought number of other antennas from various other Chinese vendors as well with the intention of evaluating these too. I was interested to see how they stood up to testing and whether they were value for money. In total I bought 12 different antenna types for just over £21 delivered! It was my intention to run the tests and report back in *RadioUser* but I never got around to finishing the job.

Being party to a recent conversation with a couple of friends concerning fake automotive parts minded me to finish off what I had started. Being in the middle of my VNA-3G review for *PW* at the time helped spur me on I must admit. So

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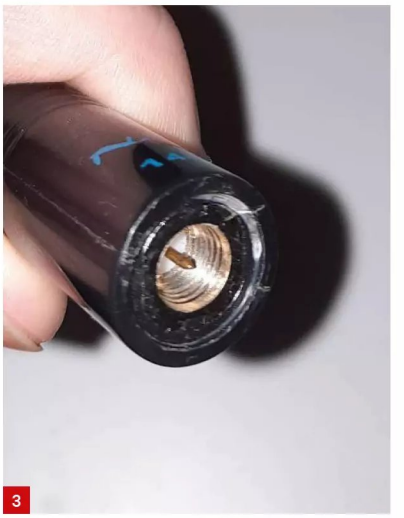

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Fig. 1: Covert Radio 'jig' with coax. Fig. 2: NA771 and case. Fig. 3: NA771 Thread close up. Note chamfered thread start. Fig. 4: VNA-3G as a 'handheld'! Fig. 5: NanoSaver sweep of my NA771. Fig. 6: Return Loss and VSWR plot taken from the Nagoya NR771 Datasheet. Fig. 7: NanoSaver sweep of VX-1R antenna.

better late than never!

I must be honest here and acknowledge that what follows may only be half the story as I do not have any genuine devices to test them against. Hopefully though it will help to indicate what to expect from my selection of these cheap antennas.

Testing the Chinese Nagoya NA771

Without having a genuine NA771 to compare with it was difficult to assess if this was the real article or not as overall the antenna looked well-made although I noted some signs of glue residue on the base that looked untidy. Also, the base was different to the photos of the NR771 on the Nagoya website. My one was parallel all the way to the base where the Nagoya photo shows a distinct step.

On the packaging, which was orange in colour, there was no mention of the name Nagoya anywhere, **Fig. 2**. Current Nagoya packaging has a Btech logo on it as they are in partnership with Baofeng Tech. The plastic end cap on the antenna did not have the Nagoya logo etched onto it, which I believe the genuine ones have, and I understand that there is usually a soft washer supplied to form a seal with the radio while my offering did not have this. However, we are talking nearly five years ago when I bought these antennas so things may have changed since then.

One major issue was that was that the thread on the SMA connector at the base of the antenna was faulty in that it was impossible to get the thread to start on the SMA connector of a radio.

Close inspection of the thread did not reveal any visible damage, nonetheless I ran an engineer's de-burring tool over the mouth of the thread to create a chamfer. After going deep enough to cut back the tops of the first couple of threads I managed to get the antenna to at least make connection to the inner pin of the connector but it was impossible to seat the antenna onto a radio correctly. Could there be an error on the pitch of the thread, **Fig. 3**?

On air tests using a THF7E revealed that the NR771 in question was no better than the supplied stock Kenwood antenna on 2m and it was very poor on 70cm. So the next thing to do was check the antenna's matching and to do this, bearing in mind the poor thread, I carefully mounted the NR771 directly onto the S11 port of the VNA-3G after setting a span of 100-500MHz and calibrating directly onto the port's SMA connector using the Cal kit supplied with the unit.

I just held the VNA-3G as if it was a handheld radio and observed the trace on the screen, **Fig. 4**. The resultant plot demonstrated that this particular antenna was not resonant anywhere near either 2m or 70cm. I connected the USB lead to the analyser and ran NanoSaver on my PC. After running a similar calibration in the software the displayed trace appeared to be close to that displayed by the analyser itself and is shown in **Fig. 5**.

Setting the markers within the NanoSaver band indicators the VSWR at 144MHz read 7:1 and 14.8:1 at 436MHz so pretty awful. The lowest SWR was 2.3:1 at 225.6MHz. I don't believe these figures would be much better when on a radio and they may well explain the mediocre performance of this particular specimen! Compare this to **Fig. 6** from the Nagoya datasheet.

Out of interest I then ran a sweep on the tiny little antenna that goes with my Yaesu VX-1R. This

is no more than 110mm long including the base! As can be seen, **Fig. 7**, resonance is very sharp around 2m with the VSWR being quite high at 3.8:1 at 144MHz and 2.1:1 at 436.3MHz.

So while looking better than my NA771, it is not a perfect match in this test but then the VNA-3G is metal cased and about three times bigger than the VX-1R so this may have affected the readings. Yaesu may well have optimised this little antenna for fitting on the VX-1R, which is tiny itself.

I can't remember the individual price of the NA771 that I bought but presently one well-known UK seller is offering genuine items at £21.99 +p&p while there are scores available on eBay from China priced as low as £3.83 + 10p p&p. It is more than likely the cheap items are not the genuine article. However, despite the middling performance of the type I tried, if you are just looking for a replacement for a lost or broken antenna, then at around £4 it won't break the bank. Hopefully I was just unlucky with the bad thread on the one I bought.

Being a clone or fake does not mean that these cheap antennas are not usable and they may offer good value. Also, it is possible that there is more than one 'factory' producing them so quality will probably vary. Just be aware that if it's the genuine article you are after, then buy from an authorised dealer or at least a reliable source. That these fake/clone items are freely available on eBay without any apparent restriction is another story.

I will continue on this subject next month and bring you the results I found with some of the other antennas I bought.

AN-SOF Antenna Simulator

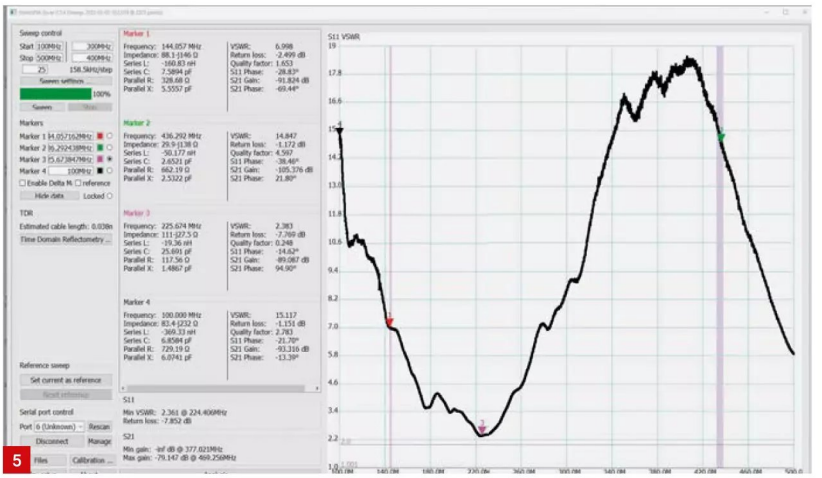
AN-SOF has had a further update and is now running at V8.20. This version, which was released at the end of April, has many improvements that will not be directly visible to the user as they have been focused on the calculating engine. AN-SOF have released this preliminary description:

"AN-SOF has released its latest version, 8.20, which brings significant enhancements to improve the software's accessibility and performance. The new release builds on the improvements made in version 8, with a focus on two key areas. Firstly, it provides an intuitive way to access data, making it easier than ever before to interact with graphs and results. Secondly, the calculation engine has been improved, ensuring greater accuracy and reliability. In addition, math libraries are now embedded in the software, eliminating the need to install external packages. With AN-SOF version 8.20, users can expect a faster, more powerful, and more accessible experience."

Also added to the website is a smart colour interactive user guide:

https://antennasimulator.com

That's all for this month! **PW**



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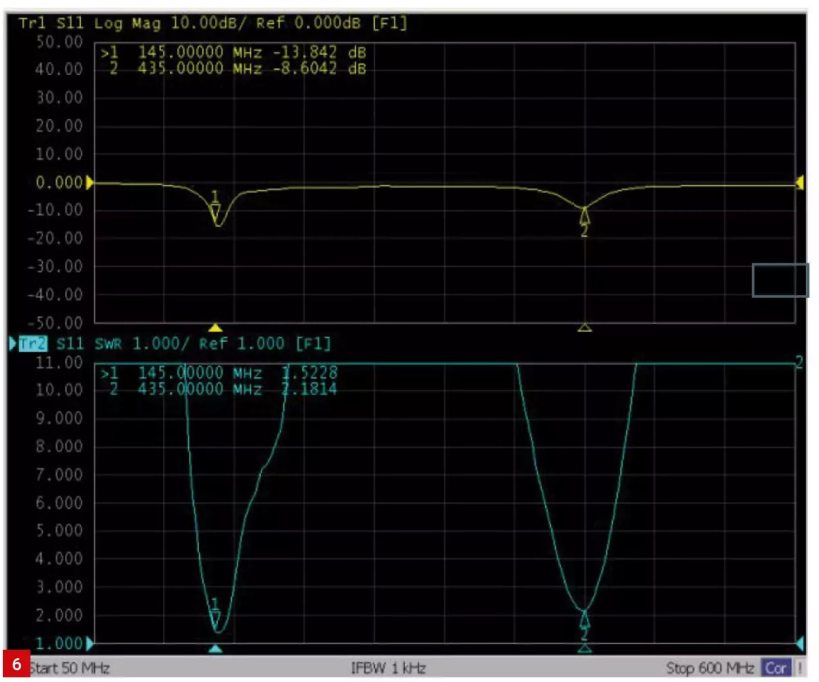

