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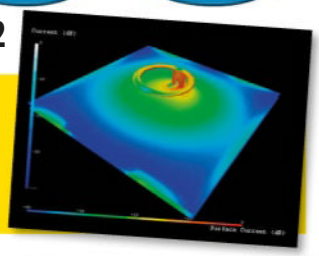

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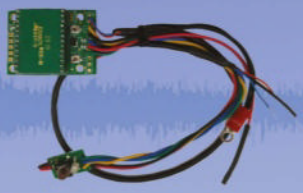

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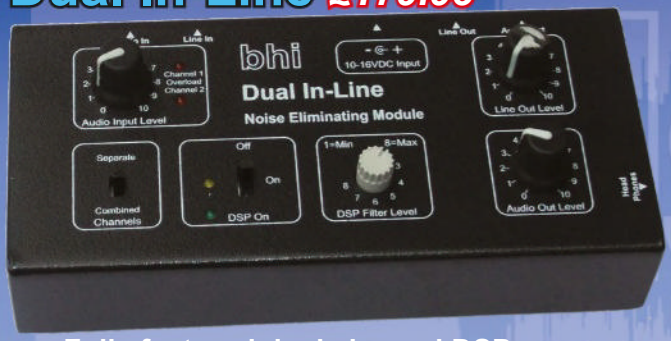

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Keylines

This January issue of *PW* will appear on the shelves on WH Smith and others in early December and remain there until early January when the February issue replaces it. So it's appropriate that I should take this opportunity to wish all our readers Seasons Greetings for Christmas and the New Year. The world, sadly, remains a fractured place in many respects, not least the ongoing war between Russia and the Ukraine and, more recently, the sad events in Israel and Gaza. These events have spilled over into amateur radio. For example, some contest sponsors are continuing to disallow contacts with Russian stations. It's such a pity to see politics creeping into our hobby in this way, because one of the special characteristics of amateur radio, and a matter of pride, has always been our ability to cross boundaries of nationality, race, religion and so on, to create international friendships. Yes, there have been issues in the past with some country's amateurs forbidden to contact those in certain other designated countries, rules which for the most part no longer exist. But generally we have been free to talk with whoever we wish, wherever they are. And this is surely something of which we can be proud, helping to break down the barriers that so often exist between different peoples. Radio waves recognise no borders and neither should we (other than as counters for our various awards!).

Whither our radios?

Back in the 1980s a colleague bought a new Ford Escort and commented that he didn't see how car technology could improve on what he thought was the complete package. How wrong he was! Modern cars bear no relation to his Escort. As well as having every gadget imaginable, including power steering, air conditioning, cruise control, etc, along with in-car entertainment and navigation, often linked to the outside world via mobile phone technology, they are also much safer, economical, etc. Yes, a car's basic function is still to get us from A to B, and some enthusiasts continue to revel in driving classic models but most prefer to do so in the modern version. Even electric cars, though different in many ways, are there to get us safely from here to there and back.

Similarly with our radios. Before the second world war, technology advanced from spark transmitters to early vacuum tubes allowing the development of regenerative receivers and tuned radio frequency sets. By the end of the war, many radio amateurs were able to buy surplus receivers using superheterodyne technology, sets they wouldn't have been able to afford new

but were more than happy to make use of. Early transistor technology actually led to something of a step backwards in terms of performance, albeit allowing smaller, lightweight sets that could, in many cases, work off batteries and therefore be more suitable for mobile and portable operations (I still recall the GW8BHH/P team on top of the Brecon Beacons, tuning high to low and low to high on the 2m band, using a pair of AR88s as tuned IFs!).

Solid-state technology improved hugely in the years that followed, including the arrival of integrated circuits, allowing many more facilities to be added at minimal extra cost. And now we have SDR technology, where much of the heavy lifting is done by software and we take advantage of the cost reductions that have come about through the massive computer industry.

Yes, our radios still have a basic function, to allow us to communicate from A to B, but with much improved performance, extra bands and modes, PC interconnectivity and much more. Is this the end of the road? Almost certainly not, even though we may have little idea at the moment as to what the future will bring. But let's enjoy the journey while making the most of what we have.

This month

Meanwhile, I hope you enjoy this month's issue. The mix of articles varies from month to month and I know we can't satisfy all the readers all the time, but I do hope you find something to pique your interest. And do have a go at our seasonal quiz. It should be straightforward for most of you but may point up the odd area where you need a refresher!

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**

New from Moonraker

The RIGEXPERT SHACKMASTER POWER 500 (36A) power supply features: Space-saving design with touchscreen display • Low acoustic noise • Multifunctional Touch Display •-30°C to +70°C operating temperature • Intelligent protection system • Prioritising safety and security, it features an advanced Intelligent Protection System. So your device is shielded from overcurrent, overvoltage, and overheating, allowing you to work confidently, knowing your valuable equipment is well-guarded.

The ShackMaster Power 500 is equipped with four Powerpole DC connectors, offering ample ports to effortlessly connect various devices without the need for adapters or complex configurations. Also features two USB Type-A ports and two USB Type-C ports, it empowers you to charge devices, connect peripherals, or power USB-compatible gadgets seamlessly, all while maintaining a clutter-free workspace. It includes a built-in USB interface that lets you connect it to your computer, enabling you to log and analyse consumption data, allowing for informed decisions about energy efficiency.

Available from Moonraker for £379.95.
https://moonrakeronline.com

Announcing the D-STAR QSO Party 2023

Icom UK are pleased to share details about the 2023 ICOM/JARL-Authorised International D-Star QSO Party. The global event is set to take place over the holiday period beginning at 0000UTC on 27 December and will continue through to 2359UTC on 5 January 2024.

As in previous years, the aim is to encourage D-STAR operators to communicate with as many other operators worldwide but also to encourage the use of the picture-sending function found in the latest D-STAR radios. For every 30 points gained, those who enter will get into the draw for one of the prizes. In addition, all operators who submit an approved log will be given a D-STAR Party Certificate (PDF) for participating.

To learn more about the event including rules and how to submit your log, visit:
www.icomjapan.com/event/dqp2023

The D-Star QSO Party is open to all licensed amateur radio operators, regardless of their D-STAR experience level. Whether you're a seasoned D-STAR expert or a newcomer eager to explore this technology, this will be a fun way to ring in the new year!

RSGB CONVENTION VIDEOS RELEASED: The RSGB has released several videos from the 2023 Convention. In the first, RSGB General Manager and Convention Chair, Steve Thomas M1ACB, talks to RSGB President John McCullagh GI4BWM and IRTS President Enda Broderick EI2II. The two Presidents discuss their views on the opportunities, challenges and great things happening in amateur radio at the moment. This discussion has been very popular with those who have watched it already – you can see it on the RSGB YouTube channel or on its website at:
rsgb.org/convention
While other videos from this year's Convention are being prepared, the Society is releasing a bumper collection of presentations from its 2022 Convention, which previously had only been available for members to view. You can see these at:
youtube.com/theRSGB
in the playlist called RSGB 2022 Convention. The topics range from VHF transverters and VHF contesting to *RadCom* HF predictions and also using the right tools to work more 144MHz DX. Again, these are getting very positive feedback already and as there is bound to be a presentation that you will enjoy and find inspiring, why not take a look!

RSGB COURSE AND EXAM FINDER: The RSGB affiliated club Course and Exam Finder map has been relaunched this week. All affiliated clubs were invited by email to submit information about courses and exams that they run. The replies that were received are now on the RSGB website at:
https://rsgb.org/main/course-exam-finder
If you use the search function and it doesn't show any results, you will need to widen your search area. If your club provides training or holds exams and it isn't shown on the map, please go to and complete the form. If you need any help, you can email
exams@rsgb.org.uk
Additional information will be uploaded each week, so please submit any changes before 3pm on Fridays.

BROADCAST CELEBRATES 80 YEARS FOR UK SHORTWAVE SITE: One hundred people turned out on Tuesday 17 October for an 80th anniversary celebration at the UK's last remaining shortwave radio transmitting site. Countless others attended the party from a distance – as shortwave listeners who later sent in reception reports.
The Woofferton Transmitting Station, which was built by the BBC during the Second World War, is

owned by Encompass Digital Media. Its celebration broadcast was transmitted to listeners in Europe as an analogue broadcast on 17.785MHz and as a DRM broadcast on 11.725MHz.
In a rare turn at programming, the station also used its oldest transmitter – a Marconi BD272 built in Britain in 1963, to send programming to North America on 15.245MHz.
To hear the anniversary broadcast, go to this link:
https://tinyurl.com/5n922jb7

FIRE DESTROYS KEY BEACON ON MADEIRA ISLAND: A wildfire recently destroyed one of the newest installations to the Northern California DX Foundation's International Beacon Project. A blaze in October destroyed radio beacon CS3B. The CW beacon had been in operation barely a month when fire swept through, destroying the building, the radio inside and the antenna. Replacement is expected to take some time.

AMARS SPRING ACTIVITY 2024: Amplitude Modulation Amateur Radio Society (AMARS) is organising its first Spring Activity in February 2024. It will be a fun and relaxed, competitive event, promoting the use of the AM mode on the air. Using vintage gear, old military kit as well as modern AM-capable equipment is not just acceptable, it is all encouraged. The club also promotes using homebrew equipment.
The Spring Activity's objective is to accumulate a good score making contacts using only amplitude modulation transmission. The event will take place on Saturday 24 February, running for four hours, from 1600 to 1959UTC. Contacts on any bands, excluding WARC bands (30m, 17m and 12m), will count.
Entries may be in one of two sections. Section A is low power, up to and including 10 watts. Section B, for participants running more than 10 watts.
A plaque will be awarded to the winner in each category. Certificates will be awarded to the top three entries in each section.
More information is available on the AMARS website (below) where a copy of the full rules is available to download. Information is also included on the club's G5AMS page at QRZ.com. AMARS secretary can be contacted by email at secretary@am-ars.org.
https://am-ars.org

KW DAYS 2024: 'KW Days' returns once again in January as a celebration of the UK's largest ever specialist amateur radio manufacturing company. Dartford made equipment ranging from the 1950s to the 1970s will be on the air across the UK and overseas on the weekend of 6/7 January.
The GB8KW multi-operator station will be again be active from Cray Valley radio club's HQ in Eltham, showcasing a whole range of equipment for visitor inspection
Nine special event GB-KW calls have already been issued. Such is the growing interest that many will be operating throughout January, calling CQ-KW on the hour/half hour when active.
The KW-Radios@groups.io has achieved some notable 'firsts' in 2023. The re-manufacture of a limited number of KW2000A transceiver front panels and a replacement for the now unobtainable Kokusai mechanical filter, permitting the restoration even more KWs.
This active group of collectors and ex-employees continues to provide help and support to those undertaking restorations and an extensive archive of manuals, circuits, and associated material continues to be curated.
Vintage KW AM and CW equipment will be found on VMARS or FISTS frequencies.
Classic SSB equipment, in tribute to the famous KW77 receiver, will be using Non-WARC frequencies ending in 77kHz +/- QRM. Primarily 1.877MHz. 3.77MHz. 7.177MHz 14.177 & 14.277MHz. 21.277MHz & 28.377MHz.

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

GB2GFS, JAMBOREE ON THE AIR: This station was active in this year's JOTA activity in October, on 80, 40 and 17m SSB, activated for the Goodwick Scouts in Pembrokeshire. The group worked five UK Scout and Guide stations, and a number of non-Scout and Guide stations around the UK and Europe, including two 'Bunkers on the Air' stations. The station consisted of transceiver, linear amplifier and an inverted-vee dipole at 35ft. In addition, Morse keys and a sounder were in full swing with the Scouts sending each other messages in Morse, which then had to be faithfully decoded.

All Scouts (and Leaders) were made aware of the Training for their Foundation Licences that is available, should they wish to take it up. Foundation, Intermediate and Advanced course books were also provided to the group.

EXAM FUNDING FOR YOUNGSTERS : The Radio Communications Foundation (RCF) is a small charity that seeks to promote radio engineering and amateur radio. Last year, a number of teachers identified the cost of Foundation exams as a barrier for some young people. The RCF Trustees considered how they might help.

Funding exams for every youngster was seen to be unaffordable, and unnecessary in many cases. As a start, and to help those with greatest need, the Trustees have agreed to fund 60 Foundation exams each year. The funding will be available to anyone who is under the age of 21, in full-time education and needs help with the exam fee.

Fifteen exams will be funded every three months. The first batch of 15 exams will be funded in January 2024. If any of the allocated funds are not used, they will be rolled over to the next quarter. No money will change hands, the RCF Trustees will simply make the bookings and pay the RSGB.

How to apply? In time, there will be a simple online form to complete. In the meantime, anyone seeking funding should simply send their details to rcfsecretary@commsfoundation.org along with a supporting statement from a parent or guardian outlining why they should be supported by an RCF funded exam. Details of their interest in amateur radio, and how they have trained, or are training, for the Foundation exam will also help the Trustees make their decisions.

If the scheme proves to be successful, and amateurs continue to donate to the RCF, with Gift Aid, there may be scope for increasing the number of exams funded each year.

Further details about the RCF, and how to donate, can be found here:

https://commsfoundation.org

G-QRP SUPPORTS RCF EXAM FUNDING: When G-QRP Club Secretary Dick G0BPS heard about the RCF initiative to pay for 60 RSGB Foundation exams taken by young people in full-time education, he asked if the Club could help out. The Club Committee (minus Chairman Steve G0FUW, who is also an RCF Trustee) agreed to sponsor an additional ten exams.

ML&S TO DISTRIBUTE ADDITIONAL VIBROPLEX PRODUCTS: *From Facebook:* Vibroplex is pleased to announce that as of 16 November 2023 we have a new agreement for our Vibroplex, Bencher, INRAD and Par EndFedz product lines to be under exclusive distribution for the UK by Martin Lynch & Sons Ltd. We look forward to a productive successful future for both of us!

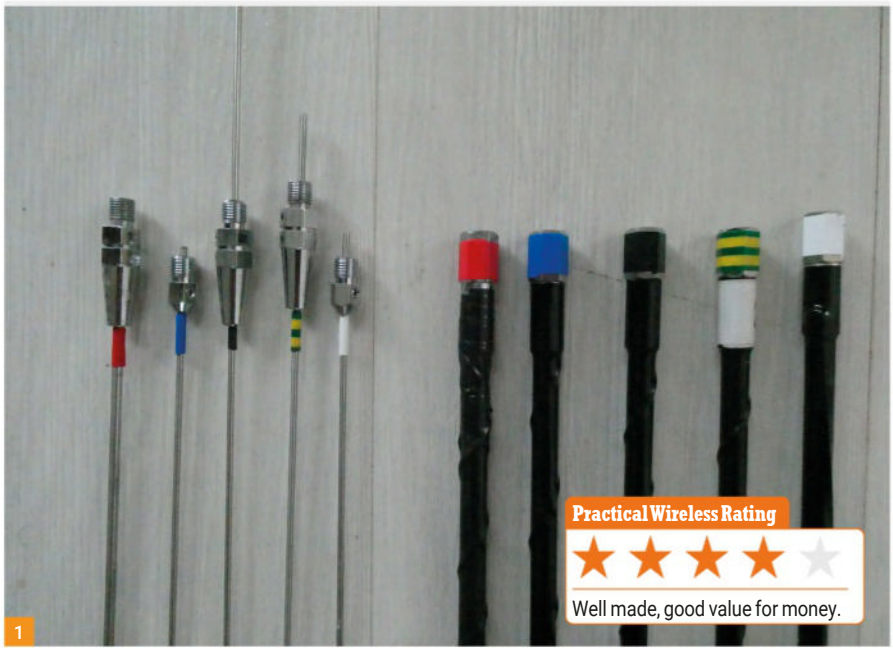
END OF AN ERA: The end of a program after 83 years of broadcasting. Since 9 October, the Radio-Canada Company has stopped broadcasting the timing signal tones of the National Research Council of Canada (CNRC). It has been since 5 November 1939, that every day, at exactly 0100 Eastern standard time, that the long symbolic dash of the hour signal was aired on the CBC and the SRC airwaves.

Of course, the idea of this time signal was created in the world of analogue systems. We are now in a digital world. During analogue broadcasts, the time signals reached directly to the listener and allowed clocks to be synchronised with incredible accuracy. Unfortunately, due to the new technologies, it is now impossible to synchronise the broadcast. Audio arrives at its destination with uncontrollable delay due to digital, compression, sound processing and IP packet transmission. The delay can be up to nine seconds!

As an alternative, the CHU station of the National Research Council of Canada (CNRC) transmits hourly signals continuously on the frequencies of 3.330MHz (3kW), 7.850MHz (10kW) and 14.670MHz (3kW). The transmission mode, USB with re-inserted carrier, provides the time signal without having to use a single sideband radio and also provides three standard frequencies. These frequencies are from one of the three atomic clocks located at the transmitter station. And, of course, nowadays, there are a number of very accurate time facilities available via the internet.

MORE LOCAL RADIO STATIONS TO SHUT DOWN: After shutting down Greatest Hits Radio broadcasters in Lancashire, Manchester, Leeds and Humberside in 2021, Bauer (owner of Greatest Hits Radio) is shutting down its broadcasters in Scotland, Ireland and the North of England. Few listeners will mourn these disappearances because the powers of these transmitters were ridiculously low. AM Greatest Hits frequencies that are being turned off are: 990kHz 0.25kW Doncaster, South Yorkshire (ex Hallam); 1035kHz 0.32kW Ayr, Prestwick, Irvine & Kilmarnock, Ayrshire (exWest Sound AM); 1107kHz 1.5kW Inverness, Highland (ex MFR); 1152kHz 1.8kW Newcastle, Sunderland & County Durham (ex Metro / GNR); 1152kHz 3.6kW Glasgow (ex Raio Clyde); 1161kHz 1.4kW Dundee & North Fife (exTay); 1305kHz 0.15kW Barnsley, South Yorkshire (ex Hallam); 1548kHz 2.2kW Edinburgh, Lothians & South Fife (ex Forth); 1548kHz 0.74kW Sheffield, South Yorkshire (exHallam); 1584kHz 0.21kW Perth, Perth & Kinross (exTay) Global is also shutting down its AM services. It's a very quick disengagement, often without taking into account the licence's expiration date and sometimes despite fines that can run up to £25,000 but reflecting the fact that revenues are falling at the UK's private radio stations. The share of local production is in freefall since changes in legislation that allows this.

Vince Lear G3TKN
g3tkn@yahoo.com



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Mobile whips: what is best for you?

Vince Lear G3TKN takes a look at the range of mobile whips available from Ampro.

In general terms there are three basic types of HF commercial mobile whips available on the amateur market:

1. Single-band whips covering just one amateur band.
2. A whip with taps on a loading coil, selected by a 'flying lead'.
3. A whip with motor driven coil or separate auto ATU for multiband use.

Let us look at each one in turn and consider what each one offers.

The AmPro range of single band mobile whips comes into category 1. They have the advantage that each single whip is relatively inexpensive and is easy to tune. Once tuned and locked into place, it should hold its resonant frequency. These types of mobile whips are lightweight and can be secured to a vehicle by a mag mount. This means that they can easily be removed when not required. This is particularly important if the car is parked and prevents the risk of the antenna being tampered with or stolen. In addition, the use of a mag mount means that the car does not need to be drilled or modified in any way as it would in the case of a heavier type of antenna. However, I would not feel happy driving along with a 2m+ whip on top of the car attached to the mag mount via just the SO239 / 3/8th inch (9.2mm) connector! All my activity has been with the car stationary. It is essential that safety must always come first when one is considering any mobile antenna installation.

Products available

A typical example of an antenna in category 2 with taps on a loading coil is the Australian manufactured 'Outbacker'. This type of antenna has a flying lead, which plugs into different sections of a loading coil. These are marked out for the different amateur bands. This antenna is somewhat larger but never having owned one, I would not want to make a comment on what type of mounting would be suitable for it. Normally the larger antennas would require either fixing to the car or a triple magnetic mount used. It does, of course, have the advantage that one antenna can be used over a number of different bands simply by changing the connection of the flying lead.

Prices start to ramp up once we get to remotely resonated antennas in category 3. In addition, these antennas are more complex to install. Such antennas will require control cables to operate them. Two good examples of these include the Yaesu ATAS (Active Tuning Antenna System). However, this will only work with the appropriate listed Yaesu transceivers. Icom also have a similar system called the AH-2B. This is basically a whip antenna fed into an Icom AH4 remote auto ATU. This would entail a more complicated installation, with the Icom AH4 tuner secured in the boot area (or trunk, as US hams would call it). Not only would one need coaxial cable routing back to the transceiver in the car, but also a control cable to operate the AH4 tuner.

Of course, other tuners could be used but if one is using an Icom transceiver, such as the popular IC-7300, then the Icom tuner can be controlled from the Icom transceiver.

More recently, Icom have introduced a new remote tuner called the AH730.

The category 3 options are more expensive and need a more permanent installation. However, they do offer the advantage that one can change bands without the need to get out of the vehicle and adjust the antenna.

The specification of the AmPro whips

The specification of the AmPro mobile whips is shown in **Table 1**. This is taken from the Moonraker / Waters & Stanton / Nevada website. The antenna is rated at 250W. I would assume that this is PEP (peak envelope power) but this is not mentioned in the specification. No mention is made of maximum power limits if a high duty cycle mode such as FT8 were used.

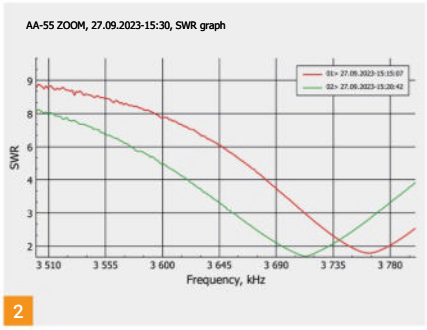
It is quite conceivable that some operators may want to use FT8 from a /P installation. I have run my IC-7300 at 30W on FT8 to protect the PA stage. However, this should be well within the power limit for a high duty cycle mode for the AmPro whips. It would be useful, however, if a maximum safe power for a high duty cycle mode such as FT8 was given for the AmPro range of mobile antennas.

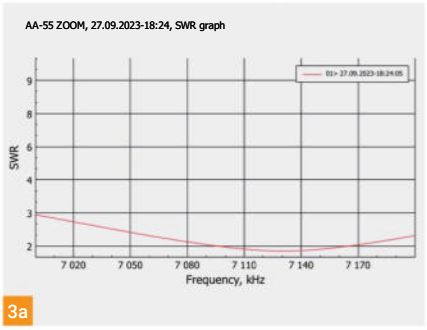
Bands covered by the AmPro whips

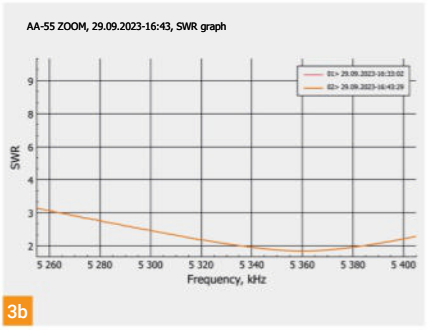
An advantage with the AmPro range of mobile whips is that they manufacture an antenna for every single amateur band from 160m to 4m. This includes all the WARC bands as well as the 60m band. This means that one can buy just the whip(s) that cover bands of particular interest.

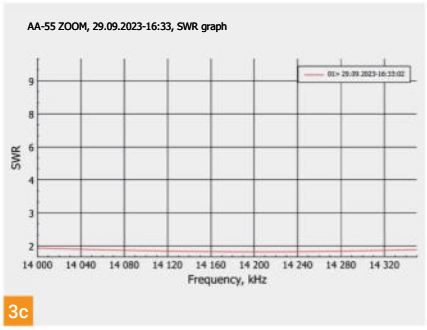
When the whip is stored in the car, the sliding whip section will probably need to be taken off. However, should these top sliding sections get muddled up between whips it will cause a problem since each is resonated for a particular band.

My solution was to buy a number of different coloured rolls of PVC tape and affix the same matching colour to the top of the base section and to the bottom part of the whip where it is secured to the base section, **Fig. 1**. This way one will always know which sliding part of the whip sec-









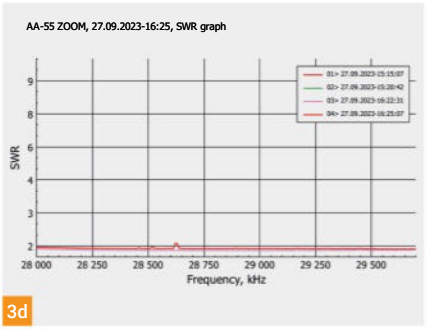


Fig. 1: Coloured tape matches whip sections to bases for easy identification.
Fig. 2: The green curve is when using the triple mag mount and the red curve is when using the single mag mount on the 80m AmPro whip.
Figs. 3a-3d: SWR plots for the AmPro whips on 60m, 40m, 20m using the single mag mount. The 10m plot is a dual plot taken for both single and triple mag mounts. The plots lie above each other and show no difference between single and triple mag mounts on that band.

tion goes with each bottom section of the whip for a particular band.

The tape at the bottom of the stainless-steel whip acts as a marker for the required resonant point of the antenna.

I do not have the 160m AmPro whip, but it is worth mentioning that this costs more than the other AmPro antennas. Its present cost is £69.95 (October 2023). The coil diameter appears to be larger (obviously to take into account the much lower resonant frequency) and I would expect the antenna to weigh slightly more than some of the other higher band whips. It is also worth noting, that as with any small loaded antenna for the 160m band, the bandwidth is very narrow. The actual bandwidth of the AmPro 160m whip is given as 15KHz (presumably between the 2:1 SWR points).

Construction of the AmPro whips

The AmPro whips are made up in two sections. The rigid bottom section is about 1cm diameter with a length of 1.2m to 1.25m. The bottom part of the antenna has a helical winding, which then connects to a tight closely wound coil, which itself connects to another helical winding up to the top of the first section.

In the 40m AmPro whip, for example, the bottom helical winding covers a distance of 80cm prior to it connecting to the main loading coil, which is 26cm long. The top helical winding covers a distance of 15cm. The helical winding and coil are wrapped in what appears to be fairly heavy-duty heatshrink plastic material. The whole structure is well made and well sealed against rain and moisture.

The ratios of helical windings and coil length are different depending on which band the whip operates on. The lower the frequency, the longer the main loading coil becomes.

The second section of the AmPro antenna is a stainless-steel whip or 'stinger' as it is sometimes known. This is about 1.5mm in diameter and is locked in place by grub screws into the top of the bottom section. I was pleased to see that Moonraker sell spare matching stainless-steel whips should one be either damaged or cut too short when trimming the antenna.

As with any short loaded antenna, the bandwidth is rather tight (especially on the lower frequencies) and it is probably better to adjust the stainless steel whip section for resonance using an antenna analyser.

Mounting of the AmPro whips

The 40m and 60m whips weigh slightly different, but their average weight is about 190g. The higher frequency ones that cover 10m, 6m and 4m could be expected to weigh less. However, the AmPro whips are generally lightweight and therefore do lend themselves to being supported by a magnetic mount.

I own just a single magnetic mount, which is quite adequate when using my small (57cm) VHF/UHF dual-band mobile whip when the car is moving. But, as I mentioned earlier, I only use the AmPro whips when the car is stationary.

I gave some thought to how the single and triple mag mounts would affect the operation of the HF whips both in terms of SWR and signal strength, since the triple mag mount would offer more capacity to the car body. I was able to borrow a triple mag mount from **Rob G3RCE** who also kindly loaned me his 20m and 10m AmPro whips. My hypothesis was that the triple mag mount would have far more effect at the lower frequencies than the single mag mount.

I therefore decided to test the 80m, 40m and 10m whips to see how the single and triple mag mount affected their SWR's. For these tests I used my RigExpert AA55zoom analyser running the Antscope 2 software on my computer. I also used a feature on the analyser that allowed me to 'calibrate out' the effects of the coaxial cable.

If we look at the 80m dual plots, **Fig. 2**, the triple mag mount moved resonance LF by 53kHz. Both SWR's were very low at 1.19:1 and 1.05:1 for the single and triple mag mounts respectively. On the 40m and 10m bands, resonance appeared to be unchanged whether using the single or triple mag mount. See **Fig. 3** for some of the plots I made.

The final test I wanted to make was to see if the actual signal strength was affected on the 80m, 40m and 10m bands using single and triple mag mounts.

My close neighbour, **Chris G3VCR** (who lives about four miles away), owns an Anan 7000DLE SDR transceiver and was able to give me a fairly

Key features/ Specifications

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- VSWR 1.5:1 or better.
- Power 250W
- Fitting 3/8th thread.
- Bandwidths: 160m-15kHz; 80m-35kHz; 60m-55kHz; 40m-60kHz; 20m-150kHz; 17m-160kHz; 15m-200kHz; 12m-300kHz; 10m-500kHz; 6m-1500kHz

Table 1: Specifications of the AmPro mobile whip antennas.

Fig. 4: The AmPro whip on the car roof.

accurate signal strength comparison [using the dBm (above noise floor) readout on his Anan]. My initial hypothesis turned out to be correct; on the two different resonant frequencies on the 80m band, between the single and triple mag mounts, the triple mag mount gave a 2dB improvement. On both 40m and 10m, there was no noticeable difference.

I would assume from these results that if one was using the 160m AmPro whip, the difference in favour of the triple mag mount may be even more! However, trying to remove a triple mag mount from the roof of a car compared to a single mag mount requires considerably more 'pulling power'!

General performance

All my tests were carried out with my car parked in the driveway of my house in a normal suburban area. For the particular tests I carried out, this was quite valid.

It is well known that one can expect a considerable improvement in HF performance if operating from near sea water. This makes a huge difference as many will know who have been able to do this. As well as the big improvement we can expect with the transmitted signal, we are very likely to have a very low noise floor, compared with operating in a suburban environment. All this shows the advantages gained when we can operate /P in what we would term 'a good radio location'.

On the bands from 14MHz and upwards, the AmPro whips tend to become more efficient since, of course, they get somewhat nearer to full size in terms of a quarter wavelength. For example, the 20m AmPro whip at 2.13m, is about 42% of a full-sized quarter wave whip while on the 10m band it is 85% of a full-sized quarter wave.

The next comparison is not at all scientific but I felt may be of general interest. I compared the AmPro whips on 80m, 60m, 40m, 20m and 10m with my 130ft EFHW wire antenna. I did lots of A/B testing on the different bands to see if I could get a very general feeling for how far down the AmPro was compared with the EFHW. The AmPro whips were mounted in turn on the single mag mount on the roof of my Volvo XC60 SUV with the vehicle parked in my driveway, **Fig. 4**.

Once again, I must emphasise that this was not a very scientific test; the car was not completely out in the clear and I did notice some difference between stations to the north (going away from my house across the road!) compared to stations located to the south where the house was in the way. The latter seemed to result in lower signal strength on the AmPro whips.

The EFHW was arranged as an inverted-L at the time with a 55ft vertical section sloping away from my tower and a 75ft horizontal section.

A better test might have been to compare the whips with a fixed station multiband vertical in the garden, so that we are comparing similar polarisation. However, I had no multiband vertical to test it against.

My general feeling was that on 80m, 60m and 40m the AmPro whips were some 15dB (maybe 20dB at times) down on the EFHW. At night on 40m, some European signals were in fact only 10dB down using the 40m AmPro whip.

Results seemed very similar on 20m but at times I felt the differences were perhaps only 10dB down on the 20m AmPro depending on where the stations were located.

The 10m band was quite interesting since the antenna is only about 38cm short of full size. The noise floor was noticeably higher on the AmPro; this was to be expected as the car was parked near to the house. However, signals were generally stronger on the AmPro than on the EFHW. I would question the general performance of my EFHW on 10m! There is no doubt that one can be very competitive on the 10m band running the AmPro10 whip; especially if one is in a particularly good location. The SWR across the 10m band is very flat and would allow operation right up into the FM portion of the band if one so desired.

Conclusion

The single band AmPro whips are very well constructed and weather protected. They offer excellent value for money, considering that most are in the £20 to £24 region depending on band (October 2023). The 160m whip retails at £69.95 but of course the coil and diameter of the whip are larger.

Although single band, the AmPro range offer the advantage that one only needs purchase the whip(s) for the band(s) of interest.

The top whip sections unscrew so that the whip(s) can easily be stored in the boot (trunk) of most cars.

Moonraker / Waters & Stanton / Nevada sell a fixed mount (at very reasonable price) with an earth rod, so that any AmPro whip could be fix mounted in one's garden. Obviously, the addition of radials would improve performance. Maybe for those with severe planning issues this might be worth considering despite the restriction of the whips only being single banded.

It is worth mentioning that AmPro appear to offer 'mini' versions of their whips for 80m, 40m and 20m according to the Moonraker website. These could well be useful for those who want something smaller in the way of a mobile antenna.

Acknowledgments

I would like to thank G3RCE for the loan of the 20m and 10m AmPro whips together with the triple mag mount and G3VCR for help with the field strength measurements. **PW**

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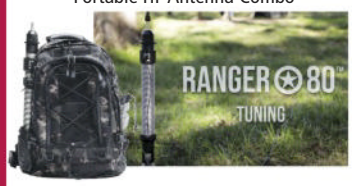

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1

Ray Howes G4OWY/G6AUW
practicalwireless@warnersgroup.co.uk

Arecibo & Sam Harris W1FJZ

Ray Howes G4OWY/G6AUW relates a tale about the Arecibo radio telescope.

The radio telescope at Arecibo, Puerto Rico, was at one point not only one of the most iconic telescopes in the world, for many decades (completed in 1963) it was also the world's largest single dish spherical telescope and the most sensitive. During recent times it's been superseded by the *FAST* (Five Hundred metre Aperture Spherical Telescope) instrument located at Guizhou Province, China. There is another similar device under construction in Australia and South Africa, the Square Kilometre Array (SKA), which will, as its title suggests, be the largest radio telescope when it finally becomes operational.

The Arecibo observatory, **Fig. 1**, was opened towards the end of 1963. It employed a 1000ft spherical reflector. Incoming radio signals would be focused on a movable antenna gantry positioned about 550ft above the reflector. The gantry was able to be moved to various positions to allow celestial targets to be tracked in the sky. There was also a 12m radio telescope with a laser facility to zap the Earth's atmosphere.

Many discoveries were made at Arecibo. The first exoplanet that surrounded a pulsar during 1992, detailed radar mapping of Venus and Mercury, the discovery that the rotation of Mercury was wrong. It rotated every 59 days not 88 days. Notwithstanding its pioneering work with the ionosphere, American astronomers working at Arecibo happened upon the first binary pulsar (for which **Joe Taylor K1JT**, developer of the WSJT software, received the Nobel prize) among other things.

