PRACTICAL WIRELESS

www.radioenthusiast.co.uk

NOW INCORPORATING RadioUser

DECEMBER 2023

THE UK'S NUMBER ONE AMATEUR RADIO MAGAZINE SINCE 1932

NEW PI IS HERE | Details of the long-awaited Raspberry Pi 5 unveiled

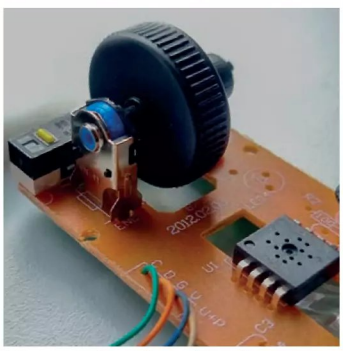
AUTO TUNERS ON A BUDGET

Comparing the new AT-100M and ATU-100

Practical Wireless REVIEW

RSGB Convention

All the news from this year's gathering of the great & good



Practical solutions

Home build project for a remote tuning knob for SDR

MARITIME Awards and aids to navigation

Range of schemes and operating periods linked with lighthouses

ARCHIVE The Micro Midget and its amazing capabilities

How the 'smallest receiver in the world' was even able to operate a loudspeaker

THE 2023 INDEX

Every major article this year listed in order inside

YOUR SAY

Letters from fellow readers

9 770141 085167 12

WARNERS GROUP PUBLICATIONS

£5.99

Display until 14th December 2023

bhi Clean up your noisy audio with.. ..a bhi DSP noise cancelling product!

ParaPro EQ20 20W Parametric Equalisation Audio Units

- Greatly improved audio for those with hearing loss
- Two separate mono inputs or one stereo input
- Use with passive speakers or headphones
- Basic EQ units EQ20 **£219.95** - use with your bhi Dual In-Line, Compact In-Line or In-Line Module
- DSP noise cancelling version EQ20-DSP **£299.95**
  EQ20B-DSP (with added Bluetooth on input) **£359.95**

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

In-Line Module £159.95

IN-LINE Module - 5W amplified DSP noise cancelling In-Line module - 8 filter levels 8 to 40dB - Use in-line with a loudspeaker

NEDP1901-KBD £129.95

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

Dual In-Line £179.95

Fully featured dual channel DSP noise cancelling unit
- 8 Filter levels 9 to 40dB
- 3.5mm speaker level & line level inputs
- separate 7W mono speaker output-
Stereo headphone socket
- Easy to use controls

Compact In-Line £189.95

- Powerful audio processor
- Removes noise and interference
- Hear weak signals clearly
- Easy to use with "real time" audio adjustment
- Use with headphones or a loudspeaker

NES10-2MK4 £129.95

- 5W amplified DSP noise cancelling speaker
- 8 to 40dB noise cancelling
- Audio bypass feature
- Compact rugged speaker
- Use mobile or base station
- Supplied with integral 2M audio lead, fused DC power lead & manual

DESKTOP MKII £219.95

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

"The DESKTOP speaker is great, audio is crisp and clear, brilliant!" Mr B Hiley

NEDSP1962-KBD £139.95 New

Amplified DSP noise cancelling pcb module - Boost your extension speaker with this easy to install retrofit module - Audio bypass feature - Simple control with LED and audio indication - Fitting kit supplied plus install manual and speaker labels

bhi Ltd, Burgess Hill, RH15 9RR, UK

Tel: 01444 870333 - www.bhi-ltd.com

EA&O

VISA PayPal MasterCard

PRACTICAL WIRELESS
Incorporating RadioUser

December 2023 Vol. 99 No. 12
On sale: 9th November 2023
Next issue on sale: 14th December 2023

ISSN 0141-0857

Practical Wireless
Warners Group Publications plc
The Maltings, West Street
Bourne, Lincs PE10 9PH
www.warnersgroup.co.uk
Tel 01778 391000

Editor
Don Field G3XTT
practicalwireless@warnersgroup.co.uk

Designer
Mike Edwards
mike.edwards@warnersgroup.co.uk

Advertisement & Production Manager
Kristina Green
01778 392096
kristina.green@warnersgroup.co.uk

Marketing Manager
Katherine Brown
katherine.brown@warnersgroup.co.uk

Marketing Executive
Charlotte Bamford
Charlotte.bamford@warnersgroup.co.uk

Publisher
Claire Ingram
clairem@warnersgroup.co.uk

Photocopies & Back Issues
We can supply back issues, but we only keep them for one year. If you are looking for an article or review that you missed first time around, we can still help. If we don't have the actual issue we can always supply a photocopy or PDF file of the article.

Technical Help
We regret that due to Editorial timescales, replies to technical queries cannot be given over the telephone. Any technical queries are unlikely to receive immediate attention so, if you require help with problems relating to topics covered in PW, please either contact the author of the article directly or write or send an email to the Editor and we'll do our best to reply as soon as we can.

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

Keylines

I've enjoyed this month chasing some of the many DXpeditions that have been active on the HF bands. It's good to see these operations starting again in earnest following COVID and the sunspot minimum. Now expeditioners can travel to most places (albeit air fares, especially to the Pacific, seem to have shot up) and, fortunately, this coincides with a welcome improvement in solar activity.

I also enjoyed the RSGB Convention – the write-up appears in this issue. It's always good to catch up with friends and especially so given that the National Hamfest didn't happen this year. Apparently, the East of England Showground near Peterborough, which was to have been the new venue, was sold to developers and all autumn events were cancelled.