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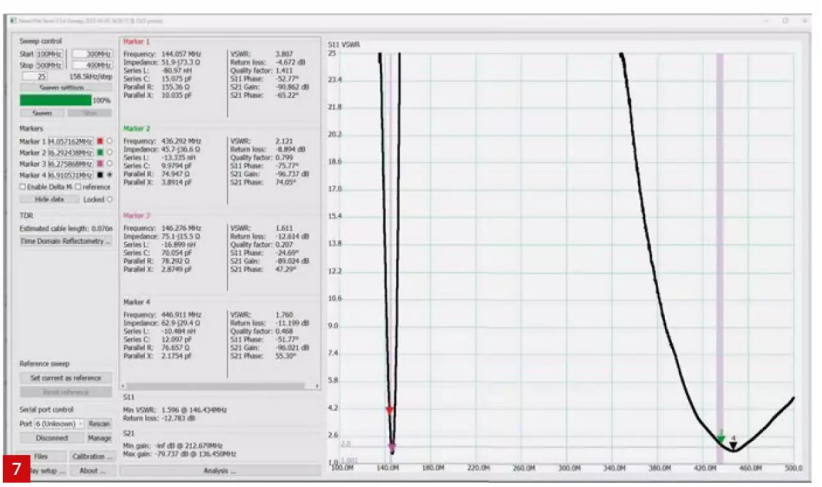

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BBC Coronations (Pt I)

With the Coronation of HM King Charles III on 6 May, **Keith Hamer** and **Garry Smith** begin a special series looking back to see how the BBC have covered coronations since 1937. There is also a special Coronation vintage radio advertisement from the archives. Also featured this month are the commemorations to mark the anniversary of the BBC 6BM Station in Bournemouth, the BBC Cymru-Wales Centenary, and the BBC Alba-Scotland Centenary. We also continue the series about the development of Swiss Radio and Television since 1933, the Blattnerphone, and the concluding installment about Vladimir Zworykin.

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The Coronation of **King Edward VIII** was due to take place at Westminster Abbey on Wednesday 12 May 1937. Extensive technical preparations had already been made by the BBC. The *Proclamation of the Coronation* in 1936 was announced from *St. James's Palace* in London on 29 May, and from *Mercat Cross* in Edinburgh on 3 June. The announcement was broadcast on the wireless – television didn't arrive until the world's first, regular, public, high-definition service began from studios at Alexandra Palace on 2 November 1936.

However, the King decided to abdicate on 11 December 1936, following opposition to his Coronation from some quarters because he wanted to marry **Wallis Simpson** who had been previously married. Although the King's Coronation was cancelled, the original date of 12 May 1937, remained because Edward VIII's brother and successor, **King George VI** and his wife, **Queen Elizabeth** (formerly known as **Elizabeth Bowes-Lyon**), were crowned on that day and became *King and Queen of the United Kingdom and the Dominions of the British Commonwealth*, and *Emperor and Empress of India*.

King George VI made his Coronation speech on 12 May 1937, using a standard microphone, but housed in a special ornate case, **Fig. 1**. Several 'Royal' microphones have been produced by the BBC for various special broadcasts, but they were all standard devices which were simply placed inside grand-looking receptacles.

The King began his speech with the following remarks: *"It is with a very full heart I speak to you tonight. Never before has a newly crowned King been able to talk to all his peoples in their own homes on the day of his Coronation. Never has the ceremony itself had so wide a significance, for the Dominions are now free and equal partners with this ancient Kingdom, and I felt this morning that the whole Empire was in very truth gathered within the walls of Westminster Abbey."*

Wireless coverage of the Coronation was the most elaborate and complex that the BBC had hitherto undertaken. It was the climax of months of planning and organisation by the *Outside Broadcasts Department* and the *Engineering Division*. The success of the broadcast was the result of co-operation between programme producers and the BBC's excellent technical staff.

Detailed arrangements were made by **S Joly de Lotbinière**, *Director of Outside Broadcasts*, and included the allocation of seven commentators at vantage points along the processional route and in *Westminster Abbey*.

Coverage began at 10.15am with a description of the procession as it began to move down the

Mall from an observation post in *Green Park*, overlooking *Buckingham Palace*. Meanwhile, peers, commoners, representatives from the *British Dominions and Territories*, foreign royalty and other important guests were arriving at the Abbey.

As King George and Queen Elizabeth stepped into the ancient, gilded *State Coach* within the precincts of Buckingham Palace, the story was continued by another commentator. His description was emphasised by the superimposition of sounds picked up by an 'effects' microphone over the archway through which the coach passed. The Green Park commentator resumed his narrative as the procession made its way down the Mall, flanked with thousands of spectators.

Of the 58 microphones used during the entire day, 32 were installed in the Abbey. They were concealed in many unlikely places – beneath chairs, faldstools (small movable stools for kneeling during prayers), in chandeliers, and inside lecterns.

Following the service, as the procession made its way from *Parliament Square*, in place of the planned voices of onlookers, four special 'atmosphere' microphones were used so that listeners at home could imagine the splendour of the pageant as it passed along *Embankment*, across *Trafalgar Square*, through the *West End* club-land district, past St. James's Palace to *Piccadilly Circus* and on to *Constitution Hill*. The first of these microphones was at the *Victoria Embankment* end of *Horse Guards Avenue*, the second near the *King Charles I* statue in Trafalgar Square, the third on the roof of St. James's Palace, and the fourth on the balcony of a large block of buildings in Piccadilly Circus. As the cavalcade neared Constitution Hill, the only BBC commentator who had the opportunity of describing it from the beginning was positioned near the *Quadriga* (a statue depicting a four-horsed chariot), atop the *Wellington Arch*. Near the commentary box was an 'effects' microphone which helped to re-create the spectacle for listeners at home.

Vintage Coronation Wireless Equipment

This month's special *Coronation* trawl through vintage copies of desolate newspapers and magazines has uncovered the *G.E.C. 5 A.C. Transportable*, **Fig. 2**.

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 equipment originally featured in an advertisement for the Coronation in May, 1937:

Your choice for the Coronation

G.E.C. 5 A.C. Transportable

Do not neglect a good intention. That "Better listening" you promised yourself can now be yours – in good time for the Coronation – with a minimum of expense and absolutely no worry or preparation. Until this set was designed you couldn't expect such marvellous performance, such brilliant tone, such delightful enjoyment of radio, unless you bought an expensive set, and installed a really efficient aerial and earth system. But now, here is the solution to your difficulty. You merely plug in this Transportable in any room – forget that things like wires, aerials and earths ever existed – and listen to the wonderful Coronation programmes with such enjoyment and thrilling realism that only G.E.C. Radio can give you. Ask your dealer to demonstrate this and other G.E.C. models.

MADE IN ENGLAND

Complete with OSRAM Valves.

16 GNS

12, 18 or 24 months' Hire Purchase

WRITE for folder No. BC 7728 which illustrates and describes the complete range of G.E.C. Radio. Sent post free on request. The coupon is for your convenience.

POST COUPON TO-DAY

Please send me folder No. BC. 7728

No installation – no aerial – no earth – just plug in.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.

Cut out and paste on a postcard, or enclose in unsealed envelope. Halfpenny postage in either case.

R.T.

Fig. 1: The special ornate microphone used by King George VI for the Coronation speech on 12 May 1937. Fig. 2: The *G.E.C. 5 A.C. Transportable* wireless, produced just in time for the 1937 Coronation. Fig. 3: The *Cardiff Wireless Orchestra* on 13 February 1923, during the first 'live' broadcast on BBC 5WA. Fig. 4: The baritone opera singer, Mostyn Thomas, performing the traditional Welsh folk song, *Dafydd y Garreg Wen*, on the opening night of BBC 5WA. Fig. 5: The BBC 6BM studio in Bournemouth, which opened on 17 October 1923. Fig. 6: Television pioneer, Vladimir Kosma Zworykin, displaying a selection of his cathode-ray tubes.

No installation – no aerial – no earth – just plug in.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.

Cut out and paste on a postcard, or enclose in unsealed envelope. Halfpenny postage in either case.

R.T.

Apart from a fascinating advertisement for

a transportable radio produced in time for the Coronation, it's also interesting to note the 'half-penny postage' back in 1937!

BBC Cymru-Wales Centenary (Pt I)

At 5.00pm on Tuesday 13 February 1923, listeners tuned in to the **5WA Station** to hear the BBC broadcasting from Wales for the first time. **John Reith**, the BBC's first General Manager, said: *"Hello, 5WA – the Cardiff station of the British Broadcasting Company calling. This is the General Manager of the company talking."*

Following his introduction, there was a 'live' concert by the *Cardiff Wireless Orchestra*, **Fig. 3**. The baritone opera singer from Blaenau Gwent, **Mostyn Thomas**, sang a medley including the famous traditional folk song, *Dafydd y Garreg Wen*, **Fig. 4**.