However, during 2020, disaster struck. A cable that held up the gantry platform snapped sending it crashing down into the dish below. Then, to add to the disaster, another cable snapped in 2020. It was subsequently announced by the US National Science Foundation that owned and financed the observatory, that the telescope was in serious danger of imminent collapse and that the

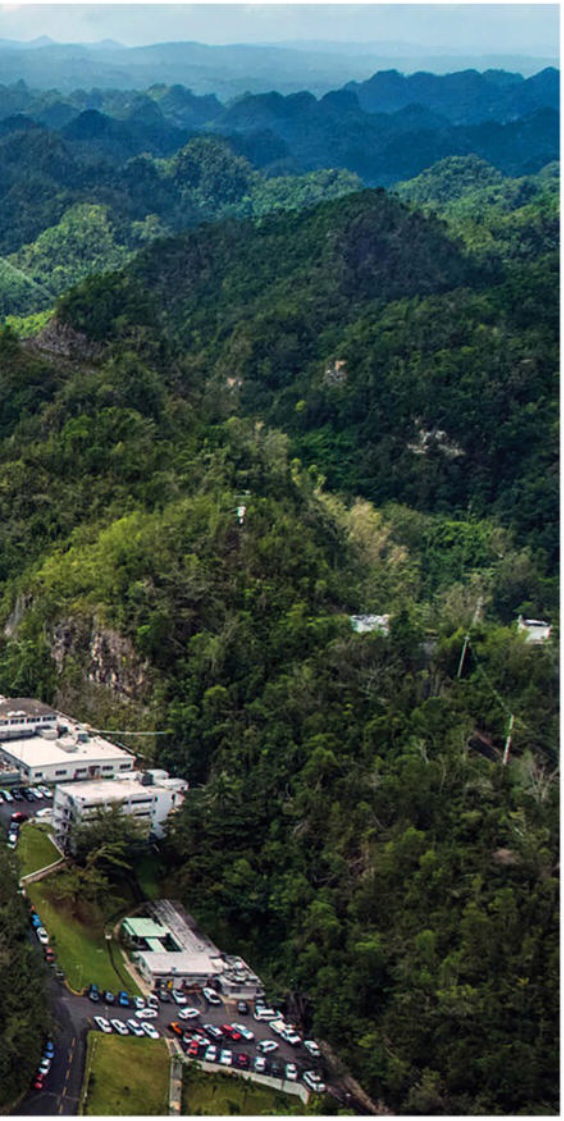


Fig. 1: The Arecibo antenna before its collapse.

broken cables could not be repaired or replaced safely. The good news is that the entire site will now be repurposed into a visitor centre and apparently it will also be utilised as an outreach educational facility at some point in the near future.

The Arecibo telescope was also used as a powerful radar transmitter. The object of the exercise here was to transmit radar beams to distant celestial targets whereby when reflected it allowed astronomers to measure the spins and other relative information of the targeted object such as an asteroid, for example. Built into a natural sinkhole which, luckily, provided a near perfect fit, it was to become the go-to place for all and sundry in the scientific community.

Because the telescope at Arecibo was so sensitive and able to detect extremely weak radio signals, it was probably best known in the public arena as an extraterrestrial intelligence seeker, SETI (Search for Extraterrestrial Intelligence). Well, barring the odd one or two excitements, many attempts were made, but no such signals from any extraterrestrial civilisation were ever received. Undeterred, during 1974, **Frank Drake** persuaded the powers that be at Arecibo to send out his aptly titled 'Arecibo message'. This message provided details via a pixel-art image (once decoded by whoever) of what it's like on planet Earth. To date, there has been no acknowledgment. But I suspect that many people had their fingers crossed! I did as did Mr Drake. He unfortunately passed away in 2022 aged 92. He is remembered for the Drake Equation, a probability formula, and as a former Director of the Arecibo observatory. The story goes that as a child, while using a radio telescope observing a star cluster, he thought he'd heard a 'curious signal', thinking that it might be a signal from an extraterrestrial source. It wasn't. He'd detected a signal being sent by a local radio amateur across town.

The observatory at Arecibo made many outer world discoveries, Including the first substantiated exo-planets, the first discovery of a binary pulsar, the composition of the ionosphere and produced the first radio maps of the surface of Venus. NASA, unsurprisingly, was also involved financially with the observatory. So, not only did it contribute to many important scientific based discoveries during its long reign as the place to be for astronomical research and other still classified data, it also provide an ideal platform for other less esoteric activities, including amateur radio Moonbounce (EME).

Enter Sam Harris

Enter **Sam Harris W1FJZ** (W8UKS/W1BU). Sam was once a global-ham superstar. And not unlike a couple of other people I know well, or used to, he ate, slept and drank ham-radio. And if you didn't realise that crucial fact, he could be a very difficult man to get on with. But if he liked you and you liked him, well, it was a marriage made in heaven. Sort of. In the early days, Sam had a huge spread out in Medfield, MA (not too far from Boston), which featured a ginormous antenna farm. Towers with enormous beams sprouted like weeds there. Because he simply had to have the loudest signal on every available band. It got so bad, that his wife, W1HOY, brought him his dinner and hydration to his operating desk, which he rarely left. His preoccupation with ham-radio and being the best would propel him to greater things. At one point, W1FJZ was running 7000 watts, which consisted of an array of separate finals for low-band operation. Hence the big signals. Suffice to say, Sam was usually at the top of the DX leaderboard. Having the loudest signal on any band helped. His extensive antenna farm and towers spawned many articles in the then ham-radio magazines.

No doubt many readers will have heard that well known phrase about big antennas: *"That an antenna is not big enough unless the winter brings it down"*? That was attributed to Sam. And he was one of the first to get echoes back from the moon on 2m/6m using stacked Yagis. Eventually he progressed to dishes, big ones of course. Sam always thought big. During this time, my mate and mentor, **Wayne Green W2NSD** (SK), lived not far away from Sam in New Hampshire. Wayne had put up 336 elements on 144MHz atop a mountain. There was obviously a bit of competition between them!

W1FJZ had been working at Microwave Associates, selling his 6m high-gain parametric amplifiers that he'd invented (some people had predicted that it might work, but nobody had actually built one until Sam came along). To cut to the chase, they worked so efficiently that the US military came knocking on the door. Soon, almost every US military radar installation worldwide had one. They were that good. Sam wrote an article all about it in an April issue of *73* magazine. Many readers thought it was a joke. **Fig. 2**, from *73* magazine, shows Wayne Green (centre) with Helen and Sam.

EME

Time now for a little slice of EME histrionics. Back in early 1946, The US Signal Corps Engineering Laboratories were the first to get their signals/echoes bounced back from the moon's surface. I recall they used a dipole-array of some description. I guess this milestone had to have been recorded? The first amateur radio attempt (144MHz) at hearing returning echoes from the moon occurred in 1953 courtesy of W3GKP and W4AO. Sam was also very active during the latter half of the 1950s on both 6m and 2m, hearing his echoes on both bands. The first actual EME 2m QSO happened in April 1964. W6DNG/OH1NL. Then, W1FJZ/W1BU trumped that with a 432MHz EME QSO with KH6UK in 1964. There was a 220MHz EME event too, I think that was in the 1970s? Stacked Yagis/rhombics were the antennas of choice until of course, parabolic dishes became viable for ham-radio EME operation. There were attempts to enter the 2304MHz EME realm during the 1960s. However, it was decade or so before that frontier was breached. At this juncture, I should point out when Sam and others were pioneering EME, they didn't have the benefit of computer technology. Which, when you think about it, makes the whole enterprise even more remarkable. Because the most important challenge then was when moon-time would be common for both distant contacts. In other words, being able to locate the position of

Fig. 2: Helen, Wayne and Sam.

the moon at any given time. Yep, their problems were staggering. Today, we take that task for granted. Software programs (WSJT etc) will work it all out for you. Doppler shift, polarity problems, no problem. Software can even control your antennas. Sit back and enjoy. There are other things that these clever programs can do. If you're into EME, you know what they are.

Always wanting to climb a higher hill and get there first, the next goal would be stepping up in frequency to 1296MHz EME. So, along with the crew at the Rhododendron Swamp VHF Society, Sam took a leap into unknown territory. 1296MHz was chosen because it was then the highest band where valves of 1kW were available, solar noise was at a minimum, receiver noise figures are low and so on. But what really clinched it was the loan of an 18ft parabolic reflector. And how to keep it pointing at the moon? This was solved with yet more ham-type ingenuity.

Our amateur radio past sparkles with outstanding technical achievements, the next one being at the then heady heights of 1296MHz. And soon be surpassed. Due in no small part to Sam's extraordinary dedication to cross the finishing line first, he and co-workers at W1BU were on the cusp of ham-radio immortality. The forthcoming drama was about to be made reality. The doors of a completely new concept in ham-radio communications were going to be kicked down.

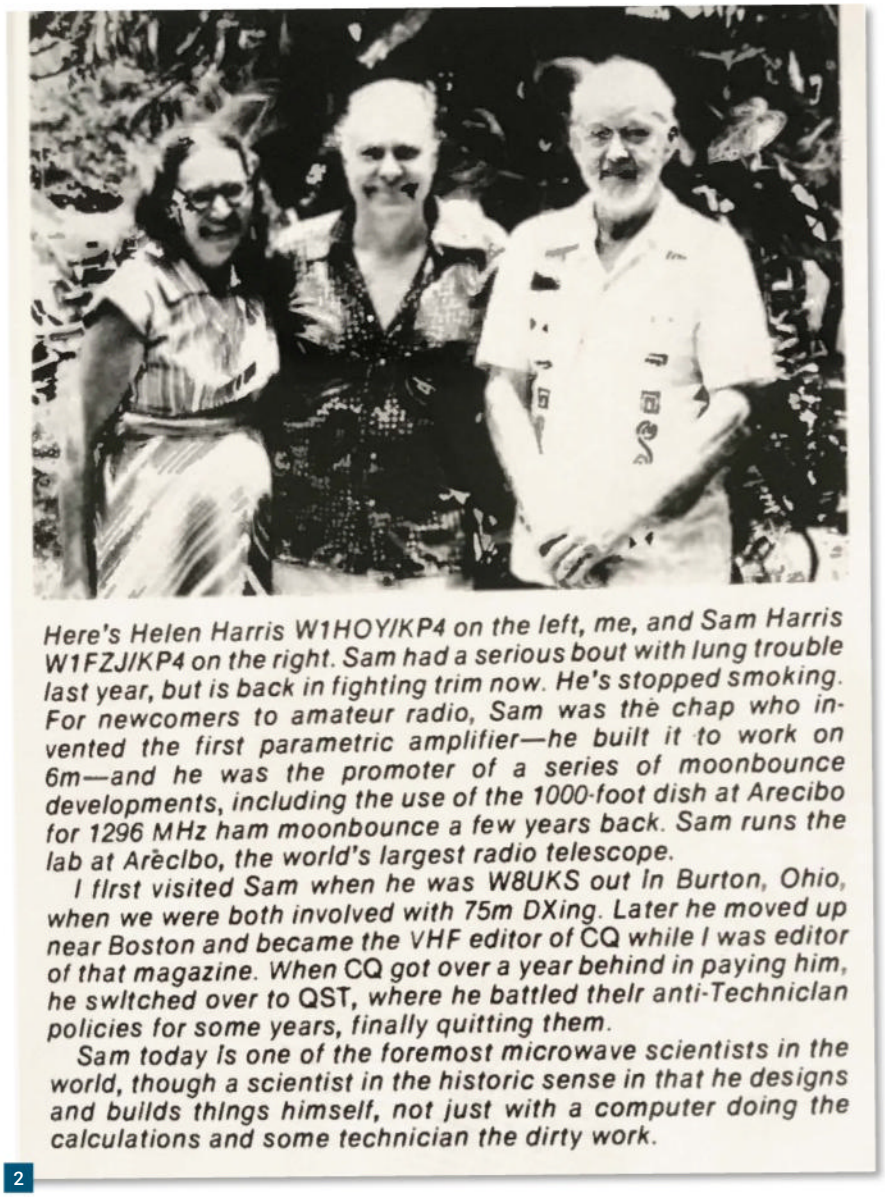
On a magical morning 21 July 1960, the first successful two-way intercontinental EME QSO experiment was triumphantly achieved between the Rhododendron Swamp VHF Society (W1FJZ/W1BU, using a klystron amplifier at 300/400 watts output) in Medfield MA, and the Eimac Gang Radio Club (W6HB) in San Carlos, California. Truly, a gold-star moment for amateur radio. And it goes without saying, of course, that high stability was essential in many fields in this enormous endeavour. For example, to achieve the required sensitivity, we're talking a bandwidth of 100Hz or less. In those days of yore, undreamed of. It's really all about signal-to-noise ratio and if works out or not. Which it did.

And so to Arecibo

After this momentous event, in 1965 Sam and his wife found themselves travelling to the Arecibo observatory in Puerto Rico, where Sam would help head up the laboratory. And play a role in the operation of the 1000ft hemispherical reflector. Their callsigns then: W1FJZ/KP4 and W1HOL/KP4. While there, Sam got briefly busy with 2m and 70cm EME. Wayne W2NSD visited one time and got involved with some of Sam's 1296MHz experiments. He'd gotten the powers-that-be there interested in ham-radio moonbounce. According to Wayne, the gain of that huge dish was so great, that *"the band sounded like 20m during a contest"*. Owing to allocated dish time restraints, Sam built his own fixed dish (a tiny replica of the big one), that again as Wayne also mentioned, had a moveable antenna pointing in the direction of the big dish. When operational, he got so bogged down with so many other professional laboratory uses for it, that his ham-radio moonbounce work took a back seat.

W1FJZ was a force of nature. A maelstrom of inventiveness. And I suspect that today not many people have of heard of him. But those involved with EME probably have. Sam Harris W1FJZ passed away in November 1995. His enduring legacy will be his unbridled enthusiasm to step into unknown frontiers waving the ham-radio flag.

EME nowadays (DX on steroids) is a revelation compared to when Sam spun his magic. Now, it's 23cm (using circular polarisation to minimise Faraday rotation), 13cm, 9cm, 3300-4500MHz, but limited worldwide use, 6cm, 5650-5925MHz, allocated worldwide, 3cm, 10,000-10,500MHz (1988, rings a bell for the first EME QSO here) still the most popular microwave band for lunar fun. And last, 1.25cm, 24GHz. This band is an enormous hill to climb EME-wise as I'm sure most EME advocates would testify. Low-noise amplifiers being just one of the thorny issues. Again, this band has been conquered by a couple of ambitious EME fans. On 18 August 2001 by VE4MA and W5LUA. The first EME contact on 24GHz. And the strange thing is, the higher you go at these frequencies, the less power is needed. But whether lunar-bounce will become routine at 24GHz is another matter. We'll see. However, I'm sure that if W1FJZ was around now, he'd be giving it a damn good go. **PW**



Here's Helen Harris W1HOY/KP4 on the left, me, and Sam Harris W1FZJ/KP4 on the right. Sam had a serious bout with lung trouble last year, but is back in fighting trim now. He's stopped smoking. For newcomers to amateur radio, Sam was the chap who invented the first parametric amplifier—he built it to work on 6m—and he was the promoter of a series of moonbounce developments, including the use of the 1000-foot dish at Arecibo for 1296 MHz ham moonbounce a few years back. Sam runs the lab at Arecibo, the world's largest radio telescope.

I first visited Sam when he was W8UKS out in Burton, Ohio, when we were both involved with 75m DXing. Later he moved up near Boston and became the VHF editor of CQ while I was editor of that magazine. When CQ got over a year behind in paying him, he switched over to QST, where he battled their anti-Technician policies for some years, finally quitting them.

Sam today is one of the foremost microwave scientists in the world, though a scientist in the historic sense in that he designs and builds things himself, not just with a computer doing the calculations and some technician the dirty work.

2

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No More Secrets

David Harris reviews another book about Bletchley Park, but with a new perspective.

David Harris
mydogisfinn@gmail.com

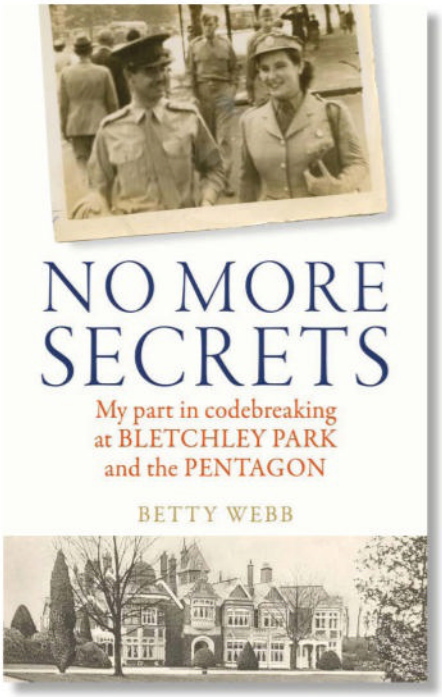
This is a very different book about the Bletchley Park wartime codebreaking centre as it is told from the viewpoint of an ordinary woman, **Betty Webb** (b.1923) who served there as a member of the Auxiliary Territorial Service (ATS), which was the women's equivalent of the regular army.

Betty grew up in rural Herefordshire and unusually for her time was home schooled. In 1937 she goes on an exchange visit to Germany for three months and acquires a reasonable grasp of the language. In 1941, at the age of 18 she decides she wants to join the war effort and signs up with the ATS as a clerk. Someone in recruitment must have picked up on her knowledge of German as she was posted to Bletchley Park where 1,500 civilians and military personnel worked in 1941. She worked in the military section under code breaker **Brigadier John Tiltman** *(see Forgotten Giant of Bletchley Park by Harold Liberty. I reviewed this biography of Tiltman in* RadioUser *October 2022)*

She works in the section which deals with signals from the German Police. These were not coded using Enigma but with hand cyphers. These decoded signals enabled the UK to learn about conditions in Germany, the effects of bombing on cites, executions, typhus outbreaks and mass exterminations. She works a three-shift rota, working either 8am to 4pm, 4pm to midnight or midnight to 8am.Her work involved registering all enciphered signals. Everything about Bletchley Park was top secret and staff were not permitted to tell anyone where they worked or what they did. Friends and family could not visit Bletchley and all post had to be sent to a PO Box number in London. Initially she lives off site with a local family and has her own room and adequate fresh food.

Wartime pay was very low and as a private in 1941 she takes home £0.52 a week after deductions (about £33 in today's money) By 1945 she had been promoted to sergeant and earned £2 a week (about £110 today). She had little opportunity to visit her home as the return fare from Bletchley to Woofferton (the station nearest her home) was around £2. Trains during the war were often very crowded and subject to long delays, which meant that weekend visits home were not practical.

Some books about Bletchley have stressed the industrialisation of codebreaking, which involved the employment of over 10,000 people by 1945, resulting in very poor living and working conditions. However, Betty talks about the fun and friendship she found there with many social activities taking place outside of working hours. She had boyfriends, went to dances, musical recitals and enjoyed eating sausages and chips in the canteen. Travelling to and from Bletchley at night was hazardous as it involved using old buses, which had to travel on unlit roads and were equipped with only very minimal lighting. In 1943 she follows Brigadier Tiltman to the Japanese codebreaking section. She is now living at Shenley Road camp where conditions are austere with 30 beds in each hut.



No More Secrets. My Part in Codebreaking at Bletchley Park and the Pentagon by Betty Webb. Mardle. 2023. 232 pp. Pbk. £9.99.
ISBN 9781837700219
www.mardlebooks.com

In May 1945 she volunteers to serve abroad with the ATS and was due to be posted to India but at the last moment is sent to Washington, DC to work with the British contingent at the Pentagon. Personnel would normally travel to the USA on troopships but she was able to fly. She describes flying to the USA on board a Boeing 314A flying boat, which she joined at Poole harbour in Dorset. The plane then refuelled at Foynes, which is on the River Shannon in Ireland. The plane then flies across the Atlantic to Botwood, Newfoundland for another refuelling stop before it travels down the eastern seaboard of Canada and the USA to Baltimore. From there she goes by train to Washington DC.

Some books about Bletchley have stressed the industrialisation of codebreaking,which involved the employment of over 10,000 people by 1945,resulting in very poor living and working conditions.

She spends five months in Washington working on Japanese signals and was there when the war ended with the dropping of the atomic bomb on Hiroshima. Betty writes with great enthusiasm about life in Washington, which was in tremendous contrast to the austerity of Britain. Food was plentiful and she could enjoy steak, salads and ice creams whenever she wanted. With the war now over she returns to the UK on board the Cunard ship *Aquitania*. She goes back to Bletchley Park and is eventually demobbed in February 1946.

Betty attends a secretarial course and has a number of different office jobs in the immediate post war period. In 1955 she becomes an officer in the Women's Royal Army Corps (WRAC) of the Territorial Army (TA). She enjoys being back in uniform and in 1958 becomes a full time, employed officer in the TA. She leaves the army in 1969 to work for the The Law Society. She also gets married in 1970 but her happiness is only short-lived as her husband dies in 1978. She remained very active in retirement and served for 32 years as a member of Wythall Parish Council, Worcestershire.

In 2009 she attended a veterans event at Bletchley Park and has subsequently given over 200 talks about life at Bletchley to schools and groups. She has been on television and has been interviewed by many newspapers and magazines. In 2015 she was awarded the MBE for her services to Bletchley Park and in May 2023 celebrated her 100th birthday.

The book contains many of Betty's own photos, a glossary and bibliography. I found her account of life during World War Two compelling and she writes in a most entertaining style. **PW**

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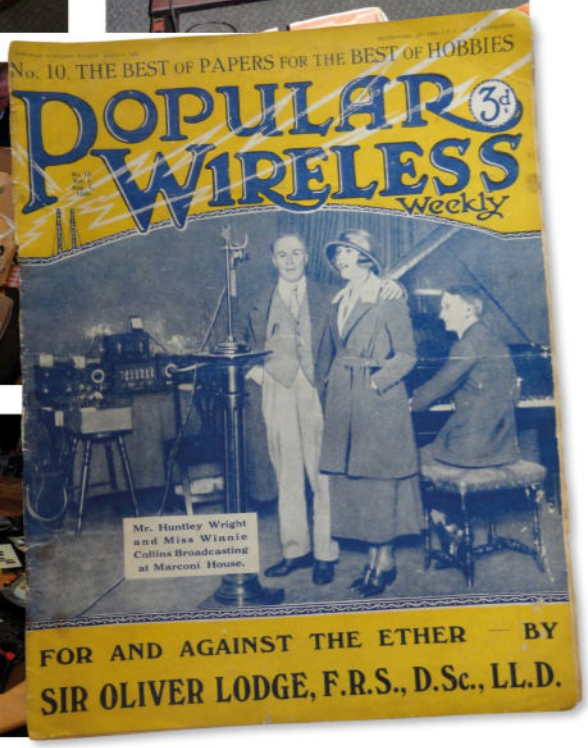


BVWS Autumn Meeting at Golborne

Georg Wiessala
egwiessala@gmail.com

Georg Wiessala enjoyed visiting the latest get-together of the British Vintage Wireless Society.

This has to be one of my favourite radio events of the year: The meeting of the British Vintage Wireless Society (BVWS) took place, once again, in Golborne, on 29 October 2023.

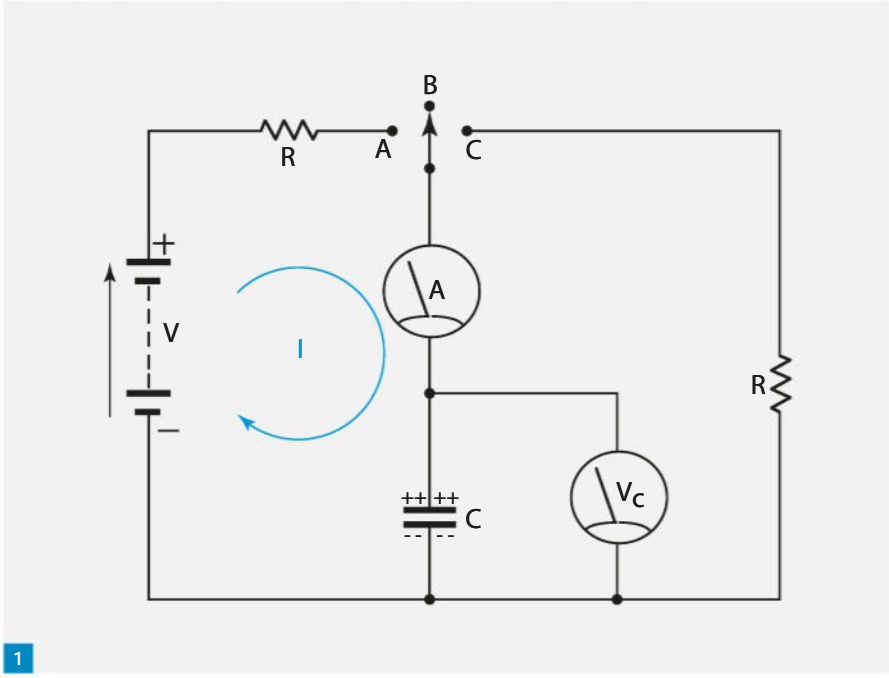
The old TV sets normally to be found there were missing this time around. However, there were plenty of beautiful antique and classic radios to behold, as well as sundry accessories, tubes, books, magazines, and much more to delight the heart of the vintage enthusiast.

Having a chat with some BVWS members and stallholders here is always an enlightening experience and shows just how much interest there is in classic gear and collecting. The highlight of my visit was coming across a 1922 copy of *Popular Wireless Weekly*, with an article by **Oliver Lodge** in it, entitled *For and Against the Ether*. How amazing is that! Oliver Lodge was not just a prominent physicist but also a Victorian 'Spiritualist', who sought to contact the son he lost in the First World War (1914-1918). He even wrote a whole book about this, entitled '*Raymond*'. 'Ether', then, in more than one sense of the word.

References

BVWS:
www.bvws.org.uk
RadioEnthusiast (2022 Meeting):
https://tinyurl.com/4k7sdaxz
The Spectrum Monitor, June 2012 (Oliver Lodge)

Chris Murphy M0HLS
practicalwireless@warnersgroup.co.uk



1

Capacitors (Pt II)

Jeff and Natalie close off their discussion about capacitors.

It was a Friday morning in the electronics lab and Jeff was mulling over his plans for the weekend while making himself his usual early morning cup of tea when his apprentice Natalie approached him. *"Morning Jeff"*, she said, *"I know we usually talk about electronics stuff on a Thursday lunchtime, but yesterday when we talked about capacitors, we didn't have time to discuss how they work and that so I was wondering". "If we can talk about them today"*, Jeff cut in. *"Yes, if we can"*, Natalie replied. *"OK, I suppose so"*, said Jeff, *"Let's get it out of the way then"*.

Lunchtime arrived and Natalie wandered over to Jeff's desk. *"Right"*, said Jeff, *"Yesterday we looked at some of the physics behind electric fields and that and how a capacitor is constructed, and the things that determine its capacitance. So now we need to look at what happens to a capacitor when we apply a voltage, and in particular a direct voltage to it"*. Jeff drew the arrangement, **Fig. 1**.

"What we have here", Jeff explained, *"is a capacitor that can be connected to either a DC voltage source via a resistor or simply via a resistor but no voltage source, depending upon the position of the three-way switch. In series with the capacitor there is a centre zero ammeter and connected across the capacitor a voltmeter. We could also connect an oscilloscope across the capacitor." "Yes, OK, I see"*, said Natalie.

"Now", said Jeff, *"If we move the switch to position A, then a charging current will flow into the capacitor via the resistor. The charging current will only flow for a short time and will be at its maximum value when the capacitor is fully discharged. If we watch the ammeter it will deflect to the maximum value of current, which is limited by the resistor, and then slowly start to fall in value. I'll draw a diagram in a minute"*, **Fig. 2**. *"What about the voltage?"* Natalie asked. *"I was coming to that"*, said Jeff, *"If we watch the voltmeter, we will see that as the current falls, the voltage across the capacitor will rise. Eventually we will reach a point where the current has fallen to zero." "Yes, understand that"*, Natalie agreed.

"Now", Jeff continued, *"while a current has been flowing, from Ohms law there will have been a voltage drop across the resistor, but when the current drops to zero there won't be any voltage across the resistor and the voltage across the capacitor will be equal to voltage of the DC source."*

"OK, understand that", said Natalie. *"How long does it take for a capacitor to get fully charged?" "Well"*, said Jeff, *"it depends upon a couple of things. You'll notice on the diagram I've drawn that I have marked a point on the time axis with the lower case Greek letter Tau (τ) This point is called the Time Constant and is where the voltage across the capacitor has reached sixty three percent of the maximum voltage. If we assume that the charging current is constant, which from the diagram you can see that it isn't, then the time constant is found by multiplying the values of the resistor and capacitor and is quoted in seconds and the capacitor will be fully charged in roughly five time constants. So, if we have a one hundred microfarad capacitor and a ten kilohm resistor, the time constant will be one second and the capacitor fill be fully charged in about five seconds"*.

$\tau = RC$
$\tau = 1 \times 10^{4} \times 1 \times 10^{-6}$
$\tau = 1s$

"Ok", Jeff went on. *"If we now return the switch to position B, and watch the voltmeter, we will see that the voltage across the capacitor will remain as it was." "For ever?"* Natalie queried. *"In theory yes, in practice no."* Jeff explained. *"Due to leakage currents, the charge on the capacitor and hence voltage across it will eventually start to drop. And here's an important point to be aware of. Some capacitors, especially those with capacitances up in the hundreds of microfarads or more like those found in power supplies, can hold their charge for some considerable time."*

"Yes, I've heard about having to discharge capacitors before working on them", said Natalie. *"Correct"*, Jeff said. *"They can retain a charge of several hundred volts and can give you a nasty electric shock if you touch both terminals so it's best to discharge them with a resistor before working on them. In fact, some capacitors have a resistor in the order of several kilohms connected across them in order to provide a discharge path when the supply is removed."*

"Oh, OK, I've seen those on circuit diagrams and often wondered why they were there." "Well, now you know", said Jeff. *"I've had a few shocks from capacitors myself over the years and they're not pleasant."*

"Anyway, we've jumped ahead a little bit", Jeff said. *"Let's have a look at what happens when we do discharge a capacitor. If we now move the switch to position C, you can see that what we're doing is connecting a resistor across the capacitor." "Yep, got that"*.

"Right", Jeff continued. *"The capacitor will now start to discharge through the resistor. With the capacitor in its fully charged state, the current flowing will be at its maximum value and the ammeter will deflect but in the opposite direction to when we were charging the capacitor." "Is that because the current is flowing in the opposite direction?"* Natalie asked. *"Correct"*, Jeff replied, *"and as the capacitor discharges, the voltage across it will fall – eventually to zero and again*

Fig. 1: Applying a direct voltage to a capacitor.

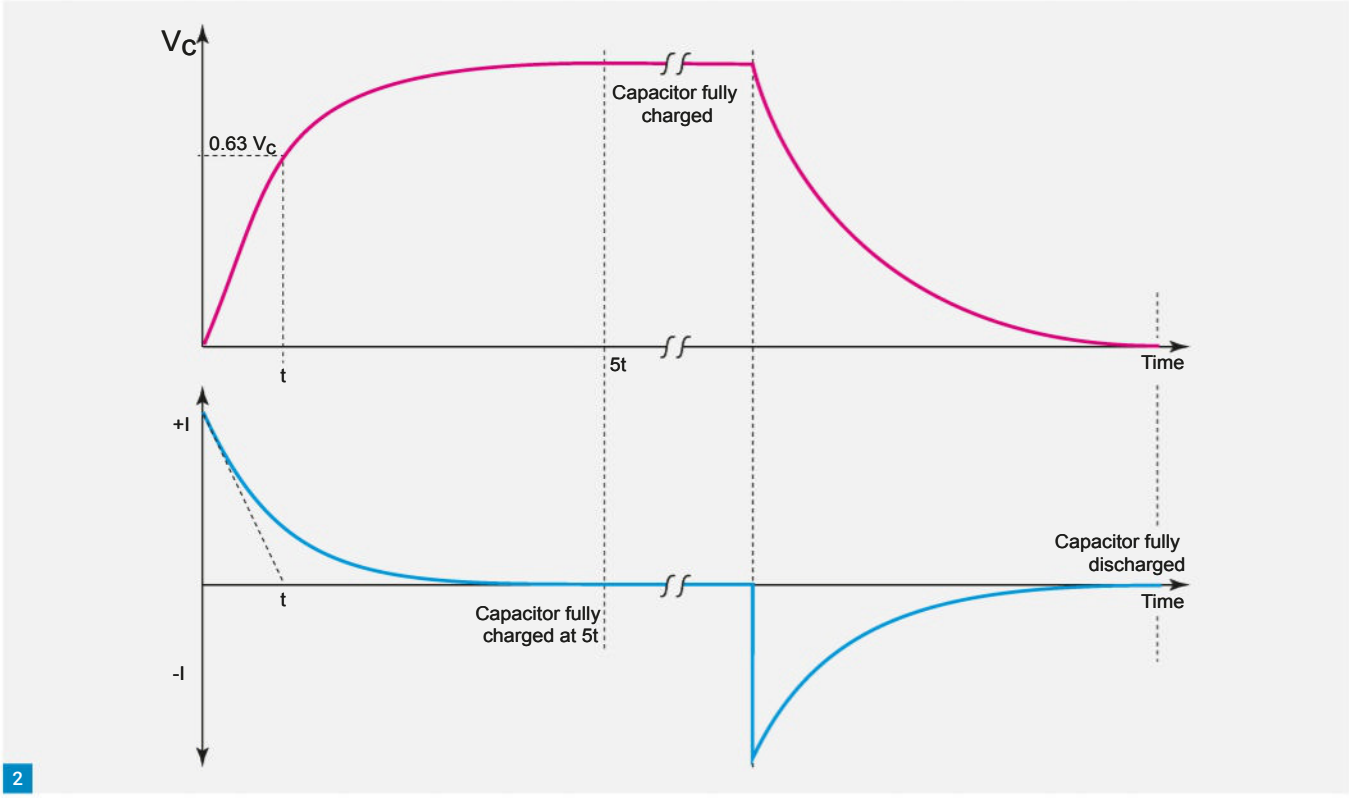


Fig. 2: Voltage and current as capacitor becomes charged. Fig. 3: Capacitors in parallel. Fig. 4: Capacitors in series.

from Ohms law, as the voltage falls so will the current, again to zero. You can see this from the diagram that I drew."

"I've seen a formula somewhere that says that the charge on a capacitor is equal to the capacitance multiplied by the voltage applied to it Does this apply to what we've just said?" Natalie asked. *"It does indeed"*, Jeff replied and wrote down the formula.