Alive and well

Once again we have *Letters* relating to the future of the hobby and whether indeed it still has a future. We should probably call a halt because this is one that has come up time and again over most recent decades and probably been done to death. It was quite clear from the RSGB Convention that although we seem to be an aging hobby, there is still lots of life in amateur radio and newcomers are joining, albeit mostly later in life rather than as teenagers as was once the case. Although *PW* is the only mainstream high street magazine left catering to the hobby, there remain plenty of special interest groups that all seem to be thriving – WAB, ISWL, UK Six Metre Group, G-QRP and the like. I know **Colin Redwood G6MXL** plans to cover some of them in a future *What Next* column.

CE and all that

This month's news items include an interesting new product from Elecraft that we thought was worth a mention. However, we also state that it is not available here in the UK and, indeed, may never be, as it hasn't been CE approved and it's possible Elecraft may feel that CE approval isn't worth the time, effort and expense. The same is probably true of many of the products currently being made in China and advertised on eBay and similar websites. Of course, there is no reason why *PW* readers shouldn't purchase such products but caveat emptor (buyer beware!). Things are not always as they seem and you can well be caught out. One or two of our columnists (such as **Keith Rawlings** in his *Antennas* column) have pointed out that products from China claiming to be the genuine article aren't always what they seem. And you certainly won't have any comeback if this turns out to be the case. It really is worth buying from a UK dealer if you want reassurance that you are buying the actual product and want the assurance of proper backup, if needed.

Silent Keys

I have recently been asked to help with the disposal of items from two Silent Keys. This is also a task that falls to many radio clubs, as members pass away. It's a tough one and not helped insofar as many of these Silent Keys have made no provision for the disposal of their radio gear, with the result that those attempting to help are working in the dark, often with a struggling widow looking on. There's no simple answer but we should all, perhaps, in the fullness of time, do what we can to prepare for the inevitable, if only to make lists, keep boxes and documentation in a designated place and so on.

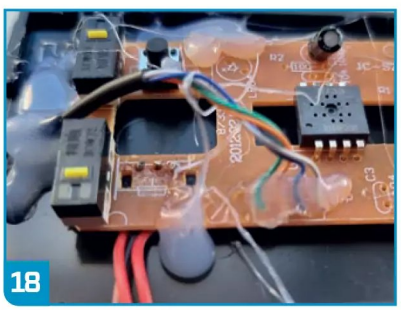
More nostalgia

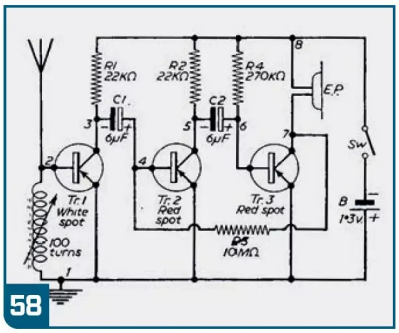
This month I have featured a project by **Clive Sinclair** that appeared in the November 1958 issue of *PW*. Clive would have been 18 at the time. It is certainly recorded that he wrote his first article for this magazine while still at school and later, as we have mentioned before, became assistant editor and effectively took over the editorship for a while when the then editor became too ill to continue. However, Sinclair's name never appeared on the masthead. What I find interesting about this month's featured project is that he was already thinking of miniaturisation, an idea which he followed in later years with several of his commercial projects, including audio amplifiers and tiny radios. I think the only one of his products I actually owned was a ZX81 computer but readers will certainly remember many of them.

Don Field G3XTT
Editor, *Practical Wireless* Magazine

Contents

10


18



58

Newsdesk

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

New from Elecraft

The Elecraft website is showing a new product, the KH1 transceiver. The description says, "We've just tackled some of the hardest problems with HF field deployment: How to get you on the air in seconds, with an internal ATU that tunes both a built-in, multi-band whip and BNC-connected random wires. Providing field logging that's truly convenient. Creating the optimal user interface for handheld CW operation – because there isn't always somewhere to sit. And making an HF rig that's light enough to use HT-style without wrist fatigue. The result of this effort is the KH1: an ultralight radio you'll never leave at home. It's ideal for SOTA, hiking, vacation and business travel, or just that carefree hour after the chores are done. With the Edgewood Package your KH1 becomes a fully integrated station, with fold-out log tray and pen, plug-in keyer paddle, battery, charger, ATU, and whip antenna. It all fits in our versatile ES20 carrying case, with room to spare."

KH1 Features:

- 40-15m amateur bands; 6-22 MHz SWL • CW mode; 5 watts, all bands
- ATU includes whip & high-Q inductor for 20/17/15m • 2.5Ah Li-Ion battery & internal charger • CW decode & 32k TX log • Scan/mini-pan feature
- Real-Time Clock • Full remote control • Speaker
- RIT, XIT, & VFO lock • Light grey case stays cool even in bright sunlight

As yet the KH1 is not CE certified so is unavailable in the UK, but we thought readers might want early warning of this new product.

New from Moonraker

The Ranger 80™ is a rugged, base-loaded vertical, designed for portable, rapid deployment. Perfect for portable operations such as Parks on the Air, field day, and emergency communications.

Precision machined in the USA from premium materials, the Ranger 80 coil will tune from 80 to 15m using the included heavy duty military whip. The Ranger 80 will handle up to 200 watts SSB and 100 watts digital (50% duty cycle). The rapid-deploy radial system uses a custom radial 'puck' that accepts up to eight 4mm banana plugs. This enables quick attachment of the included four-wire radial kit and leaves room to expand your radial field for increased performance. No more fumbling around with radial wire connections, just plug in and get on the air.