50 years later, in 1973, he recalled how momentous, and nerve-racking, the first broadcast was. He said: *"It was touch and go whether we were going to be ready in time. Engineers were stringing up microphones from the ceiling and testing equipment with seconds to go. I hardly had any time to practice, which made me extremely nervous, as in those days microphones weren't simple things to use. You had to stand close for deep and quiet notes, and move away for louder higher notes, and getting the right balance was more of an art than a science. But we simply had to be ready – the start time had been advertised in all the newspapers – and so we were, by the skin of our teeth."*

When 5WA began, there were complaints from newspaper proprietors regarding unfair competition. To placate them, the BBC agreed to broadcast news bulletins only after 7.00pm, by which time the daily newspapers had been sold. Even so, there was still friction between the Press and the BBC, the former constantly finding ways to publish disparaging reports about the quality of reception and programme content. Initially, the station was intended to serve South Wales and the West of England, rather than the entire Welsh nation. The dailies had a field day reporting complaints from English-only listeners having to listen to programmes in the Welsh language.

BBC Scotland-Alba Centenary (Pt I)

The **BBC 5SC** Station began broadcasting on Tuesday 6 March 1923, from an attic in Rex House, 202 Bath Street, Glasgow, as part of the British Broadcasting Company. Despite the very small space available, it often housed an orchestra, pipe band, choir, solo singers, actors and speech makers. Before very long, BBC Scotland began to expand and broadcast news bulletins, current affairs, sport, religious addresses, and general entertainment into people's homes.

John Reith, the BBC's founder, chose Glasgow as the Scottish starting point, due to the size of the potential audience. However, by the end of 1924, additional stations had opened in Belmont Street, Aberdeen (*2BD*), Lochee Road, Dundee (*2DE*) and Edinburgh (*2EH*). Edinburgh's offices and studio were located in the rear premises of a music shop at 79 George Street. The station broadcast local productions and *Children's Hour* during the afternoon, and evening programmes on Friday nights. The output from stations 2BD and 2EH were clearly picked up in the USA during *International Radio Week* in November 1924. A reconstruction of this event was organised by radio amateurs in 2023.


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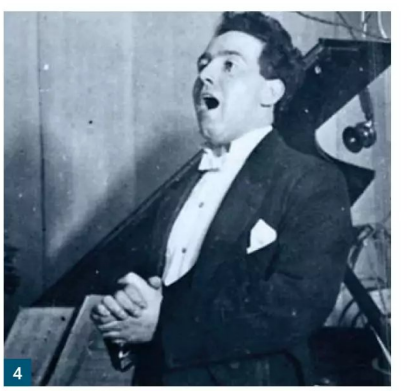
The 5SC station subsequently moved to Blythswood Square and then on to West George Street as the station expanded. In 1929, it was decided that BBC Scotland's headquarters should be in Edinburgh's Queen Street. These premises opened on *St. Andrew's Day*, 1930, and remained Edinburgh's Broadcasting House until relocating to *The Tun* in April 2002. This coincided with the creation of the *Holyrood Parliament*.

The 1930's had a promising start with a new serial called *The McFlannels* and a number of regular comedy shows. On 1 September 1939, two days before the declaration of World War II, Scotland's output was merged with the *BBC Home Service* from all transmitters. The *Scottish Home Service* resumed normal programmes on 29 July 1945.

The **Third Programme** broadcast across the UK for five hours each evening 'live' from the first **Edinburgh International Festival** in 1947. Morning recitals were aired on the Scottish Home Service between **Music While You Work** and **Workers' Playtime**. Edinburgh's **Queen Street Studios** became home to many reporters from overseas broadcasting organisations as networks across the world were eager to feature such a high-profile event. In 1948, the silver jubilee of the BBC's arrival in Scotland was celebrated with an exhibition in Broadcasting House called **BBC At Home.** The **Radio Times** featured birthday messages from various dignitaries. Broadcasting House in Edinburgh held similar celebrations in 1949 with an exhibition called **BBC At Work**.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BBC 6BM Station Commemorated (Pt I)

PW reader, **David Morris** of Lytchett Matravers, near Poole, has kindly sent a photograph of the recently unveiled Blue Plaque to commemorate the BBC's first radio station in Bournemouth. This will be featured in the next column.

David writes: *"I have sent a photograph of the Blue Plaque for the 99th anniversary of 6BM which is in Holdenhurst Road, Bournemouth. I was present at the unveiling along with two other British DX Club members last October when BBC Radio Solent did an Outside Broadcast for their Breakfast Show."*

BBC 6BM transmitted on 410m with an aerial power of about 1kW. The station was officially opened in Bournemouth almost 100 years ago on Wednesday 17 October 1923. It was one of eight stations established in main cities and towns. The other seven stations were: London (*2LO* on Tuesday 14 November 1922, on 369m, located at Marconi House), Birmingham (*5IT* on 15 November 1922, from Witton on 420m), Manchester (*2ZY*, also on 15 November 1922, on 385m from Trafford Park), Newcastle-upon-Tyne (*5NO*, 400m, Christmas Eve, 1922), Cardiff (*5WA*, 353m, 13 February 1923), Glasgow (*5SC*, 415m, 6 March 1923), and Aberdeen (*2BD*, 360m, 10 October 1923).

Each location provided programmes from their own studio and employed unique orchestras, specific to that station, **Fig. 5**. Music-quality landlines didn't exist at first, but simultaneous broadcasting began in May 1923, over GPO trunk telephone circuits, which greatly improved the overall quality. The eight local stations relayed regular news bulletins from London.

The 6BM station was originally destined to be located in Plymouth. The first programme began at 8.00pm and featured the *Bournemouth Municipal Military Band*, conducted by **Captain W Featherston**. Various guests took part, including the mayor of Bournemouth who was introduced by the General Manager of the *British Broadcasting Company*, **John Reith**.

The station was located above a pram and cycle shop at 72, Holdenhurst Road and could be received at a distance of approximately 25 miles (40km). Some of the more notable broadcasts featured a regular one-hour slot called *Children's Hour*, and a wide range of 'live' music programmes, often featuring the *Bournemouth Municipal Orchestra,* which later became the renowned *Bournemouth Symphony Orchestra*.

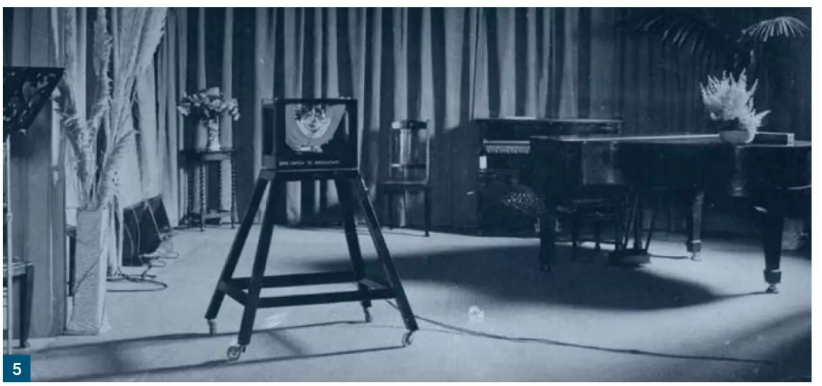
Service Information: Switzerland (Pt III)

The Swiss short-wave service was originally introduced in September 1935. Known then by the German-language abbreviation, *KWD* (*Kurzwellendienstes*), and today as *swissinfo.ch*, it was founded with a mandate to provide programming for Swiss listeners abroad and to raise Switzerland's international profile. KWD was not the first station to broadcast programmes for Swiss expatriates; the *League of Nations* station at Prangins, in Kanton Vaud, had been used for this purpose as early as 1932.

In 1938, Latin-based *Rätoromanisch* was recognised as the country's fourth national language, and the studios in Zürich began broadcasting programmes in Romanisch in between those in German. The language is also known as *Rumantsch* in some areas of Kanton Graubünden. During the *Second World War*, *SRG-SSR* filled an important function as a neutral, unbiased supplier of news, reaching far outside Switzerland's borders via short-wave broadcasts. *Radio Beromünster* and *Radio Monte Ceneri* became known as the only free German and Italian-language radio stations in Europe. Radio Monte Ceneri came into service in 1933 for the Italian-speaking Ticino region.

The Blattnerphone (Pt III)

Prior to the *First World War*, **Ludwig Blattner** was involved in the entertainment industry in, and around, Liverpool. He was the manager of the *La Scala* cinema in Wallasey from 1912 to 1914, and often conducted the cinema's orchestra. He also composed a waltz entitled *The Ladies of Wallasey*.



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Around 1920, he moved to Manchester and managed a chain of cinemas.

In early 1928, press reports appeared stating that Blattner was planning a 400-acre complex with a hospital, plus a 150-room hotel, an aeroplane club and the largest collection of studios in the world, for which he was budgeting to spend between £2m and £5m. He later formed the *Ludwig Blattner Picture Corporation* in Borehamwood, Hertfordshire. This studio complex later became the *BBC Elstree Centre*. In 1928, he bought the *Ideal Film Company Studios* and promptly renamed it the *Blattner Studios*.

Blattner was also involved in an early colour picture process for the cinema. Around 1929, he bought the rights for the use of a lenticular colour process called *Keller-Dorian Cinematography* which he could only use outside the USA. This process separated the red, green and blue colours of a scene and recorded them onto a single frame of monochrome film. He renamed this system the *Blattner Keller-Dorian Process*. Unfortunately for Blattner, his process lost out to rival colour systems.

Blattner promoted a version of his Blattnerphone technology in 1930 as one of the first telephone answering machines. In 1931, he advertised a version of the Blattnerphone as the *Blattner Book Reader*, an early Audiobook playback system for the visually handicapped.

In 1939, the BBC used a Blattnerphone to record Prime Minister **Neville Chamberlain** announcing to Britain, and the rest of the World, the outbreak of World War II.