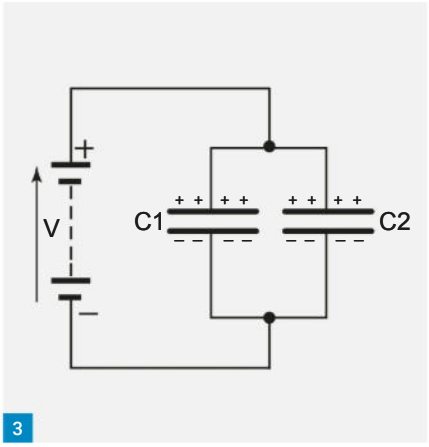
$Q = VC$

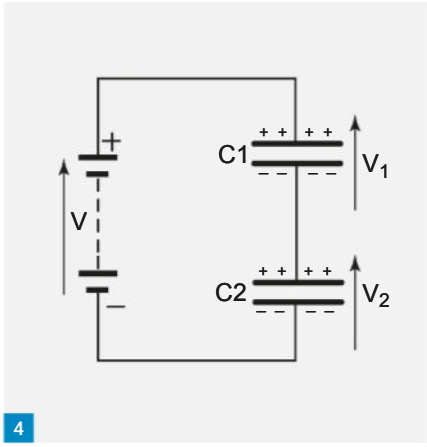
"Here, we have Q representing the charge in Coulombs, V the voltage in volts, and C the capacitance in Farads. From which it follows that if we have a one Farad capacitor with one volt across it, then the charge will be one Coulomb." "So", said Natalie, *"for capacitors that we normally use the amount of charge wouldn't be very high". "Not unless we apply very high voltages."* said Jeff. *"Let's do an example. Let's say that we have a one microfarad capacitor with one hundred volts across it. Then the charge will be one hundred micro-Coulombs."*

$Q = VC \quad Q = 100 \times 1 \times 10^{-6} = 1.0 \times 10^{-4}$ C

"If we now increase the voltage to say, ten thousand volts, then the charge will become ten milli-Coulombs."

$Q = VC \quad Q = 10{,}000 \times 1 \times 10^{-6} \quad Q = 0.01$C





"OK", said Natalie, *"Anything else?" "Well"*, said Jeff, *"Just for completeness let's have a look at where the equations for capacitors in series and parallel come from". "That would be good"*, said Natalie. *"OK"*, said Jeff, *"We'll look at capacitors in parallel first as the sums are a bit easier. Consider the diagram I've just drawn* (**Fig. 3**). *Here we have two capacitors C1 and C2 connected across a DC voltage, V. From the formula that we've just used we can conclude that:"*

$Q1 = C1V$ and $Q2 = C2V$

"If we were to replace C1 and C2 by a single capacitor, C so that Q1 + Q2 would become a single charge, Q, then"

$Q1 + Q2 = Q = CV$

"From which we can say that" $C1V + C2V = CV$

"Dividing through by voltage gives"

$C1 + C2 = C$

"Which is our formula for capacitors in parallel. For capacitors in series the sums get a bit more complicated but just try and follow the logic", Jeff said. "In a series circuit (**Fig. 4**) *the current, and hence the charge, Q, is the same at all points in the circuit. So we can say that the charge on C1, Q1, will be the same as the charge on C2 which is Q2. From this we can conclude that the total charge, Q, will be the sum of Q1 and Q2." "Yes, I see that"*, Natalie agreed.

"OK", Jeff continued, *"I'll walk you through the steps. The total voltage across the capacitors, V, is the sum of the voltages across C1 and C2":*

$V = V_1 + V_2$

"Dividing through by the charge gives":

$V/Q = V_1/Q = V_2/Q$

"But, we know the capacitance is found by the charge divided by the voltage, so"

$C_1 = Q/V_1$ and $C_2 = Q/V_2$

"If we now replace C1 and C2 with a single capacitor, C, then":

$C = Q/V = Q/V_1 + Q/V_2$

"From which we can deduce that":

$1/C = 1/C_1 + 1/C_2$

"Oh, excellent", said Natalie, "I'll keep that with my notes and pass on to Poppy and Isla". "Glad to be of help", Jeff said. "One more thing before we finish. If we know the value of each capacitor and the total voltage, we can also find the voltage across each capacitor. Starting with the fact that the product of each capacitor and the voltage across it will be the same, we can manipulate this to derive two more equations that will allow us to find the voltage across each capacitor. I'll take you through the steps again, which are best explained by doing an example. So, here we go":

$C_1V_1 = C_2V_2$

"Which we can manipulate to get two more equations":

$V_1/V_2 = C_2/C_1$ or $V_2/V_1 = C_1/C_2$

"So, let's put some numbers in. Let's say that C1 is ten microfarads and C2 twenty microfarads and they are connected in series across one hundred volts." "OK", said Natalie. *"If we pick one of the equations that I wrote, it doesn't matter which, we can write"*:

$V_2/V_1 = C_1/C_2 = 10 \times 10^{-6}/20 \times 10^{-6}$

"Since the total voltage is one hundred volts, we can say that":

$(20/10)V_2 + V_2 = 100$

"Therefore":

$3V_2 = 100$ and $V_2 = 33.33V$

"Following on we have":

$V_1 = 100 - 33.33 = 66.67V$

"So, there we have it", Jeff concluded. *"Thanks Jeff"*, Natalie replied. *"I'll copy this and pass to Poppy and Isla. Can you write us a few questions as well please?" "Of course"*, Jeff replied.

Jeff's questions

1. A 47µF capacitor is charged via a 5kΩ resistor. Calculate the time constant and the time for the capacitor to become fully charged. (0.24s and 1.18s)
2. A 100pF capacitor has a voltage of 80V across it. Calculate the charge. (8nC)
3, If the charge on a capacitor is found to be 2mC when it has a voltage of 90V across it, calculate the capacitance. (22.22µF)
4. Two capacitors, C1 and C2 are connected in series and have values of 100nF and 22nF respectively. If the total voltage across them is 20V, calculate the voltage across each capacitor. (16.39 and 3.61)
5. A capacitor of unknown value takes 5 seconds to reach its fully charged condition when charged via a 1kΩ resistor. Calculate the value of the capacitor. (1000µF)

Correction

In the table on p.49 last month, the dielectric strength of air should have been given as 3MV/m or 3,000kV/m, not 3kV/m. Apologies. **PW**

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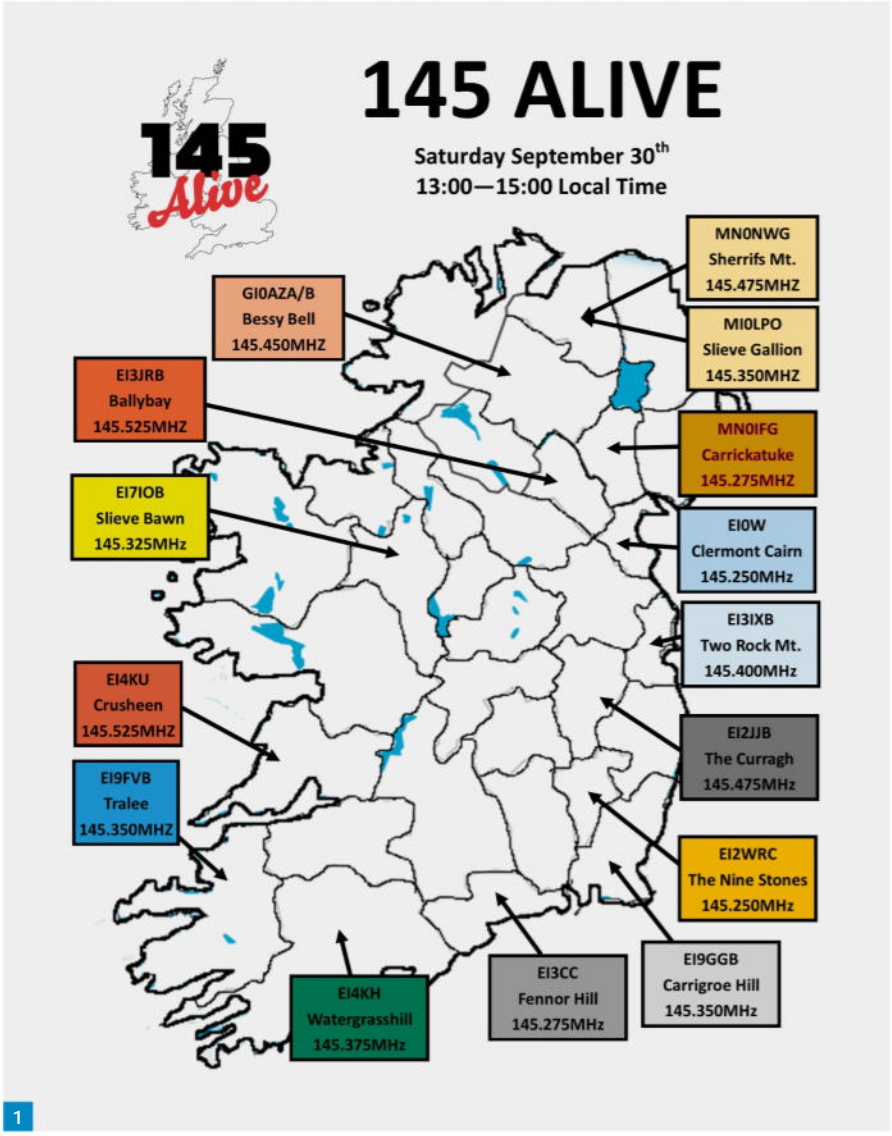

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Quansheng UV-K5 developments

Tim Kirby GW4VXE has another full column of VHF/UHF news, starting with an update on the UV-K5 handheld transceiver.

Although as I reported a couple of months, the Quansheng UV-K5 turns out not to transmit reliably on 6 and 4m, some of the modified firmware versions that have been produced have been useful. One developer, whose versions appear under the moniker 'OneOfEleven' has dramatically improved the AM receive performance, such that you can use the rig to receive airband successfully, which was not possible with the original firmware.

I've also tried the spectrum sweep feature, which is in many versions of the firmware, and it's not bad. Clearly, it's not as good as a professional spectrum analyser, or even the band sweep feature on some more expensive handhelds, but it's absolutely usable and quite fun to play with. You might find some new, active frequencies by using the feature.

Perhaps something exceptionally interesting is that one of the developers has made it possible for the rig to receive (only) SSB. It receives HF entirely adequately from 18MHz upwards into VHF. I had the opportunity to try it on 2m, using a half-wave whip and was surprised to hear a brief snatch of the GB3MCB beacon transmission (probably by aircraft). This raised a question in my mind whether the rig could be used to receive a CW/SSB satellite downlink. When it stops raining, I'll try this out and report back.

It's simply amazing the ingenuity that has been shown to make this £20 handheld do so much more. You can find a repository of the many versions of the firmware at:

https://tinyurl.com/2uy9pp3z

At the time of writing, I'd probably recommend trying either the Matoz or Egzumer variants.

Simon Lucas M3ZYH and **Andy Green 2E0GYI** are two who have been having fun with these radios and the alternative firmware and feel the radios are well worth their price for experimentation value alone. And, of course, they do work well on 2m and 70cm.

145 Alive in Ireland

Many thanks to **David Gardiner EI3IXB** for sending in some details of the last 145 Alive event in Ireland. David writes, *"Ireland joined in the 145 Alive event on 30 September for the first time. This is a fun event aimed at increasing 2m activity and started a couple of years ago, no Irish net control stations had previously been involved.*

*"It was decided to run it on an All Ireland basis and it was felt that it would be better if Northern Ireland had their own organiser. Using his contacts from SOTA, **Jamie 2I0FVX** of the Mid Ulster club volunteered and did a great job of activating the event in GI with full coverage of the province and plenty of chasers. In all 36 Net Control stations were set up, 11 in the Republic of Ireland, 4 in Northern Ireland and 21 in the rest of the UK, mainly in England. The Irish stations were on hills or SOTA summits and coverage was 'almost nationwide'.*

"We had a strong showing in relation to the number of net control stations relative to our size and number of licensed amateurs. Thanks are due to the clubs and individuals who braved the bad weather to set up these stations. Unfortunately, it turned out to be a very wet day, but this did not dampen spirits or activity and the feedback from participants was very positive, with many looking forward to the next event. It was noticeable that the use of FM enabled several recently licensed amateurs to join in with modest equipment. Many participants contacted several net control stations and were passed around other amateurs in the nets involved.

Fig. 1 is a map of activity from Ireland during the event.

10GHz first with Luxembourg?

In the last column, **Gus Coleman G3ZXZ** wondered whether he had made a first 10GHz contact

Fig. 1: A map showing the activity from Ireland during the recent 145 Alive event.
Fig. 2: A tractor bucket makes a useful variable height platform for working on antennas – Ed 2E0WWF installing Don's new 6m LFA Yagi.

between England and Luxembourg. Following a little investigation, Gus discovered that **Charlie G3WDG** had made an EME contact with LX several years ago. Gus now wonders if his contact is a first on tropo.

The 8m band

Listening on the 8m (40MHz) band from Gibraltar with a 5m wire connected to his IC-7300 via a 9:1 balun, **Kevin Hewitt ZB2GI** reports hearing EI2IP (IO52), G8JNJ (IO80), PJ4MM (FK52), SV1DH (KM18), 4X1BG (KM72), G9PUV (JO00), ON7YD (JO20), S59F (JN65), SV1DE (KM18), WM2XEJ (EM83) and ZR1ADI (JF95) – which is a very impressive log.

Roger Lapthorn G3XBM (Cambridge) says that with 2.5W to a low dipole he is regularly spotted on FT8 in the Caribbean and has made two-way contacts with PJ4MM and ZF1EJ. Roger says that although he has been spotted in South Africa and Canada, he has not made a two-way contact as yet. He says that although he objects to having to pay for access to the band, his inclination is to try the band for another 12 months from next April.

Paul Farley G7PUV (Sussex) who operates as **G9PUV** says that he has made a handful of contacts on the band, but nothing new. Unfortunately, the poor weather has kept the mast wound down for a lot of the month.

The 6m band

It's always frustrating when a contact fades out on you before it can be completed. Such is the way of things and of course, it might be dull if all contacts were straightforward! Nevertheless, here at **GW4VXE** (Goodwick), I was very disappointed to lose **Mike Harris VP8NO** before we could complete on 27 October. Mike was disappointed too! He said that it was the first time that he had heard G or GW on the band. A few days previously, I had heard **Bob VP8LP** coming through for a couple of periods. Fingers crossed there will be another opportunity. Both openings were around 1630UTC. The propagation was a mix of Es to the Med and then presumably, F2 from there. There have been other openings and I was lucky enough to work 3B8FA (LG89) and FR1GZ (LG79) on 28 October – again a combination of Es and F2. I was pleased to work the A25R expedition to Botswana on 29 October, who were audible for several hours at good strength although I haven't heard them since. Also worked on 29 October was V51WW (JH81). Other stations worked during the month were CX6VM (GF27), CE4MBH (FF44), LU4FW (FF96), LU9DO (GF05) and CX7FH (GF15) on 27 October and


2

a useful opening to Brazil on 1 November with two new grids from PU3MIP (GF49) and PY3SSZ (GF36).

Don G3XTT (Wells) has also had an interesting month and says that on occasion the band has sounded like 20m with the almost daily ZS, 7Q, V5, 3B9 and PY stations coming through. Don's son, **Ed 2E0WWF**, put up a new 6m Yagi for him, **Fig. 2**, and as Ed was winding the tower up to vertical, Don could see people calling A25R. Just as soon as the tower was vertical and the beam pointing in the right direction, Don could copy A25R and within five minutes they were in the log! Don says that he has seen the occasional VK decode as well as a YB station calling A25R. All on FT8 of course.

Roger Greengrass EI8KN (Co Waterford) wrote to say that the band had opened to Australia for several days around breakfast time. On 5 November, Roger heard and called VK6ZLX but he faded away, but fortunately Roger was then called by VK6TM. The QSO was completed and Roger was very happy with a 6m ATNO, grid and continent!

Keith Watkins G8IXN (Redruth) also emailed on 5 November to say that VKs were being worked on the band. Nothing was heard here!

Kevin ZB2GI worked a number of PY stations from the ZB2BU club station via TEP as well as a number of Es QSOs from his home station as well as V51WW (JH81) and ZS6NJ (KG33).

Stewart Cooper G4AFF (Norfolk) worked CX6VM for a new country on 5 October. In an opening on 27 October between 1839 and 1915UTC, Stewart worked LU1FAM, LU1FIN and LU5FF along with some PY stations. Next day, he worked 3B8FA at 1039 UTC for a new DXCC and then on the 29th, V51JH. Stewart says he was heard in VK6 for one period on Friday 3 November and Sunday 5 November, but didn't hear any stations to work. Also on 5 November, Stewart heard Ecuador but did not manage to make a QSO, but

was pleased to work VU2CPL at 1343 and HK3W at 1434 – two new DXCCs, which were confirmed within hours on LoTW. Stewart has worked 74 DXCCs on the band this year, compared to 59 in both 2022 and 2021. During the Aurora on 5 November, Stewart worked a number of G, GI and GM stations on SSB in IO65, IO66, IO77, IO85, IO86 and IO93 squares.

Steve Telenius-Lowe PJ4DX reports another good month on 6m. *"On 12 October there was a particularly good opening to Indonesia and, after making a few QSOs on FT8, I worked YB2MDU and YB2DX on SSB. YB2DX was a genuine 59 at a distance of 19,430km: quite remarkable! The same day 9M2DA was worked on FT8 for a new one on 6m. On the evening of the 13th XT2AW was also a new one.*

"On 15 October, the JAs were back! Many Japanese stations were worked via long path from 1323UTC onwards. ZS4TX was decoded once at 1356UTC, but no QSO. Once again the usual Indonesians were worked and then TO8FH (Mayotte) for another new one, plus 7Q7EMH and TR8CA. The following day several YBs and 9M2DA were decoded and later in the day 3B8CW and 3B9FR were worked for two more new ones, plus 7Z1SJ.

"On 17 October there was a fantastic long path opening to the Far East – the best yet – between 1300 and 1415UTC when, in addition to more JAs, four Korean stations – HL4GAV, HL3GOB, HL4CJG and DS4AOW were worked and a couple more heard, as well as DU6/PE1NSQ. To speed things up a bit I QSYed to 50318 FT4 and had an equally large pile-up on FT4. Later the same day 4S7AB, S01WS and PZ1EW were worked: HL and 4S7 being two more 6m new ones.

"The next new one came in the form of VP8LP on the 20th. 3D2AG was also worked, though not a new one. The following evening there was a good opening to the Pacific with VK4WTN at 2200UTC, followed by VK4KSY, FK8HA and FK8HM. On the 22nd E51WL on the North Cook Islands was worked: oddly enough I have worked the North Cooks several times on 6m but never even heard the South Cooks, which is supposedly far less rare.

"The 23rd was poor the whole day but in the evening D2UY and another new one, 9G5AF, were worked. Yet another new one, PY0FR was worked on the 24th. After more than a week there was another JA long path opening on the morning of the 25th, with good signals and many callers, though not as spectacular as the opening on the 17th.

"I took part in the CQWW SSB contest on HF over the weekend of 28/29 October so I have no idea what conditions were like on 6m then. The following day, though, VP8NO became the second Falkland Islands station worked this month.

"Into November and suddenly the band opened to Europe for a few days. On the 1st I worked several EA stations, two CT1s and EA9ACD and, on the 6th, several Italians plus 9H1TX and 9H1PA. On the 7th ZD7BG was worked and, as I am writing this on the 9th 7Q6M has been coming in at good strength for 90 minutes.

"So, with eight 6m All Time New Ones this has been a pretty good month on the Magic Band again."

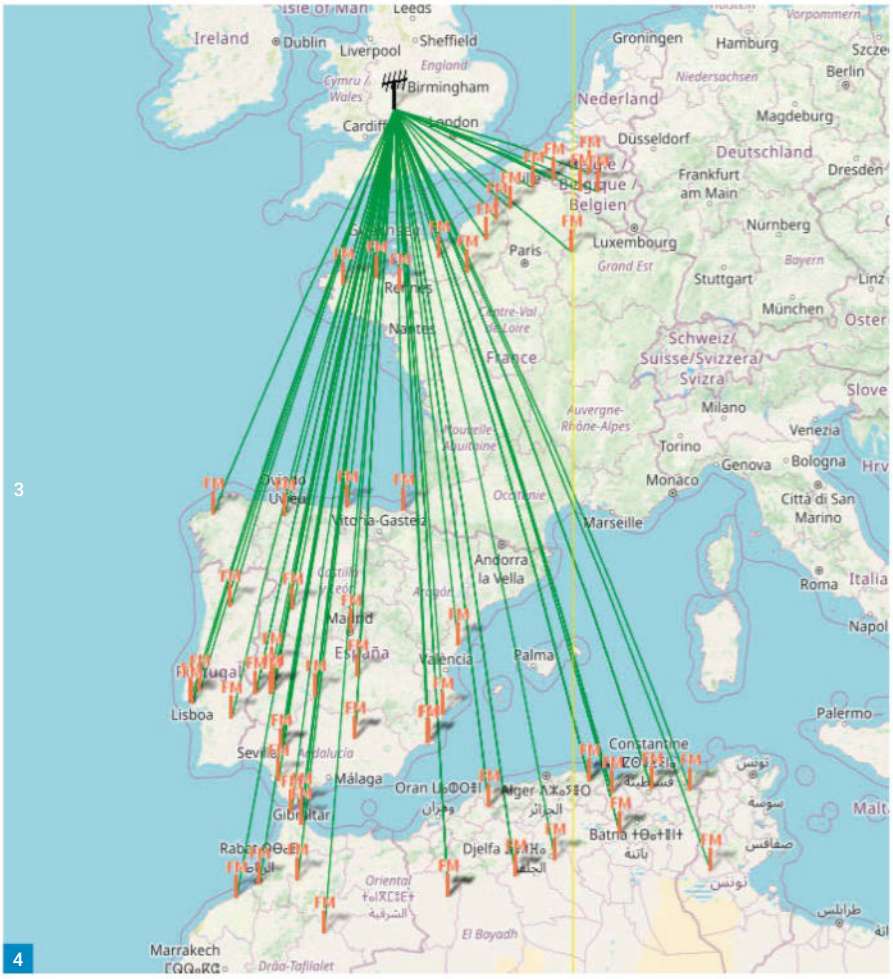


Fig. 3: One of the SSTV images transmitted from the ISS as received by Kevin ZB2GI.
Fig. 4: 30 days of FM Band II reception from Simon Evans in Gloucestershire.

The 2m band

Keith Watkins G8IXN (Redruth) wrote to confirm the new beacon F6KOH on 144.480 is from JN09CM, Le Havre. The beacon uses a halo antenna and is run by **Olivier F1PVU**.

Derek Atkin-Brown G8ECI (Grimsby) wrote to say that having moved house he is no longer in JO03 square, but just over the border in IO93. His new house doesn't have much space for antennas, but he has been listening on the band with a halo at 4m above ground and has been surprised what he has heard. He is currently in the process of stacking two halos for 2m at 7, along with a 6m halo at 5m. Derek says that he has already made a few QSOs on 2m.

Stewart G4AFF worked GM4GUF (IO85) and GI6ATZ (IO74) on SSB during the Aurora on 5 November with some nice new ones on CW including LY1R, SP4SAS and SP7VVB. Stewart says he is still putting his station together but there is a long way to go. He also mentions that he and **Pete G4CLA** had visited the D4C station on Cape Verde at the end of October for CQWW Phone and that Pete had tried to repair the D44FF/EA8FF 2m beacon but that unfortunately it needs a complete new PA palette.

Roger EI8KN also caught the aurora on 5 November and says although there was nothing exotic worked, it was interesting to note the strength of the signals.

Phil Oakley G0BVD (Great Torrington) was dis-

appointed to work only one station during the Marconi Memorial CW contest on 4/5 November, MW0BGL (IO81).

The 70cm band

Jon Stow G4MCU (Hockley) enjoyed the good conditions during the October UHF contest, working some good DX on SSB; highlights included HB9XC (JN37), DR9A (JN48), HB9IAB/P JN36) and F8KHP/P (JN38).

The 23cm band

Jon G4MCU worked DR9A (JN48) and F4KJP/P (JN29) on the band during the October UHF contest.

Satellites

Kev ZB2GI received a number of SSTV images from the International Space Station during the SSTV event held between 27 October and 1 November, **Fig. 3**. The topic was the first artificial satellite, amateur radio and school satellites. Kev used an FT-817 connected by a data interface to a Windows laptop running MMSSTV. Kev's antenna was a homemade 2m Yagi made from two TV rabbit ears antennas and two lengths of plastic trunking.

Patrick Stoddard WD9EWK (Phoenix) writes, *"On the satellites, GreenCube (IO-117) appears to now be the most popular satellite among the regular satellite operators. More and more are getting on. I'm working on my setup for that satellite, so I can add it to my list of satellites I work at home and away from home. The Ukrainian ship captain who also works satellites, **Yuri UT1FG**, has started working GreenCube while at sea. More grid squares for satellite operators".* Patrick also made a trip out to the DM52/DM53 grid line in southeastern Arizona recently, taking around three hours to get there and operated on several passes to give out those grid squares to others.

FM and DAB

Simon Evans (Twyning) says that in the last month there have been several Es openings and sent a map, **Fig. 4**, showing the spread of the openings. Simon observes that these E openings seemed to coincide with some of the major storms that have we have experienced. From my perspective it's interesting to see the MUF going into Band II in October – something that should be worth noting for 70MHz enthusiasts. Simon says that there is no DAB DX to report but Ofcom have allowed changes to the Sound Digital MUX on channel 11A allowing many more stations to use DAB+. In order to help those with DAB only sets, Ofcom have allowed some of the local MUXes to carry mono DAB versions of channels such as Absolute 80s and Planet Rock.

Adam Wisher (Cheltenham) writes, *"It's been a fairly interesting month in terms of out of season sporadic E activity on FM.*

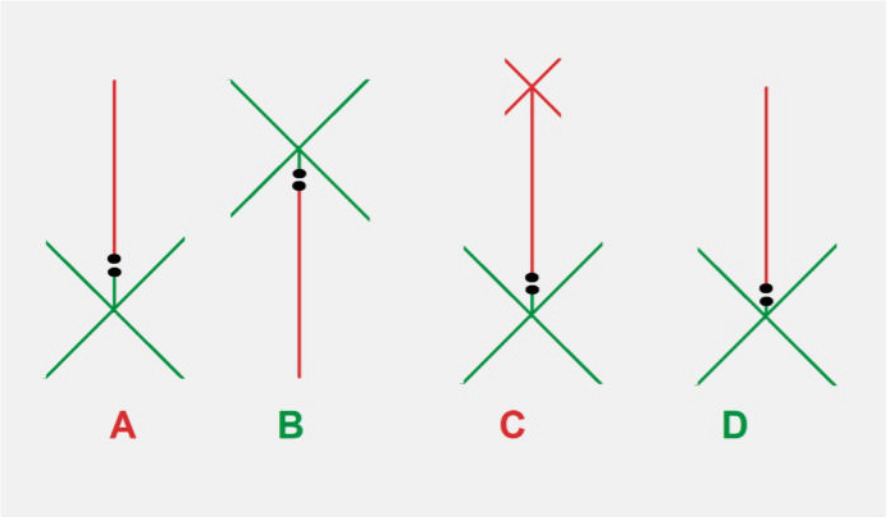
"I had the Azores on 89.5 (RTP Antena 1) and 87.7 (RTP Antena 3), both from São Miguel island on 26 October in the afternoon. 89.5 has made it here a few times before but it was the first time for 87.7, although it was very weak.

"There were also interesting conditions on 22 October, I didn't pick up anything directly here (I think the hills to the south of Cheltenham block things for me when the reflection angle is too low) but with Wenvoe off-air for maintenance, Ridge Hill on 88.6 ended up rebroadcasting sporadic E signals including RNE Radio Clásica for a while from a couple of transmitters in the south of Spain, with RDS being passed through at times".

Merry Christmas and a Happy New Year to all readers. Very many thanks to those of you who have contributed to the column this year – I really appreciate it and I always enjoy the diversity of your reports. **PW**

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

Billy McFarland GM6DX
gm6dx@outlook.com



Asymmetrical Hatted Vertical Dipole Antenna for portable operating

Billy McFarland GM6DX constructs a handy portable antenna for the HF bands.

Having a portable antenna that can be used on various bands, as well as having a small footprint, is going to be one of the most challenging type of antennas to design or construct. One of my favourite antennas that meets this criterion is the Asymmetrical Hatted Vertical Dipole. As the name suggests it is a dipole antenna that is loaded by means of a capacity hat. The drawing, **Fig. 1** shows the more common designs of an AHVDA. The one we are going to look at is design D. The design of this antenna means that we can assemble it using off-the-shelf parts, which is good for various reasons such as ease of assembly as well as replacing any parts in future.

The first thing you need to purchase is a feedpoint assembly from JPC antennas, as seen in **Fig. 2**. This feedpoint has 3 x 3/8th threaded socket connections, which will house long telescopic whips similar to that supplied by Buddipole antennas. You will of course need 3 x 5m long telescopic whips which have a 3/8th thread for connection. The photo, **Fig. 3**, shows the all the parts needed, the feedpoint, a basic camera stand as well as three telescopic whips and some coax. The total cost for these items is around £95 (less the coax) and all were purchased on Aliexpress. Total list of items needed for this antenna is as follows:

1 x Light / camera tripod
1 x JPC antenna assembly
3 x 5.6m long whips with 3/8th thread
3 x 12mm ring connectors
1 x ferrite ring (for RF choke balun)
1 x length of coax

The first stage is to get this pre-made feedpoint assembly ready for use with a camera stand. In order to connect this to a camera stand that uses a standard ¼ thread I obtained a camera stand connector (1/4 threaded socket) and glued it into the house using epoxy. This can be seen in **Fig. 4**. The next step is to have the ability to connect coax to the feedpoint housing, which in turn connects to the telescopic whips. At first I drilled holes and tapped the brass screw turns for an M3.5 diameter thread. However, after putting this connection to test, I found that it had poor stability and did not provide a good electrical connection. I looked for an easier solution where I ended up using 12mm ring connectors. I simply placed these over the thread of the telescopic whip antenna when being screwed into the feedpoint housing. This is easier to do and the electrical connection is solid. **Fig. 5** shows this connection.

Given the design of this antenna as seen in Fig 1, it requires two connections to the coax shield and one connection to the coax centre, all terminated with the 12mm ring connectors. So, I took two 100mm lengths of 16awg silicone wire (as that is what I had lying around) and soldered these to the coax shield. Once complete, you will have two connections for ground and one for the centre as seen in **Fig. 6.** This antenna will require the use of a choke balun at the feedpoint. So, when making your electrical connections it might be worthwhile creating a 'jumper' cable wrapped around a toroid that will allow you to connect any length of coax. A choked connection could look something similar to the drawing in **Fig. 7**.

That's all the hard work complete. The next stage is setting the antenna up and tuning if for each band. When first testing, I set up in a quiet location. I sat the tripod in situ and started to pull out the telescopic whips. The bottom two horizontal whips will be the same length as each other. However, they will always be shorter than the vertical radiating element. The overall size isn't that big considering the frequencies in use and you can see the overall antenna in **Figs 8** and **9** for the 20m band. I made several adjustments for all of the bands, 20, 17, 15, 12, 10, until I had a nice SWR sweep as seen in **Fig. 10.** I noted down all the adjustments made for the best SWR sweeps and after several hours of testing I noted the lengths for each frequency as seen in **Table 1**.

A few notes that it is worthwhile sharing. The first one is to try and have the feedpoint at least 2m off the ground. The lengths of the whips for the 20m band can sag easily and touch the ground, affecting the SWR. The attachment from the underside of the feedpoint assembly to the tripod can be weak. I would improve this assembly by attaching it to a board and then clamping board to the tripod as this will provide far better support. Finally, to adjust the tuning, try moving the vertical radiator up or down first before any adjustment is made to the radials. This antenna is small in size and can be packed away for that backpack operating or even the holiday style DXpedition. The cost is relatively low and the assembly is not that difficult. It covers a range of frequencies and offers the low angle take-off for working those DX stations. This is one antenna that I intend in putting to use on my next trip and I hope you have fun giving this antenna a go. As always, any questions please email me at **gm6dx@outlook.com**

Frequency (MHz)	Radiator (m)	Each Radial (m)
14.175	5.60	4.45
18.100	4.64	3.25
21.250	4.02	2.74
24.900	2.45	2.33
28.500	3.04	1.97

Table 1: Antenna dimensions

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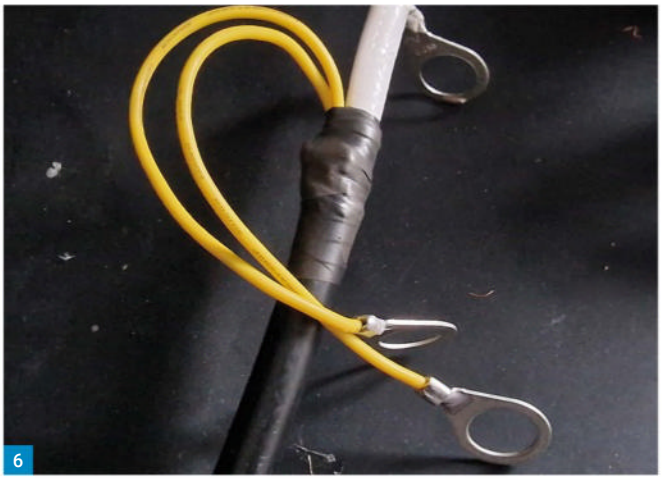
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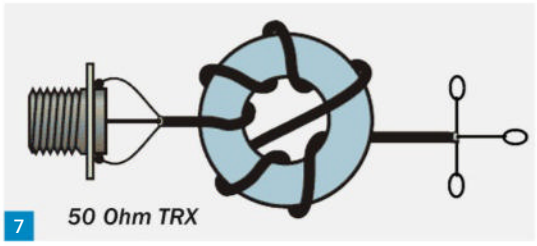
Fig. 1: Common AHVDA designs. Fig. 2: Feedpoint from JPC antennas. Fig. 3: The parts needed for the project. Fig. 4: Feedpoint glued to the tripod. Fig. 5: Electrical connection to the feedpoint. Fig. 6: Connections for ground and centre screen. Fig. 7: Using a choke.