The antenna system mounts on the included ground spike or optional [z]Pod™ using standard 3/8-24 mounting hardware. This means it's also compatible with many industry standard mounting accessories for ultimate flexibility. The included 9.3ft military whip sets up in seconds and collapses to a compact size for transport. When you're done making QSOs, the entire system packs neatly into the included backpack.

The complete kit, available from Moonraker, retails for £599.95.
https://moonrakeronline.com/ranger-80-portable-hf-antenna-system

146/147MHZ NOV EXTENSION: Ofcom has agreed to the RSGB request to extend the 146 or 147MHz NoV for a further year. It is available on a non-interference basis and the NoV is subject to a 30-day notice period of change or withdrawal. Full licence holders can apply for the 146 or 147MHz NoV on the RSGB website at:
rsgb.org/nov

TROPHY MANAGER NEEDED: After serving for nine years, the RSGB Trophy Manager is retiring and the Society is looking for a new volunteer for this role. The position is part of the RSGB Volunteer Leadership Team, reporting to the Board. Working in close relationship with the three Contest Committees and the RSGB General Manager, the Trophy Manager looks after the RSGB trophies, arranges for their engraving and presentation to recipients, and maintains the trophies' history.
Currently the trophies are stored in a commercial storage facility, paid for by the RSGB. This facility can be close to your location, so you don't need to live close to RSGB headquarters.
The Trophy Manager needs to communicate clearly with trophy winners, trophy donors and RSGB staff and volunteers. You will also need IT skills to prepare the required documents for trophy engraving, maintain various trophy records, and prepare information for use by the RSGB. You will need to be adaptable, being both proactive and reactive, in order to manage the preparation of trophies for presentation at the AGM and the Convention. You will need to attend both of those RSGB annual events.
Although set out as an individual role the tasks of the Trophy Manager could also be carried out by a small team, and expressions of interest in carrying out the role in that way would be welcomed. If you are interested in applying for the role or would like to find out more, please email:
gm.dept@rsgb.org.uk

RSGB HONOURS LONGTIME VOLUNTEER: Trevor Hughes G4WKJ has accrued more than one claim to fame during his many years as a volunteer at the National Radio Centre at Bletchley Park. He has donated his time on a weekly basis since the centre's opening in 2012 -- and he is the creator of the Snail Morse Key, a simple and popular kit used by the RSGB to introduce children to Morse Code.
On 6 October, RSGB General Manager, Steve Thomas M1ACB honoured Trevor for donating his many hours of time and expertise as well as for his design and the introduction of the widely used Morse Code kit. Martyn Baker G0GMB, the centre's coordinator, said the immense amount of time Trevor has donated to the centre has helped ensure its success today.

DISTANCE LEARNING FOR INTERMEDIATE EXAM: The Bath Based Distance Learning team (BBDL) has helped over a thousand students to pass UK amateur radio exams with pass rates consistently above the national average. The next BBDL Intermediate course will run from January to May 2024. Students will receive weekly work packages via a virtual classroom. There will be weekly on-line tutorials and revision quizzes. Students will also have access to one of the BBDL remote tutors who will provide feedback and additional guidance when required. There will be lots of practical exercises to bring the theory to life. Students will be expected to do the exercises at home and report their results. At the end of the course there will be a number of mock exams.
There will be no charge for the training but students will need to provide their own textbook, scientific calculator, electronic parts and tool kit. Students will also have to arrange their own exam at the end of the course, but advice will be provided at the appropriate time.
As part of the application process, there will be some pre-course work to ensure students are able to use our on-line learning systems and to be sure they are ready to study in January.
Another BBDL course for the Full Licence will follow on from the Intermediate course, running from August to December. A further announcement will be made when that course is ready for enrolment. However, we are encouraging all those who intend to study for the Full Licence and passed the Intermediate exam before September 2019 to join our Intermediate course. This will provide good revision and bridge the gaps created by syllabus changes in 2019 and 2022.
To receive course application details, please email BBDL Team Leader, Steve G0FUW, via g0fuw@bbdl.org.uk The deadline for completed course applications is Wednesday 06 December.

NEWS FROM THE RSGB NATIONAL RADIO CENTRE (NRC): (contributed by *PW* author Joe M1MWD) The NRC at Bletchley Park continues to be very busy, with visitor numbers approaching pre-Covid levels on some days. There is always something interesting to see and do there, and visitors are frequently to be heard using the radio station to pass greetings to radio amateurs around the world. This tends to happen regularly during the NRC net on weekday mornings around 7.130MHz. Visitors who are licensed radio amateurs are also allowed to operate using the callsign GB3RS, and this almost invariably generates a minor pile-up of call-ins. (Note: please bring your licence document along if you would like to have a go).
Recently, when John G0KTW and Joe M1MWD were on duty in the radio room, we were visited by a group

of young people. John began explaining the equipment and the screen displays as he usually does to visitors, only to discover that many of these young visitors were already licensed, with M7 callsigns, some for over a year! However, they had never made an HF contact. We christened them the Cool Gang, because, as they explained to other non-licensed visitors there at the time, they told us that having an amateur radio licence was *"a really cool thing to have"*, and *"it was really cool to talk with people on the radio"*.
What followed was an enjoyable hour or so as one after the other they picked up the microphone on the FT-5000, found a free frequency and put out their first HF CQ calls. The image is Eta M7ETR in contact with David MM0LGR/P, just south of Ayr. Also pictured is Alex M7VTX, who also called CQ and worked several European stations. Another operator, Paul M7CUW, also made a few QSOs on 40m.
The visitors watching all this thought that these young operators sounded very professional, despite being completely new to operating the NRC radio equipment. John and I were chatting afterwords and he observed, rather wryly, that it must surely be newsworthy to have half a dozen people under 60 making CQ calls on the radio. A really Cool Gang!
The NRC morning net is open to call-ins from any other station, for a chat, or just a signal report from other stations on the Net throughout the UK. Recently, prompted by something in a piece in *PW* about the use of Morse Code in emergency situations, one of the NRC Volunteers John G4FZA has started a slow Morse 'net' from 0930 local on 40m. The idea is to encourage those who have not used CW recently to call in with callsign, name, and signal report. This is proving very successful for those who want to brush up the CW skills. John is an ex-government operator, but is really enjoying helping more people to take up this mode more regularly. And who knows for sure – maybe the aliens will land one day and we will all need those CW skills to communicate. Dah-Dit-Dah.