Early Television Pioneers: Vladimir Zworykin (Pt V)

In later life, Zworykin regretted the way that television had been abused to trivialise subjects rather than for the educational and cultural enrichment of audiences. He often denounced the entertainment medium that television had spawned and in 1981, he described the content of American television as *"awful"*. Perhaps it's just as well he can't watch British television today!

Following his retirement in 1954, he was named an honorary vice president of *RCA*. Up until 1962,

6

he also served as director of the medical electronics centre of the *Rockefeller Institute for Medical Research* (now *Rockefeller University*) in New York City. In 1966, the *National Academy of Sciences* awarded him the *National Medal of Science* for his contributions to the instruments of science, engineering and television. This award was the nation's highest scientific honour. It was just one of 27 major awards he received for his pioneering work with cathode-ray tubes used in television receivers, cameras and medical equipment, **Fig. 6**. He was also founder-president of the *International Federation for Medical Electronics and Biological Engineering*, a recipient of the *Faraday Medal from Great Britain* (1965), and a member of the *U.S. National Hall of Fame* from 1977.

Doctor Vladimir Kosma Zworykin died on 29 July 1982 in Princeton, New Jersey (USA), aged 92.

DX-TV & FM News

The latest DX news, plus details of changes to broadcast television and radio services, is available online via the *Radio Enthusiast* website by searching in the *Latest Articles* section.

www.radioenthusiast.co.uk

Stay Tuned!

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

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DISCLAIMER Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. Practical Wireless advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The publishers of Practical Wireless wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

Bargain Basement

Wanted

ALTAI TV FM ANTENNA ROTATOR CONTROL UNIT The brown and silver one, with knob on right. Must be working. Thanks.
Call Paul on 07748 948685

YAESU FRG100 RECEIVER KEYPAD
Call 01724 763404

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PRACTICAL WIRELESS MAGAZINE All issues from 2007 to 2017 inclusive. Mint condition. £60 ono with proceeds to local good causes.
Collect only from NE45
E-mail simon@m5poo.co.uk.

Up For Grabs

CATALOGUES (HISTORIC) RS April-July 1978, Electrovalue 1982. First to give postal address gets either/both (state preference). No calls before 10am or on Sunday morning at all, thanks.
Call Godfrey G4GLM on (020) 8958 5113 or email cgmm2@btinternet.com EDGWARE

Rallies & Events

All information published here reflects the situation up to and including **20th March 2023**. Readers are advised to check with the organisers of any rally or event before setting out for a visit. The Radio Enthusiast website **www.radioenthusiast.co.uk** has the latest updates, please check it regularly. To get your event on this list, e-mail the full details as early as possible: **wiessala@hotmail.com**

15 April

YEOVIL ARC 37TH QRP CONVENTION: The Digby Hall, Sherborne, Dorset DT9 3AA. Doors open from 9.30 am to 1.30 pm. Admission is £3 (no dogs except guide dogs). Supported by RSGB, G-QRP & RAFARS . (BB | CR | CS | TS | Parking (Not free) | L).
http://yeovil-arc.com
qrp@yeovil-arc.com

16 April

CAMBRIDGESHIRE REPEATER GROUP RALLY: Foxton Village Hall, Hardman Road, Foxton, Cambridge, Cambs, CB22 6RN. Open 9.30 am (7.30 am traders), £3 (BB | FP | RSGB | TI | TS). Burger van opens at 8am.
07941 972 724
rally2023@cambridgerepeaters.net
www.cambridgerepeaters.net

16 April

HOLSWORTHY SPRING RALLY AND BOOT SALE : Holsworthy Livestock Market Holsworthy Devon EX22 7FA. Doors are open to the public from 10 am. For traders and car boot pitches, contact the club secretary (CR | DA | FP).
Ken G7VJA m0omc@m0omc.co.uk
http://www.m0omc.co.uk

23 April

NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION (BLACKPOOL RALLY): Norbreck Castle Hotel; Queen's Promenade, Norbreck, Blackpool FY2 9AA.
https://narsa.org.uk

29-30 April

IRISH RADIO TRANSMITTERS SOCIETY 90TH AGM WEEKEND RADIO SHOW : Doors open at 11 am and entry is €5 per person. Additional interested traders are welcome. Icom UK is among the sponsors of raffle prizes on the day (BB | CR | D | FP | LB | L [Saturday, April 29th] | RF | TI: 145.550MHz (S22) | TS | Wi-Fi [free]).
www.irts.ie
www.sbrc.ie/agmweekend
admin@sbrc.ie

30 April

RIPON RADIO RALLY: Hugh Ripley Hall, Ripon, North Yorks, HG4 2PT, 100 m west of High Skellgate traffic lights B6265. Traders from 7 am to 9.30 latest, tables £12 each. Doors are open at 10 am. £3 pp. BB is upstairs: *if you can't carry it, don't bring it!* Donation of £1 per item to a local charity, sold or not.
davidg3una@gmail.com
https://www.g4sjm.co.uk/contact-us

7 May

DARTMOOR RADIO RALLY: The DRC Rally will be held again at The Yelverton War Memorial Hall, Meavy Lane, Yelverton. Devon, PL20 6AL. Doors are open at 10 am. Admission is £2.50 (BB | CR | FP | TS).
07854 088 882
2e0rph@gmail.com

7 May

THORPE CAMP HAMFEST 2023: Thorpe Camp Visitor Centre. £4 per person entry. Traders are to arrive from 7 am. Visitors are to arrive from 8 am. (CR) – *no need to book*.
https://thorpecamp.wixsite.comt

14 May

BRAEHEAD RALLY (RAYNET UK): This Rally is being run by Raynet-UK.
https://tinyurl.com/yewfr46n
www.braeheadradiorally.com

21 May

DUNSTABLE DOWNS RADIO CLUB ANNUAL NATIONAL AMATEUR RADIO CAR BOOT SALE : Stockwood Park in Luton. This is the 38th year without a break (bar COVID) that this event has been run. All the usual facilities will be there. Further details on:
www.ddrcbootsale.org

21 May

RETROTECHUK (HOSTED BY THE BRITISH VINTAGE WIRELESS SOCIETY): Sports Connexion, Leamington Road, Ryton-on-Dunsmore, Coventry, CV8 3FL. Large annual vintage technology fair, with up to 200 indoor stalls. Private sellers, clubs and dealers offer vintage items. General admission is £10 for 10.30 am entry *(early entry [9 am] is £25)* (BB | FP).
jezzer3@hotmail.com
07799 110 080
www.retrotechuk.com

28 May

DURHAM & DISTRICT ARS RADIO RALLY: Bowburn Community Centre, Bowburn, Co. Durham DH6 5AT. Doors open from 10.10 am to 2.30 pm with disabled visitors gaining access at 10 am. Admittance is £2. (BB | CR | SIG | RSGB | TS)
07826 924 192
dadars@gmx.com

4 June

SPALDING RADIO RALLY: Holbeach Utd. Youth FC, Pennyhill Rd, Holbeach, Lincs, PE12 7PR. Doors open at 10 am. Disabled access from 9.30 am. Admittance £3. The organisers look forward to welcoming you all again this year for the usual excellent rally, lots of local attractions to make the journey worthwhile for all the family. (CB | CR | FM | TS).
07754 619 701
rally2023@sdars.org.uk
https://sdars.org.uk/spaldingrally

10 June

ROCHDALE & DISTRICT AMATEUR RADIO SOCIETY (RADARS) SUMMER RALLY: St. Vincent de Paul's Hall, Norden, Rochdale, OL12 7QR. Doors open at 10 am with the entry fee still only at £3 (CR | FP).
rozallin@gmail.com
dave@cardens.me.uk

11 June

JUNCTION 28 RALLY: Alfreton Leisure Centre Bowls Hall, Church St. Alfreton, DE55 7BD. Trader Bookings are now being taken. Opening at 10:15, traders will have access from 08:00. Everything is indoors. £12.00 per table (all provided) admission is £3.00 per person.]. We offer 100 tables for traders, including dealers, manufacturers, and suppliers providing new and used equipment. Local and national or specialist clubs represented.
www.snadarc.com
secretary@snadarc.com

The 2023 NATIONAL HAMFEST has been cancelled

11 June

MENDIPS RALLY: Farrington Gurney Memorial Hall, Church Lane, Farrington Gurney, Somerset BS39 6TY. Tables in the hall and car boot on the field; entrance is £2; the doors are open at 9.30 am; traders from 7.30 am.
07870 168 197
mendipsrally@hotmail.com

18 June

EAST SUFFOLK WIRELESS REVIVAL (IPSWICH RADIO RALLY): Kirton Recreation Ground, Back Road, Kirton IP10 0PW (just off the A14). Doors open at 9.30 am, and the entry fee for visitors is £3. Trade tables are from £10. B4SWR HF station. (BB| CBS | CR | FP | RSGB | SIG | TS)
07710 046 846
www.eswr.org.uk

23-25 June

HAMRADIO FRIEDRICHSHAFEN
https://tinyurl.com/4puvauz5

25 June

NEWBURY RADIO RALLY: Newbury Showground, next to junction 13 of the M4 motorway in Berkshire, RG18 9QZ. There will be a display area with an amateur radio station and exhibits. Open to sellers at 8.00 am and visitors at 9.00 am. Entry is £3 for visitors and £15 for a seller's pitch. Advance Bookings (with discount) can be made. (CR | CS | D | FP | SIG)
www.nadars.org.uk/rally.asp
NewburyRally@nadars.org.uk
www.nadars.org.uk

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

Read more radio news and reviews at www.radioenthusiast.co.uk/news

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

Everyday Electronics

Dear Don,
I have just read your editorial from April *PW*. Here (see photo) is *Everyday Electronics*. This magazine carried a regular feature called *Radio World*, written by the late **Pat Hawker G3VA**.