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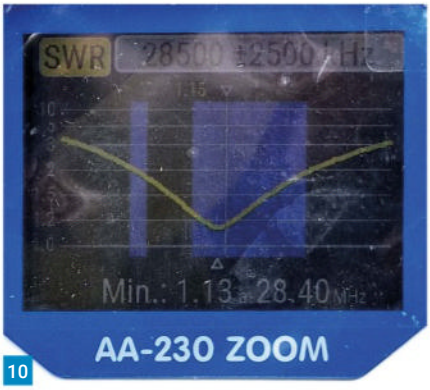

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Fig. 8: 20m band antenna. Fig. 9: Set up ready for use. Fig. 10: SWR sweep on the 28MHz band.

Practical Wireless Seasonal Quiz

Our thanks to **Bob Glasgow GM4UYZ**, editor of the excellent Cockenzie & Port Seaton Amateur Radio Club newsletter, for agreeing to our using questions from the monthly quiz.

1. In the 2-metre band plan, the frequencies from 144.994MHz to 145.1395MHz are allocated to
a. FM simplex channels b. FM repeater inputs
c. SSB and CW only d. Satellites.

2. This, Fig. 1, is a diagram of a
a. ground plane antenna b. Yagi antenna
c. 5/8 antenna d. Horizontal dipole.

3. The DC voltage across a resistor is 20V, while the current flowing through it is 10mA. What is the resistance of the component?
a. 2kΩ b. 12kΩ c. 20kΩ d. 200kΩ

4. When there is an EMC problem due to lack of immunity in the TV receiver, and no fault is attributable to the amateur station, it is the responsibility of the
a. RSGB b. **Amateur licence holder**
c. TV owner d. **Broadcast authority**

5. The value of a capacitor depends upon:
a. The area of the plates and the distance between them
b. The average thickness of the plates
c. The DC potential difference between the plates
d. The AC potential across the plates

6. A transformer:
a. Will change one alternating frequency to another
b. Will change DC voltage
c. Always has an iron core
d. Can only be used with AC

7. Which plug, in the drawing, Fig. 2, should be used to connect coaxial feeder to the transmitter output?
A. B. C. D.

8. The main mode of propagation for long distance contacts (DX) on the HF bands is by:
a. ionospheric reflection b. ground wave
c. meteor scatter d. direct wave

9. The Callsign GB0BSM would indicate that the station is a Special Event Station located:
a. In England b. In Scotland
c. In Wales d. Anywhere in the United Kingdom

10. When using single sideband on the 1.950-2.000MHz frequency band, the mode switch would normally be set to:
a. AM b. FM c. LSB d. USB

11. A filament bulb is placed in a continuous circuit with 12 Volt battery and glows. What is the effect if the battery is replaced with a 12 Volt alternating current source?
a. The bulb goes out.
b. The bulb will glow brightly and burn out.
c. The bulb will glow very faintly.
d. The bulb will continue to glow as before.

12. An amateur decides to change the frequency band of operation but forgets to check the antenna matching. An effect of this may be that the:
a. antenna is overloaded
b. wrong frequency is transmitted
c. transmitter may be damaged
d. transmitted signal sounds distorted.

13. If an FM transmission causes the picture of a TV receiver to disappear, this form of breakthrough is called
a. Under deviation
b. Cross-modulation
c. Image
d. Blocking

14. The screen of a coaxial cable must be properly connected to the body of a PL259 plug in order to
a. prevent water getting in
b. confine the signal within the cable
c. stop the cable coming apart
d. make a neat appearance.

15. The output signal of a VHF transmitter may contain many unwanted frequencies both above and below the carrier frequency. These unwanted frequencies are normally reduced by fitting a:
a. Low pass filter
b. High pass filter
c. Band pass filter
d. Band stop filter

16. A transmitter is set to a frequency of 1.96MHz. Which one of the following must be used to check for second and third harmonics?
a. An SWR meter.
b. A UHF receiver.
c. A general coverage receiver.
d. A radio frequency power meter.

17. A radio receiver is set to receive a signal of 14.1MHz and the local oscillator is set to a frequency of 13.6MHz. What will the intermediate frequency be?
a. 500kHz b. 13.6MHz c. 14.1MHz d. 27.8MHz

18. Which component, Fig. 3, conducts ONLY in one direction?
A. B. C. D.

19. The intermediate frequency of a superhet receiver is the:
a. The sum of the RF and the local oscillator frequencies
b. Difference between the RF and the local oscillator frequencies
c. Sum or the difference between the AF and the local oscillator frequencies
d. Sum or the difference between the RF and the local oscillator frequencies

20. Signals from a transmitter working on 3.56MHz are reported as causing interference over the whole of the FM broadcast radio band. This is probably caused by a harmonic of the RF signal getting into the
a. RF Amplifier b. 10.7 MHz IF amplifier
c. AF amplifier d. Power supply

Fig. 1

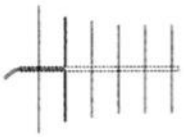


Fig. 2

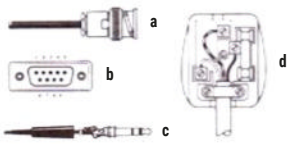
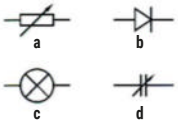


Fig. 3



The answers can be found on page 66

Merry Christmas

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HARDROCK-50 PA

As well as investing in a HARDROCK-50 PA, **Mike Richards G4WNC** continues his advice on using Node-RED for station control.

My trusty Hermes Lite 2 transceiver serves me very well most of the time, but there are occasions when I could do with a little more than 5 watts of RF. Looking around the available options, I settled on the HARDROCK-50 PA. This is a very well-designed 50-watt, HF to 6m PA with automatic RF detection and simple manual/auto band switching that requires a drive power of up to 5 watts. The HARDROCK-50 is an ideal match for the Hermes Lite 2. The HARDROCK-50 is based on an original design by **Jim Veatch WA2EUJ**, first published in the August 2010 issue of *QST* magazine. Although the HARDROCK-50 is supplied as a kit, all the surface mount components were preinstalled. As a result, all I had to do was fit the inductors and a few through-hole devices and assemble the parts into the case. In the standard kit, you must wind your inductors, but I took the easy route and bought pre-wound toroids from **Mychael Morohovich AA3WF**. I've shown photos of the PA in **Fig. 1** and **Fig. 2**.

As you can see, it's an elegant project. The PA uses four RD16HHF1 MOSFETs in the PA stage, each rated for 16 watts RF output. These are comfortably underworked in the HARDROCK-50, and the suppliers (HobbyPCB in the US) claim that the built-in protection can handle all loads from a full short to an open circuit without damage; I haven't tested this! To facilitate rig control the HARDROCK-50 rear panel has PTT and ACC sockets. The ACC socket can be set to communicate with either the Elecraft KX3 or the popular Yaesu FT-817 rigs to provide automatic band selection and transmit/receive switching. Also available is an automatic ATU kit and a QSK board for silent high-speed Tx/Rx switching. Both units fit inside the HARDROCK-50 case and I will probably add both over the next few months.

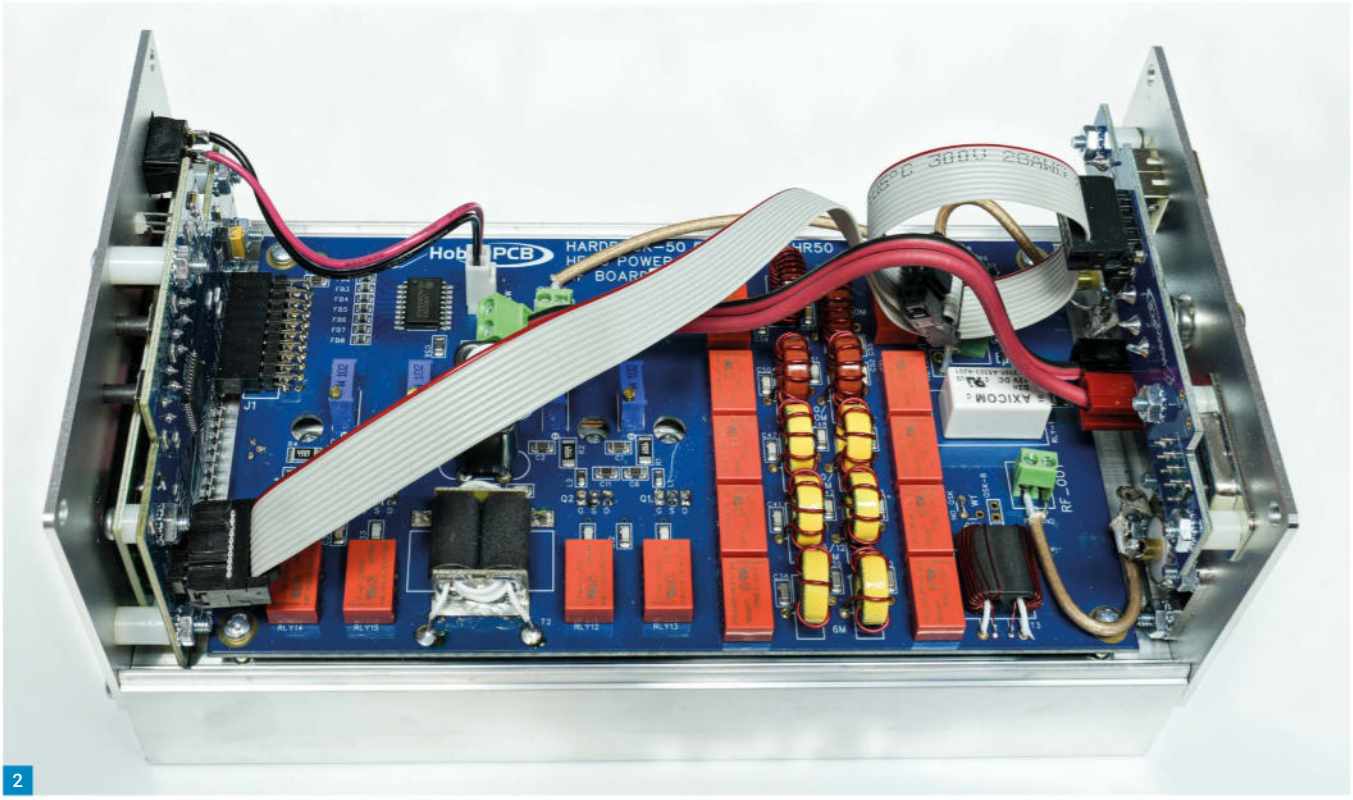
Node-RED rig control continued

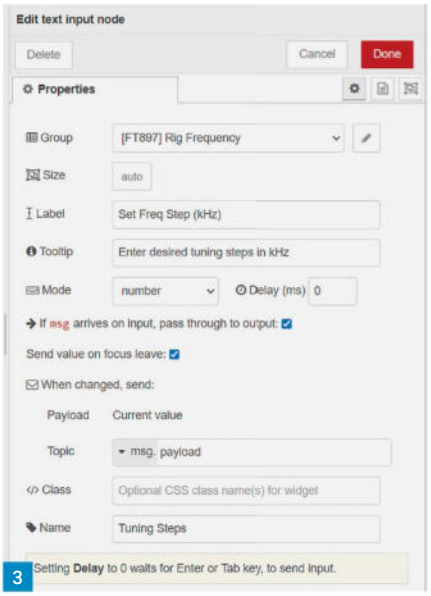
Last month, I showed you a very basic use of Node-RED to control the frequency of a transceiver via a web browser using the Hamlib rigctld utility installed with WSJT-X. I'll show you how to add buttons to the browser GUI (Graphical User Interface) this month. I'll also show how to add physical buttons and rotary encoders using Node-RED. This can be particularly helpful if you want to use Node-RED to control a remote transceiver. While I have included screenshots showing the completed flows, these can be difficult to read in the magazine, so I've shared the flows on the Node-RED website in the Flows section:
https://flows.nodered.org

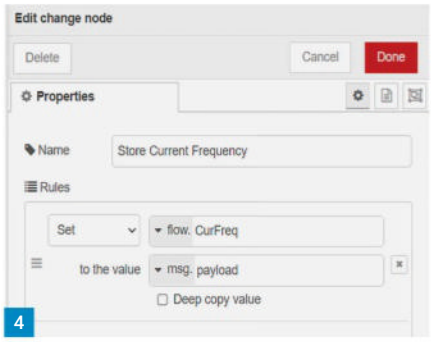
Just enter G4WNC in the search box to find all my shared flows. The flows are complete with a description and can be downloaded and imported into your Node-RED installation. In the examples, the FT-897 rig is connected to my main Windows 11 PC, but Node-RED and the button box are all running on a network-connected Raspberry Pi 4B. As Node-RED access is via a web browser, the device running Node-RED can be anywhere on the network. This makes it ideal for remote operations such as controlling the shack from the house or a remote location.

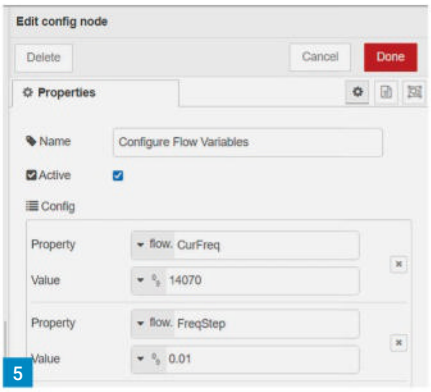
The first task is to add a couple of buttons to the GUI to increase or decrease the current tuned frequency. To do this, we need to create a couple of variables, one to hold the current frequency of the rig and the other to store the frequency steps we want to use when stepping the tuning. Node-RED has three variables we can use: context, flow and global. Context variables are only available within a function node, so they won't work for us, but flow variables are available from any node within the current flow, so are ideal for us. When building more complex Node-RED programs, several flows are often required, and that's when the global variables come into their own. The first thing we'll add to our GUI Dashboard is a second text input node that we can use to enter the desired frequency steps. Although this is a text entry node, you can change the Mode to number so that it only accepts digits. Two other required steps are, first, setting Delay to 0 to make the node wait until you press enter before passing the message. If you don't set this, the node will pass each digit as you type it. The second important step is to tick the box marked: "if msg arrives on input, pass through to output". We don't need this for the first example, but it becomes important when we start adding physical buttons. I've shown the completed node configuration panel in **Fig. 3**. The next step is to add nodes to store the entered frequency and steps into our flow variables.

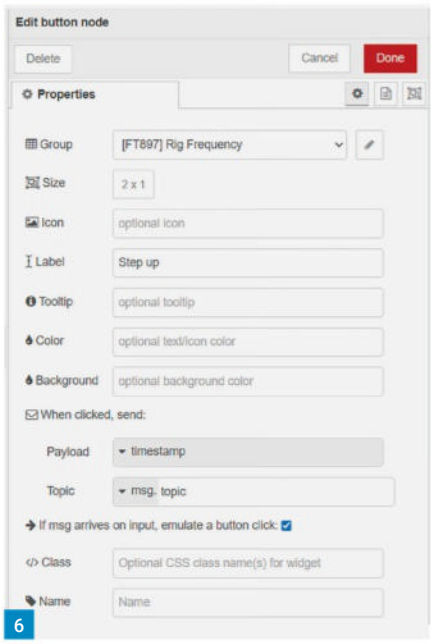
The simplest way to do this is to use Change nodes. In this example, the node takes whatever value is in the msg.payload and stores it in the variables flow.CurFreq or flow.FreqStep. I've shown the configuration in **Fig. 4**. We can enter the desired frequency and











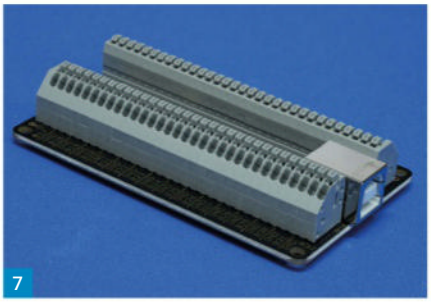


Fig. 1: HARDROCK-50 RF power amplifier. Fig. 2: HARDROCK-50 internal view. Fig. 3: Frequency Step Node configuration. Fig. 4: Node-RED Change node to store variables. Fig. 5: Node-RED Config node to pre-set variables. Fig. 6: Node-RED Button node configuration. Fig. 7: Leo Bodnar USB Button Box interface.

steps and store those in our flow variables. Next, we should add a Configuration node to prevent our flow from starting with unpredictable values in our variables. This will prime the variables with values of our choosing. The configuration node is not in the standard Node-RED installation, but you can install it as follows:

Go to the Node-RED menu (top-right, 3 horizontal lines)

Choose Manage Palette

Click the Install tab and enter "config" in the search box

Locate "node-red-contrib-config" in the

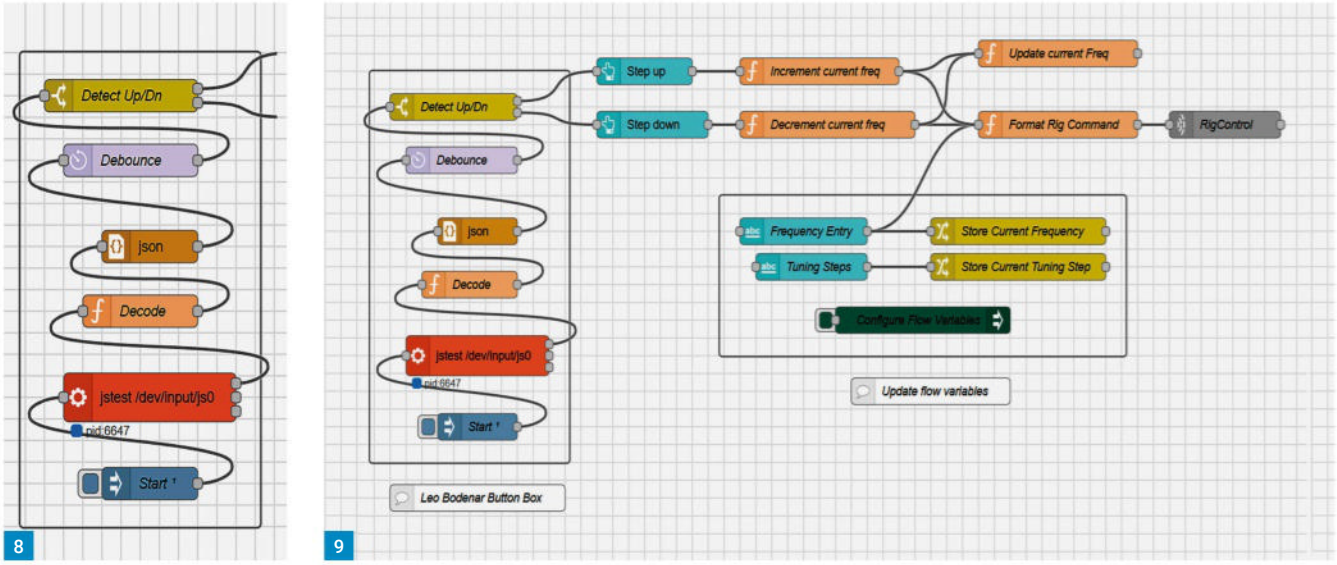


Fig. 8: Node-RED flow to utilise the USB Button box with a rotary encoder.
Fig. 9: The complete rig control flow.

results and click Install

This will install the new node, which resides in the function section of the nodes

Drag the new config node onto your flow and double-click to open the configuration. Please ensure you tick the Active button because this forces it to run at start-up. As shown in **Fig. 5**, you can set multiple variables using this node. To add a new value, click the tiny button marked "+add" at the bottom.

Having completed the preparation, we can add a couple of buttons to increase/decrease the frequency. Drag two buttons from the Dashboard section and drop them on your flow. Double-click to open the config panel and change the label in one button to Step-Up and the other to Step-Down. Ensure the "If msg arrives on input, emulate a button click" is ticked. You can leave the payload set to timestamp because we are not using the message content. In this case, a button press acts as a trigger for the following node. I've shown the config panel in **Fig. 6**.

Next, we need to use a line of JavaScript in a Function node to change the frequency by the chosen step size. The maths is simple, i.e. (current frequency + frequency step). Here is the practical code example:

```
msg.payload = (flow.get('FreqStep') + flow.
get('CurFreq')).toFixed(3) ;
return msg;
```

Let me explain this for those new to JavaScript.

msg.payload is the message that we're building to be sent from this node.

flow.get('FreqStep') is the method for recalling the value from the variable that holds our chosen frequency steps

flow.get('CurFreq') recalls the receiver frequency from our variable.

.toFixed(3) This limits the output from the calculation to three decimal places. It's necessary because JavaScript, like many programming languages, stores numbers in binary format. This can cause a problem because binary numbers cannot represent all decimal numbers precisely. Calculations involving these numbers can produce tiny errors resulting in many decimal places. A good example in decimal notation is 1/3, as this can only be shown as 0.333r with an infinite number of recurring decimal places. By adding: .toFixed(3), we are rounding up the number and limiting the decimal places. The disadvantage is that the formatting change also converts the number into a string, but we can quickly deal with that later.

return msg; sends the message from the node output.

Let's quickly move on to see how to add physical buttons and knobs to make a more complete remote-control solution. There are many ways to add controls, but my current favourite is to use the USB Button Box interface units from **Leo Bodnar**:

leobodnar.com

Leo makes some excellent accessories, including his very popular Precision Frequency Standard. The button box I'm using here is the BBI-32 unit, as shown in **Fig. 7**. This high-quality interface unit has push-fit connectors and uses standard joystick emulation, so it doesn't require special drivers. The interface works on Windows and Linux, including the Raspberry Pi, and provides up to 32 on/off buttons. However, the configuration can be changed using free Windows software from Leo. This lets you connect rotary encoders using two switch ports and a ground connection. Once configured, turning the control clockwise fires the first switch and anti-clockwise fires the second switch. For the Node-RED example we've covered here, we can use the rotary encoder to step the frequency up or down and create a manual tuning knob.

The initial problem is processing the button box signals so we can use them in our flow. Fortunately, a kind soul with the nickname Umochi has shared a flow that extracts all the buttons and axes from a standard joystick interface. I have adapted and simplified that flow for our purposes. I've shown the flow in **Fig. 8,** but here's a quick description of the blocks for those wanting to adapt it. I'll start my description from the bottom of Fig. 8. The Start node does what it says and sends a message to kick off the flow. Jstest is an Execute node that runs the program jstest on the Raspberry Pi. This program is designed to test joysticks and sends the status of every possible switch and axis whenever a switch is operated. The Decode node tidies up the formatting of the message and removes unwanted elements. The JSON node converts the processed message into a JSON object ready to be handled by Node-RED. Debounce slows the message rate from the joystick. I found that some rotary encoders had noisy contacts that created excess messages. The Debounce or delay node solves that. Detect Up/Dn is a Switch node that detects which way the encoder rotates. Clockwise rotation sends a message to Step up, while anti-clockwise triggers Step down.

If you're interested in using or adapting these flows, please feel free to download them. If you create something useful, then I encourage you to share it so we can all benefit.

Still no Raspberry Pi 5 at the time of writing, but it should be here by next month, and I'll be able to update you on its performance with Data Modes software. **PW**

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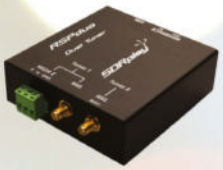

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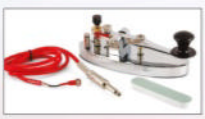

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Steve Telenius-Lowe PJ4DX
teleniuslowe@gmail.com


1

Lots to report

It's been a busy time on the HF bands as **Steve Telenius-Lowe PJ4DX** reports.

Welcome to the January *HF Highlights* and a very Happy New Year to all readers.

On 9 November some of Bonaire's radio amateurs got together for a dinner at one of the restaurants in downtown Kralendijk, **Fig. 1. Paul PJ4SON** has recently become active, mainly on 28MHz SSB, and **Ish PJ4ISH** is a new licensee who hopes to be active soon.

There were so many DXpeditions during the month under review, from mid-October to mid-November, that there's only space to give each the briefest of mentions.

The month on the air

When last month's *HF Highlights* was 'put to bed' on 11 October there were eight DXpeditions on the air simultaneously. **Yuris YL2GM** operating as **ZD9W** from Tristan da Cunha was on the air from 29 September to 22 October and made over 70,000 QSOs.

From Senegal, **Elvira 6W/IV3FSG** made 35,414 QSOs between 3 and 17 October. The W8S Swains Island DXpedition also closed on 17 October with 91,630 QSOs. TO8FH (Mayotte, FH), on the air from 10 to 22 October, logged 84,036 contacts. From Niue, E6AM was also on the air from 10 October and closed on the 23rd.

From Vanuatu, YJ0TT began on 26 October but by the time the Russian DXpedition Team started as A25R from Botswana the following day these were the only two major operations still on the air. That was all to change on 3 November, though, with the big surprise of the month: an operation from Socotra Island, Yemen, **Fig. 2**, by **Ken LA7GIA** and **Shani HA5DDX** as 7O8AD and 7O8AE respectively. This operation was only announced a day or two before the off and was a 'tent-and-generator' DXpedition using 100W stations and vertical wires on the beach. Also on 3 November, the Mediterraneo DX Club opened up from Cameroon as TJ9MD and (starting with a bang at 0000UTC on 5 November!) TX7L was on from the Marquesas Islands, part of French Polynesia but a separate entity for DXCC.

The 'big one' for November, 4W8X in Timor-Leste, began on the 7th and had tremendous S9+ signals here, on the opposite side of the world.

Meanwhile, the CQ World Wide SSB DX contest took place over the weekend of 28/29 October with great conditions on 28 and 21MHz, but reportedly very poor propagation on 3.5 and 1.8MHz. I put in a 21MHz single-band entry and made over 2700 QSOs in 16.5 hours, working 114 DXCC entities.

What to look for in January

The big one will be the TX5S Clipperton Island DXpedition, scheduled to take place from 17 January for 16 days. Clipperton is a French possession in the eastern Pacific, off the coast of Guatemala. This is a major expedition, with 16 experienced operators running high power to beams and verticals by the ocean, so signals should be good. See:

clip.pdxg.net

For those with a 160m antenna, or who can put one up for the weekend, remember the CQ World-Wide 160m CW contest, from 2200UTC on 26 January for 48 hours. I'm no CW contest operator but last year gave out the PJ4 multiplier to just over 100 stations, ending up as number 1 in Bonaire (no surprise there!) – though the certificate, **Fig. 3**, informed me that I was number 3 in South America, which *was* a surprise. For SSB operators, the CQ 160 SSB contest starts at 2200UTC on 23 February.

Readers' news

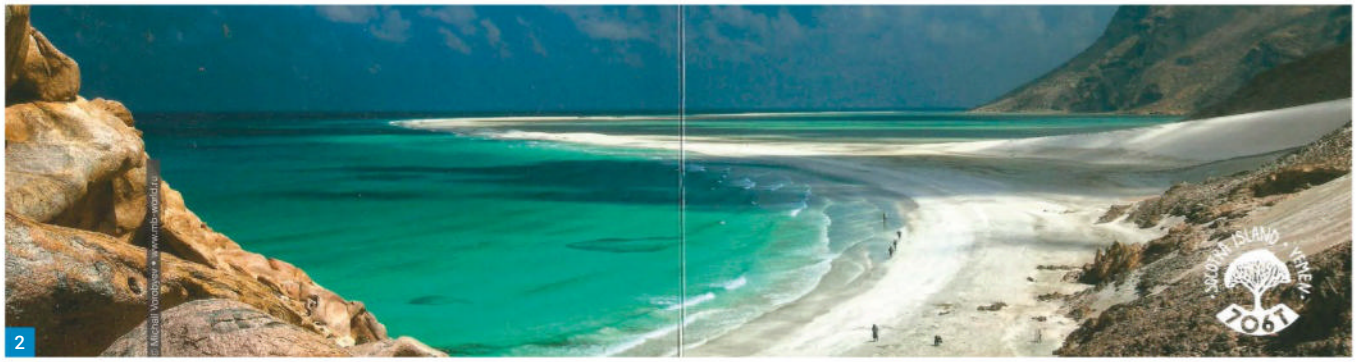
Simon Davis-Crane G7WKX will be returning to Majorca between 22 December and 1 January. *"I'll be active as EA6/G7WKX on HF, using SSB and digital (FT4/FT8). Activity will be holiday style, likely from POTA parks and maybe the odd SOTA summit* (**Fig. 4**) *if time allows. This year I will be taking the FT-891, along with dipoles for multiple bands,"* said Simon.

Reg Williams G0OOF reckons it was *"a very enjoyable month with plenty of DX to be worked... One DXpedition I spent a lot of time, early mornings and late afternoons, trying to work was T2C Tuvalu. They were having a hard time operating due to location, QRM and construction traffic. Operating was around the clock, all bands and modes so the operators were trying their best. Alas I failed to work them. W8S Swains was fairly easy to work, producing good signals on 10 and 14MHz. Very good operating keeping strictly to F/H mode. TO8FH Mayotte was worked on two bands with signal reports exchanged but no RR73. Club Log was checked for a possible confirmation but no luck there... E6AM Niue was managed on 14MHz. YJ0TT Vanuatu came on air later in the month: 10 minutes of calling on 14MHz and the QSO was completed with a confirmation later. Away from the Pacific was ZD9W Tristan da Cunha, worked on 7 and 10MHz."*

Martin Burch VK4CG sent a brief note with his log to say *"Thought I would get this one in early this time due to conditions being 'dead' over the last week here... I have only included one station from VK as this is a special event station."* This was VI7ALARA, operated by **Catherine VK7GH**, who I had the pleasure of meeting along with her husband **John VK7IO**, **Fig. 5**, when they visited Kota Kinabalu, where I was living at the time.

Jim Bovill PA3FDR thought *"The 10m band continued to be more open this month, with most of the activity on FT4 rather than FT8, not only during daylight hours but on some days well into the evening. During the second half of the month there were especially good openings to the western states of the USA. Other highlights included a new DXCC from Senegal (6W/IV3FSG) and some rarer countries, Sri Lanka (4S7AB), Fiji (3D2AG), the Faroe Islands (OY/MM0NDX), the Falkland Islands (VP8LP) and the Isle of Man (GD6ICR). Finally, I am always on the lookout for QSOs from my native country, Ireland, North and South. Normally I would not add these to my HF report, but I feel one does deserve a mention. It was from **Peter MI5JYK** from Glengormley on the outskirts of Belfast using only 5W. To quote him: 'There are very few MI5-prefixed calls active so we can be quite rare'."*

Etienne Vrebos OS8D has now activated 220 of the 2700 castles in Belgium and says *"I could try to work them all, 2500 still to do: it keeps me busy*



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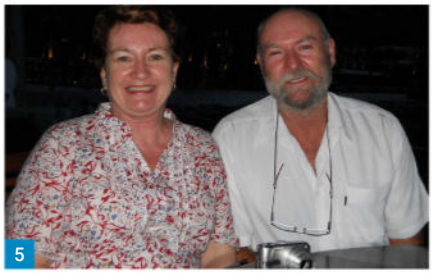

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Fig. 1: Clockwise from front left: Steve PJ4DX, Martin PJ4MM, Jan PJ4HOT, Peter PJ4NX, SWLs Ruud and Hans, Bert PJ4KY, Paul PJ4SON and Ish PJ4ISH (photo: Ish PJ4ISH). Fig. 2: Spectacular view of Socotra Island, from the 2012 7O6T QSL card. Fig. 3: It can be quite easy to win a CQ contest certificate (see text)! Fig. 4: EA6/G7WKX operating from SOTA summit EA6/MA-077. Fig. 5: Recently active as VI7ALARA, Catherine VK7GH with John VK7IO.

for the next 10 years or more!" Although Etienne worked many of the recent DXpeditions (see 'Band highlights' below), including ZL7/SP5EAQ, A25R and TO8FH, he also said that he *"tried to work several DXpeditions but still struggle with 'up 5 to 15' and the crazy world on the band when they appear. It's OK as for them it's the only way to hear somebody, but I've some difficulties to join the 'zoo'."* Despite the aurora, Etienne commented that on the morning of 6 November, with *"very bad propagation – space weather – I made my best* [portable] *activation ever on 40m, even Cuba called me, CO7NL... at 0630UTC. Got him with a nice 56."*

Carl Mason GW0VSW said *"I decided to replace my G5RV as it has been up a few years now and survived some very bad weather. The new one is slightly higher with 450Ω twin lead instead of 300Ω and fed with RG-213. So far it seems to be performing well and slightly better on some bands compared to the old one. I entered the CQWW SSB contest and managed 140 QSOs in a few hours the second day. Hard going with 5W but I enjoyed the challenge. I heard plenty of US and South American stations but could not work them... I'm quite pleased with the results but disappointed I could not do better with SSB."*

Owen Williams G0PHY reckoned that *"the euphoria from working W8S* [last month] *did not take long to wear off. I've managed contacts with three of the recent DXpeditions: TO8FH, A25R and TJ9MD, but T2C got away. At the start of the DXpedition they were strong on 14MHz in the mornings but they seemed to neglect SSB somewhat.*

"During the CQWW phone contest I did two 6-hour stints at the Shefford club's contest station, G3B. The first session was on Saturday morning from 0600UTC. We started on 14MHz but changed bands to 28MHz and conditions were excellent. We worked stations in Alaska, Australia, China, the Indian Ocean, South America and the Caribbean. The second session was until 6.00am on Sunday morning. I've done this spell before and we've usually been on 7MHz but this time we stayed on 14MHz. The band was open to South America and the Caribbean the whole time and at about 3.00am we worked a ZL. Later T2C was heard very faintly calling CQ but P33W was providing strong co-channel interference. We did manage to work both stations on Chatham Island in quick succession. YJ0CA on Vanuatu was another strong signal but by this time I was losing the will to live and we failed to break the pile up! The station setup of a K3 transceiver, Acom amplifier and SteppIR beam obviously helped us maximise the propagation and it was a bit deflating to return to the home station and return to the usual struggle to break pile-ups. [However,] *yesterday I managed to start decoding FT8 signals so a whole new world awaits."*

Kev Hewitt ZB2GI reported that he and Gibraltar Amateur Radio Society members **Rodney Pereira ZB3P, John King ZB2JK, Ronnie Payas ZB2RR**, club regular **Mike Wilson G4GOU** and 33 enthusiastic Scouts activated ZB2FFG from Wellington Front Fortification, **Fig. 6**, during October's Jamboree On The Air. The Scouts were from the 1st/4th Marquis of Milford Haven's Own group, **Fig. 7**.

Tim Kirby GW4VXE operating as **GW4MM** wrote that his big news was that he put up a DX Commander Signature 9 vertical, covering 10 – 40m, including the WARC bands. *"Performance seems to be excellent and it is a real joy to have a resonant antenna on the WARC bands. My only concern is how well the antenna will survive the storms that the west Wales coast endures! The good news is that the antenna is very light and easy to drop down if bad weather is on the horizon."* Tim has enjoyed making QSOs with the various DXpeditions *"generally when the pileups have run down a bit!"* He said he enjoyed working GB2BD, celebrating 100 years of the BBC in Aberdeen. The station was put on by members of the Aberdeen ARS and located in the foyer of the BBC building, **Fig. 8**. The Controller

Fig. 6: The ZB2FFG JOTA location. Fig. 7: Scouts at ZB2FFG operating SSB. Fig. 8: The GB2BD station in Aberdeen (photo: Allan GM4ZUK).

of BBC Scotland passed a greetings message to **Chris Tran GM3WOJ**.