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

HAMCATION: The Orlando Amateur Radio Club is hosting the 77th Annual Orlando HamCation from 9 to 11 February 2024, at the Central Florida Fairgrounds and Expo Park. HamCation is the second-largest ham radio convention in the World, with the inaugural event dating back to 1946. Since the first event, HamCation has continued to grow, with a published gate figure for all three days in 2023 of 21,800.

With almost 100 vendors being hosted this year, there will be something for everyone, no matter the level of interest or involvement. For attendees wanting to further their ham radio skills, over 42 forums are hosted over three days, and attendants can also take a test for their amateur radio license at the Technician, General, and Amateur Extra levels.

The HamCation website has undergone several updates for this year, with more easy-to-use features and a ticket purchasing system. Those who want to attend can purchase tickets, SWAP tables, tailgate spaces, and make RV reservations online. The user-friendly site provides information on HamCation activities, vendors, and hotel partnership discounts. For more information on Orlando HamCation, follow HamCation on Facebook, Instagram, or Twitter, or visit:

www.hamcation.com

ARISS NEWS: (submitted by John Hislop G7OHO) Amateur Radio on the International Space Station (ARISS, URL below) offers children in schools and colleges the opportunity to put forward questions to an astronaut on board the International Space Station (ISS), using amateur radio. Each year, about 100 contacts are made, with 20 of them in Europe. There is no doubt that communicating with an astronaut on the ISS can have a huge, long-lasting impact on a child's interest in Space and Science. Even the teachers and organisers remember the event for a long time after. St Peter-in-Thanet junior school in Broadstairs, Kent, was given that chance on 18 October 2023. We hope that this article will encourage other schools to take up the challenge.

https://tinyurl.com/4yxf6f9n

The Hilderstone Radio Society had been instrumental in securing Wellesley House school's amazing contact with Tim Peake in 2017. We thought it was time to help another school to do the same. But which school? Secondary schools are very tied up with GCSEs, and Space hardly gets a mention in the science curriculum. Primary schools are more flexible, and they tend to cover a term's topic of Space and Astronomy.

In August 2022, 9-year-old Isabella, a member of the Hilderstone Radio Society and daughter of Matt Payne M0LMK, had a short QSO with Kjell Lindgren KO5MOS as he passed overhead in the ISS. Later, he said that their conversation was the highlight of his

trip. The contact made news all around the world.

Our decision was made. Isabella's school, St Peter-in-Thanet junior school was the natural choice.

The school's Science Coordinator, Nathan Williams, was approached and he jumped at the chance. He persuaded the headteacher and they submitted the application form in October 2022. NASA requires the school to make an educational plan that will integrate the contact into the school curriculum and involve all year groups. However, there was no guarantee that the application would be accepted, so we waited for the decision with trepidation! In December we heard that it was 'good to go'! We were told that the contact could be at the end of 2023, or even in 2024.

The theme for British Science week in March 2023 was Connections. The Hilderstone Radio Society organised various activities to do with radio communications. Year 3 classes sent Morse code to each other using LEDs. Year 4 classes received a personal message from the FUNcube-1 satellite, while the whole of year 6 used Python to code a message on the Raspberry Pi Sense Hat for the astronauts on the ISS.

For Space Week, the Ramsgate Stargazers organised astronomy-based activities, including investigating the craters on the Moon, solar astronomy and making a pocket sized Solar System.

In the Summer term, the school heard that the contact would take place in October. All the children were given the opportunity to submit a question for the astronaut.

In the Autumn term, Nathan started an after school Space Club for the lucky pupils who would be asking the questions. The first session was a remarkable Zoom session with Kjell! Matt keeps in contact with him and Kjell was able to organise time out from his busy schedule to talk to the children about his Journey into Space and working for NASA.

I read about the SPARKI (Space Pioneers Amateur Radio Kit Initiative) project developed by ARISS-USA. It was designed to both prepare schools about to have a contact and to persuade schools to apply for one. It covers radio waves, codes and radio communications. The project comes with a manual and software to run on a Raspberry Pi. I thought it was so good I trialled it with the Space Club and my youth group, the STEAMettes. I think it gave them a better understanding of what the radio contact was all about.

An astronomy evening for the pupils was arranged at the Ramsgate Royal Esplanade, overlooking the sea with dark skies. We were thrilled to see the ISS pass overhead, as well as the craters on the Moon and the rings of Saturn.

I also gave a presentation to all the year 5 and 6 classes about the science behind the ISS. In his work Principia, Sir Isaac Newton explained how objects could orbit the Earth, including the Moon. As a result of their free fall to Earth, the astronauts experience weightlessness. So yes, there is gravity in the ISS but free falling means that it seems to disappear!

From 8.30 on the day itself, pupils from other schools started to arrive. The event was streamed to all the classrooms. When everyone was settled in the school hall, the headteacher, Mr Whitehouse, gave a warm welcome to all the children, parents and teachers. The RSGB was represented by the Marketing Strategy Manager Anna Clarke M7EPA and Director Stewart Bryant G3YSX.