The edition I still have is from Dec 1981, and in addition to an article about CB legalisation (Oct 1981), Pat's column announces three new bands from January – the WARC bands.

Chris Kirby G4FZN
Richmond

Economical Alternative Heating

Dear Don,
I read **Mark Tuttles's** (**G0TMT**) article in April *PW* with great interest. It brought back memories of the EberSpacher Heaters we used on cold Winter mobile deployments during my time with St John Ambulance.

I have safety concerns about the installation shown by Mark, however. There could be an 'incident pit' waiting to develop into a major problem.

1. The photograph of the heater exposes at least two problems:

a. The heater box appears to be mounted directly onto a flammable surface, i.e. the wooden shack wall. There should surely be a fire-resistant barrier and an air gap.

b. The fuel tank is mounted directly above the heater unit; not a good idea I would suggest.

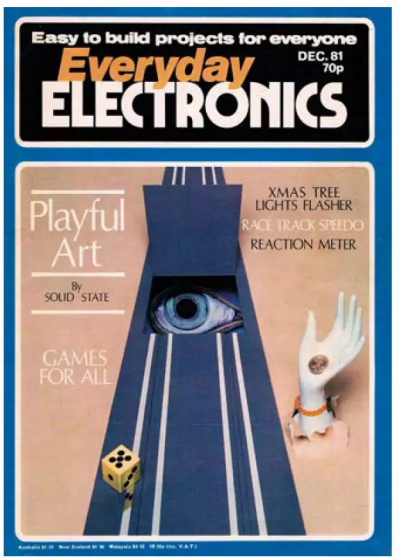
2. The photograph of the battery backup system indicates other possibilities.

a. Mark has used an IP65 enclosure, which looks very neat. However, the charging unit will generate heat. This heat will have no means of dispersal because of the enclosure.

b. This heat build-up will be exacerbated by the presence of the hot air outlet directly underneath.

c. I am delighted that a fuse has been incorporated to disconnect the battery (viz my previous letter on fuses). The fuse wire is exposed, however, which will allow hot, molten metal to fly around the enclosure.

d. Think about it: what would necessitate the fuse to operate? 'Short circuit' high current, which could cause the battery to vent hydrogen. Hydrogen in an enclosure with a potential source of ignition, nice bomb!



I hope these comments will assist Mark and others to enjoy the hobby safely. By the way, a source of Red Diesel is canal boat suppliers.

My Kindest Regards to all fellow radio enthusiasts

Michael White G4HZG
Clay Cross, Derbyshire

Dear Don,
I read with interest the article on *Economical Alternative Heating for the Shack* (April). Perhaps a note of caution may be useful to readers who are thinking of this solution. There are safety risks associated with purchasing products from the Far East using online marketplaces. While offered at an attractive price, many products will not have been tested to demonstrate conformity to UK safety standards and present a risk to the user. One of the brands mentioned in the article has been subject to a very high number of product safety alerts in the UK. A search for product recalls and alerts on the gove.uk website is recommended. The Office for Product Safety and Standards has recently launched a campaign entitled 'Shop smart and stay safe' to alert consumers to the risks related to buying products from online marketplaces.

Any form of fuel-based heating also has an associated risk of carbon monoxide poisoning. The installation should prevent fumes being re-introduced into shack if the wind changes direction etc.

I share the author's shack heating problem and have solved this by insulating and installing a 200W flat panel heater with a wall-mounted thermostat (as used for central heating). I keep the shack at around 10° to prevent condensation problems with the radio gear and it is quick to warm up when required.

Eric Edmonds G6ILU
Margate

Long-Time Reader

Dear Don,
Seeing the letter from a reader (*PW* April) reminded me of my earliest reading of *PW*. I was 10 years old (1967) when I bought a large box of radio magazines at a jumble sale. They were a mix of *PW* and *Practical Television* and I read through so many of them in one sitting (all day) that I made myself feel quite sick, hihi.

I spent my hard-earned pocket money (in those days I had to do chores to earn it) building the *Technical Topics* and other circuits described to limited success. It was many years before I realised what the sections labelled 'errata' were for!

I had no contact with any other enthusiasts then to advise me. There was a television and radio shop near me whom I used to constantly pester for 'Repanco coils type xxx etc and crystal diodes and OC71 transistors', only to be told by the rather snooty owner that such stuff did not exist anymore. I think he only wanted to sell expensive TVs and radios, not components. Anyway, I discovered an article saying a medium radio could be retuned to cover the 160m amateur band, so I put an old valve radio to the test. Fortunately, on that day the Dagenham Town Show was running a 160m AM demonstration station just across the Thames from me and they came booming in. I was hooked.

I later found out about the North Kent Radio Society from these publications and attended my first meeting at age 13. Even then I had to miss the second half of the meetings as my parents still insisted that I had to be home before my bedtime!

I applied at my local college to take their

★Star Letter★

The Star Letter will receive a voucher worth £20 to spend on items from our Book Store, or other services offered by Practical Wireless

Radio Maths

Dear Don,

I would like to follow up on **Tony Jones'** (**G7ETW**) letter *Radio Maths* in the April issue of **PW**.

Tony is right to question the need for maths education for the advanced licence. Since some maths is required to pass the exams, then it needs to be taught and tested. However, and I do not say this lightly, you do not need to be a maths wrangler for the amateur licence. You need some basic principles, commit to memory a few formulas and be able to rearrange formulas (formulae?).

The fundamental issue is that maths historically has not been taught well at secondary school level and is probably not taught well today (I only have anecdotal evidence of the latter). In my own case, being from a Secondary Modern background, maths had about the same relevance to my life as French irregular verbs. I pounded slowly through pages of quadratic equations thinking to myself, *"when will I ever need to solve a problem with two unknowns and if I did why would I think of using a quadratic equation?"* We were never told that (at least I don't think so) and I never asked. What we need are teachers that are brilliant, who bring a subject to life whether it be languages, history, art or maths and show that it is relevant to our lives. Trouble is, it's not a perfect world. Teachers are under pressure to achieve targets that are not always in the best interests of students, they are hand-tied by bureaucracy and political correctness. On the other hand, children don't all come from perfect family backgrounds. It's tough.

I came to 'proper' engineering late in life via the mature entry route and had a successful career in electronics engineering despite having a woeful grasp of mathematics. I was almost exclusively dealing with digital electronics where mathematical demands beyond Boolean algebra and Karnaugh maps were few. I was blessed with an intuitive logic and had a nodding acquaintance with a few analogue building blocks so throwing together the odd amplifier or power supply was not an issue. Also, digital electronics was sufficiently far removed from RF work not to spoil my hobby. The last 12 years of my working life were spent as a software engineer where common sense and logic were the essential elements.

When I retired and had more time to spend on my RF designs I needed, for instance, filters requiring impedance matching to a preceding amplifier stage. This and other challenges finally brought me into conflict with complex numbers (see my plea for help in March 2021 issue of *PW*), Smith charts and load lines. Textbook approaches were frustrating and I didn't have anyone local to ask for help. After *PW*, the next best thing I did, and I recommend it, was discover the Khan Academy. This offers free online courses in many subjects, including all aspects of mathematics. The courses are gentle, thorough and give one lots of practice that can be repeated until understanding is perfected. Just Google 'Khan Academy'.

So, what should be taught in schools? A facility with arithmetic is obviously essential to everyday life, but true mathematics properly taught can provide students with tools to describe and understand not just physics, electron tunnelling and suchlike but modelling and statistics can help one to understand all sorts of aspects of everyday life such as traffic flow on motorways or finance. Maths is not on its own in my essential recommendations: English, including grammar, must be taught because in this age of social media accurate communication is so important to ensure that not only do we understand each other's feeling and emotions, but we can follow at least the basics of cosmology for instance – and we can teach these things effectively.

The arts should be taught on an equal level to maths and sciences. There seems to be an insurmountable wall between arts and sciences, it shouldn't be there. In my experience a good engineer or scientist needs the same qualities as any artist, but those qualities will be applied in a different direction. Just as there is beauty in art, there is beauty in a well designed and executed piece of engineering. Digging deeper the beauty is not just the outward appearance of a structure, but in the thought processes and equations used to bring that thing into existence. There is beauty in a set of equations that do not directly result in a physical object but describe a natural phenomenon, such as Maxwell's equations describing electromagnetic waves for which we are grateful!

I firmly believe that schools should have a balanced curriculum of Engineering/Science subjects and Arts/History/Languages (dead and alive) if we are to produce fully rounded individuals who will lead fulfilling lives and be beneficial to our communities. All this requires a special brand of teacher and school freed from many of the bureaucratic demands of the system.

Coming back to Tony's opening paragraph my advice is not to be put off by Advanced licence maths, but to tackle the problem a bit at a time. Perhaps Advanced licensees at your local club can help, try private tuition, take an online course such as those offered by the Khan Academy.

Michael Jones GW7BBY,
Llangeler, Carmarthenshire, Wales

RAE class and was told I needed permission from my school to attend as I was so young. I felt confident I would get permission as I was a 'goody' at school and was doing well. I never felt so much rage as when my request was dismissed by our draconian headmaster with a curt 'NO', with no explanation. I was never a 'goody' after that!

I had to wait another year before I could take the RAE course without permission. I had to travel to London (age 14) for the first time to take my Morse test, which I passed, much to the surprise of my doubting school colleagues. I have held my licence for 52 years now.