28MHz beacons

Neil Clarke G0CAS began his regular 28MHz beacon report for October with a look at the world-wide beacon network on 28200, in which 18 beacons transmit for 10 seconds in their allocated time slot. All 18 transmit in the three-minute cycle. 4U1UN (New York) was heard on ten days from the 18th, when transmissions recommenced. W6WX was logged on 18 days. Both VE8AT and KH6RS were heard for the first time this sunspot cycle on two and seven days respectively. From South America, LU4AA and OA4B were received every day while in Oceania VK6RBP was heard on 22 days and ZL6B on seven days. ZS6DN was logged on 25 days. From the Middle East, 4X6TU was logged every day except the 7th. On eight days in October all ten USA call areas were heard. As expected, the W6 and W7 call areas were more difficult to hear, with the W6 area logged on 21 days and W7 on 14 days. No beacons were heard from North America on the 21st or 29th. In Greece, SV5TEN 28189, SV2RSS 28265 and SV6DBG 28269 were heard every day along with SV2HNE 28201 on 28 days.

Sporadic E occasionally took place throughout the month with the best openings occurring on the 19th and 22nd.

Band highlights

From this issue, in order to give these band reports more meaning, a new code system is being introduced. The two letters in brackets following the reporter's callsign mean the following:

"**Q**": Most or all QSOs were made using **Q**RP power levels;

"**M**": Most or all QSO made with **M**edium power (100W or less);

"**H**": Most or all QSOs made with **H**igh power (more than 100W).

"**S**": **S**ingle-element antennas (vertical, dipole, end-fed etc) used on all bands;

"**B**": **B**eam used on 14 to 28MHz bands (Yagi, quad, Hexbeam etc, anything with two or more elements).

Reg G0OOF (MS): 7MHz FT8: ZD9W. **10MHz FT8:** W8S, ZD9W. **14MHz FT8:** E6AM, W8S, YJ0TT. **18MHz FT8:** UA9SHH. **21MHz FT4:** JA4FKX, VP8LP. **28MHz FT4:** 8J1RL.

Martin VK4CG (MS): 7MHz SSB: K3EST. **14MHz SSB:** CN3A, F4IVV, K3LR, KH6J, OG1F, T2C, VI7ALARA. **21MHz SSB:** JE1CKA, SM5INC. **28MHz SSB:** 3D2AG, DV7MIS, K7DXX, VR2AN.

Jim PA3FDR (MS): 7MHz FT8: 9Y4DG. **10MHz FT8:** K0IDX. **14 MHz FT4:** JR0WZR, OY/MM0NDX, RI0SP, W8KF, YV5JLO. **14MHz FT8:** BD8AHICR, MI5JYK, PW8BR, UN7JO, VA3TPS, ZL4AS. **18MHz FT4:** K8CW, YE1DO. **18MHz FT8:** 3D2AG, 4K3ZX, A71UN, JA1QOW, ND6H, UA0SDX, VE2KTF, YB8XOB. **21MHz FT4:** 5Z4VJ, A61DI, BA5CJ, CX3DDO, JN1RFB, LW5DR, UN7CBY, VA7AQ, W0OVX, YB3CUG. **21MHz FT8:** AX37EUDXF, BA3KY, VK1MA, YC3CYK. **24MHz FT4:** JG1RVN, KY7M, UN9FF, VP8LP. **24MHz FT8:** K6XX, RU0AX, PY5QW. **28MHz FT4:** 6W/IV3FSG, 9K2HN, BG8GAM, JF1SQC, K7BG, KP4AH, RA0CGY, ZS4ZO, ZZ5WCB. **28MHz FT8:** 4S7AB, HI3A, JA8CJY, JV1A, N6PE, TI2MOT, ZS4JAN.

Etienne OS8D (HB): 7MHz SSB: CO7NL. **14MHz SSB:** 3W9A, B0A, UN/OH7O/P, ZL7/SP5EAQ. **18MHz SSB:** 5X3K, AL7KC. **21MHz SSB:** 5X3K, BD7BM. **24MHz SSB:** 5W0LM, FS/AC4LN, FY5KE, HS0ZOA, PV8AL, TO8FH, V4/N2HX. **28MHz SSB:** 4K50DHC, 4L2M, 5X3K, 6Y1V, A25R, AP2N, CX3AT, E21AZ, EP2C, ET3AA, EX9A, FM5BH, HI8HRD, HK3C, HS0ZEX, JR4ABB, KP4PR, LO7H, NP2X, PJ4G, PJ4SON, PS0F, PU5BIA, TI5VMJ, TJ9MD, TO8FH, TR8CA, V31XX, VU2DSI, YC2DBW, ZP0X.

Carl GW0VSW (QS): 3.5MHz FT8: EW6BZ. **5MHz FT8:** W4UEF. **7MHz FT8:** TF5B. **10MHz FT8:** NP4TX. **14MHz FT4:** KC2NJ. **14MHz FT8:** A61DI. **18MHz FT8:** 5A1AL, 9Z4A, A25R, A65D. **21MHz FT4:** K9NN. **21MHz FT8:** 9Z4A, A25R, WW1WW. **21MHz SSB:** CN3A. **24MHz FT8:** A25R, CO2DL, CX1VH, D2UY, HI8S, PY2SAO, VE9UN. **28MHz FT8:** A71UN. **28MHz SSB:** P33W.

Owen G0PHY (HS): 14MHz SSB: 8P5A, VK3DAE. **21MHz SSB:** 8P5A, PJ4K, TJ9MD, V26B, V47T. **28MHz SSB:** A25R, TO8FH.

Kev ZB2GI (MS/MB): 14MHz SSB: W1ABW. **24MHz FT8:** KK8MM, WP4U. **28MHz SSB:** JS2LGN, K6YRA, R9FE, VA7VOL, XE2SMG. **28MHz FT8:** 4L7CE, AD7Z, VA6EA, WP4PJE, XE3ISS.

And as **ZB2FFG (MS): 21MHz SSB:** NR2Q. **28MHz SSB:** PP5KJ, W5AC.

Tim GW4MM (HS): 7MHz CW: UN7CW, VE3EJ. **10MHz CW:** A25R, VP9/AA1AC, Z68XX. **10MHz FT8:** VK9QO. **14MHz CW:** KH6LC, T2C, VK2BJ, XQ6CF. **18MHz CW:** A25R, HQ9A, TJ9MD, TO8FH. **18MHz FT4:** 4W8X. **21MHz CW:** KH6LC, VK6T, VU2TMP. **21MHz FT8:** 7O8AD, A25R. **24MHz CW:** 4K50DHC, 4L4DX, 5R8AL, 9N7AA, A71/RN1B, TO8FH, V31XX, VP5/WQ7X. **24MHz FT8:** A25R. **28MHz SSB:** PJ4K, W3/M0DXR. **28MHz CW:** A25R, CX5FK, PZ5CO, S01WS, TJ9MD, UN5G, V26AG, VK2GR, VP5/WQ7X, XQ6CF, ZA1F. **28MHz FT8:** A25R.

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 March issue the deadline is 11 January. 73, Steve PJ4DX. **PW**

1

Setting up a new antenna

Keith Rawlings G4MIU continues with his new antenna installation, before offering an update on AN-SOF.

Keith Rawlings G4MIU
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Last month I started describing how I intended to plan my new antenna systems at my home QTH. With the retirement of my Scam 40 40ft pump-up mast I intended to replace it with a lighter and more manageable LMA-L 33ft Portable Mast, which I obtained from Moonraker. I also ordered a pair of TK-12 heavy duty mounting brackets and mast clamps for it. The LMA mast was to go back into the same position that was occupied by the Scam 40. This was against the house wall in a small corner where the garage attaches to the house.

My first task was to clear an area of junk that had collected in the corner after the removal of the old mast. I then gave it a quick power wash to remove the grime the wind had blown into that corner. As this was drying I collected together the tools and bits and pieces I needed to fix the brackets to the wall. I had in my collection of odds and ends some M8 anchor fixings, which would be suitable to fix such a lightweight mast to the wall.

These are of the variety where the threaded part is a stud and not a bolt. I preferred this as I could set the stud to just protrude from the tapered end of the fixing so as I tightened the nut the stud would protrude from the front and not the back of the fixing as it would with a bolt. The stud can then be cut off to length once the brackets are fitted.

Firstly, I had to mark where I wanted to drill the holes. Ideally these needed to be in the centre of the brick, away from edges and mortar joints. To make things difficult, the bricks used in my house have holes in the centre. However, to my good fortune the holes in the brackets just matched the sections of the brick that were solid, but only just, **Fig. 1**. It did mean that I had to go close to the edges of the brick. This was not ideal but as the mast is not heavy and would not be left up in windy conditions I accepted the situation.

I started with the top bracket and chose to mount it as near to the top of the lower mast section as I could, which was just over head height. I held the bracket up with a spirit level balanced on it and made marks where I wanted the holes, **Fig. 2**.

It is important that the holes are of the correct size and in this case the fixings required a 14mm hole. I have a Makita SDS hammer drill and used a 14mm SDS drill bit to make the holes. I have found it beneficial to start holes in brickwork without using the hammer option. This enables a dimple to be made in the brickwork, which prevents the drill bit from wandering as it may do when directly using hammer.

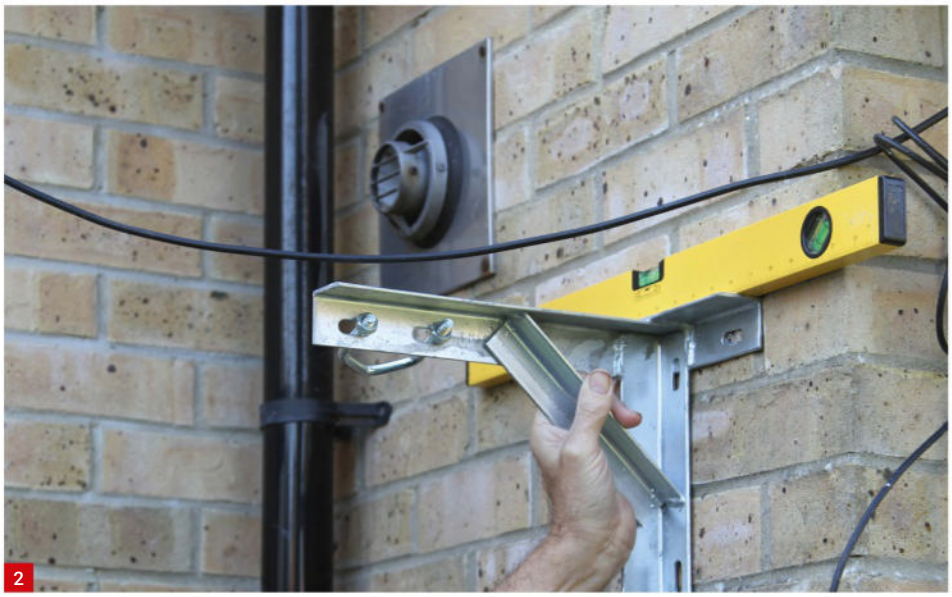
Once a suitable dimple had been made I switched to full hammer and drilled the hole to the required depth. In this case, as the Makita drill is quite powerful, I did this in one go but for smaller drills, using a series of smaller drill bits to make pilots holes makes life easier. The fixings were then inserted into the holes level with the face of the bricks, the bracket put into place and the nuts on the studs tightened just enough to be able to tap the bracket square while using the spirit level to check that all was level.

Once I was happy, I tightened the nuts to a point that nothing was going to move but not too much to crack the brickwork. I then used a plumb line to ensure that the bottom bracket was exactly in line with the top one. The bottom bracket was then fixed in the same way as the top one, **Fig. 3**.

I should state that in this instance the brackets are not taking the weight of the mast, the bottom of which is resting on a base that elevates it off the ground to avoid damp. This has allowed me to use wall fixings that are smaller than I would have used had the mast be in an elevated position. Another option I could have used in this case was resin instead of the expanding fixings, as I did with the bracket of the larger Scam 40 mast. However, as I had just about used the last of my canister of resin when filling the holes from the previous installation, to save money; I used what I had to hand.

In some situations it is possible to drill through a wall and out to the other side, in which case bolts or studs and a supporting plate may be used to spread the load of the brackets.

I had initially thought to make my own brackets but to be honest it was easier to buy them and



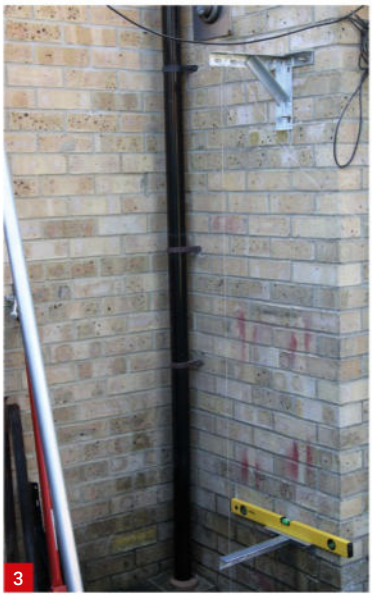


Fig. 1: Hollow house brick showing left, the closeness of the fixing to the outer edge, and right the possibility of fixing into a void.
Fig. 2: Measuring up the top bracket.
Fig. 3: Both brackets fitted and the use of a plumb line. Fig. 4: Upright, pretty much!

they were galvanised too. What I didn't consider when making my purchase was on what side the flat face of the brackets would be. As you can see from Fig. 2 this face is towards the building. For me it would have been better for it to face the other side so that the mast would then be on the garden. This would make it easier for me to place the mast into position.

This is not a major consideration for the LMA mast but I want the option to swap over to a 2in aluminium scaffold pole in this position as well. This will have a base that will allow the pole to pivot at the bottom so I can let it down onto a trestle to access the antennas. To achieve this I will probably have to remove the brackets and take them to the workshop to weld a couple of plates on to them. These will be drilled to take the U-bolts. This is a shame as the brackets in their present form have a nice coating of galvanise on them, which will have to be disturbed when welding. Anyway, as it stands the LMA should do what I'm asking of it.

My next task in the antenna planning operation was to put some wire back up in the air. My problem now is with 10m being open most days I have a yen to try a two-element beam again. I had one that I made when I lived with my parents. This design, with a hefty wooden boom, came from a long-lost copy of the ARRL's *Beam Antenna Handbook*. I fancy spending time making another one of the same design but it would be a bit too heavy for the LMA mast. What if I made an 'ultra-light' version? I had a look around and I have enough bits of wood and some small diameter aluminium tube that could be used. A quick check on the RSGB EMF calculator demonstrates that I could make a two-ele beam compliant in that position using 100W as long as it was over 5.5m high.

I will see how I get on and if I make any progress, I will report back next month.

AN-SOF Antenna Simulator Update.

In their ongoing task of improving their software AN-SOF have released a further upgrade. The latest update is to Version 8.70 and has a number of enhanced functionalities. The focus has been on both Input and Output Data Improvements to refine user operability and offer greater flexibility.

Input Data Improvements:

Solid Surfaces with Thickness: V8.7 introduces the capability to model solid surfaces, not just wire grids. These solid surfaces are composed of conductive strips that can have a defined thickness. This enhancement opens the door for more realistic simulations, enabling modelled surfaces that are not infinitesimally thin. While, at present, these solid surfaces may appear as 'skeletons' in the AN-SOF workspace, work is being undertaken on developing an interface to visualise them more realistically.

Material Selection: There is now an added a feature that allows the selection of material for wires, grids and surfaces from a list of metals. This selection automatically sets the resistivity. Also included is a 'Custom' option to set the resistivity manually.

Substrate Dielectric Materials: There is now an integrated list of dielectric materials added into the Substrate ground plane option. Materials such as FR4, RT/Duroid, and Rogers RO slabs are now readily available. This means that the permittivity is automatically set for the chosen material, simplifying the design process.

Output Data Improvements:

EIRP Compliance: Compliance with electromagnetic field regulations is paramount. To assist users in this regard, Average and Peak Effective Isotropic Radiated Power (EIRP) has been added to the Power Budget table. These values are presented in both Watts and dBW, and can be plotted against frequency. This feature enables users to evaluate whether an antenna model adheres to the maximum EIRP limits stipulated by regulations.

AN-3D Pattern Enhancements: Visualising the 3D radiation pattern lobes has been made easier. The AN-3D Pattern app now includes up/down buttons, allowing you to effortlessly resize the antenna relative to the radiation pattern. This feature enhances the ability to grasp the antenna's directional properties.

Axial Ratio: Recognising the importance of polarisation analysis, AN-SOF have introduced Axial Ratio in dB and dimensionless formats. This figure helps users to determine the polarisation of the field by providing the minor-to-major axis ratio of the polarisation ellipse. Perfect circular polarisation is indicated by an Axial Ratio of ±1 (with +1 representing right-handed and -1 representing left-handed polarisation), while linear polarisation is characterised by an Axial Ratio of 0. Additionally, AN-SOF offers both right and left circular components of the field.

S11 in Decibels: Responding to the specific needs of users in microwave frequencies, AN-SOF have added S11 in decibels to plots and tables. This addition, along with the already available VSWR, offers valuable insights for RF analysis of antenna bandwidth.

This 'latest' release came out at the beginning of November last year (such is the lead time to magazine columns!). I have had a short time to evaluate the new additions and they have been found worthwhile. It is nice to note that AN-SOF have quickly followed up their information on using the software for EMF compliance calculations with added features to assist in these calculations, **Fig. 6**.

Fig. 5: The finished job. Fig. 6: AN-SOF Power Budget Table section showing EIRP.

ON5AU SK

Just as I had completed this month's column I learned of the sad news that **Marcel ON5AU** became a Silent Key at the end of October 2023. Readers may remember that I reviewed his book *Advanced Antenna Modelling* and the accompanying titles *Practical Antenna Models Vol 1-3* in *PW*.

I never worked Marcel over the air but we did exchange a number of emails regarding antenna modelling and his books on this subject in particular. Marcel also authored a five-volume set of books entitled *Ham Radio Antenna Collection* and also a four-volume set of books called *Radio Waves Propagation*. I know that Marcel was also in the process of adding to the *Practical Antenna Models* range.

I don't know if Marcel's passing will affect the availability of his current titles, which are available on Amazon. It may be that they are 'print on demand' so will stay available. Marcel also made a large quantity of **L B Cebik's** work available on his website so that all of this important information remained online and free to access.

Dual-band antenna

David M0BGR wrote a letter to *PW* regarding the simple dual-band antenna from the October 2023 edition. He questions the use of imperial dimensions in the design and the use of a PL259 on the base of the antenna. As **Don** alluded in his reply, the original design being American was in inches and therefore I kept with these dimensions so readers could easily compare the dimensions of my version with the original.

Regarding the use of a PL259 David seems to have misunderstood the point that, as described in the text, the antenna was designed to fit on a Panorama clip-on mount so that it could be easily located in any suitable position and this mount is fitted with an SO239 making the use of the suggested Type-N impossible.

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

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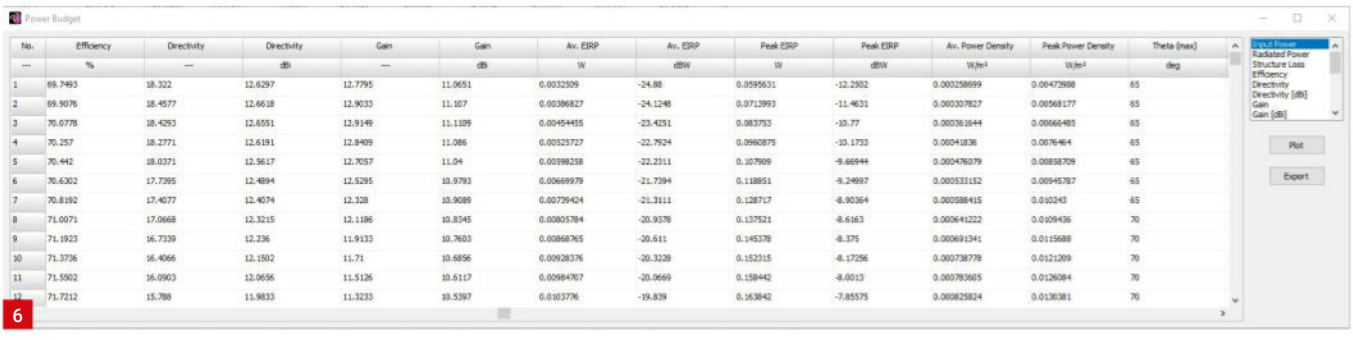

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Colin Redwood G6MXL
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The 15th PW 70MHz Contest: Results 2023

Colin Redwood G6MXL presents the results of the 2023 contest.

Generally good weather, albeit with a rather cold northerly wind in part, greeted those who ventured out portable for the 15th *Practical Wireless* 70MHz Contest on Sunday 24 September 2023. The 23 entrants made a total of 400 contacts with 76 different stations in 15 different squares, **Fig. 1**.

Low power section winner

Wayne Dabrowski MW0LKX/P operated from IO82KL and won the low power section using a Yaesu FTdx10 transceiver and a 6-element PowAbeam antenna. Wayne showed the benefit of operating to the end of the contest by working OV3T in Denmark with just 10 minutes until the end of the contest, and was the only entrant to do so.

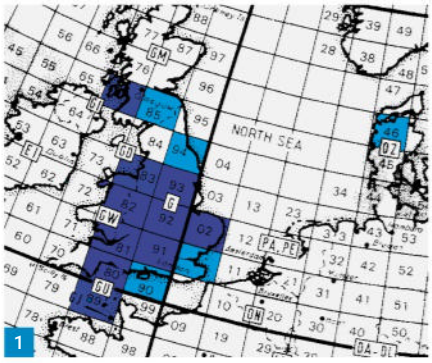
Open section winner

Gloucester Amateur Radio & Electronics Society G2HX/P were the winners of the high-power section. They used an Icom IC-7300 with a Gemini 4 amplifier feeding a 5-element Quad antenna. Full details of the results can be found in the tables in this article. As usual certificates will be sent to all the leading stations and leaders in each square.

Weather

Several stations commented on the weather. In some cases, stations who would have preferred to operate portable, elected to stay at home. **Derek G3WAG** said, *"The weather forecast for the contest day was possible rain and very high winds. Which resulted in me operating from the home QTH. This together with very poor conditions, resulted in my very poor score. Furthermore, I gave up after an hour as I could only hear the locals I had already worked (with one exception). Which is a real shame as this is one of my favourite contests."* Some of those who ventured out had to contend with very inclement weather. For example, **Max Townend G4SDX** said, *"The weather was very bad at that altitude and I had winds and driving rain reaching 30mph at times. This limited the height at which I could raise the antennas on the mast to about 4.5m. This didn't help with take-off, and I feel I could have worked a few more stations had the mast been at its full 8m height."*

Despite the strong winds at over 400m above sea level, **Richard Constantine G3UGF/P** managed to operate from his van, **Fig. 2**. He described the wind as extreme. His van frequently rocked as the only parking was almost broadside to the shifting wind across open countryside for some 20+ miles. He found that his heavy-duty mast secured by six pegs and three guys, wasn't safe to be at full height – 3 metres AGL was the safest thing to do. As a result, he found no improvement on last year.



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Square	Name	Call	No. entries
IN89	Chris Rees	GU3TUX	1
IO75	Roy Kavanagh	GM5LOW/P	1
IO80	SADGITS	G4RLF/P	2
IO81	Gloucester ARES	G2HX/P	2
IO82	Wayne Dabrowski Hereford ARS	MW0LKX/P	3
IO83	Warrington ARC	G0WRS/P	1
IO91	Stewart Wilkinson	G0LGS/P	6
IO92	Northampton RC	G8LED/P	4
IO93	George Max Townend	G4SDX/P	2
JO02	Fred Handscombe	G4MBC	1

Table 1: Leading stations in each square.


2

Fig. 1: Map showing locator squares of stations that entered (in dark blue) and other stations worked (light blue).
Fig. 2: Richard Constantine G3UGF's station in IO93AS.

Description	Name/Team	Callsign
Low-Power Winner	Wayne Dabrowski Hereford ARS	MW0LKX/P
Open Winner	Gloucester Amateur Radio & Electronics Society	G2HX/P
Leading Single Operator	Wayne Dabrowski Hereford ARS	MW0LKX/P
Leading Multi-Operator	Gloucester Amateur Radio & Electronics Society	G2HX/P
Leading English Station	Gloucester Amateur Radio & Electronics Society	G2HX/P
Leading Welsh Station	Wayne Dabrowski Hereford ARS	MW0LKX/P
Leading Scotish Station	Roy Kavanagh	GM5LOW/P
Leading Channel Island Station	Chris Rees	G3TUX

Table 2: Leading stations

Conditions

Richard Constantine G3UGF/P found that signals were spasmodic and struggled just to make the same number of contacts as the previous year, in a shorter space of time. He felt that, *"Only a few stations across the South appeared to spasmodically turn northwards"*. Richard compared notes with a friend and suggests this was also his friend's experience. Richard continues, *"Contacts came almost exclusively in an arc from SSE to SSW"*. He tried many times to work GM4CXM in Glasgow on CW but conditions proved just too poor to complete a scoring contact. He noted that, in years past, GM and GI were not a problem to work. Despite the poor weather conditions, **Simon Pryce G0EIY** managed to work twice as many stations as last year.

Equipment

Increasingly stations are using transceivers that incorporate the 4m band rather than using a separate transverter with a 10m or 2m transceiver. Max Townsend G4SDX was one such station. He used a Yaesu FTdx10 transceiver, **Fig. 3**, with a pair of home-made antennas, both from DK7ZB designs. In addition, he used a vertical end-fed half-wave antenna, with an in-built pi-tank matching circuit, which gives excellent performance, at a little over 2.1m in height. Most entrants used a Yagi antenna with two to six elements, **Fig. 4**.

Logging

Logging accuracy was generally good with just a few points deducted during adjudication. The few errors that occurred were either mis-copying locators or assuming the report received was 59 when in fact it was something different.

2024

The 16th *PW* 70MHz Contest is provisionally booked for 22 September 2024. I am expecting the rules to appear in the September 2024 issue due in the shops mid-August 2024. Let's hope for better weather in 2024!

Congratulations & thanks

Congratulations to the 2023 winners and on behalf of all entrants a big *"Thank You"* to all stations that participated. **PW**

Fig. 3: Max Townsend G4SDX's Yaesu FTdx10 incorporates the 70MHz band.
Fig. 4: The 3-element Yagi being checked at the Warrington Amateur Radio Club's portable location.
Fig. 5: Stewart Wilkinson G0LGS/P station in IO91AU.

Pos	Call	Name	QSOs	Squares	Score	Locator	Transceiver	Antenna	Ht. m asl
1	MW0LKX/P	Wayne Dabrowski Hereford ARS	44	14	616	IO82KL	Yaesu FTdx10	6-ele PowAbeam	476
2	G4RLF/P	SADGITS	31	11	341	IO80WX	IC-7300 + Pre amp	5-ele Yagi	277
3	G3UGF/P	Richard Constantine	12	7	84	IO93AS	Icom IC-7300	4-ele Yagi	0
4	G0OIW/P	Mark Palmer	13	5	65	IO91LO	Yaesu FT-710	Dipole	230
5	G0WRS/P	Warrington Amateur Radio Club	11	5	55	IO83PG	Icom IC-7300	3-ele Yagi	131
6	G8ZAX	Rob Rees	8	4	32	IO91RF	K3+Trans4m	4-ele LFA	87
7	G0EIY	Simon Pryce	8	3	24	IO82OR	Kenwood TS-2000 + TVTR	5-ele LFWA HB	70
8	GM5LOW/P	Roy Kavanagh	3	1	3	IO75QN	Yaesu FT-817ND + TVTR	3-ele Yagi	120

Table 3: *PW* 70MHz low power results table

Pos	Call	Name	QSOs	Squares	Score	Locator	Transceiver	Antenna	Ht. m asl
1	G2HX/P	Gloucester ARES	44	11	484	IO81WU	Icom IC-7300, Gemini 4 Amp.	5-ele Quad	273
2	G8LED/P	Northampton Radio Club	36	13	468	IO92LH	Icom IC-7300 + HB PA	6-ele LFA @ 12m	135
3	G0LGS/P	Stewart Wilkinson	36	10	360	IO91AU	Icom IC-7300	5-ele PowAbeam	250
4	G3LVP	Ken Eastty	26	10	260	IO81WV	Kenwood TS850 + HB Xvtr + HB 4CX250 PA	6 ele	0
5	G4YPC	Peter Croucher (Guilford & District RS)	21	10	210	IO91RH	Icom IC-7300	4-ele Jaybeam	26
6	G4MBC	Fred Handscombe	17	9	153	JO02FH	Yaesu FT-101D	7-ele	18
7	M0NDA	NDARC - Nuneaton And District ARS	17	8	136	IO92FM	Icom IC-7300	4m Squalo	142
8	G5JJ/P	Taunton & District Amateur Radio Club	14	8	112	IO80MV	Yaesu FTdx10 (Barefoot)	InnovAntennas DB-664 dual band 3-ele Yagi	210
9	G4SDX/P	George Max Townend	12	8	96	IO93AP	Yaesu FTdx10	DK7ZB 2-ele Yagi HB + End-Fed Vertical	340
10	G4CIZ	Tony Wallbank	13	7	91	IO91FG	HB Single Conversion rig + BLF177 PA and BF981 RX front-end	4-ele Yagi	125
11	G1MZD	David Barlow (Northampton Radio Club)	11	6	66	IO92NB	Yaesu FT-857D	5-ele G4CQM	98
12	GU3TUX	Chris Rees	10	6	60	IN89VR	Yaesu FT-710	HB9CV	70
13	G3WAG	Derek	10	5	50	IO82PB	Icom IC-7300	5-ele DK7ZB	75
14	G0RMG	Roy Jones	4	3	12	IO92AG	Icom IC-7300	Philips WDT 70 4M Half Wave Vertical	130
15	M0HPI	Guildford And District Radio Society	2	1	2	IO91QG	Icom IC-7300	Quarter wave groundplane in loft	73

Table 4: *PW* 70MHz open section results table

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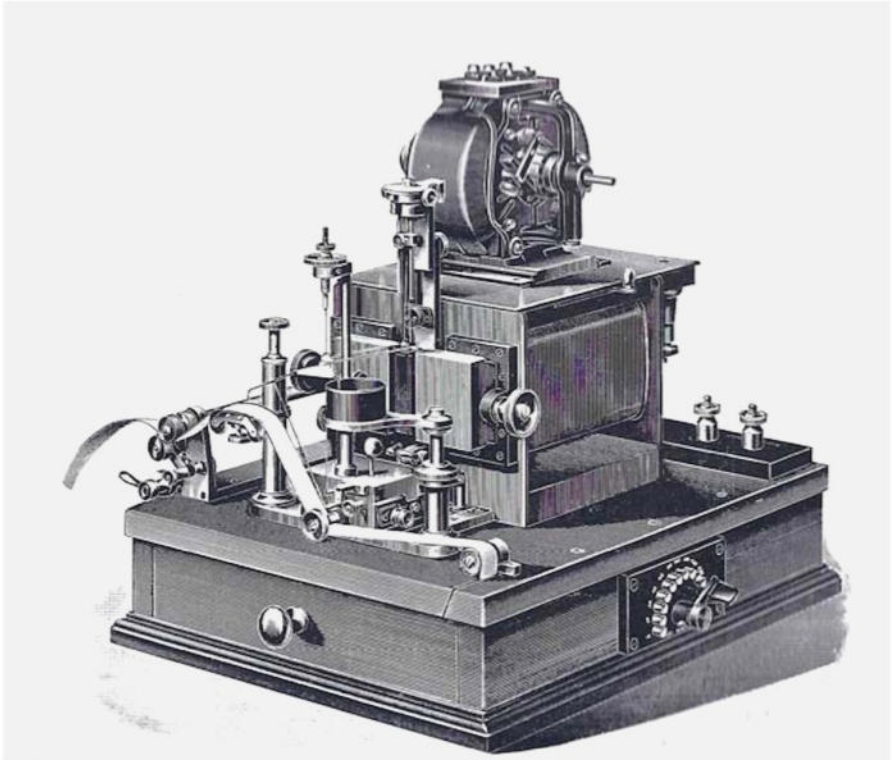

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Morse before radio (Pt II)

Tony Smith G4FAI concludes his account of how Morse was sent and received before the advent of wireless.

The receiving instrument on the first successful Atlantic cable of 1858 was a sensitive mirror galvanometer. This detected variations in a very small current received through the cable. The variations moved a finely balanced needle combined with a mirror, to deflect a ray of light onto a screen. From these deflections one operator read off the signals and called them to a second operator who wrote them down in longhand.

Later, a slightly better system was described by **George B Prescott**, in his *History, Theory, and Practice of the Electric Telegraph*, 1864:

"The operator, who watched the reflection of the deflected needle in the mirror, had a key, communicating with a local instrument (a register) in the office, which he pressed down or raised, as the needle was deflected; and another operator occupied himself in deciphering the characters thus produced upon the paper... the fastest rate of speed over the cable could not exceed three words per minute."

This in turn was replaced by the Siphon Recorder, **Fig. 1**, which printed the incoming signals on tape. They were sent by operation of a twin lever 'cable key', not to be confused with the simpler railway tapper key described in Part 1. Depression of the left key sent a positive signal (a dot) to the distant receiver, and the right lever sent a negative signal (a dash). The signals were of equal length and were identified by an undulating line of Morse either side of a continuous line on the tape. In use, the key was not vigorously tapped as on landlines, but was gently pressed to take account of the slowness of the system.

A deflection above the line represented a dot, and a deflection below the line a dash. In the example illustrated, **Fig. 2**, some of the letters can be easily identified by an inexperienced eye, but others clearly needed interpretation by a skilled operator.

Morse in the armed forces

Until WW1 the British Army and Navy used similar Morse signalling techniques and procedures. The Army used the sounder and the single-needle in the Crimean War 1853-1856, using cable laid on the ground, **Figs 3** and **4**, erected overhead or in trenches, depending on terrain and circumstances. By routing telegraphic traffic through civilian landlines across Europe, and the newly laid cross-channel submarine cables, forces at the front were able to communicate directly with the War Office in London for the first time.

In the South African War of 1879-1880, they experimented with the telephone, invented a few years previously, in the hope that it might be used to receive audible Morse signals over lines too bad for sounder operation.