We were fortunate to have trainee astronaut Meganne Christian at the event. She gave us a summary of her career in the Space industry and her selection from 22,000 applicants to become an astronaut reserve with the European Space Agency.

It was time for Isabella to come to the microphone and call for the International Space Station. In a clear voice, she said "NA1SS, November, Alpha, One, Sierra, Sierra, this is GB4SPT, Golf, Bravo, Four, Sierra, Papa, Tango, calling and standing by for a scheduled contact with the International Space Station, over". After three attempts Jasmin replied and Isabella's face lit up!

The children began their well-rehearsed questions. They ranged from living on the ISS to life elsewhere in the Universe. Jasmin seemed to enjoy answering them. To the question "what is the most amazing thing you have seen on Earth from the Space Station?" she replied "every time I look at Earth there is something beautiful looking back at me. I get excited when I see a coastline as most of time we see ocean and I know there will be people down there." You can see the contact here:

https://youtu.be/InPIIHGV-YE

Richard Constantine G3UGF
practicalwireless@warnersgroup.co.uk

1

ATU-100 auto tuner on a budget

Richard Constantine G3UGF looks at the ATU-100 plus the new and latest version, the AT-100M.

A friend called me to say that the auto tuner at his /A alternative location had finally passed away and that he was looking for a low-cost replacement. Did I know anything about the Chinese made AT-100? I have to confess that despite being something of a hoarder and possessing several automatic QRP to QRO matching units from various manufacturers, that this was a new one for me. Yes, I was aware of it and had seen it many times in a number of versions on-line and in various forms but never used one.

After a little discussion and seeing what looked like a very attractive price online (caveat emptor) I couldn't resist in joining my friend in pressing the, 'buy it now' button just to find out if it could live up to its claims.

It's worth mentioning at this point that goods on some online sites described as being 'in the UK' or 'delivered from London' etc. don't often arrive as quickly as you might reasonably expect. In most cases they are part of larger shipments from China, that may already be in the UK or you may have to wait for the next container load. In my case, it was delivered from a warehouse behind a supermarket in Ipswich, three weeks later.

It arrived with no instructions, no warranty information, no makers label and only a thin, unfused power lead. I removed the lid somewhat gingerly for the benefit of *PW* readers and was pleasantly surprised to find a very professionally built PCB.

Same tuner, many versions

It was immediately clear that this was the ubiquitous open source, N7DDC design that's in the public domain. It said so on the PCB designed by BH3SAP.

Never slow to seize an opportunity this design first began to appear from China as bare circuit boards some time ago, then with components as a DIY kit. This remains true today and you can obtain one from many different sources, including Amazon, for around £30.00.

Early assembled versions had problems. Many were of variable build and component quality but this can't be said of the one I received.

With so many now flooding the internet some assemblers are either omitting buttons and functions to save cost or adding additional bits to make them more attractive. The design calls for a plug-in LCD display and I've seen some quite large ones, the smaller displays being more common.

My version has the addition of two rear-mounted terminal posts, for use with wire antennas and ribbon feeders, not just coax. Higher end units from well-known companies usually sport a 4:1 balun inside where you find post terminals. In this unit the red terminal is simply in parallel with SO239 socket.

Thinking about it a balun capable of handling 100 watts simply wouldn't fit inside the case but there's nothing to stop you adding one externally.

Design parameters

Reading the design notes for the ATU-100 I discovered that **Dave N7DDC** originally designed the unit to have separate bypass/straight-through and reset modes using individual buttons. This particular incarnation arrived with a single large push button that I soon learned has a dual function. During testing I discovered that a short press triggered reset and a longer press put the unit into Tune mode as indicated on the display. Looking online at a DIY kit version instruction sheet clearly showed that wires soldered to the underside edge of the board marked B1 and B2 via a switch to ground can be engineered to trigger the same functions on separate buttons.

Which brings me to the PIC microchip that's on the PCB located just behind the front panel. If you're into programming the design notes and the black art of hexadecimal code, the design shows 34 different parameters that can be set. Maybe bedtime reading for some but definitely not me!

The original design requires a minimum input of 5 watts to initiate tuning but for those interested only in QRP operation there's now a lower power modification doing the rounds on forums.

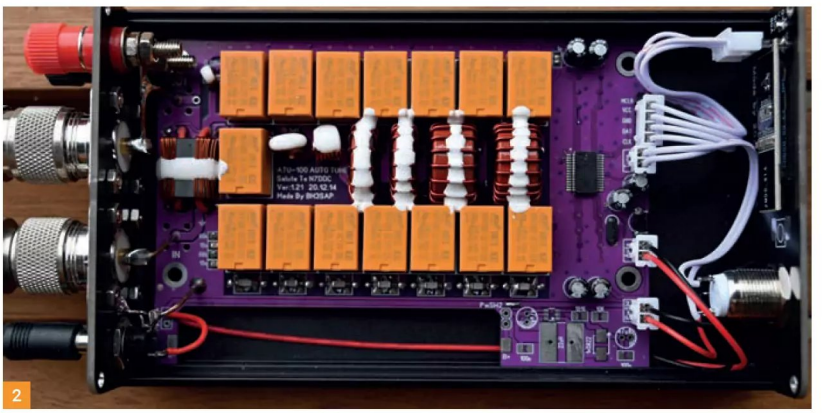
It's clear from the shape of the circuit board in the test model and the legends on the PCB that the design has provision for the addition of an optional battery, presumably Lithium, plus a charging circuit.