I did stop buying *PW* for a number of years as I joined the RSGB and took their magazine, but I still used to buy *PW* from newsstands whenever I saw it. I used to have a choice then from *Wireless World*, *Elector*, *Short Wave Magazine* etc. I have not seen a copy of *PW* in a newspaper shop for years. Do you not promote this anymore? I subscribe now, but often wonder how many missed opportunities there have been to entice the younger generation into radio without these magazines on show.

Keep up the good work Don

Ken May G4APB
Dartford

***(Editor's comment:** Thank you Ken, great Letter. We do still sell* PW *through newsagents. My local Smiths here in Wells always has copies and my wife and I were in Cirencester the other week and I noted that Smiths there had it too. But I gather it's down to branch managers as to which titles they carry.)*

Practical Wireless and Others

Dear Don,

Your comments in *Keylines* March issue regarding past magazines stirred a few memories. I think I bought my first *Practical Wireless* in 1961

Read more radio news and reviews at www.radioenthusiast.co.uk/news

in the newsagents in Eastbourne railway station. My elder brother picked my father up each weekday evening on his return from work in London. I would always tag along to see what new magazines had come in.

In the 1950s we lived in Southeast London and next door to us was a radio amateur called **Ronnie Adams**. I never knew his callsign but I was always interested in what he was doing and I think this is what set me on the road to a lifetime in radio and electronics and getting my Class B license in 1968.

So, I have taken *PW* for over 50 years and in that time changes in electronics have been just amazing and herein lies a problem. Very few of us have the capability to build anything anymore. Yes, many experiment with small projects and work on antennas, but most of us simply splash the cash and get the best black box we can afford.

But I am fed up with seeing a constant stream of 2m and 70cm handhelds and mobiles that all do the same as the previous 20 or 30 models and reading reviews that simply repeat what is written in the handbook. I want to know if it works better as a radio, not if it now has facilities that 99% of us will never use.

I also cannot see the point of featuring articles about primitive equipment that belongs in a museum. It may be of interest to people of my age or older, or collectors, but I can assure you, most youngsters see it as old worthless junk. These young amateurs want current, relevant articles. Don't put them off before they start.

I have no simple fix but I do know that the average age of amateurs in the UK is increasing each year, so we all know how that one ends up. Surprisingly though, this is not the case in other countries. I have listened on 40m to young male and female operators all over Europe coping brilliantly with pile-ups. Some are operating from their school clubrooms. Does this happen in the UK?

So, I think that for amateur radio to thrive in the UK, we need to change our image and perhaps *PW* should lead by targeting these school kids here and send a few complimentary copies out to see if there is any interest.

Graham Lindsay G8BZL
Hove

A Wooden Shed?

Dear Don,

Whenever I subscribe to a new magazine, I am always asked for 'the offer code'. This way I get a free set of crappy screwdrivers or some cheapo headphones or something like that. The problem is that I seldom have an offer code and its almost as if the publishers don't want to take my order unless I go into town and buy the current copy to get an offer code. Thank goodness my subscription to *PW* doesn't involve any of this nonsense.

I had to smile when I took out my sub to *PW*, as it was to volume 90. I have got thousands of back copies of *PW* right back to the first edition in 1932, from volume one! In fact, if I went on *Mastermind*, my specialist subject would be *Practical Wireless 1932 to 1979*.

However, I have just finished reading the March 2023 edition and question why you ran an article on making a wooden shed! Surely that's a subject for *Practical Woodworking* or any of the other 'Practical' series that **FJ Camm** ran in the 60s?

On another subject, **F G Rayer G3OGR** was a well-known contributor to *PW* for decades. He first started writing letters in the 40s and I believe his first constructional article was a one-valve set using a 6K7 around 1948. His articles were in *PW* from the late 40s till at least the 70s.

The reason for me writing to you is, I wonder what happened to all the radios and transmitters he built over the years in order to produce those articles? Did he pull a project to bits to use them in another project, did he give the stuff away, or do they still exist in a massive lock up somewhere?

Andrew Redding
Sheffield

*(**Editor's comment:** Great to hear about your collection Andrew and the reminder about the Practical series of magazines, sadly most no longer around. As for F J Camm – a true polymath! And with regard to FG Rayer, funnily enough I had decided this month to feature one of his historic articles and will run one of his transmitter designs in the near future. I suspect he cannibalised each project to build another over the years!)*

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For more information see: www.HamRadio.co.uk/TS990

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BATTLESHIPS OF WWII

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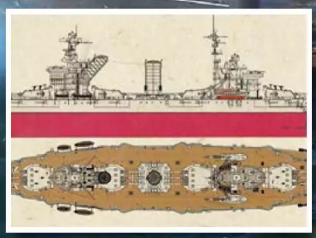
SPECIAL COLLECTOR'S EDITION

Your guide to 85 of the greatest battleships, from seven nations, that fought in WWII

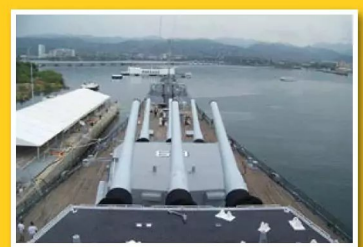
ALLIED & AXIS SHIPS

Production details, contemporary photos, blueprints and key class specifications for 85 battleships



KEY NAVAL BATTLES

From sinking the Bismarck, Midway and the Atlantic, to the Battle of Leyte Gulf



ESSENTIAL NAVY MEDIA

Navy museums and warships to visit, online naval gaming, battleship models to build

»COLLECTING NAVY MILITARIA What to look for and how to start a warship-based collection

BATTLESHIPS OF WWII

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This publication is printed by Warners Midlands PLC Telephone: 01778 391000

Cover image courtesy of World of Warships

▼ *USS Carolina pitching in heavy seas while screening Task Force 38.3 off the Philippines, 12 December 1944*

Welcome

While the battles on the ground in WWII have rightly been recognised as key events in the war, those fought at sea had an equally important role. Sea was the route by which American matériel kept Britain and the Soviet Union fighting in the darkest days of WWII. Without those supplies the war effort would have run dry, the population out of food and the efforts of those on the ground and in the air would have been in vain. There were four key areas – the Atlantic crossing to Britain; the Arctic run to supply the Soviet Union; the Mediterranean where British, Italian and German forces fought it out; and the Pacific, where the Allies took on the naval might of Imperial Japan. In this special, 132-page collector's edition bookazine, we take a look at the key naval battles and the ships that fought them.

While sea battles typically involved destroyers, cruisers, and in the Pacific especially, aircraft carriers, here we are looking at the role and specification of the battleships, the mightiest ships of all. At the start of WWII, the most powerful navies arguably belonged to Britain and Japan, but it didn't take the USA long to outbuild both, thanks to its vastly superior industrial capacity. Meanwhile, the German ships were a danger in the Atlantic and North Sea to both shipping and Britain's warships, which made it a priority of the Admiralty to send as many to seabed as fast as possible.

Here you will find 85 battleships and pocket battleships, with schematics for each class, a build history and their role in WWII. They are organised by country and then by class, such as the Queen Elizabeth class, where the ships had similar characteristics. There are specification panels for all classes and the ships where they differed from each other.

At the start of each section we take a look at the strategic situation for each of the navies represented here: Great Britain, France, USA, Soviet Union, Germany, Italy and Japan. Various treaties in the 1920s and '30s had restricted what could be built and so, on the eve of WWII, some navies were still equipped with WWI-era dreadnoughts. These were hastily upgraded as the main threat soon became apparent – that of attack from the air. After the early war clashes between ships, it was the aircraft carrier war in the Pacific that became the focus point, and finally, towards the end, the battleships were lending their awesome weaponry to support landings in France, Italy and the Pacific islands.

To conclude this special collector's guide to the battleships of WWII, we take a look at naval museums and floating warships around the world for you to visit; battleship models you can build; online naval simulations to play; and finally, how to take your interest to the next level by collecting naval militaria.

Duncan Evans, Editor

BATTLESHIPS OF WWII

ALLIED BATTLESHIPS

Starting with the British Queen Elizabeth class battleships, the *Valiant*, *Elizabeth*, *Warspite*, *Barnham* and *Malaya* these are the warships that held the empire together while it was assailed on all front. Then we move on to the French fleet and the controversial way it was dealt with by the Germans, French and British. After 1941 the industrial might of the USA came into play, building ship after ship to turn the balance of power at sea. Then there are the ageing Soviet ships, trying to hold off the advancing Germans.

BRITISH SHIPS

FRENCH SHIPS

AMERICAN SHIPS

SOVIET SHIPS

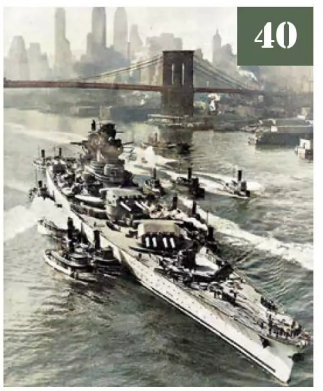
AXIS BATTLESHIPS

The Kriegsmarine was always of secondary importance to Hitler which meant it was at a significant disadvantage compared to the Royal Navy. The focus was on sinking Allied merchant shipping, rather than confront the British battleships. It was Italy in the Mediterranean and especially Japan in the Pacific that were the major Axis naval powers. Once Germany's capital ships had been put out of action and Italy had been knocked out of the war, it was in the Pacific that the naval campaign would finally be resolved.