This idea led to the 'vibrating sounder', **Fig. 5**, possibly the first purpose-built Morse buzzer signalling instrument, invented in 1881 by **Lieut. Philip Cardew, R.E.**, at the School of Military Engineering at Chatham.

Preece and **Sivewright**, in *Telegraphy*, new edition 1905, commented that *"where other instruments fail from weak signals through faults of insulation on the lines, the vibrating sounder has proved eminently successful"*.

Disadvantages

The 1908 edition of *Instruction in Army Telegraphy and Telephony*, Vol. 1, also described the advantages of the vibrator system. It stated that the telephone receiver was very sensitive, and only a very small current was required; the circuit could be divided into two parts, enabling ordinary (ie, sounder) Morse currents to pass through one path, and the vibrating currents through the other at the same time.

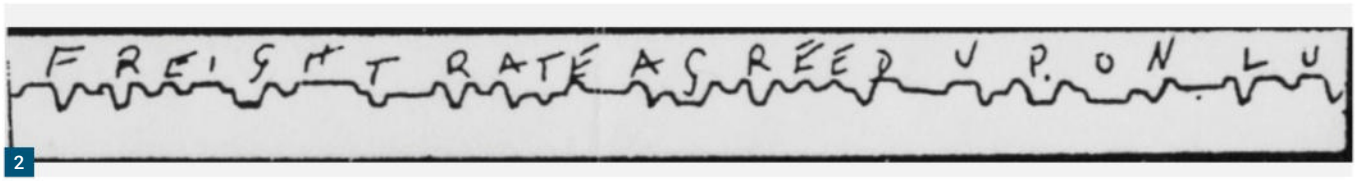
Its disadvantages were that the vibrating currents induced similar currents in all neighbouring wires, producing buzzes in any telephone receiver connected to them, so that several vibrator circuits could not be worked by side for any distance. It was more tiring to operate than ordinary sounder circuits; and the operating speed was slower.

The greatest problem came to light in the trenches in WW1, when it was realised that induction or earth leakage from the vibrating signals were being intercepted and read by the enemy. The problem was overcome by the Fullerphone, invented by **Capt. A C Fuller**, RE, in 1915.

Buzzers not widely adopted

Morse enthusiasts today, familiar with tone reception of Morse code, may wonder why landline telegraphy continued to receive code by 'clicks' and other sounds, and did not convert to tone signalling when suitable systems became available. The simple answer seems to be that the existing instruments provided long-established reliable communication, and it was generally believed that reading tone signals was more difficult than reading sounder or other signals.

Change would also have involved large-scale re-training of staff and the expensive installation of new equipment at a time when, faced with faster alternative systems such as the teleprinter, and ever expanding and improving wireless services, the writing was already on the wall for landline Morse. The vibrating sounder if it



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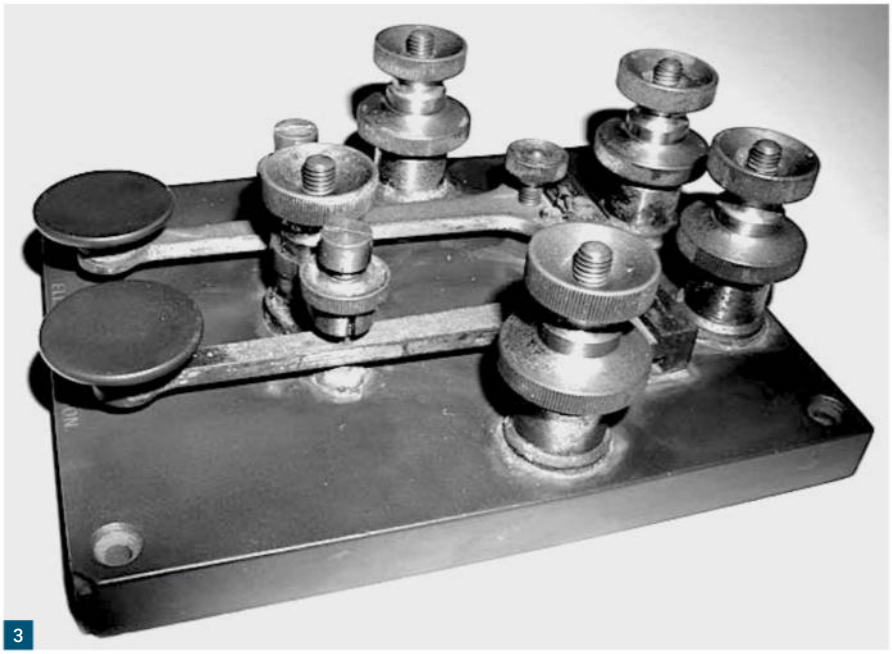
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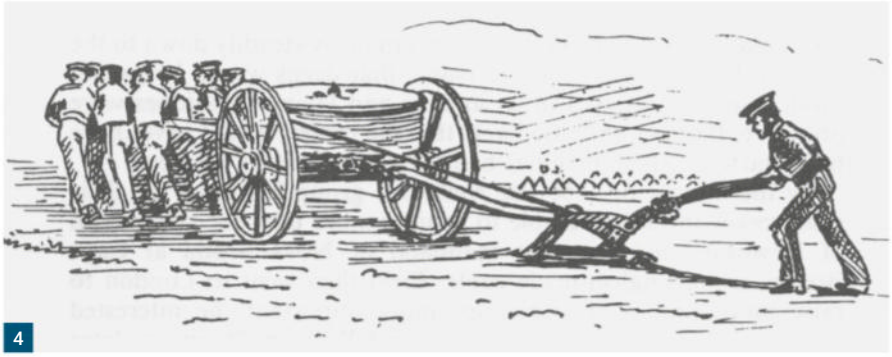
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Fig. 1: Siphon recorder. (Public domain). Fig. 2: Siphon recorder tape. Fig. 3: Cable key. (Doug Palmer K4KEY.) Fig. 4: Cable laying in Crimean War. (Public domain).

could have been improved, pointed the way, but it did not come into universal use. The Fullerphone was, however, widely used by the Army up to and during WW2.

The heliostat and the heliograph

The Heliostat, introduced into the British Army in 1875, reflected sunlight to a distant station, using a shutter to spell out the Morse symbols.

The heliograph, **Fig. 6**, was an improvement on the heliostat, signalling Morse with an oscillating mirror instead of a shutter. Ranges varied according to the size of the mirror. A five-inch model had a range of 50-70 miles in good atmospheric conditions.

It needed at least three operators, one to call out the message to be sent or write down the message received, one to operate the heliograph to send a message, and one to use a telescope to read the messages from the distant station and call them out to the transcriber.

Signalling speed was up to about 12 words per minute, depending on the skill of the operator and weather conditions. The last known operational use of the heliograph by the British Army was at the siege of Sollum Hayata during the desert campaign of the Eighth Army in 1941.

Navy landlines

It seems strange that the Navy required its signalmen to have an ability with sounders or buzzers, which were land-based systems. Nevertheless, all larger vessels were equipped with a Morse key, a sounder, a Post Office (P.O.) relay, and appropriate batteries.

Each ship was also equipped with 1000 yards of cable for submarine work and a further 1000 yards for shore work, to connect to the Admiralty or P.O. landline network when moored or anchored in port. Permanently anchored Depot ships had 10,000 yards for submarine work and 10,000 yards for shore work.

P.O. operating procedures were followed and every ship had a two or three letter Call Signal, being as far as possible an abbreviation of the name of the ship.

The Navy also used two P.O. telegraph relays with telephone receivers, achieving the same performance as the Army's vibrating sounder by adjustment of the tongues of the relays to make them vibrate when the sending key was depressed.

The sending speed required in the qualifying examinations for naval signalmen, using the sounder or buzzer for a period of five minutes, varied through different ranks from 12 words per minute (wpm) for a Boy or Ordinary Signalman, to 21 wpm for a Chief Yeoman of Signals. Similar speeds were expected from army signallers of comparable ranks.

Signal lamps

The Navy first used flashing lamps for signalling in 1867 but did not use Morse with them until about 1874. They evolved in two different classes, those controlled by mechanical means and those controlled electrically. In the former, the Morse effect was obtained by a hand operated disc or shutter in front of a light source. In the latter a Morse key was used to make and break the circuit.

The light sources used included candles (in the earliest days), burner and wick using mineral sperm oil, acetylene, electric arc, and electric lamp.

Long range signalling was by searchlight with a detachable shutter. Depending on atmospheric conditions, a 2,000-candlepower arc lamp could be read on the horizon by the naked eye.

More modest lamps were used for closer ship-to-ship signalling, and non-directional signals were provided by yardarm blinkers operated by a Morse key.

The army used a range of signal lamps, some held by hand, some spiked into the ground, or housed in carrying cases. They were operated at speeds of 8-12 wpm and could communicate over distances of up to four miles in the field. For longer range work the heliograph was used.

Fig. 5: Transmitter, Vibrating. (Public domain). Fig. 6: Heliograph. (Harpers Weekly, May 1879). Fig. 7: Morse flag signalling used by the army and the navy. See explanation in text. (Public domain). Fig. 8: Naval shutter, used for ship to shore communication. (Public domain) Fig. 9: Collapsing drum. (Public domain).

Flags

Morse signalling flags were used by both the army and the navy. The flags were coloured white with a blue horizontal stripe for use with a dark background and dark blue for use against a light background.

To send Morse, a single flag on a staff was waved above the head of the signaller as shown in the illustration, **Fig. 7**. The 'at rest' position is shown at 'A'. For a dot, the flag was moved to 'B' and returned to 'A'. For a dash, it was moved to 'C' and returned to 'A'.

The sending speed required by examination for all ranks of naval signalmen, in both flag waving and flashing lights, was 12 wpm. The same applied to army signallers. The signalling distance of the flags was up to four miles.

Ship to shore

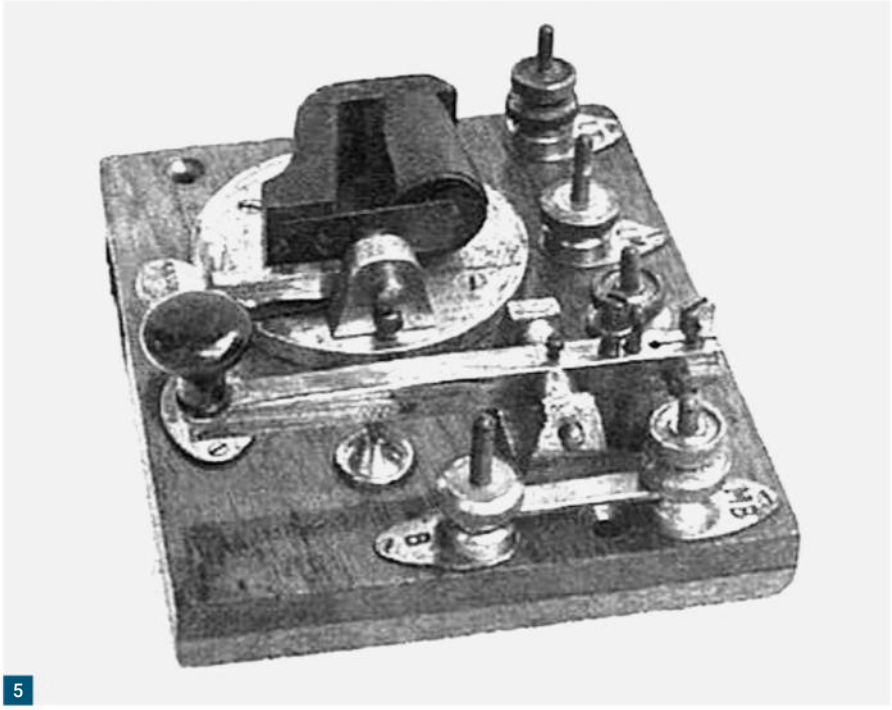
Two other methods, principally for naval use, were shutters and collapsing drums. Shutters, **Fig. 8**, were used at permanent stations on-shore to send messages to ships close by at sea. They consisted of a series of connected shutters, each working on a pivot, which moved simultaneously when activated by a handle.

When the shutters lay horizontal nothing could be seen by a distant viewer. When they were vertical, they represented the appearance of a large object to the viewer, thus enabling dots and dashes to be signalled.

Used against a dark background, the shutters were painted white and the framework black. Used against a sky or light background, they were painted black and the frame white. Shutters could be any size according to the distance over which they were required to transmit signals. The *Admiralty Manual of Signalling* recorded that the largest size in use had 72 feet (presumably square feet) of surface and was visible over a range of 10-15 miles in clear weather.

The collapsing drum was another naval signalling device, again chiefly used between ships and shore, erected 15 or 20 feet above deck or ground. It was self-collapsing and operated (extended) by hand. It was omnidirectional in use, and could communicate with other ships or land stations in any direction.

The illustration, **Fig. 9**, shows the drum extended by the line C. This represented the exposure of a light and the second figure, with the drum collapsed, represented an obstruction of the light, enabling Morse to be sent as with a signalling lamp.



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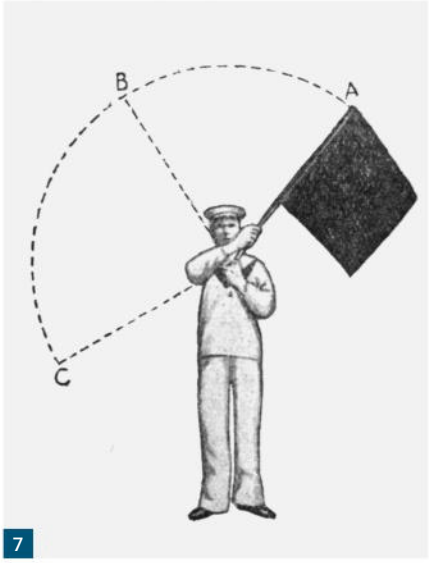
Telegraphists needed

By the end of the 19th century Morse telegraphy was in use in one form or another in almost every part of the world. There was a continuous demand for potential telegraphists capable of learning the code and mastering the various ways of sending and receiving it.

The industry provided training for new recruits, commercial training schools offered courses and qualifications, and many books were published on how to learn the code and become an expert telegraphist.

As in later years, when amateur enthusiasts took up wireless telegraphy, hobbyists, in America at least, had a similar interest in landline telegraphy. They may have been seeking to master the code in the hope of obtaining employment in the industry, but undoubtedly some strung up wires across town to communicate with their friends, just for the fun of it.



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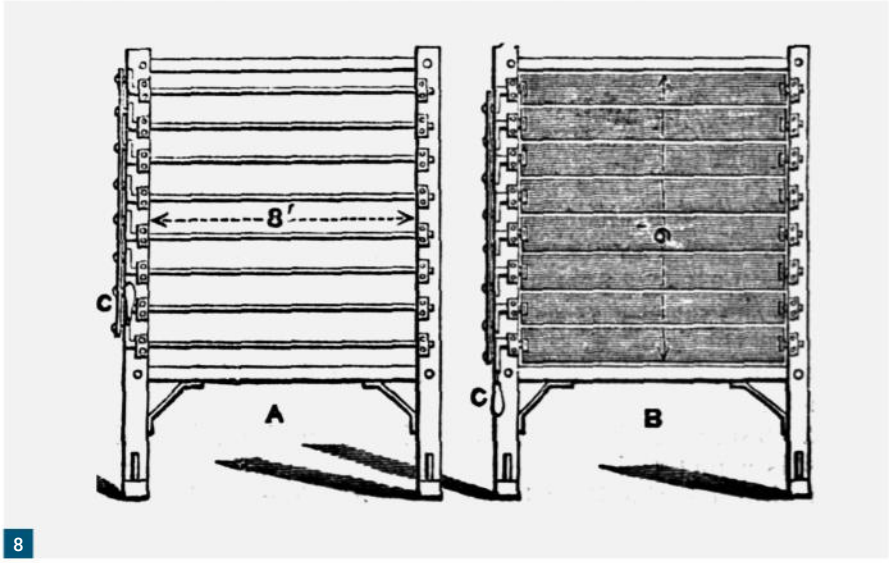

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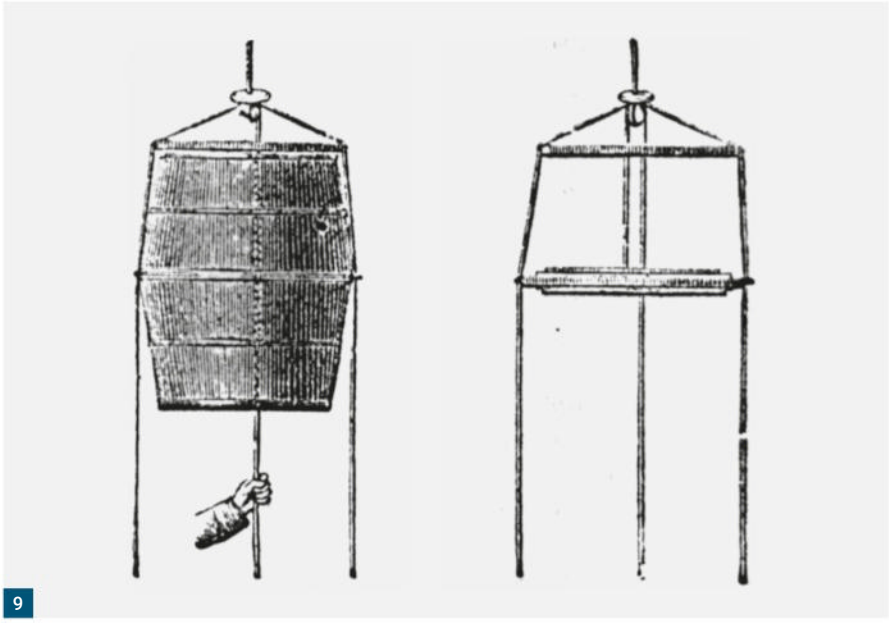
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In 1884 J.H. Bunnel & Co. of New York published a 48-page *Students' Manual* to help amateur telegraphers on the path to a successful career in the profession. Although it is only concerned with American code, it provides an interesting insight into the learning and practice of Morse of over 100 years ago – how to construct your own line and make good earth connections, wiring up two and multiple-instrument circuits, assembling and putting the battery into operation; procedures, the most frequently used abbreviations and so on.

Arrival of wireless

The invention of wireless marked the beginning of the end of landline Morse telegraphy, but it was a slow decline. The American sounder remained as the basic receiving instrument for P.O. telegrams in Britain until the early 1930s, when the P.O. began to phase out the Morse system in favour of teleprinters.

The Army, also a major user of sounders, faced with the prospect of losing a valuable reserve of P.O. telegraphers, then opted for greater use of the Fullerphone. In North America the sounder remained in use until around the 1960s, and the last commercial Morse via sounder in Australia was sent in 1963.

The needle telegraph and the double plate sounder, using Morse, survived on Britain's railways until the 1970s. The Post Office's last inland Morse circuit, serving the islands of the Outer Hebrides by submarine cable, was discontinued in 1954 when a fault in the cable closed it down.

Examples of beautifully made brass and polished wood telegraph instruments, dating from the Victorian age, survive today in museums, heritage railways, and enthusiasts' collections. They are reminders of a different world, using a different technology, where Morse telegraphy played an important and significant role. **PW**

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Planning a Small Club IOTA Activation

Thinking of planning a small expedition, either as an individual or with your club? **Chris Colcough G1VDP** has lots of good advice, based on hard-won experience.

Over a few years we here at Strumble Head Amateur Radio Klub have activated Ramsey Island (EU-124) in the IOTA contest and just for fun and Strumlehead Lighthouse for the Lighthouses on the Air award. These are both activations where we have to take everything with us – from the radios and antennas to a drink of water. We now have the logistics to a fine art but when we first started, we had many problems and took far too much kit. So, we decided to put together a planning list of what we needed to do to get the island/lighthouse on the air. This is to inspire other clubs or groups to look around and have a go themselves.

Contest or special event

One of the first aspects we looked at when planning our activations was whether we were focusing on entering a contest or activating the IOTA just for fun and to give away the IOTA for award chasers who need it. Whichever we did, we needed to make sure it was fun and we all had time on the air and a chance to see and enjoy the location.

First, we looked at what contests were on in the summer. Of course, we know contests are not everyone's idea of fun so we decided on the IOTA contest for Ramsey and the International Lighthouse Weekend (URL below) for putting on the light as both are at a time when the weather in the UK is generally settled and warm (which has yet to happen on both activations). We knew that we would have plenty of callers in both of these events as this is what the weekends were about.

https://illw.net

Location and research

Once you have chosen your destination the planning starts. If it is possible, then visit the location to get an idea of the location and make contact with anyone who may be able to give you info on the location. The internet is full of mapping websites such as Google Maps, have a look at the Satellite images of the area. These give an idea of what the lay of the land is, including whether there is a safe area to erect antennas that will not interfere with any other members of the public or local wildlife.

Also check for ease of access as there may be issues for any disabled or older members of the group getting to and from the site. It is no good planning everything and then finding when you get there that it is a climb up steps and a hike to the operating site, or there is no disabled access for wheelchair bound operators. I know none of us are getting any younger so bear this in mind when planning any group activity not just an IOTA.

If you are looking at doing an IOTA look at the IOTA website (URL below) for how rare and wanted the island group is. For example, we found that EU-124 was most wanted in Asia so we tried to target this area. This does not deter other callers though so be prepared for pile-ups. There are still a few UK islands that need activating as many IOTA enthusiasts don't just want the reference number but also chase the island names. And do look at the WAB and World Flora Fauna websites as they may also have a rare area.

https://www.iota-world.org

One thing worth mentioning in this part is any licensing issues. In the UK it should not be a problem to operate using a club call or obtaining a special event callsign, but if you look at planning a major trip, then a licence for that DXCC may be needed. Search the internet at what is needed. There is an excellent book available from the RSGB, written by **Steve Telenius-Lowe PJ4DX** called *World Licensing and Operating Directory* that has lots of information on locations around the world.

While looking at location it is also worth thinking of the time of year to go. Maybe you could be

Photo 1: Chris G1VDP.
Photo 2: Some of the equipment for our trip!
Photo 3: on the boat to the island.

planning a major trip to some far-off land such as the Cook Islands that suffer from Cyclones at certain times of the year. Even a trip to somewhere close by such as the Farne Islands can raise issues. You will not be allowed to go and set up the antennas if the birds are nesting and rearing their young as the guy ropes, etc. cause a hazard to the birds in flight. So do the research to see if any other team have been there previously and contact them to get any tips on the site and who you need to talk to, maybe invite them to join you if you know any of them well. Every little bit of info helps.

Landing and operating permission

In our research we found that Ramsey Island is an RSPB nature reserve and we would have to leave it just as we found it, which meant some long phone calls and promises to the RSPB as to what we would do. So please do the research first, don't just arrive and say *"we want to put our antennas up and operate from here"* as had happened previously with Ramsey Island before we looked at it – in fact **Greg** (the warden) was dead against us going there to start with as someone had just got off the boat, wandered up to the mountain, put a wire up and started operating so had tainted his outlook on radio hams!

It is not just the RSPB/Greg the Warden that we had to approach. To get to the island we have to take a boat trip, board the boat off the RNLI's slipway for the St Davids Lifeboat, get the equipment up and down a cliff to the lifeboat house, and park our vehicles in a safe location so as not to cause problems for the daily life that goes on at St Justinians – thousands of visitors each year in the area as well as going over to visit Ramsey island. Each organisation had to be approached and permission gained, and we have to hire one of the boats off the only company with landing permission on Ramsey island (Thank you Thousand Island Expeditions, URL below). Some of these have a cost and we happily pay and support the organisations involved as they do a great job.

https://thousandislands.co.uk

With the lighthouse we had to approach both the local lighthouse keeper and Trinity House, who operate most of the UK lighthouses around the UK's coast, for permission to go up to and into the lighthouse building. This brought with it other problems. Again, we had to remove all our kit and rubbish when we left, but we also had to ensure that we would not cause interference to any of the emergency equipment or the light.

I guess it is worth mentioning sponsorship at this point. If we were planning a major expedition to a rare island and DXCC entity such as Desecheo, then we would be looking for donations to help offset some of the costs to each team member but for the UK or a holiday-style operation then we feel it is just not necessary – if you can't afford it, then you should not be doing it.

Size of the team

So how many of you are there? We think it needs a minimum of five for a trip such as Ramsey Island, but with no maximum number if you are doing a major expedition – look at how many there were on the 5-star team to Kiritimati (Christmas Island) T32C in 2011 keeping 12 stations on air 24 hours per day for almost a month. Another group, The Voodudes, found that an ideal number for their contest activities was ten people. So this is not written in stone as there have also been as few as three on a trip by us. The way to look at it is the more there are, the less time people have on air. But we are looking at operators here, what about other team members?

Some of the support team may also be operators. We have wonderful cooks, **Jane** (**Rob's** wife), **Laura** (**Ant's** Wife) and **Glenys** (**Tony G4LDL's** wife), who come along with us and spoil us boys with the meals they cook up on a small stove within the building we use for the duration of our stay. Laura and Glenys are both licensed and have also been known to get on the air and operate. Remember we all need some sustenance and fuel to keep us going, even if it is just a sandwich and cup of tea midday after being on air for a couple of hours. Not all locations will be close to shops or within a hotel so all food and drinks will need to be taken with you, so planning in this department is also a prime necessity but will be covered later.

Something that is a good idea, and apologies but this is an idea taken from the major expeditions I have witnessed over the years, is to give each team member a role or job – or at least make one team member responsible for each aspect of the activation. This then gives the team an idea of who is doing what. For example, within our group Ant is our antenna man and we know he will be the one who leads the team in getting the antennas in the air and getting a signal out. Food and wellbeing has been mentioned. Tim is the QSL manager and takes care of the after-event work making sure the correct information is on the card for any awards, Rob does the logistics, etc. But we all muck in as a team when on the island or at the farm. You will want to have memories of the trip so it is worth designating one member to be the official photographer, making sure you have a good quality high resolution images for the QSL card, and for the club's website – do look at everyone's photos but let one person collate and edit them.

Equipment and antennas

All the radios, antennas, and amplifiers we use belong to team members. We looked at the location and decided we needed to put a big signal out but keep the weight down for carrying the kit over to the island. This is not to say we have it right as yet or never had our issues, but we have learned for them.

Antennas are again what is available. Ant now manufactures and supplies a portable Hexbeam that covers from 20 through to 6m, is lightweight and ideal for expeditions. Maybe worth investing in something like this as these are also handy for any other club activities that you take part in. We have found the good old Armstrong rotator is the ideal way to turn it. Take a compass also to make sure you know the correct direction to turn the antenna. A Windom or G5RV could be used for the lower bands, and a pole with guys to support them.

Make up a checklist of who can supply what, simply done using a spreadsheet, and then make sure you have enough kit. Remember it is not just radios, antennas and amplifiers that are needed. Coaxial cable runs can be well over 100m if you have the room so no good using cheap poor quality RG58 that is lossy if you only have 100W to cover this distance, but then you don't want to be humping huge rolls of Ecoflex or the like so a good quality RG8 mini is a good choice. Power supplies, power distribution, generators, power cables, antenna supports, logging laptops, logging software, antenna switches, headsets, etc all need accounting for and someone to bring them along. As stated, make a spreadsheet and make sure you stick to it.

Photo 4: Unloading the boat on arrival.
Photo 5: Ant MW0JZE, Charles M0OXO, Tim M0URX.

There have been times in the early days when we have been on the island and not had the right tool to tighten a bolt on an antenna so we had to use pliers to tighten it, eventually rounding the nut so had problems when dismantling. Give someone the job to make sure you have the spanners or other tools needed for antenna building or any emergency repairs. Spare connectors, extra cables for the computers, notepads and pens, all the things we all have to hand in the shack need taking with you. Again, designate one person to make sure it is all there.

Personal equipment is also something we have had issues with in the past. Nothing worse than needing to answer the call of nature in the middle of the night and you don't have a torch. We have all bought head torches and we make sure that we have spare batteries and keep them to hand with our clothing. Do you need to take cooking stuff? If you have a cook on board, let them have the responsibility of this bit of kit. After all, they are going to be the ones using it the most. If you

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are like us, we seem to permanently have the kettle on making a cuppa (tea or coffee depending on your preference) so make sure there is one on site, especially for first thing in the morning to get the team up and running. This is where teamwork comes in to it, if you are making one for yourself, then ask the others if they want one.

Clothing is a problematic area when in the UK. For some reason summer clothing is the same as winter clothing with waterproofs being the first items packed. Take enough to have a spare set if you do get wet when setting up, enough to last the days there, and something fresh to travel back in. Take wet wipes to freshen up as there may not be washing facilities, a strip wash using a bucket and kettle of water before you leave to freshen up when travelling back, unless you are in a cottage or hotel. These are personal items so each member brings their own and keeps weight to a minimum.

Food and drink

Planning here can save issues on the trip. Get the cook to check that there are no special dietary requirements or food allergies. Plan a menu that will be simple foods that can be prepared beforehand, frozen and then defrosted and reheated when on the island. These can be things like a chilli/curry/stew/casserole, which can be had with a jacket potato or rice. Salad stuff can be kept fresh in a coolbox with ice pack. Cold meats for sandwiches have a shelf life of a week or so, so buy them last. Crisps and snacks to go with a light lunch. Plan to have a BBQ and invite any resident staff along – a few burgers, sausages, and steak (if you can afford it) are a great way to make friends. But make sure you have enough for each day and then some extra just in case the weather or sea conditions keep you on the island. Spare items can be donated to the residents or volunteers if on a reserve like Ramsey Island.

When doing your research on the location check on what the water supply is. Not everywhere is connected to the mains supply and you may find the water must be boiled first before drinking as it could make you ill if not. Take bottles of water to drink when erecting antennas and moving the kit. Milk, juice, and other soft drinks are worth taking with you as a change, though remember to get it in cardboard cartons or plastic bottles that can be crushed if you have to remove all your rubbish. We recommend long-life milk, simply because you may not have refrigeration available.

Evening meals also bring the chance for the team to sit around and chat. We have the rule that this is the time when all operating stops and we sit and have a meal and a drink together. Have a beer or a glass of wine but always get it in boxes as easier to dispose of. Once more this is a time when it is worth inviting any wardens or volunteers around to meet the team.

Power

Having made all the preparations and planned the trip, what power supply is there at the location? Again, if in a cottage or hotel, it will more than likely be connected to the mains supply. But if like us you like a challenge, then you will need to take the electricity with you, in other words supply the generator and fuel to get the power into the shack. This is where one team member is elected as the person to make sure you have enough juice to run all the radios, amplifiers, and computers for logging. You may even need to run some lighting off the generator. Again, this needs factoring in to the requirement and size of generator. And don't forget the fuel. No good going for five days with only two cans of fuel as you will soon run out. We always take a little more fuel with us to be on the safe side. This can always be donated to the residents if they use a generator for their own supply.

Lighting has been briefly mentioned and again it is worth checking at the planning stage what is needed. Head torches for each team member with spare batteries is a must have item, some emergency battery operated lanterns for in the shack area, and candles are all things to take as a 'just in case' on any trip – even in a hotel or cottage environment. These can be life savers if the power fails at any time.

The above is not exhaustive but meant as a starter to encourage clubs or small groups to have a go at mounting a small expedition, or even a major trip to a rare country. Research is paramount and we did hours of it before we made one move to approach the warden on Ramsey Island. If you need more then please contact me on the email above or visit the club website: **www.mc0shl.com**

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Martyn Baker G0GMB

Roger Dowling G3NKH meets the RSGB's National Radio Centre coordinator.

Roger Dowling G3NKH
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There were two particular reasons I was keen to meet **Martyn Baker G0GMB**, the subject of this month's feature. Firstly, I knew that he was an enthusiastic VHF DX-chaser and I was keen to learn more about his achievements despite the handicaps of a suburban location with limited antenna space and high local noise levels. And secondly, I knew that Martyn was one of the most familiar faces in the RSGB, with the important role of coordinating operations at the RSGB's highly successful National Radio Centre at Bletchley Park. What, I wondered, was involved in bringing the magic of amateur radio to the thousands of visitors that GB3RS attracts each year?

Martyn's QTH is Stony Stratford, near Milton Keynes, famous in amateur radio terms as the birthplace of the world's most famous multi-band antenna invented by **Louis Varney G5RV** who lived in the locality. *"My two local pubs, the 'Cock' and the 'Bull' are also the origin of the phrase 'A Cock and Bull Story' as travellers on the old Roman Watling Street related ever more implausible tales as they staggered from pub to pub,"* Martyn told me with a smile.

Early days

Born in Harrow, Martyn initially spent ten years as a physics and electronics teacher in Swindon and Newport Pagnell, having taken his B.Ed degree at Southampton University. He then moved into industry, working on mainframe computer training with a major US manufacturer. After some 20 years there, he worked in the international and commercial divisions of a small asset management company based in Olney, Buckinghamshire before taking early retirement.

Martyn's interest in electronics and technology dates back to his schooldays when he built various gadgets for his own amusement. His interest was further stimulated by a chance visit to an uncle, **Brian Hummerstone G3HBR**, who introduced the young Martyn to the fascinating new world of amateur radio. Brian kindly provided him with a CR100, one of the classic HF band ex-Government communications receivers found in many a radio amateur's shack in those

Fig. 1: Martyn G0GMB in his well-equipped shack. Here he is using his recently acquired Yaesu FTdx10.

Fig. 2: More shack equipment: on the right is a Kenwood TS-22 HF band linear and, below, a Linear Amp 'Discovery'. Fig. 3: Principal rotary antennas mounted on telescopic mast: dipole for 10m/15m/20m; 15-element 70cm beam; 5-element 6m beam; F9FT 'Tonna' 17-element 2m beam. Fig. 4: 3-element 4m rotary Yagi. The pole on the carries supports a doublet that zig-zags around the garden.

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days – and Martyn was hooked. After a while he also acquired a 2m converter and would spend many happy hours listening into the local nets.

Martyn remained an SWL until he went to college, where one of the tutors encouraged him to take his 'City & Guilds' examination (at the time the recognised requirement for a Class B VHF-only licence) and in due course he became the proud owner of the call G8KGF. His early gear comprised a Pye valve taxi-phone, modified for phase modulation, and a Belcom Liner 2, which was a popular entry-level 2m transceiver of the era.

Still restricted to VHF with his Class B ticket, Martyn eventually decided that it was time to get his full licence and he was greatly indebted to the late **Geoff Groom G3YLC** for his patient CW tuition. After much effort this led to Martyn's proudly becoming G0GMB in the early 1990s. He acquired a Kenwood multi-band TS-930, an excellent rig that he used for many years, but his principal interest remained the VHF bands using a Kenwood TS-700.