Of course, install more components and the price is bound to rise, easy to miss when checking models on eBay and listed at similar prices.

To the hills...or not

Homework done and itching to see what the unit might do, I hoped to take it with me on my next trip to the wide open spaces of the wild country. Unseasonal August weather put paid to that and I had to make do with dodging the rain in and out of my summerhouse. This proved to be something of a bonus as I was able to spend a whole day experi-

Photo 1: The ATU-100 & AT-100M.
Photo 2: Internal view of the ATU-100.
Photo 3: The ATU-100 under test.
Photo 4: The ATU-100, AT-100M & LDG AT-1. The latter was LDG's first ever tuner unit, kit build only and with no latching relays.


2

3

menting with a greater range of antenna combinations and pushing the unit out of its 50Ω coaxial comfort zone.

Guessing that the ATU-100's main use is likely for portable operation rather than the shack, I tested it with a variety of end-fed wire lengths, plus ground earth. I was looking to find a match where the wire was either a random short length or a near half-wave voltage point on the band of choice. Of course, always remembering that the wire suddenly doesn't become resonant, the ATU hopefully just prevents the radio's final stage from self-destruction.

The display indicates not only power transfer and percentage loss but also the value of L and C in circuit at any one time, once tuning stops. This indicator helps to understand what's going on when making antenna adjustments. The readout tells you what value of L or C is being inserted into the network. From this you can work out whether the antenna is behaving either inductively or capacitively, either side of minimum VSWR and without the need for a network analyser. I like that bit.

Finding the limit

That said, the power meter display needed to be taken with more than a pinch of salt. I was to some extent 'pushing the envelope'. In quite a few cases it indicated input power greater than actual fact with corresponding loss of output power. There was never any RF instability as some have claimed and I'm only talking about 0.3 -0.5 watts discrepancy. The device does read correctly into 50Ω and has a higher matching limit of around 800Ω. Of greater interest proved to be the automatic readout of what the display said was 'efficiency'.

As anticipated and just because I could, the worst-case scenario was a short 7.6m vertical wire, which gave a misleading match outside its design impedance with a rating of just 26% on 80m. Lost in translation and while the receiver was hearing things, where was 76 watts apparently disappearing when running 100 watts? The obvious answer being heat but at least it was letting me know just before the inevitable disaster. Don't try this at home!

Wires and whips

So much for non-resonant antennas, what about near resonant devices? Over many years I've collected (hoarded) something of an arsenal of antennas of all descriptions.

Checking with inverted V's and a trap vertical proved no problem. Wandering away from the in-band resonant frequency you could easily see the power transfer drop at the edges and with it the so called 'efficiency'. I was really interested to indulge myself with some HF mobile whips, typical of an average temporary setup. It's where I see this type of ATU being used, particularly as the base feed impedance of a vertical is much less than 50Ω at around 10-20Ω typical.

With a ground mount decent earth and half a wet day to play, I checked from 80-6 metres with a range of antennas including: Ampro helical, base-loaded Atom whips, Hustler base loading and also centre-loaded QRO types, late production G-Whips plus genuine ancient G-Whips made by company founder and friend, the late **Frank Pardy GW3DZJ**, both the top-loading four-bander de-luxe and centre loading helical types.

As expected, centre loading and helical versions showed much greater efficiency/effectiveness of power transfer at around 91-93% while also providing the highest remote field strength readings. Base loading, though practical, scored significantly less. No surprise and nothing new.

Hustler centre-loaded was a close second but the overall winner was a 50-year-old, 6ft White G-Whip linear loading and helical wound tribander, showing a 95% transfer. If you ever find one, buy it! Secret... linear loading allows the full length of the element to radiate.

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

5 watts of CW got contest replies from both K0 and K3 on 20m. I presume they had 'big' antennas.

The specification states the ATU-100 requires around 400mA maximum over a voltage range of 10-15 volts DC with a small residual drain in stand-by mode. Band hopping much more than a typical user might do and testing all day long proved no problem for a small external battery pack. Without modification the ATU-100 requires a drive level of 5 watts RF and can reasonably handle up to 100 watts.

The power measurement readout was mostly 10% out from specification and my findings agree, as listed earlier. There's a total inductance available of 8.53µH and capacitance of 1869pF as listed in the design notes.

Complex or basic?

The experience of using the ATU-100 made me somewhat philosophical ... How can something be both complex and yet basic? Take cars for typical example, basic models and high spec ones are all cars and they all get you from A to B.

The ATU-100 is both a complex, yet basic matching device. Typical cost of a DIY kit is around £30.00 and available ready-built, with some differences, between £50 - £85. It's all about looking closely at what you're buying and from where. If you're on a tight budget, there seems to be little to choose between any of them. Do note that kit versions require some basic surface mount skills.

The ATU-100 did the job reasonably and the value was fine for what I paid. It has latching relays to remember the last band/antenna setting when switched off. The display was easy enough to read if a little small and provided an interesting and sometimes thought-provoking guide to performance.

It's a general-purpose device, requiring no data cable interconnect and works with any 5 watt plus radio, such as the Yaesu FT-817, Elecraft KX3, Xiegu models etc, but is a little slower to tune as a result.

I didn't find any band memories so it's a case of re-tuning every time a band was changed. Unlike some higher spec devices from the major brands, it didn't automatically re-tune itself and had to be initiated from reset for best effect when moving around in-band. The single flush-mounted control for reset and tune proved fiddly to push until you got the hang of it. The three-button sequence versions might possibly be more annoying.

and now... AT-100M

As if to prove an earlier point, just as this review was wrapping up yet another incarnation of the N7DDC design landed on my desk. This one arrived from a UK supplier nicely boxed and with some translated instructions.