GERMAN SHIPS

JAPANESE SHIPS

ITALIAN SHIPS

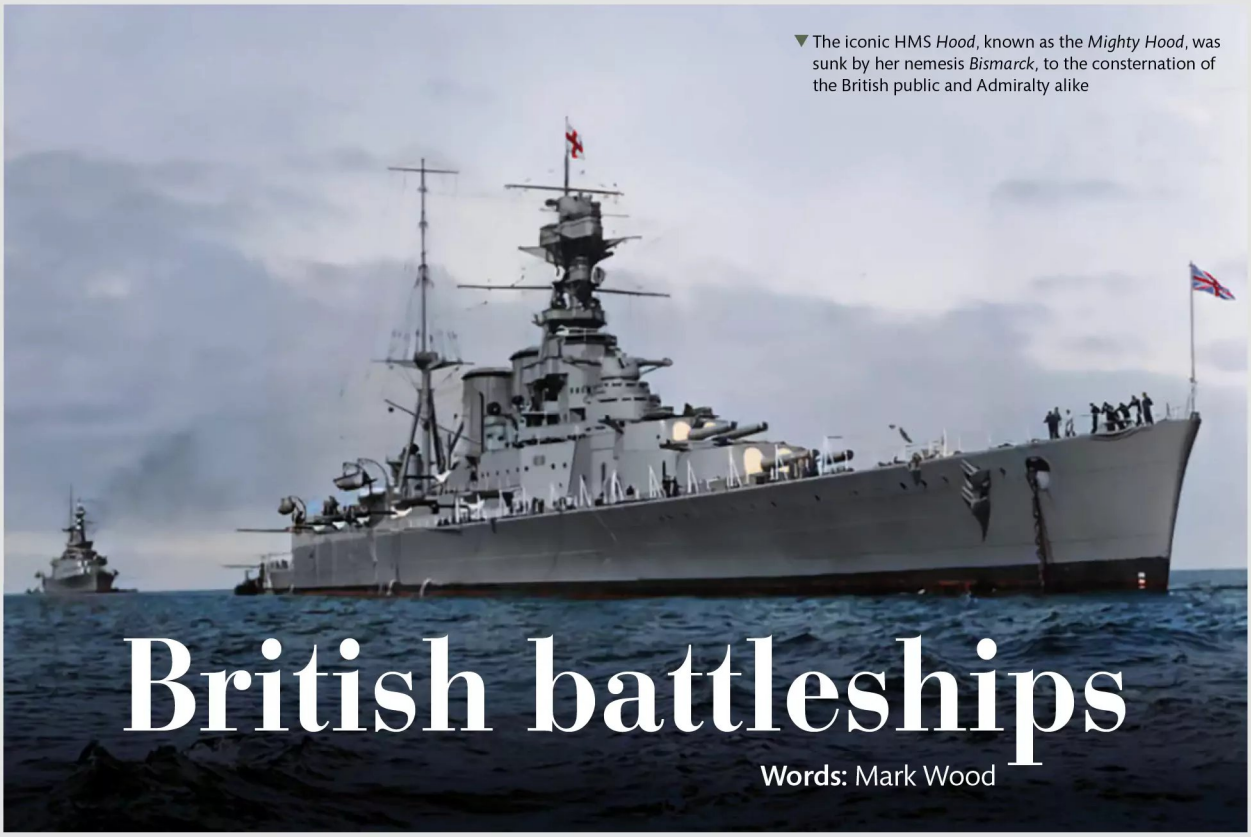


KEY NAVAL BATTLES

Whether it was the hunt for a German commerce raider, an attack on a home port, or a massive air and sea battle in the Pacific, these are the key naval battles of WWII that featured battleships.

NAVY MEDIA

Take your interest in all things battleships and nautical to the next level with museums to visit, games to play, models to build and militaria to collect.



▼ The iconic HMS *Hood*, known as the *Mighty Hood*, was sunk by her nemesis *Bismarck*, to the consternation of the British public and Admiralty alike

British battleships

Words: Mark Wood

At the commencement of hostilities in 1939, the Royal Navy was still the largest and most powerful in the world, able to call on over 1,400 vessels. There had been significant developments in both air and sea power since World War I and it became obvious that a second war would severely test the fighting capacity of the Royal Navy across the oceans of the globe, yet it was not until the late 1930s that the Admiralty set to work to upgrade Britain's ageing fleet.

Until the late 1930s Britain had relied upon a fleet of previous generation capital ships, most of which had seen service during WWI. The Queen Elizabeth class of five dreadnought battleships was completed during the first two years of the war and was designed to act as a rapid response squadron to counter enemy capital ships, being the fastest warships at that time. Between 1913 and 1917 a further five superdreadnought battleships of the Revenge class were launched and as with the Queen Elizabeth class, they were ordered during the pre-war arms race with Imperial Germany and were to be an updated design based on the *Iron Duke* blueprint with heavier armament. The Revenge class was originally intended to consist of eight vessels, but one was cancelled and the remaining two were redesigned as the Renown class with modifications to armament and protective armour.

▲ HMS *Barham*, one of five Queen Elizabeth battleships built for the Navy, was launched in 1914 and commissioned the following year

The post-war years saw drastic restrictions to warship design imposed by the constraints of the Washington Naval Treaty of 1922. The original G3 battlecruiser design, approved six months after the signing of the treaty, contravened the agreement and was adapted to become the lead ship of two, christened Nelson class battlecruisers. Although reduced in size, the ships were armed with 16in guns to maintain parity with the recent American Colorado and Japanese Nagato class warships. While the Nelson class were of a superior design to their predecessors, the trade-off for heavier armament was a reduced speed and the ships were considered ungainly.

The 1922 moratorium on large shipbuilding was continued by the 1930 Naval Treaty of London and a design that had been commissioned in 1928 was suspended. In 1935 it was reactivated and updated to become the King George V class of battleships of which five were built. The plans proposed a ship with far heavier belt armour and, with a nod to the age of sub-surface weaponry, improved anti-torpedo protection.

Perhaps the most revered of WWII Royal Navy ships, HMS *Hood*, was the only ship of the proposed four of the Admiral class battlecruisers to be realised. Despite its iconic status, *Hood* was acknowledged to be a flawed design on joining the fleet in 1920 and the remaining three were abandoned in favour of a new construction type.

As Europe teetered on the precipice of a new global conflict, Britain's Navy faced the threat of a more modern style of maritime warfare with a fleet that was already on the verge of obsolescence. ■

Artist rendition of the deadly force capable of being delivered from an obsolete plane ▼

Raid on Taranto

Words: John C Pursley

Before the war the British possessed strategically important locations in the Mediterranean and were very concerned about the Italian naval build-up.

Although at the time, the British Royal Navy was the strongest sea power afloat, it was spread out across the globe, and had no modern battleships. The number of Italian Regia Marina (Royal Navy) capital ships stationed in the Mediterranean theatre outnumbered British vessels, but the British did have an aircraft carrier, whereas the Italians depended upon airbases surrounding the contested waters.

Taranto, Italy was the home port of the First Squadron of the Regia Marina fleet. Their force consisted of six battleships (two of the modern Littorio class and their older ships had been extensively modified), seven heavy cruisers, seven light cruisers and 13 destroyers.

Although the Italians commanded a strategic central position, the British had bases at the western and eastern ends of the Mediterranean whose forces could, if brought together, pose a significant threat to the Italian fleet.

The base locations became a real problem for Britain when the war began,

▲ *Italian Naval harbour positions around the Mediterranean in 1940*

especially in June 1940 when fighting between British and Italian forces in North Africa broke out. Both sides now needed to transport men, equipment, and supplies onto the African continent.

For the Italians the challenge was minimal as they only had to cross one of the narrower parts of the Mediterranean. The British, on the other hand were not so fortunate and their options limited to two less than satisfactory choices. They could expose their ships to attacks from Italian air, surface naval ships, and submarines by traveling down the European coastline, through Gibraltar, then making a lengthwise crossing of the Mediterranean, past Sicily, and Italy.

The second choice was safer but time consuming and would expend a considerable amount of fuel as the route to Egypt required sailing down the entire west coast of Africa, back north along the east coast, through the Red Sea and the Suez Canal. The situation was compounded after France was invaded by the Germans which eliminated French naval assistance. The British could not sit by and lose the war in Africa simply because of supply problems. They had to do something to counter the Italian advantage.

The Italian posture in the central Mediterranean offered the opportunity to defeat the Royal Navy, except for two serious issues with their fleet. The Italians did not have enough oil to maintain their ships at sea for long periods as would be necessary to gain naval superiority in the Mediterranean and they lacked confidence needed to threaten or engage in a sea battle.

Planning the attack

Attacking the Italians at Taranto was not a new concept as the idea of launching

▲ *A Swordfish practices shallow water torpedo attacks in preparation for the raid on Taranto*

▲ *Swordfish 4A torpedoed Conti di Cavour. Her crew survived but were captured*

an air attack against the fleet was first conceived in the fall of 1938 when the commander of the British Mediterranean Fleet, Admiral Sir Dudley Pound, expressed concern over the survival probabilities of the aircraft carrier HMS *Glorious* in case of a war with Italy.

The Captain of the carrier, Lumley Lister, told the Admiral that Fairey Swordfish torpedo bombers were suitable for a nighttime attack, and that the Royal Navy's Fleet Air Arm was capable of such an operation.