Martyn's shack today

Martyn's extensive range of equipment, **Figs 1** and **2**, is testimony to his interest in all aspects of amateur radio today. His most recent acquisition is a Yaesu FTdx10 SDR-based HF/50/70MHz transceiver, the performance of which impresses him greatly. He also has a Kenwood TS-890 for HF band use and an Icom IC-756PRO for 6m. For optimal performance on the higher bands, he prefers to use the transceivers in transverter mode: on 4m he uses the TS-890 as a tuneable IF in association with an ME4T-PRO linear transverter and low noise amplifier. For 2m, Martyn uses his IC-756PRO and a Kuhne TR-144 transverter, and for 70cm an Icom IC-9700. He has a number of power amplifiers, including a Kenwood TL-922 and a Linear Amp Discovery for 2m.

Antennas

A telescopic mast carries a rotary dipole for 10, 15 and 20m, a 15-element 70cm beam, a 5-element 6m beam and a 'very old' Tonna F9FT 17-element 2m beam, **Fig. 3**. Supported on separate poles, Martyn has a 3-element 4m beam and a wire doublet zig-zagging around the garden for the HF bands, **Fig. 4**.

Although Martyn uses different modes on many bands, he has always retained a particular interest in all aspects of VHF, including tropo, sporadic E, aurora and meteor scatter. In DX-chasing terms his results have been impressive: at the last count he had totted up some 111 Maidenhead QRA squares on 70cm, 381 squares on 2m, 606 squares (and over 100 countries) on 6m, and 211 squares on 4m. He finds digital modes, including FT8, invaluable. *"I couldn't ever have worked China, Japan or Korea on 6m on SSB,"* Martyn told me. *"When band conditions are right FT8 makes it possible."*

Monitoring

A feature of Martyn's shack is his band monitoring software, **Fig. 5**, which has played a big part in his DX success story. *"I like to be able to monitor all the bands simultaneously,"* said Martyn. *"When you're trying to work DX it's all about being in the right place at the right time. Sometimes the openings can last for minutes or even seconds so unless you monitor constantly you can easily miss out."* On banks of screens duplicated to cover the various bands, Martyn uses KST Chat (which displays who is on each band, chasing DX, sporadic E, meteor scatter, FT8 QSO etc); JTDX (a clone of WSJT. open-source software designed for weak-signal digital communication, including FT8); DXMaps (excellent software for monitoring sporadic E); Grid tracker (used to identify Maidenhead squares still to be worked) and PSK Reporter (showing where FT8 signals are being received or sent around the world).

The RSGB National Radio Centre (NRC)

Martyn has been a lifelong member of the RSGB, having initially joined as an associate while still a youngster. He was therefore well aware of the RSGB's new showpiece demonstration station GB3RS, **Fig. 6**, at nearby Bletchley Park when it opened in 2012.

I visited GB3RS with Martyn and commend it highly to any *PW* reader who has yet to see

it in operation. It's equipped with a fine array of modern operational equipment, including a FlexRadio Flex-6600, Yaesu FT-5000, a Kenwood TS-2000 and an Icom IC-9700. Antennas include a three element SteppIR beam, a multi-band dipole for the LF bands and satellite dishes for Oscar-100 reception and transmission. There's also a comprehensive display of historic radio equipment over the years, including equipment from the UK station of the late **King Hussein JY1** kindly donated by his widow **Her Majesty Queen Noor**, **Fig. 7**.

The success of GB3RS, which now attracts over 70,000 visitors each year, soon led to the need for a professional organiser of its activities. When an advertisement appeared towards the end of 2017 it was clear to the RSGB that Martyn, with his deep knowledge of amateur radio in all its aspects plus a lifetime spent in the educational and training field, was the ideal person for the job. It was a bonus that he lived less than ten miles away!

He took on the role of RSGB National Radio Centre Coordinator in January 2018, with particular responsibility for organising the large team of volunteer demonstrators. It's no small task: with three or four volunteers required each day the team is over 50-strong. Some work most days, once a week or fortnight, while others can only offer the occasional day. So, sorting out the complex rota to meet their personal availabilities is definitely a spreadsheet task for Martyn, **Fig. 8**.

What are the qualities required of an NRC volunteer? Above all, one should have a passion for meeting people and feel confident in explaining our hobby to the public – and as a licensed amateur be able to operate the NRC's wide range of technical equipment. Volunteers are required to be able to commit to working at least one (preferably two) days per month. New applicants are constantly sought to replace those who are forced to retire due to work, family or illness, so any interested reader is invited to email Martyn at **nrc_support@rsgb.org.uk**

The future of amateur radio

My meeting with Martyn left me feeling confident in the bright future for our hobby. Amateur radio cannot live in the past, and Martyn's obvious ongoing enthusiasm for all the latest developments – not only at his home QTH but so admirably on display at GB3RS – leaves no doubt that many exciting new developments lie awaiting around the corner.

Radio has come a long way in the past century. Who knows what further developments lie in store?

Access to both the Bletchley Park museum and the National Radio Centre is free to RSGB members by downloading a free entry pass from the Members' Portal on the RSGB website. **PW**


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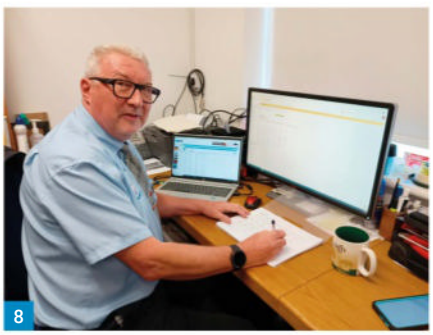
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Fig. 5: Extensive monitoring software is duplicated in two operating positions. Fig. 6: Martyn and volunteer Paul Barrett demonstrate amateur radio to two National Radio Centre visitors. Fig. 7: Some of the late King Hussein's radio gear is among the many fascinating items on display. Fig. 8: Spreadsheet time as Martyn prepares the volunteer rota for the months ahead.

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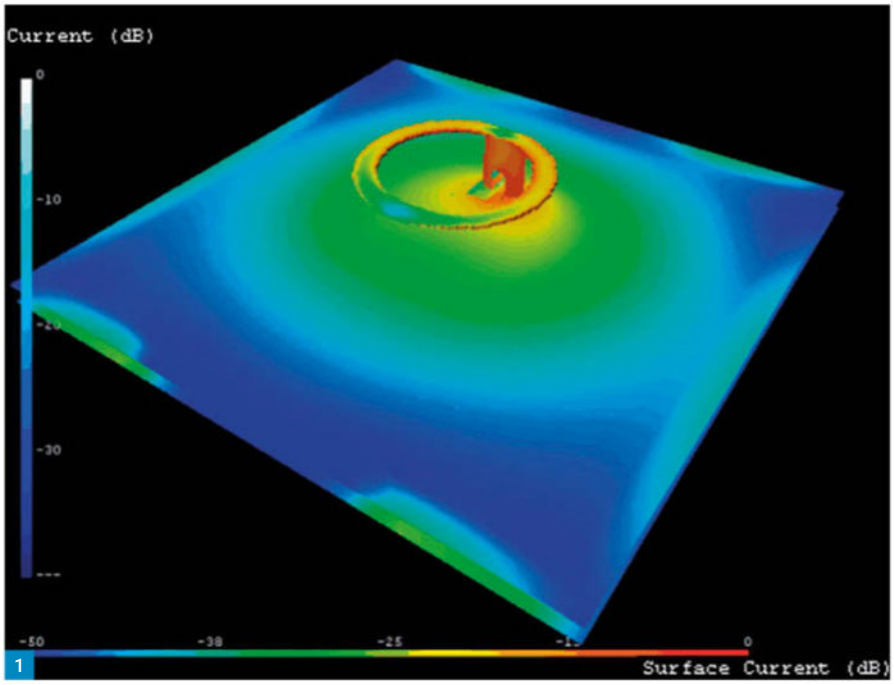


The Skeleton slot antenna HF - 440MHz

Ian J Dilworth G3WRT describes modelling and building skeleton slot antennas for HF, 40, 50, 70, 144, 433 and 1296MHz, resulting in an exceptionally low profile omni 1dBd vertically polarised antenna.

As far as I am aware VHF/UHF repeaters universally employ vertical polarisation. Most people interested in 40/50/70MHz are interested in sporadic E and use horizontally polarised beam antennas. I remain unconvinced about that for sporadic E. I do not think polarisation is important at 50MHz except to extend range when terrestrial propagation is required and there vertical polarisation is an advantage but an inconvenience for fixed stations. I have however already noted and published the likely, short term, alignments of the ionosphere in the wake of the electric fields in 'thunder cells'. However, that is not the purpose of this article. The purpose is to provide a convenient vertically polarised antenna for local and occasional sporadic E communications. A utility antenna. Of low effort, expense and of good performance lending itself to loft mounting.

I have a 50MHz folded dipole. It is inconveniently long. I could mount it outside but there are already enough antennas to make the place look like a 1970's police station! It is frankly too much bother for me, ladders, and hardware and all combined with the average height achievable. A vertically polarised slot antenna was attractive in the loft space. By so doing raising the average height but primarily for the convenience. Height above ground, in terms of wavelengths, is a central consideration of all antennas.

Mysteries of electromagnetic radiation

Maxwell (1831-1879), then **Hertz** (1857 – 1894) followed by **Lorenz** (1853 – 1928) laid the foundations of electromagnetic propagation. **Einstein** (1879 – 1955) then took these ideas further with relativity in several diverse ways. E/B = c the velocity of light sums up in the simplest way a description of the radiation from an antenna, the key part being that E and H fields are orthogonal and proceed from the antenna in time at a velocity 'c' at the frequency of the excitation. B and H are equivalent if the antenna is 'linear', i.e. no magnetic materials involved. Energy is transferred in this radiation if a receive antenna receives it. Energy = Mass × c^2, so mass is transferred by electromagnetic (EM) radiation in our everyday radio QSOs. Quite a thing to realise. The duality of radiation (e.g. of light) and energy transfer, which clearly occurs, have still not been satisfactorily resolved by current models. Likely, to me, so-called dark matter is a part of this process, who knows? No one so far in 2023. Associated with the peculiarly slow velocity of light (and EM waves and I also suppose Gravity – we assume no one knows) on a cosmological scale. Yet we appear to now know that instantaneous communication (not mass transfer) appears to be possible as illustrated by particle duality. It is a current puzzling paradox, which Einstein described as 'spooky'. And consequently, with that genius's comment I am clearly now well out of my depth and cannot reasonably comment further. We need another genius to see the way forward. The universe is clearly far more complex than we currently understand.

And so to possible designs

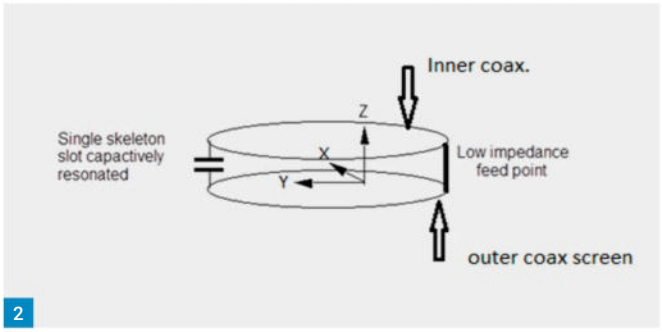
The RF current induced into a resonant antenna produces electric and magnetic fields. In a 'slot' antenna the gap between two conductors generates the electric field, which is vertically polarised between the conductors as indicated in **Figs** 1, **2** and **3**. If these are resonant, then that current is maximised and so is the radiation.

E fields get readily shorted out by interaction with nearby objects, which is why a vertical monopole or a dipole do not work well in buildings. The vertically polarised E field is particularly susceptible. The vertically polarised slot antenna also suffers this problem but to a lesser practical extent. Humans strongly interact at most frequencies, and this should be borne in mind with proximity antennas.

I operate from a hay loft for much of the year. It is Welsh slate covered, traditionally wood supported inverted-V roof and plasterboard covered. I notice little attenuation even at GPS frequencies. There is surely some when wet but not significant as far as I have witnessed.

I claim no originality for this antenna, the amazing **Jessop** (**G6JP** SK) *VHF/UHF Handbook* RSGB (1969-1987 editions) beat me to it. No references there – where did it all come from? I have gone a lot further in development of the slot antenna than his little piece in his books, by using the EM tools now available and with my own extensive measurements. His book initially precipitated my interest.

These vertically polarised antennas work well with 1dBd omnidirectionality and exceptionally low profile. No problem except for the 1-3% bandwidth compared to a dipole of ~10% and



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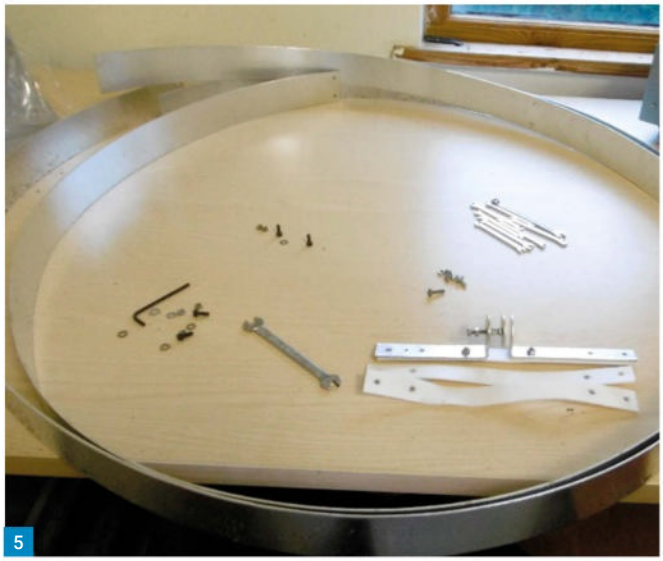

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Fig. 1: A single halfwave loop above a ground plane (GP), the column 'min GP 2*D', Table 1 indicates the minimum size required. The figure indicates the calculated induced currents in the GP from this vertically polarised resonant slot on a limited GP. They hint at the ground reflections that result in an elevated lobe by an extended GP (or the Earth). The red vertical section is the effective omni azimuthal vertically polarised radiating element. Gain is omnidirectional and 1dBd. There is significant radiation from a limited-size GP induced currents, which helps with low angle radiation. e.g. when mounted on a car roof.

Fig. 2: To avoid the ground plane or multiple radials a skeleton slot as diagrammatically illustrated is more convenient.

Fig. 3: 145 and 433MHz skeleton slots on a sliding plastic pole in the shack helps avoid standing wave nulls, which can change with the seasons. Low power operation in the shack, of course (from my hand portable connected rig). I find this convenient and, importantly for me, makes my hand portable not just an occasionally used thing whose battery is flat when I find it. I can wander about the shack (nearly) depending on the length of the remote microphone lead. Yes, I should Bluetooth it. The rope up and down certainly is a boon!

Fig. 4: Nested 50 and 70MHz slot antennas in the roof space. Dry wood is a good RF insulator. I have found slate roofs, even when wet, are not significantly lossy even at GPS (1.6GHz) frequencies. These slot antennas will never be good for DX, but they are effective and do work when sporadic E arises. Nesting these two antennas lowers their resonant frequency a little but does not appear to reduce their effectiveness. So, all the slots could be nested? However, as a precaution I have so far used separate feeders and a coaxial, high isolation (50dB) relay. Because, of course, induced currents occur in each antenna.

Fig. 5: The component parts kit. Aluminium strip is convenient. The plastic spacers need to be rigid. The first I used clearly were not, as illustrated. I then employed tubular 6mm supports in plastic. I have made an indoor 29MHz version from a rectangular wooden frame, surrounding the loops you see along the rafters and used adhesive copper tape.


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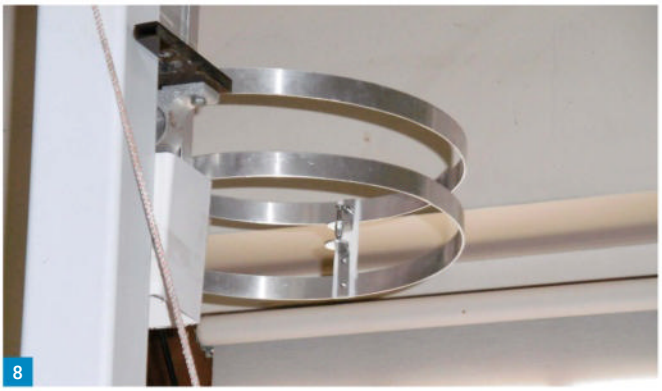
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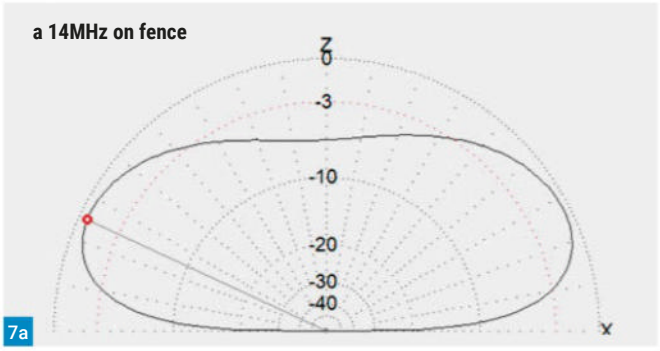

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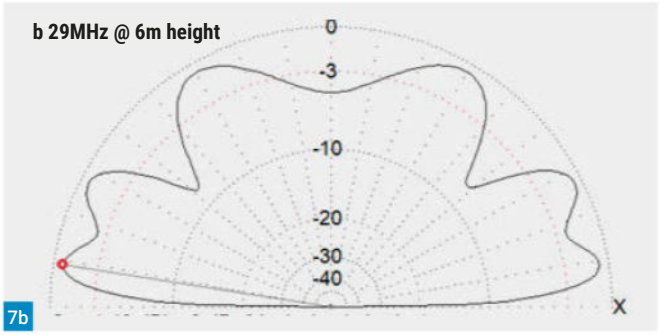

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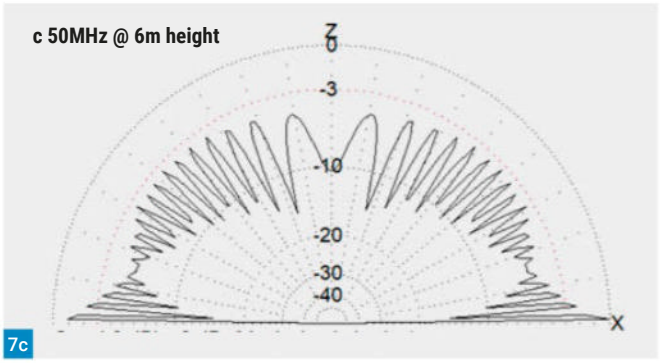

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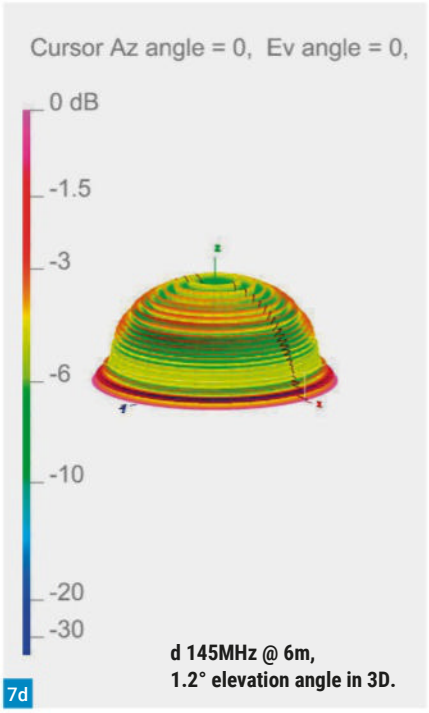

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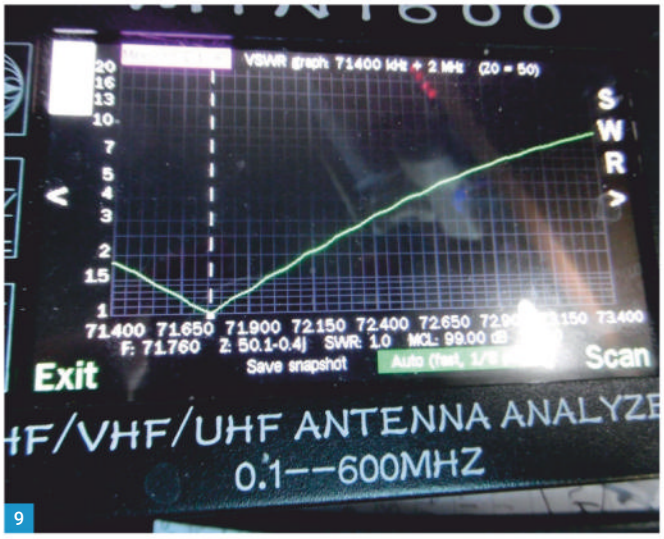
d 145MHz @ 6m, 1.2° elevation angle in 3D.

Fig. 6: Details of the indoor feedpoint adjustment. Because it is indoors, I have not got around to making it permanent. The capacitors are small airspaced of 0.5-3pF. I have found 2/3mm diameter bolt set in a captured nut to be a good practical method when opposed by a small plate a few millimeters away, as illustrated in Fig. 8. Fig. 7: MMANA (method of moments) model of a skeleton slot and the resultant far field radiation. Omnidirectional in azimuth, vertically polarised. The elevation angle depends on the height above ground. Four illustrations: 14MHz at 1.5m height on a fence (25° elevation lobe), 29MHz at 6m above ground (10°), 50MHz 6m above ground where the main first lobe is >~1.5° elevation angle, 145MHz 1.2° elevation angle both corresponding to my loft mounting place above ground. Fig. 8: Details of the tuning capacitor. I found a 2/3mm, self-captive screw and an opposing plate is adequate. My calculations indicated bigger plates but not with the antenna dimensions given in Table 1. This helps simplify the capacitor arrangement.

work as indicated. They are also amenable to reduced size operation. The radiation resistance of the antenna is more than a dipole which results in the 1dBd gain.

Here are the practical details. I have made these antennas from 5.8GHz to 29MHz. They do work 'as on the tin' and are exceptionally low profile. So, for example, on a tower block, could offer an amazingly effective multiband antenna with little wind loading. The only practical disadvantage is that they do need capacitively resonating.

I have in mind to use a small (Banggood 'cheap as chips') motor drive to capacitor thread tune remotely but really that is not necessary. I only mention it because of the HF FM repeater TX/RX spacing on 29MHz and outside weather conditions, if mounting the antenna on a wooden fence. It needs to be tuned to the transmit frequency. It makes no real practical difference on an HF receiver with poorer VSWR/return loss since the VSWR at 10:1 (a return loss of only 1.74dB) results in 4.8dB of insertion (or mismatch) loss. A 600kHz repeater spacing



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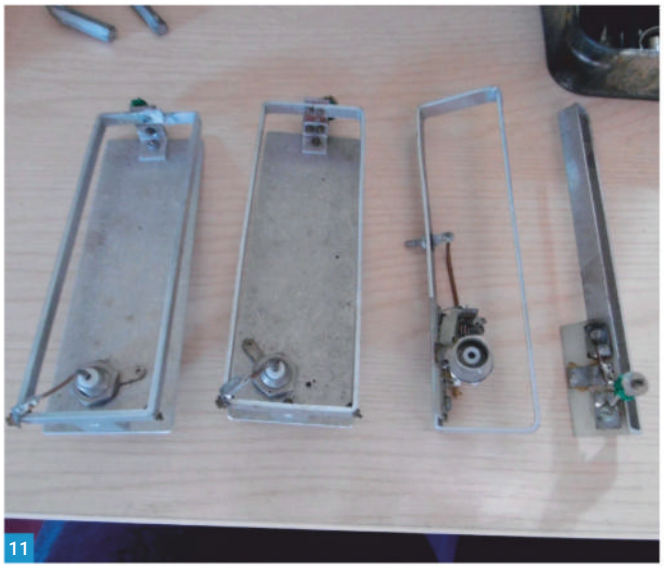
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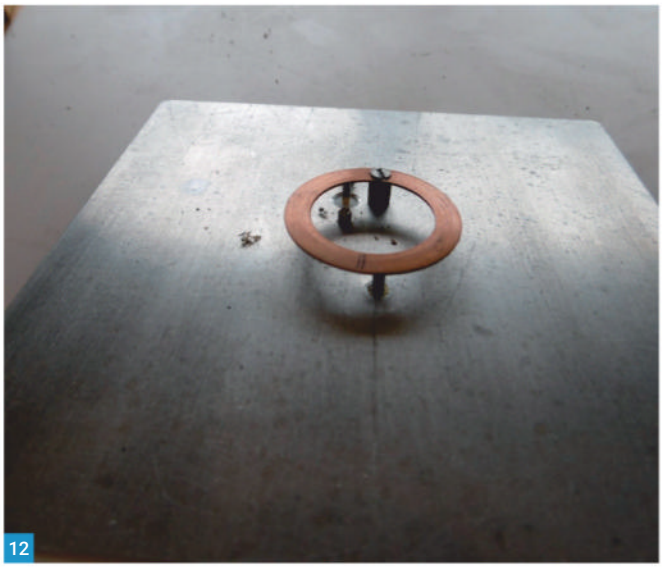
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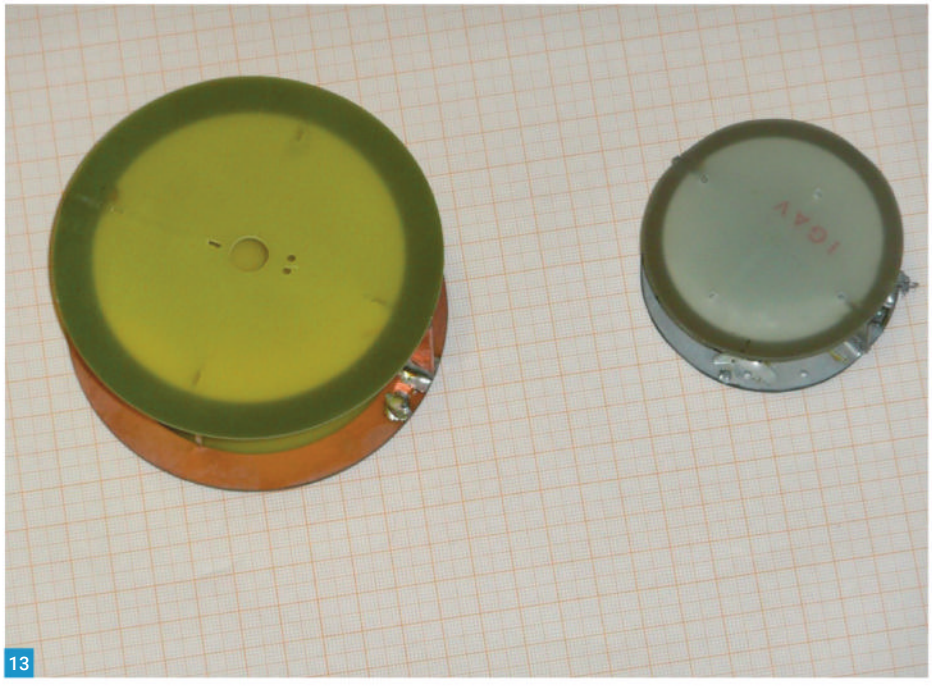
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Fig. 9: Measured SWR of a 70MHz antenna indicating the 2:1 (10dB return loss) bandwidth of ~ 3% bandwidth. For repeater use tune to the TX frequency since a poorer match at the receive frequency is of little practical significance.
Fig. 10: A 2m antenna bandwidth and VSWR with 1MHz bandwidth at >~15dB return loss.
Fig. 11: A rectangle can be more convenient and, in this case, only when the X-Y ratio > 2 starts to gradually effect the omnidirectionality.
Fig. 12: A ground plane becomes more convenient at 1296MHz and above. The resonating screw is in the lower right and the matching feed point to the left of the ground post, as indicated in Fig. 11.
Fig. 13: PCB printed VHF skeleton slot antennas.

with these antennas will result in a VSWR of far less and insignificant mismatch loss on receive. Of course, I am thinking of repeater operation. Even on 29MHz ~3% 10dB return loss bandwidth corresponds to 870kHz so the slot antenna is entirely practical for repeaters (e.g. 29620kHz NY hills from the UK) on 10m.

I hope this is useful and mostly something to consider and I hope gets some on locally 40/50/70/145/433/1296MHz vertically polarised irrespective of sporadic E layer lifts and their horizontally polarised beams (40MHz now in the USA I note). These low-profile vertically polarised slot antennas may help because they are practical and useful. One problem might be getting a 40/50/70MHz one in the loft space given the typical small access trap doors. However, they do not have to be circular. A rectangular shape with x, y ~< 2:1 makes little practical difference in far field radiation omnidirectionality as I have found by my EM modelling.

Constructional details are, I hope, self-explanatory. It is important to maintain the spacing between the elements rigidly because at the capacitive, high impedance end, this spacing governs the resonant frequency. The main radiating part that carries the RF currents is the vertical conductor between the rings. I have made this out of square section aluminium extrusion to increase surface area and give physical support. Matching is not critical and with the aid of an SWR meter or just receiver noise it is straightforward to find the resonance. As with any narrow-band antenna care in construction is required, especially if it is to be used outdoors. Some VHF versions I have made from PCB as indicated in **Fig. 12**. I enjoyed making one from adhesive copper tape, which might not be appropriate outdoors? In fact, it has occurred to me to spiral wind the elements with conductive tape to lower the resonance (narrowing the bandwidth) in which case it may approximate to my old **Prof. Jennison's** (**G2AJV** SK) toroidal antenna (see web) but his antenna has a much higher height-to-diameter ratio, which obviously aids vertically polarised radiation.

The antenna lends itself to miniaturisation or reduced size because of the capacitive tuning. It is surprising, for example, that a shrunk 145MHz version measuring 0.06 wavelength diameter and 0.03 wavelength in height, produces just -16dBd gain. Not significant on HF so long as the signal is already above the noise floor and QSB moderate. So, certainly narrow band on HF when significantly reduced in size, slot antennas are not to be ignored. Not good for NVIS perhaps? But I was recently surprised, reminded, by verticals (with counterpoises however limited in a chassis of a vehicle). But then we already know tuned whips work effectively when mobile/portable.

There are higher frequency resonances, which I have explored by EM modelling but not in terms of properly matching. I have confidence in the EM modelling if done intelligently. However, these higher modes may well be useful, even advantageous, in mixed polarisation situations where the antenna becomes multi-lobed and directional.

Importantly perhaps, I have included details of a practical, vertically polarised, low profile 40MHz antenna to encourage activity there. Recognising these lower VHF bands demand rather inconveniently large vertical antennas if they are dipoles or even monopoles with ground planes. Plus, the advantage of the slot is that the antenna average height is no longer a limitation as it can be with a vertical dipole. **PW**

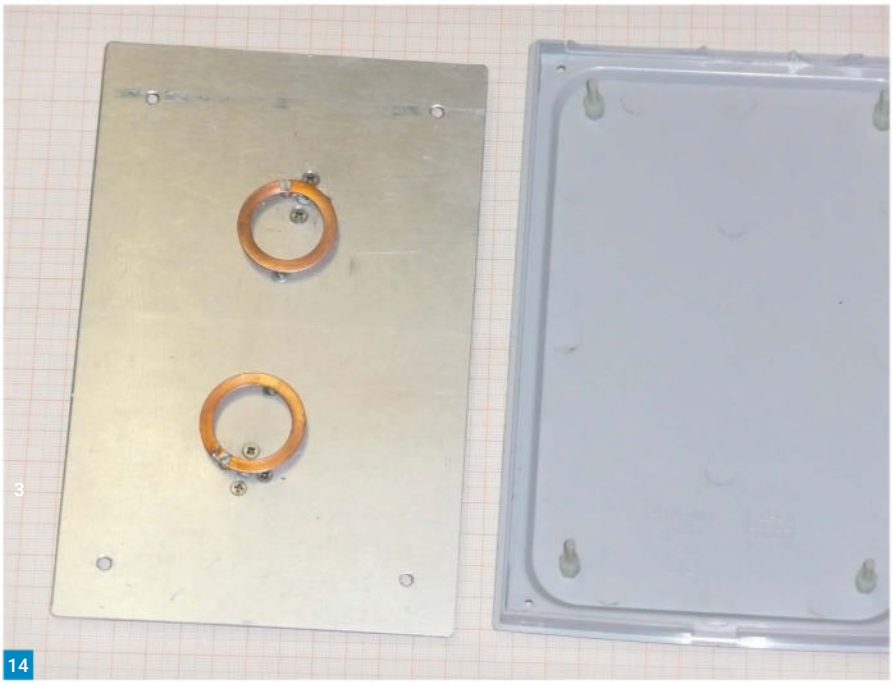

Fig. 14: The GP and pair of copper rings are TX/RX for Inmarsat satellite on top of a vehicle with a plastic radome (cover). This indicates a practical way to make a 1296MHz and higher slot on a limited ground plane. This one makes a very good GPS (Rx) antenna because of the low elevation angle response.

Design of vertically polarised slot antenna

freq. MHz	lambada m	52° dia m	total length m	8° height m	5° match m	min 2*D m	width 2°	diA
14	21	3.1	9.7	0.48	0.30	6	0.119	0.038
21	14	2.1	6.5	0.32	0.20	4	0.079	0.025
24	13	1.8	5.7	0.28	0.17	4	0.069	0.022
29	10	1.5	4.7	0.23	0.14	3.0	0.057	0.018
40	7.50	1.08	3.40	0.17	0.10	2.2	0.042	0.013
50	6.00	0.87	2.72	0.13	0.08	1.7	0.033	0.011
70	4.29	0.62	1.95	0.10	0.060	1.2	0.024	0.008
145	2.07	0.30	0.94	0.05	0.029	0.6	0.011	0.004
434	0.69	0.100	0.31	0.02	0.010	0.2	0.004	0.001
1296	0.23	0.033	0.105	0.005	0.003	0.1	0.001	

Table 1: Practical dimensions of the slot and skeleton slot antenna for various frequencies. 360° is a wavelength at the frequency considered. The low impedance feed, via coax, is connected to the lower ring at the base of the shorting post and the centre conductor to the upper ring 5 electrical degrees away as indicated in the 'Match feed column' and Fig. 2. The far-right column 'width' indicates the minimum surface area of the conductor required to avoid losses, large at 14MHz. implying 3.4cm diameter, e.g. 2in alloy pole or smaller copper pipe. At 50MHz, as can be seen from the photos, much more practical to use aluminium strip or tubing. A lighter, cheaper way is fibreglass pole and adhesive tape? A copper disc is practical at 433MHz and above. Illustrated is a 1296MHz version. In all cases the capacitor required is 0.1 -3pF variable and easily constructed using a captivated bolt 2/4mm and an opposing metal plate.