The AT-100M version is lighter by some 80 grams even with its internal battery pack, due mainly by the size reduction. Weighing in at 350 grams a USB charging- lead is included. It has no post terminals to the rear or feet to the base.

4

I had intended to show you a side-by-side internal view of both units. Ironically, despite the provision of a 1.5mm Allen key in the package (why?), the latest M version is inside an annoying slide-out-only alloy sleeve.

Removing and re-fitting the front panel and disconnecting all the leads proved more than a little tricky so discretion being the better part of valour I declined.

I can tell you that the relays are the same and the inductor toroids are smaller. The spec sheet indicates that while the unit is good from 0.1 to 100 watts, full carrier on AM/FM and data modes is limited to 50 watts and between 18-30MHz the matching impedance is rated as being between 15-800Ω.

Same but different

The circuit board layout is very similar, more densely populated to accommodate extra features and this time designed by BI3QWQ.

The central display is completely different. At switch-on it shows battery volts and percentage charge. Forward and Reflected power display shows as bargraphs on two lines. Pressing the much easier raised button on the front panel reveals two additional display screens. Number two gives Forward and Reflected power plus SWR numerically. Screen three gives the number of inductors and/or capacitors in use as blocks, not as L and C values. On a second line in smaller print you can also see SWR, supply volts and percentage battery capacity.

Unlike the previous lower cost version, the percentage efficiency that I found so useful in determining if I was radiating effectively or simply losing power and warming up the tuner unit isn't available.

Holding in the single button at switch-on gives access to programmable functions/parameters from the front panel. It's a bit fiddly and you have to scroll through four small pages to find the one you want by repeated button pressing. If you miss it, you have to go around the loop again. – you simply can't have everything!

To change any one of 17 parameters, you hold the button down to reveal a list of choices, as detailed on the included instruction sheet. Here's a small sample of things available in the M version.

- Beeper on/off. (ATU-100 didn't have one)
- Number of tuned results stored – 1-20 available.
- Tune minimum input step power e.g. for QRP etc.
- Automatically tune if VSWR too high Yes/No

You can see that this model now has features not in the original design and appears to have a memory.

Having spent time with both units and repeating some of the earlier test setups, they both have their qualities and work in almost identical ways when it comes to matching a variety of antennas both near resonant and non-resonant. I really couldn't put a piece of paper between them.

However, on the usability front it's clear that these two incarnations differ. While the basic concept remains much the same the packaging of the N7DDC design seems to be constantly re-inventing itself.

Price aside, when choosing anything it's always trade-off between features and benefits, i.e. I want this benefit but do I really need this feature? The big benefit might be the lower price but then again, owning the latest model is always tempting.

Notes

For more information Google search, N7DDC or go to:

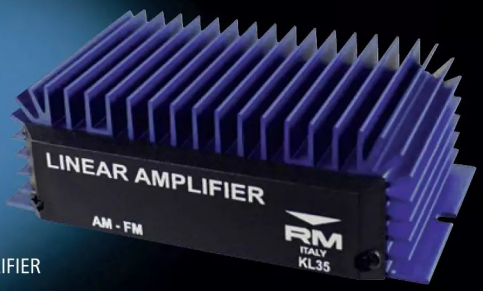
www.oz9f.dk

AT-100M is available direct from China or, in the UK, from, Sinotel UK Ltd, Circa £90.00 delivered at time of press. PW

nevada® radio

For a **Reliable, Fast, Friendly** Service

RM KL805
24V - 24-30MHZ (600W)
LINEAR AMPLIFIER



RM KL35
20-30MHZ (35W) LINEAR AMPLIFIER

RM

We carry the complete range of RM Base and Mobile HF Amplifiers

RM HLA305V
PROFESSIONAL WIDEBAND HF 1.8-30MHZ
(250W) AMPLIFIER (WITH LCD)

RM BLA600
WIDEBAND HF 1.8-55MHZ
LINEAR AMPLIFIER

RM MLA-100V
1.8-54MHZ LINEAR AMPLIFIER

RM KL505
1.8-30MHZ (230W) LINEAR AMPLIFIER (WITH PRE-AMP)

www.nevadaradio.co.uk

023 9231 3090 @NevadaRadio www.facebook.com/nevadaradio https://www.instagram.com/nevada_radio/

• Deethe Farm Industrial Estate • Cranfield Road • Woburn Sands • Milton Keynes • MK17 8UR

Don Field G3XTT and Colin Redwood G6MXL
practicalwireless@warnersgroup.co.uk

1

The 2023 RSGB Convention

Don G3XTT and **Colin G6MXL** give an overview of this year's RSGB Convention, held once again at Kents Hill Conference Centre, Milton Keynes.

Given that there was no National Hamfest this year (one is promised for next year, apparently back at Newark with the contract already signed), it was great to attend the RSGB Convention and catch up with friends old and new. One of the first I met was *PW* regular columnist and contest organiser **Colin Redwood G6MXL** who was attending for the first time and I asked him for his impressions – see his report below on the various lectures.

Indeed, it was good to catch up with many of our authors such as **Mike Richards G4WNC**, **Gwyn Griffiths G3ZIL** and **Roger Cooke G3LDI** along with regular contributors such as **Victor Brand G3JNB**.

The event was well organised as usual with **David G7URP** and **Tammy M0TC** from the Norfolk Club along with the Camb-Hams doing a fantastic job recording and streaming the video from five simultaneous lecture streams along with occasional one-on-one interviews.