The Fairey Swordfish was one of aerial warfare's improbable heroes. Entering service in 1936, it looked like a relic from WWI. In an era of all-metal monoplanes, it was a fabric skinned, two-seater biplane. With a top speed of 143mph the plane was incredibly slow. So slow, it could be argued that the lack of speed was a blessing in disguise as faster modern enemy planes kept overshooting them while attacking.

Admiral Pound had the foresight to realise the significance of this proposition and ordered training to commence for such an operation. At the time an airborne attack against ships from a carrier was considered so revolutionary, that training was performed in utmost secrecy.

The shallow waters of the Italian port posed a significant technological challenge as British aerial torpedoes could only be dropped into water at least 75ft deep lest they hit the bottom. The harbour at Taranto was only about 39ft.

BATTLE STATS

United Kingdom

COMMANDERS
Admiral of the Fleet Andrew Cunningham
Vice Admiral Lumley Lyster

FORCES
1 aircraft carrier • 2 heavy cruisers • 2 light cruisers
4 destroyers • 21 torpedo bombers

CASUALTIES
Killed: 2 • Captured: 2 • 2 aircraft lost

Italy

COMMANDERS
Admiral Inigio Campioni

FORCES
6 battleships • 7 heavy cruisers
7 light destroyers • 13 destroyers

CASUALTIES
Killed: 59 • Wounded: 600
2 fighters lost • 3 ships disabled • 3 ships damaged

▲ *Swordfish lining up in anticipation of the Taranto raid (Warthunder.com)*

To overcome the problem, engineers designed a system that would force the torpedo to land with a belly splash in lieu of a nose-dive. A rotating drum was attached under the belly of the Swordfish with one end of a cable wound around it, and the other end attached to the nose of the torpedo. Once the torpedo was released, it unspooled the cable as it fell. The nose of the torpedo was prevented from dipping downward by the tension of the cable. Once the torpedo hit the water, it would run close to the surface.

A month before WWII broke out Ad… Pound was replaced by Admiral Sir … Cunningham who was caught off… when Italian dictator Benito M… declared war on 10 June 19… military assets in the M… been previously red… transferred to th… the imminent … went to N… was ma…

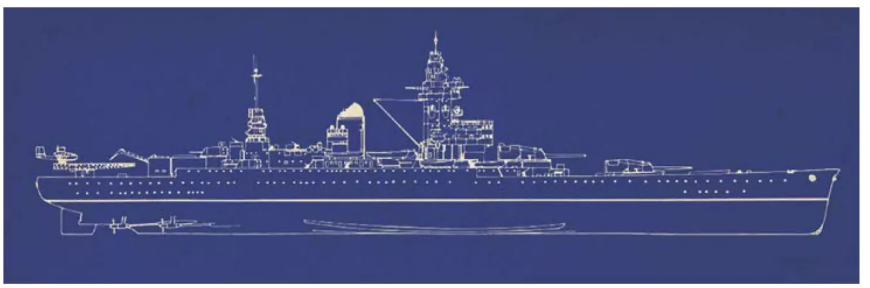
▼ A side profile of Dunkerque highlighting her forward facing armament

Dunkerque class

DUNKERQUE

It was 20 years after the Bretagne class before France commissioned further battleships, leading to the *Dunkerque* being laid down in 1932. This ship was very different from anything that had come before and was heavily influenced by the Washington Naval Treaty and the other treaty battleships around the world. Like the British Nelson class, *Dunkerque* had all her armament facing forward in two massive turrets, each of which housed four 330mm (8in) guns. Her armour was designed to counter the German *Deutschland's* 283mm guns and she had a top speed of 29.5 knots, far faster than the older designs of dreadnoughts that had previously served France. *Dunkerque* was launched in 1935 and entered service in 1937. With all her main armament facing forward, her fantail was an ideal launch point for aircraft so she had a catapult on her stern and carried two float planes to assist spotting for her guns and other general duties.

The outbreak of war saw *Dunkerque* serving in the Force de Raid alongside her sister ship *Strasbourg*, three light cruisers and eight destroyers. This force was based at Brest and was sent forth on the opening day of the war to counter any chance of a surprise naval attack from Germany's Deutschland class pocket battleships. The battleship was used on convoy work and joined HMS *Hood* in patrols to try to hunt down *Scharnhorst* and *Gneisenau*. Patrolling off Iceland highlighted defects in the design of *Dunkerque* and she had to drop to 10 knots to avoid damage due to her limited freeboard and light construction. On 11 December 1939, like many other French battleships, *Dunkerque* carried part of France's gold reserve to Canada and escorted troop ships back again. In the Spring of 1940 *Dunkerque* moved to the port of Mers-el-Kébir and she was here when France surrendered.



▲ Side profile of Strasbourg

When the British fired on the French fleet, *Dunkerque* was tied up facing the wrong way so could not bring her guns to bear. The crew quickly loosed the anchor and manoeuvred to try to fire on HMS *Hood*. Although *Dunkerque* fired off several salvos, none hit the target. *Hood* was more accurate and the French battleship was hit by four 15in shells. These shells damaged the ship's rudder and the final shell destroyed one of her boilers and took out electrical power so her crew were forced to beach the ship to prevent her sinking. Most of the crew were evacuated and repairs began with the intention of allowing the ship to limp home to Toulon. On learning of this the British launched aircraft armed with torpedoes that caused further, extensive damage and the ship would have been lost by a hit to the magazine had her Captain not had the foresight to flood it at the first sign of British aircraft. After further emergency repairs the ship crawled back to Toulon for more permanent repairs.

When the Germans and Italians decided to seize the Vichy France ships, her crew opened the dock gates and tried to flood and sink the ship. By the time the Italians reached the battleship she was declared a complete loss and the Axis began to scrap her in situ but it was not until 1958 that the final remains of *Dunkerque* were sold for scrap.

STRASBOURG

The second ship of the Dunkerque class, *Strasbourg* was similar but not identical to her sister ship. It was decided to increase the armour thickness of the ship during construction and so she boasted an extra 58mm of armour on her belt and an extra 12mm of armour thickness on her decks. The combination of these increased her displacement by an extra 1,200 tons. *Strasbourg* was laid down in 1934 and launched two years later. She entered service with the French navy in 1938 and joined *Dunkerque* in April 1939 as the 1st Battle Squadron. *Strasbourg* received two identification tripes on her funnel in comparison to *Dunkerque*'s one to allow the two vessels to be quickly told apart. At the outbreak of war *Strasbourg* completed her duties in tandem with *Dunkerque* until October 1939 when she joined HMS *Hermes* and a pair of destroyers to patrol the central Atlantic. Although the patrol was mostly uneventful, *Strasbourg* did

▼ *The twin turrets of Strasbourg seen from the bow*

▲ *The sleek bulk of Strasbourg when newly commissioned*

SPECIFICATIONS

Dunkerque

Class: Dunkerque
Displacement: 26,500 tonnes
Length: 214.5m (703ft 9in)
Beam: 31.08m (102ft)
Draft: 8.7m (28ft 6.5in)
Speed: 29.5 knots
Range: 14,537km (9,033 miles)
Crew: 1381-1431 men
Armament: 8 x 330mm guns • 16 x 130mm guns • 8 x 37mm AA guns • 32 x 13.2mm AA MGs
Armour: Deck – 11.5cm (4.5in), Waterline belt – 22.5cm (8.86in)

SPECIFICATIONS

Strasbourg

Class: Dunkerque
Displacement: 27.700 tonnes
Length: 214.5m (703ft 9in)
Beam: 31.08m (102ft)
Draft: 8.7m (28ft 6.5in)
Speed: 29.5 knots
Range: 13,888km (8,630 miles)
Crew: 1381-1431 men
Armament: 8 x 330mm guns • 16 x 130mm guns • 8 x 37mm AA guns • 32 x 13.2mm AA machineguns
Armour: Deck – 12.7cm (5in), Waterline belt – 28.3cm (11.14in)

successfully capture the German merchant ship *Santa Fè* on 25 October.

Strasbourg was ordered to Mers-el-Kébir in April of 1940 following an abortive operation to Norway to defend that nation against the Germans. *Strasbourg* returned to the Mediterranean to undertake patrols against Italian shipping following Mussolini's declaration of war against the Allies. Following France's surrender, *Strasbourg* was one of the many battleships in Mers-el-Kébir when the British issued their ultimatum. *Strasbourg* was moored with her stern facing the sea so she had to slip her moorings and she headed for open waters along with four destroyers. Although damaged by some near misses, *Strasbourg* managed to clear the harbour and elude the British. Debris had entered her boiler room, slowing *Strasbourg* to no more than 20 knots and leaving her with black smoke belching out. On realising their quarry was escaping, the British launched a series of carrier aircraft attacks, all of which missed and *Strasbourg* managed to reach the safety of Toulon. *Strasbourg* became the flagship of the Vichy French navy and underwent repairs and refit in 1942 including the fitting of radar.

In November 1942 the Germans moved to seize the remaining French fleet in Toulon but to prevent this the crew of the *Strasbourg* sabotaged and scuttled the ship. Any equipment that might have been of use to the Germans such as rangefinders and radios were smashed with sledgehammers and the boilers were lit, with the water feeds cut off to cause them to explode. The ship's seacocks were opened to flood the ship and scuttling charges were detonated to prevent her being easily refloated. The Italians refloated the ship anyway but decided to scrap her due to her poor condition.

Following the Italian surrender, the ship returned to Vichy hands and moored in the Bay of Lazaret where she was sunk by gunfire from the USS *Nevada* during Operation *Dragoon*. Refloated once more she was used as a testbed for underwater explosions before being scrapped in 1955. ■

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