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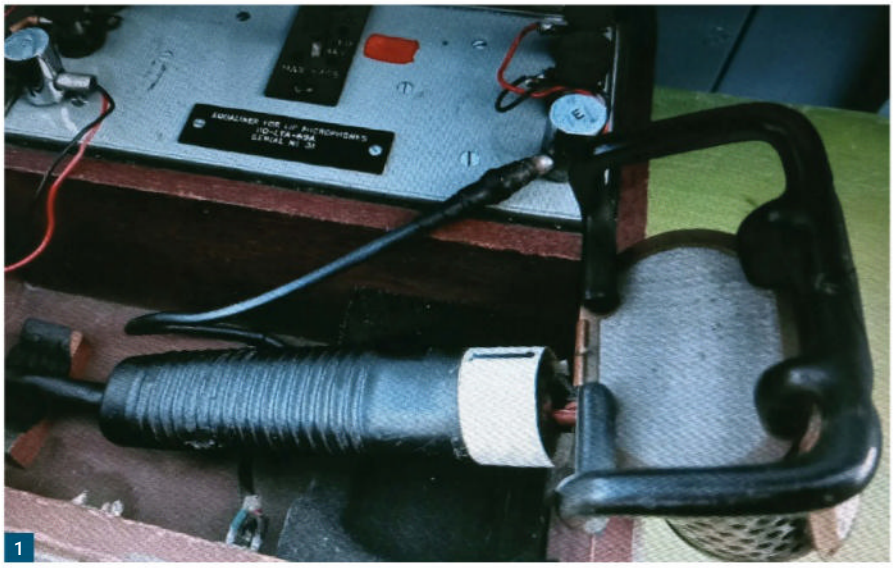
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BBC coronations, Part IX

Keith Hamer and **Garry Smith** continue the special series looking back at the BBC's coverage of Coronations since 1937. There is also a Coronation vintage television advertisement from the archives, including a description of the various radio and television companies behind the 'Defiant' brand. There are more unique details about Roland Pièce, the pioneer of Swiss radio broadcasts, from family archives supplied by his Grand-Nephew, and PW reader, Pierre Yves-Pièce. The series charting the rise and fall of BBC 198kHz transmissions focuses on the Daventry 5XX Station. We also continue our series about the development of Swiss Radio and Television since 1922.

A number of technical innovations were developed by BBC engineers especially for the 1953 Coronation. These included an improved version of the *lip microphone*, **Fig. 1**. This type of microphone was first developed for the 1937 Coronation so that commentators working in different languages, or on different networks, could be placed at intervals of no more than five feet apart without causing interference to each other. Other developments for the 1953 Coronation included: the *derivative equaliser*, which proved effective in compensating for certain types of electrical and optical distortion experienced with television cameras; a new method of camera synchronisation; the *suppressed-frame* process for recording television pictures on film; and the special equipment used for converting the television signals transmitted from this country to the different picture standards prevailing on the Continent. For the 1953 Coronation, the BBC engineers worked in close co-operation with the *Post Office Engineering Department*, which was responsible for supplying the many additional line circuits needed to complete the special communications network.

The main events of *Coronation Day* were covered by two teams of commentators, for sound and television respectively, in continuous broadcasts lasting for more than seven hours. Both teams included Commonwealth representatives.

For the *Coronation Service*, one sound and one television commentator took their places in the Triforium of Westminster Abbey, together with representatives of the *Canadian Broadcasting Corporation* and *Radiodiffusion et Télévision Française*, who shared a microphone. A cameraman was also squeezed into the Triforium, **Fig. 2**. Other members of the sound and television teams were located in the Abbey annexe, in the Inner Courtyard at *Buckingham Palace*, and at various sites along the processional route.

Vintage coronation television equipment

This month's meander through vintage copies of deserted newspapers and magazines has discovered an advertisement by *Defiant,* which was released to the public well ahead of the 1953 Coronation, held on 2 June, **Fig. 3**. The advertisement dates from 9 January 1953. 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 1953 **Defiant TR 1552 Table Model** television receiver.

"Making the Electrons JUMP!

In elements which conduct electricity (like copper) the electrons are free! They can jump from atom to atom. This movement of the electrons forms a path which enables the electric current to pass through the conducting metal.

Our technicians have made the electrons jump to the highest peak of perfection in Radio and Television. The Cathode Ray Tube is the best that science can make, our circuit has every device for crystal-clear reception. A 15in aluminised tube and 5-channel tuning luxuriously housed in cabinets of consummate beauty - at the right price!

TABLE MODELS 86 gns.
CONSOLE MODEL 100 gns.
Both prices include tax.
DEFIANT
A JUMP AHEAD IN TELEVISION AND RADIO FROM CO-OPERATIVE SOCIETIES EVERYWHERE"

Unusually for television advertisements in 1953, there was a brief technical description, complete with graphics, relating to electrons and atoms jumping around inside the *Defiant TR 1552 Table Model*.

Radio and television equipment carrying the *Defiant* brand name was originally produced for the *Co-operative Wholesale Society* (the *CWS*, also known as early as 1922, in some locations, as the *Co-op*), based at 1 Balloon Street, Manchester. Initially, the CWS concentrated on the production of gramophones.

The Co-op's first venture into selling equipment to the public from a High-Street outlet was a shop called *Barnsley British*. Between 1922 and 1925, the company made a turnover of around £14,000. Following this highly successful trading period, the *Co-operative Movement*, as it was then known, opened a shop in 1925 that specialised in wireless equipment.

Although today the Co-op officially claims that it is an 'ethical company' (backed up by pages of mainly endless waffle on their website), other traders in the radio industry thought otherwise back in the early Thirties! The Co-op's trading strategy was to have a 'rewards scheme' whereby customers were issued with a 'dividend' to entice people back into their shop. In 1933, suppliers began to take restrictive actions against Co-op societies and

Fig. 1: An improved version of the *lip microphone*, developed by the BBC in the Fifties.
Fig. 2: A cameraman hunched up inside Westminster Abbey's Triforium during the 1953 Coronation. Fig. 3: A Coronation advertisement for the *Defiant TR 1552 Table Model* television receiver in 1953.

orders were not honoured. Traders regarded the Co-op dividends as a breach of the *Fair Trading Agreement,* which had successfully been in operation for some years.

The disagreement became so serious that several well-known suppliers, including *Philips Industries* and *ECKO*, suspended deliveries to the Co-op in August, 1933. Other companies quickly saw the opportunity to step in and supply the Co-op with various types of equipment. These included *Philco*, *Woodland Receivers*, *Kolster Brandes*, *Radio Instruments*, *Lissen*, and the *Drummond Radio Company of Bolton*. However, the CWS declined their offers and decided to form their own manufacturing company.

The CWS previously had close connections with other manufacturers, including the *General Electric Company* (*GEC*) whose enclosures were made by the CWS cabinet factory in Birmingham. After fruitful discussions between the two manufacturers, it was decided to form a subsidiary company. Initially, the name *Challenger* was registered, presumably as a snub to the disgruntled wireless traders mentioned earlier. However, another company, based in Bradford, was already trading with the same name and lodged a complaint.

In defiance of the original acrimonious dispute with the wireless traders, the brand name *Defiant* was born in November, 1933!

Unfortunately for the CWS, this cosy marriage with GEC was annulled after only one month following pressure from the radio industry in December, 1933. GEC informed the CWS that they would no longer produce *Defiant* radios. Furthermore, the industry introduced an embargo on the CWS and refused to supply *any* equipment to the Co-op organisation. However, despite this, Defiant radios magically became available on 5 December 1933, with two models on offer: the 3-valve Model 333 and the 5-valve AC/DC set, Model 533. Spurred on by the success of these two wireless sets, CWS wanted to expand their range and approached *Standard Telephones and Cables Limited* to produce a less expensive model, which they called *Model B4434*.

The CWS forged ahead with their expansion plans but needed guaranteed continuity of supplies and manufacturing capabilities. They came to an arrangement with *British Thomson Houston* (*BTH*) who agreed to supply *Mazda* valves, provided they would be used exclusively for the Defiant range of receivers. CWS approached *Plessey* to manufacture their wireless sets. In 1934, a rather complicated agreement was signed whereby the CWS would give Plessey at least 75% of the Co-op's business in the manufacture of wireless receivers provided that Plessey would only use products specified by the CWS, including all cabinets to be made at the *CWS Cabinet Works*. A further stipulation imposed by the CWS was that Plessey could only use components in wireless sets that were manufactured by a different company. Meanwhile, the CWS demanded that BTH could only use Mazda valves.

In June 1934, the CWS established their own *Service Centre* at premises in London. One month later, they opened their first *Service Department* in Birmingham.

The CWS' *Defiant* brand name went from strength-to-strength, but discontent with established traders in the radio industry also grew. The CWS applied to participate at the highly influential *1934 Olympia Exhibition*. The event was organised by the *Radio Manufacturers' Association*. CWS' application was swiftly rejected by the RMA. Undaunted, the CWS persevered with their wireless production and in the mid-Forties, they joined forces with Plessey in a joint venture known as *Radiophone Essex*. This subsidiary company served as a manufacturing plant for all post-war Defiant sets.

Between the 1950s and 1970s, the Defiant brand name became as popular as mainstream brands such as *Philips*, *Bush*, and *Ferguson*. Eventually, the name *Defiant* was accepted by the *British Radio Equipment Manufacturers' Association* (*BREMA*). The brand name also played a key role in the television rental sector. At its peak, over a quarter of a million homes rented a *Defiant* television receiver.

Plessey, then based in Ilford, continued to manufacture television receivers for the CWS for many years. Indeed, Plessey produced sets covering no less than 17 brand names. However, in the mid-Sixties, the company ended television production. From 1967 onwards, Defiant receivers were manufactured by the *Bush Murphy Company Limited*. Unfortunately for the CWS, Bush Murphy faced trading difficulties in the early 1980s and were forced to cease production. The CWS eventually joined forces with Philips. This resulted in the manufacture of Defiant receivers being continued from 1981 until the mid-1980s.

Roland Pièce archives: Part III

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

On the strength of his success as a young boy producing a working spark transmitter, which con-

Fig. 4: The *BBC 5XX Station* opened at Daventry on 27 July 1925. Fig. 5: A rare photograph of the first Swiss television presenter, Rosmarie Burri. Fig. 6: The experimental daily Swiss television programmes were preceded by the joint *SRG-SSR Test Card* which was based on the *RMA Resolution Chart 1946*.

sisted of a **Ruhmkorff** coil, a **Herz** exciter made from two tin cans, and two brass balls, Roland Pièce decided to enter the *Gymnase scientifique* in Lausanne. He then went to live with his **Aunt Marguerite**. He soon learned that some of his classmates were picking up the time signals from the Eiffel Tower in Paris. He then set about building a receiver, making the basic components himself, as he was unable to obtain equipment that was too expensive for him to purchase. For the tuning coil, he asked his wood-turning friend, **Philippe Allamand**, to provide him with a wooden cylinder onto which he could wind a layer of insulated wire.

A slider that moved along the length of the cylinder was used to produce the tuning effect. Roland Pièce had no difficulty in making a capacitor. He found that using tinfoil from various chocolates and paraffin paper did the trick! However, things became more complicated when it came to making an electrolytic detector. He took advantage of the resources of the chemistry laboratory at the Gymnase scientifique where he found all the necessary equipment.

With the loan of a neighbour's telephone, his equipment was now operational and ready to be coupled to the antenna made up of two 50m galvanised wires, which he had the audacity to deploy between the roof of the family home and that of the *Grand-Hôtel des Bains* located just next door. At noon on 2 January 1914, his success was announced with great excitement. From the roof of his house in Bex, Roland Pièce shouted: *"Papa, papa, come up quickly, it's working!"*

The family interrupted their meal and climbed to the top of the house to listen to the famous time signals from the Eiffel Tower. However, the antenna did not comply with the regulations as it passed over private property and cut into a telephone line. **Paul-Louis Mercanton** had experienced the same problems in 1911, with his wire cable stretching between the belfry of *Lausanne Cathedral* and the bell tower of *Palud Town Hall*! In order to comply with all the regulations, Roland Pièce requested, and obtained, a concession on 7 April 1914. He also moved his antenna to the family garden.

On 1 August 1914, the *Federal Council* declared the general mobilisation of the army. On the following day, it issued an announcement prohibiting all private use of radio communication. Shortly afterwards, the *Network Manager* of the Lausanne region informed Roland Pièce that he would personally come and dismantle his aerial system and sequester his receiver. The young student hastily made a fake receiver, handed it to the inspector and dismantled the aerial. But the passion was too strong! He immediately imagined that he could use the house's electrical network as an aerial and hide his receiver in the attic. The results were even better than with the original outdoor antenna.

Reception of the time signals from the Eiffel Tower was improved. Furthermore, the signals from Nauen (*POZ*) in the Havelland district of Brandenburg in Germany, Lyon (*YN*) in France, Caernarfon (*MUU*) in Wales, and from the *Palazzina Marconi* transmitter in Coltano (ICI), Italy, were also extremely well received. This enabled him, hidden in the attic of his father's house during the *First World War*, to listen to the official communiqués from France, Germany and Italy. Remember, listening to such broadcasts within Switzerland was illegal and Roland Pièce's father was a judge!

The rise and fall of 198kHz, Part II

In an effort to improve reception over a wider area than was possible with medium-wave broadcasts, the BBC proposed building a station working on comparatively high power, and using a wavelength between 1,000 and 2,000 metres. It was well known that the attenuation on long waves was very much less than on medium waves. However, before starting construction of a high-power station, it was necessary to conduct a series of tests to ascertain what range could be expected and whether any technical problems would arise.

In 1924, an experimental station was erected at Chelmsford, which gave distinctly promising results. Consequently, it was soon incorporated into the regular service. At the same time, however, a site for a permanent station was selected at Daventry and construction work soon began on the well-known *5XX Station*. Equipment originally used at Chelmsford was transferred to the new station, which originally began operating with an aerial power of 25kW. This was later increased to 30kW and its success from the point of view of increasing the audiences was quite spectacular. The 5XX Station opened on 27 July 1925. The site was gradually expanded and at its peak, there

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were more than 40 masts and towers erected in an antennae field, which extended over hundreds of acres, **Fig. 4**.

However, it was later realised that the station would have to be rebuilt in order to give a stronger service to all those parts of the country not served by smaller regional stations. Before permission could be obtained to put this into effect, it was necessary to obtain approval from several government departments, through the *General Post Office*. Naturally, there were certain difficulties in this connection owing to the fact that a large high-power station in the middle of England was capable of causing interference to other services that used waves not far removed from that of the proposed 5XX Station.

Service information: Switzerland, Part XI

Experimental television broadcasts in Switzerland began in 1951. These were unofficial transmissions radiated on an ad-hoc basis. In 1953, SRG introduced an official experimental service with scheduled programmes. The first television presenter was **Rosmarie Burri**, **Fig. 5**. Despite extensive searches through the archives, we cannot find any other reference about her career with SRG-SSR.

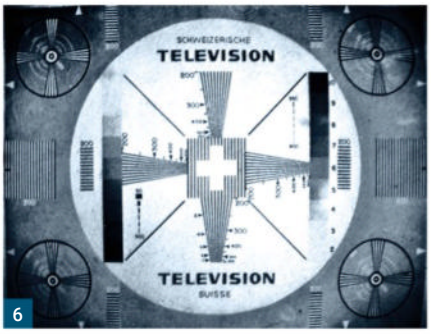
The first television studio in German-speaking Switzerland, *Studio Bellerive*, was built, as with all the original Swiss radio studios, in a rather modest existing building. It was previously a garage with gymnastics rooms and two indoor tennis courts in Zürich's Seefeld district. The studio broadcast daily for around one hour, five nights a week, with its schedule featuring a regular news bulletin called *Tagesschau*.

SSR in Geneva received their own licence for test broadcasts in 1954. The daily programmes were preceded by the joint *SRG-SSR Test Card,* which was based on the *RMA Resolution Chart 1946*, **Fig. 6**. Television in the Italian-speaking Ticino didn't begin until 1958.

FM broadcasting was introduced in 1956, resulting in improved reception and allowing the national broadcasters to expand to two radio stations each. Fast-forward to December 2014, the Swiss government established the *Frequenzmanagement und Funkkonzessionen* (the *FKV,* known in English as the *Digital Migration Working Group*) and set 2024 as the latest date for phasing out FM broadcasts. Since 2014, the popularity of digital radio has been steadily growing in Switzerland.

On 19 September 2019, *Der Schweizerische Bundesrat* (the *Swiss Federal Council*) were lobbied by various interested parties to ensure that FM radio frequencies would be supported until 2025 and that there would be a guarantee that SRG did not develop its own agenda to enforce a possible earlier closedown date. In their response, the Federal Council prohibited any further lobbying activities or advertising campaigns to convince private radio stations to switch off earlier. The Federal Council is the federal cabinet of the *Swiss Confederation* and serves as the collective head of state and government.

Any broadcasting licences issued to FM stations that expired in December 2019 were extended until the end of 2024. A consultation was held to explore whether to allow an exemption for individual FM transmitters to remain broadcasting after 2024 for a limited period in regions where DAB+ (*DAB-plus* in Switzerland) coverage would



6

be less than adequate.

Eventually, the Federal Council announced that the DAB+ digital standard would be the main distribution system for radio programmes from 2020. Furthermore, *Article 62a of the Ordinance on Frequency Management and Radio Licences (FKV; SR 784.102.1)* provided for the continued use of existing VHF frequencies, if required. At the same time, the agreement created the basis within the FKV for an FM switch-off before 2024, if this was necessary for an orderly implementation of the transition from analogue to digital distribution.

Norway was the first European country to transition from FM radio broadcasting to an almost completely digital system. The process officially began in January 2017 and was completed by the end of the following year.

Stay tuned!

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

Rallies & Events

All information published here reflects the situation up to and including **24th November 2023**. Readers are advised to always 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, to: **practicalwireless@warnersgroup.co.uk**

28 December

SPARKFORD WIRELESS GROUP TABLE TOP RALLY (IN AID OF RAIBC): Davis Hall, Howell Hill, West Camel, nr Yeovil, Somerset BA22 7QX 0930 till 1300, entry £3, free parking, refreshments (CR FP). Details from Bob G8UED
email: wjh069@gmail.com

28 January

LINCOLN SHORT WAVE CLUB WINTER RADIO RALLY: The Festival Hall, Caistor Road, Market Rasen, LN8 3HT. Doors open at 09.00. Admission £2 Indoor event, ample free car parking. Hot refreshments. Tables £10 each. Contact Steve M5ZZZ for tables and details: At 14.00 there will be a Used Equipment Auction items will be booked in from 13.00 (BB, CR, FP).
Email: m5zzz@outlook.com
Tel: 07777699069

3 March

EXETER RADIO AND ELECTRONICS RALLY: 10.00 - 13.00. America Hall, Pinhoe EX4 8PX
Email: g3zvi@yahoo.co.uk Tel: 07714198374

20 April

2024 YEOVIL ARC THIRTY-EIGHTH QRP CONVENTION: The Digby Hall, Sherborne, Dorset, DT9 3AA, 9.30am to 1.30pm. Admission £3. Talks, Traders, Bring and Buy, club stalls, cafe, parking. (BB, CR, CS, FP, RSGB).
http: //Yeovil-arc.com
mail: derekbowen1949@talktalk.net

12 May

DARTMOOR SPRING RADIO RALLY: Yelverton War memorial Hall, Meavy Lane, Yelverton, Devon, PL20 6AL. Doors open 10am, Admission £2.50, Free Parking. Contact Roger.
Tel: 07854 088882
Email: 2e0rph@gmail.com

Quiz Answers

The answers to our seasonal quiz on page 30

Question 1: B	**Question 8:** A	**Question 15:** C
Question 2: B	**Question 9:** D	**Question 16:** C
Question 3: A	**Question 10:** C	**Question 17:** A
Question 4: C	**Question 11:** D	**Question 18:** B
Question 5: A	**Question 12:** C	**Question 19:** D
Question 6: D	**Question 13:** D	**Question 20:** B
Question 7: A	**Question 14:** B	

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 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

Specialist Dealers

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Kit Suppliers

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Bargain Basement Wanted

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Your Letters

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E-mail: practicalwireless@warnersgroup.co.uk

Treacle tin dummy loads

Dear Don,
I guess making dummy loads into treacle tins was something done back in the day. I think mine (see photo) predate the ones in *PW* as the tins are marked 1lb and 2lb.
Ian Jones G4MLW
York

More nostalgia

Dear Don,
I guess, not unlike a lot of other septuagenarians, I can never quite get enough of nostalgia in all its various shades. One shade of which is many things radio. But my constant regret in this regard, is waving goodbye to so much radio equipment that in the luxury of hindsight I wished I'd kept. But didn't. There again, being pragmatic, it wouldn't have been one of my better ideas. I would have needed a warehouse or two to store it in. My three lofts would have been filled to the rafters in short order.

So nowadays I have to be satisfied with pictures of nostalgic radio equipment instead. Or just chewing the fat about it or reading about it. And that brings me to that article about the 'late Clive Sinclair' in this month's *PW* (December 2023), *The Micro-Midget*.

Clive Sinclair was one of those rare inveterate tinkerers who turned tinkering from a pastime into a business and changed the landscape of consumer electronics. And of course, Clive's idea of the miniaturisation of radio devices was remarkably prescient. Because since then, it has spawned a whole industry devoted to designing almost anything that is electronic and packing it all into a smaller and smaller space. It might be the case at some point in the near future that the substrate where the components are located will need to be dramatically revised or removed from the entire process. Circuit boards may eventually become nostalgic.

Morse before radio (same issue), got me thinking about something I read about the Mayan dynasty. Apparently, their mathematical prowess knew no bounds. They had calculated the length of a year to 365.242 days. This is where Morse code enters the frame, sort of: they used a 'counting system based on dots and dashes for numbers'. That definitely pre-dates all the other contenders for dot and dash immortality. Again, sort of. Unfortunately, when the Spanish arrived plundering the riches of South America, they burned all the mathematical records of the Mayan's believing them to be 'lies of the devil'.
Ray Howes G4OWY/G6AUW
Weymouth

Cut numbers, etc.

Dear Don,
Reading 'Morse Keys' (Dec. 2023), issue I was interested to read about the use of cut numbers in amateur transmitted CW. I have never encountered this while copying amateur Morse; my Morse skill is very limited due to short term memory problems thanks to neurosurgery following a road accident when I was much younger.

I have encountered cut numbers elsewhere in transmissions sent by the Cuban Secret Intelligence Agency, the DGI (Dirección General de Inteligencia), to its external officers and agents. The Morse transmissions, identified as M08a by the ENIGMA2000 Number Station Group, from the DGI seem to have finally disappeared. At one stage they formed a hybrid station (HM01) that sent Morse idents in the style of M08a and after six cycles sent a data signal.

The cut number system used by M08a and within HM01 remained the same. One Cuban spy known to have received his messages in Morse was **Kendall Myers**; now 86 he is serving a full life sentence, his wife **Gwendolyn**, now 85, received 6.5 years sentence for her part. Myers did not reply using Morse, rather he found the internet to be better for his purpose.

The cut numbers he would have received from his Cuban masters are very different to those stated in **Roger's** column. They are:

0 T
1 A
2 N
3 D
4 U
5 W
6 R
7 I
8 G
9 M

In their message transmission there are usually three messages, each of 150 groups. It is likely these groups were hand entered into a laptop and converted to an en clair message using bespoke programming. Such evidence is available from the case of **Ana Belen Montes** who, working the Cuban Desk in the US Department of Naval Intelligence, passed secrets to the DGI. She received her instruction by a voice transmission, identified as V02, and one frequency used was 7887kHz.

She entered her received message by hand in her laptop and then inserted a diskette labelled 'R' into

external drive. Her replies were made via the US Paging system.

Paul Beaumont G7VAK
www.enigma2000.org
London

Preserving amateur radio history

Dear Don,

I was delighted to read G3NKH's article (September, p46) describing the history of **Lynda Jopson's G6QA** callsign. I suspect that a lot of the history of our hobby is preserved and passed on by word of mouth and this makes it vulnerable to being misheard or misunderstood or being completely forgotten. This history needs writing down and this is why I was delighted to read G3NKH's article.

RAOTA was mentioned and I am pleased to say that RAOTA, though not able to assist G3NKH with his article, is playing an active part in getting the history of our hobby written down. It does this via the RAOTA 'archive challenge'. In every issue of RAOTA's quarterly magazine *OTN* the RAOTA archive manager (that's me) presents an archive challenge such as 'Your memories of amateur radio retailers/traders and amateur radio rallies' or 'What magazines and books did you read in your formative years in electronics and wireless'. Members write up their recollections and reminiscences and send them to the *OTN* editor for publication in the next available issue. This is a double win because we are succeeding in getting history written down and we are making it readily available to every RAOTA member. Sometimes I present an archive challenge looking at the hobby today, such as 'My favourite transceiver of the 21st century', because what happens today will be history tomorrow and we have the opportunity to capture it at first-hand.

October's *PW* arrived and I was happy to be reminded of the ERA Microreader (p.10). Back in the 1980s, being able to read RTTY on a device that could be held in the hand was a revelation when compared to large, heavy, noisy teleprinters or desktop home computers using bulky and heavy CRT screens. I browsed further through this *PW* and was pleased to see (p.66) that a biography of **Gerald Marcuse G2NM**, written by **David Fry G4JSZ**, has been published.

Ian Brothwell G4EAN
RAOTA archive manager
Nottingham

CE marking

Dear Don,

I have just received my December *PW* and I was surprised to read on Page 6 (*News Desk*) the final part of the interesting item about the Elecraft KH1. Quote: *"As yet the KH1 is not CE certified so is unavailable in the UK"*. Hmmm…..

This may be old news, but the GB (GB being England Wales and Scotland – excluding Northern Ireland) have left the EU and as such, in the GB, as I understand the current status, CE marking has been consigned to the dustbin, carries no legal status and is not required.

As per my email letter to you dated 11 Dec 2021 about CE and UKCA marking (which you published in *PW*), CE marking in the GB has been replaced with the UKCA mark and as such the Elecraft KH1 will need to be UKCA marked to be legally *"placed on the GB market"* (this is the term used by the legislators).

Just to complicate matters, as per my previous letter, the KH1 will require either a UKNI mark or a CE mark to be sold in Northern Ireland. This is because Northern Ireland is still part of the EU.

Furthermore, there is no such thing as 'CE Certified'. As far as I am aware, the EU do not have a certification system for these types of goods, however, they do mandate that it is 'CE Marked' by the importer to show that it meets the relevant CE Directives. This is an EU legal requirement.

Also, as far as I am aware, the GB also do not have a certification system for these type of goods. In the GB it is required that the importer (or the manufacturer if manufactured by a GB company) to 'UKCA Mark' it to show that it meets the relevant GB Directives. This is a GB legal requirement.

When the importer or manufacturer affixes (the correct term) a UKCA mark, the importer/manufacturer takes the responsibility of ensuring that it meets the relevant GB Directives. It is the importer/manufacturer who will go to court if the product is found not to meet a relevant directive.

Jim Carter G0LHZ
Reading

★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

Yaesu FT480R/780R article

Dear Don,

I really enjoyed the article on the Sommerkamp/Yaesu FT-480R/780R transceivers with some interesting tips. I have had quite a number of the VHF versions the FT-480R, all having some form of fault or issue. The biggest issues are with the PA module, the Mitsubishi M57713. These can crack internally with years of heating and cooling between transmit and receive. If you have a radio that transmits, then I strongly advise the fitment of a small external fan. It's also a good idea to remove the module, clean off the old heatsink compound and redo it with new high-quality compound. If the module is faulty, there are ways round this. M57713's are offered 'new' online but they are fakes and don't work. A Toshiba S-AV10 or 17 will work but only on FM and CW as it's a class 'C' module. A better solution is to get hold of the Mitsubishi M57732. They are still available from some suppliers, they are physically smaller and will give 7 watts with small modifications, they need less drive, easily done with a 100Ω potentiometer to adjust the drive and also bias is lower which can be done with a simple addition of a zener diode and series resistor. I've done two with total success and they work on SSB.

The other common failure on the 480R is the PLL unit with crystals drifting or totally failing. Most of the problems are caused by the brown glue Yaesu have used to secure components, it causes corrosion and can eat away on the thin leads of the crystals. My advice is to remove the glue ASAP. It goes hard, use plenty of 99% IPA and give it a good soaking, which helps with the removal of the glue. I don't advise using any glue. It's not needed except if you use the radio in a vehicle. I strongly advise not to use WD40 on the board. To keep corrosion away a very light coating of lanolin rustproof fluid (Lanoguard or Corrolan) warmed will flow under the crystals and stop the corrosion in its tracks. New crystals are no longer available and one I got specially made was not far off £100. Drift is common but remember these radios are over 40 years old.

Regarding the mods in the article, the low power mod will make the radio transmit continually on the CW position, although it does work OK on SSB. If you look at the circuit, it's not quite as simple as shorting the line to earth, I'm investigating the possibility of doing this on the function switch.

Also, the removal of D4011 doesn't work on all variants. The manual states there are five versions but in fact there are six of which I have one. It has 1, 25 & 100kHz steps and has D4011 present. Removal removes the first digit of the display but doesn't change the steps. Mine has a different diode fitment to the 'B' version, so no idea what market that particular 480R was intended for.

Hope this is helpful.

Trevor Goodenough MM0KJJ
Kilmarnock

*(**Editor's comment**: Thanks Jim for the reminder about CE and similar. I guess my thinking was that if the KH1 was not to be sold in the EU, then Elecraft probably wouldn't bother with the UK, being a relatively small market by itself (compared with the US). But I have been picked up on this by one other reader too, so I am happy to make amends and clarify!)*

Third country duty

Dear Don,

Because of the dire lack of stock of antennas in the UK I started to look outside the UK for a supplier and couldn't find any information on the import duty charged on purchasing antennas from Europe. I accept that VAT is charged at 20% but I didn't want any nasty surprises when the goods arrived at the doorstep. I have searched the UK Government website on these matters:

https://tinyurl.com/34k3ezbz

and as I far as I can see there is no category for amateur radio and nothing mentioned about antennas either. Am I missing something?

Mark Waples G6CPX
Wellingborough, Northants

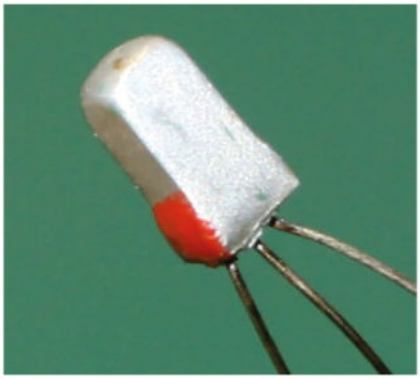
*(**Editor's comment**: I can't help I'm afraid Mark and I have heard that Customs take various approaches depending on who exactly deals with it! But do any readers have advice for Mark? If so, email me and I will pass it on.)*

The Micro-Midget

Dear Don,

The illustrations of The Micro-Midget receiver (December 2023, page 60) show what the transistors look like. The photo shows a similar red spot transistor from my own collection and its unusual case closely resembles the British Thomson-Houston GT1, introduced 1958 (don't confuse with GET1, quite different). This raises the possibility that the coloured-spot devices were out-of-spec seconds, made available to enthusiasts at reduced price. It's also probable that Sinclair himself did the same with his claimed range of microalloy (MAT) transistors. As you see from my MAT100 in the photo, the paper label is crudely stuck on (there's another in the original packet with pre-decimal price). At the time, it is alleged that Sinclair worked for Plessey in Southampton and was able to take their cast-offs, test them and pass as his own. Bernard-Babani even published a book of circuits for the MAT range (with a decimal cover price).

Godfrey Manning G4GLM
Edgware



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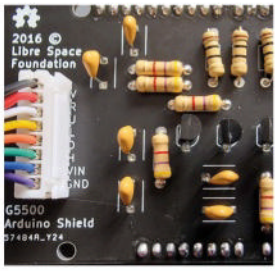

REVIEW SKYKING TXHF-6 – A VERY DIFFERENT DISCONE: Richard Constantine G3UGF says "You can never have too many antennas!"
THE NEW SDRCONNECT SOFTWARE: A review by Georg Wiessala.
PORTABLE MILITARY RADIO COMMUNICATIONS OF WWII: Graham Caldwell begins a series of articles on WWII portable military radio equipment, including their collecting potential.
CONTROL THE CONTROLLER: Billy McFarland GM6DX has an Arduino-based project to control a Yaesu rotator from your PC.
DATA MODES: Mike Richards G4WNC introduces the Hermes Lite 2 and explains how to get it up and running.
TRANSMIT QUALITY AMONG MODERN TRANSCEIVERS, PART I: Frank Howell K4FMH starts a series looking at the transmit quality of the current range of commercial transceivers.

There are all your other regular columns too, including HF Highlights, World of VHF, Antennas, Book Reviews, What Next, The Morse Mode, Airband News, and Amateur Radio on a Budget and much more.

Cheerio 2023

What a year that was, and one I'm personally pleased to see the back of. It's not been the best of years for me health wise but onwards, and upwards!

It's almost 2024 and we thought we'd throw some of my hard earned at the showroom this time, giving it a refresh and installing yet more display cabinets for the ever-bulging array of USED EQUIPMENT. It's funny that after 33 years of running my own show I'm still shifting your excess used kit on a daily basis. I filled my first little corner shop with used stock (and the odd smattering of new gear) and decades later, the mix maybe reversed, but give me pre-owned kit anytime!

In the early days I used to sell on behalf or *"sale or return"* but those times are generally long gone and we buy outright or take in part-exchange. We still offer to sell on behalf of customers that want it, usually kit that's a bit different like £20k's worth of used Canon camera set-up that isn't usually our cup of tea.

Another thing that's changed especially over the last ten years, are new manufacturers offering us their products. A big change from when I used to constantly bang on doors trying to get there first. If I didn't, my competitors grabbed that new product that will not only put a smile on your face, but mine too. I think after all this time, manufacturers and suppliers know who ML&S are in the marketplace and trust us to promote their products fairly and honestly. It's our reputation that's on the line as well as theirs after all.

Seasons greetings to my many tens of thousands of customers that continue to support me, my two sons who now run my business, and of course my brilliant team over the years. Here's to a healthier and more prosperous 2024.

73
Martin G4HKS
the Guv'nor

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*Multi-signal receiving characteristic: 14MHz band/2kHz separation
*TX Phase Noise: 100W, CW mode

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FT-710 Field

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- Display is not included. The image is shown with an optional third-party external display that may be connected using a DVI-D digital cable.

* Photo shows the FT-710 AESS

HF/50MHz 100W SDR TRANSCEIVER w/ SP-40

FT-710 Aess

Acoustic Enhanced Speaker System

HF/50MHz 100W SDR TRANSCEIVER

FT-710 Field

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