Martin Lynch and Sons were once again the principal sponsors, while other stands included Icom UK, Yaesu and, of course, an extensive RSGB bookstall. Perhaps the only significant hiccup was that the venue had to stop taking lunch bookings mid-morning on the Saturday because 'casual' visitor numbers (i.e. those who had not pre-booked) comfortably exceeded expectations. Whether this was a sign that people are coming back to events following Covid or attending as an alternative to the cancelled Hamfest is an open question – maybe a bit of both.

The various club and special interest group stands this year were spread over two rooms, and included all the usual suspects as well as a stand for the 2026 WRTC (World Radiosport Team Championship) organisers to highlight their plans, answer questions, etc.

While I didn't manage to attend it, the Q&A session involving the RSGB Board was apparently quite lively with questions being asked about the implementation of the Society's strategy, its marketing plans, etc. In contrast, the drop-in Buildathon proved popular and suitably uncontroversial!

Neither did I attend the Saturday evening gala dinner, instead choosing to go out to a local restaurant with friends. For those who did attend, the Keynote presentation was entitled *"Life in the RF Spectrum during the last 60 years – is this a life for you?"* and presented by **Colonel John Doody FBCS FCMI CITP ACIIS MIOD**.

The bar proved popular in the evenings and, as usual, there were special beers on offer at special prices, at least until they ran out! And, of course, there was the usual raffle in support of the RSGB DXpedition Fund, with the main prizes this year being an Icom IC-705 and a Yaesu FT-891. Not bad!

RSGB Convention lectures

Colin Redwood G6MXL

The RSGB Convention included numerous lectures spread across five lecture streams run in parallel over two days covering a wide range of subjects. The lectures were generally of 45 minutes duration with breaks between some lectures for refreshments. I tried to plan my two days to cover topics of interest to me, and to also include a few on topics I knew little about.

Two of the lectures that I attended stood out for me for very different reasons. The first was a real-live demonstration of KiCad progam for designing printed circuit boards. **John Linford G3WGV** demonstrated how to use the program to draw the circuit diagram, select the components (resistors, for example, come in all shapes and sizes both leaded and SMD varieties), and lay them out. He then showed how to lay out to tracks to join the components and specify the location of any mounting holes for the board, before 'zipping' the files to send to a PCB manufacturer that specialises in low volumes and prototypes. All very impressive in 45 minutes, including introductions and questions!

For something different, I attended a lecture on the 2Tone RTTY program. Most amateurs who run RTTY use either MMTTY or a program that uses the MMTTY engine with an alternative 'front-end'. **David Wicks G3YYD** has gone back to the underlying basic principles of RTTY. Using his programming skills from years of developing software professionally in the telecoms industry, he's produced a program that not only decodes RTTY more reliably than MMTTY but is far easier to set up for a new user. I'm certainly going to give it a try as a result of attending the lecture.

Jim Bacon G3YLA, the TV weather forecaster and stalwart of conventions for many years, gave an interesting talk on the latest theories on the causes of Sporadic E and showed some progress towards being able to predict at least some openings. Other propagation talks included **Martin Atherton G3ZAY's** talk on mining Club Log for propagation studies, and **Brian Coleman G4NNS** who provided an update on the GB3MBA Meteor Beacon project.

There is nothing quite like hearing stories of

Photo 1: 'Cam' Cameron (l) and Nobby Styles G0VJG) (r) with (centre) Charles Wilmott M0OXO, QSL manager for their Rockall Island expedition. Photo 2: Happy faces in the Buildathon. Photo 3: TX Factor team member Nick Bennett 2E0FGQ watches the live video stream control centre in action. Photo 4: The ML&S stand. Photo 5: Data Modes columnist Mike Richards G4WNC about to start his talk on VarAC.

DXpeditions from the 'horse's mouth'. This year's convention featured **Cezar Trifu VE3LYC** talking about the Bouvet Island 3Y0J expedition and the Rockall Island expedition presented by **Nobby Styles G0VJG**. Both DXpeditions were terminated ahead of time due to adverse weather conditions, and it was very clear that in both cases the decision to terminate early was the right one.

Steve Clements G1YBB (GW1YBB/P) who has won the *Practical Wireless* 144MHz QRP contest on many occasions, provided valuable hints and tips on planning and executing the logistics of contesting. He described how he continuously seeks to improve every aspect of his station (and it's not just higher, bigger antennas with lower loss feeder).

For others who like going up hills in a less competitive way, there was a talk on Summits on the Air (SOTA) by **Ian Evans GI0AZB** and **Dr Esther Harper GI0AZA**.

If your interests lie up in space with satellites, then you could have had a weekend devoted to the subject thanks to Amsat-UK's lecture stream. **Iain Young G7III** described how to take satellite operation to the hills with lightweight equipment, while **Francsico Costa CT1EAT** covered a logbook/award database specifically dedicated to contacts made through the QO-100 geostationary satellite. It already has several hundred thousand QSOs uploaded. Among the other talks in this stream, I noted two on outreach projects and the experiences of operating through the QO-100 satellite from the Southern Ocean given by **Graham Shirville VP0GAA / ZD9VZV.**

For those thinking on embarking on digital voice modes, and not knowing whether to go for DMR, D-Star or Fusion, *PW* author **Tim Kirby GW4VXE** gave an excellent summary of these and a few other lesser-known modes.

If you ever wondered which digital voice mode needs a code-plug, then Tim had the answer. For those wanting to work the world on an analogue radio, **Oscar Wood 2E1HWE** provided an overview of AllStar.

If you own a VNA but are not quite sure how to use it, or you're getting results that don't quite make sense, then **Richard Ranson G3ZTB** described techniques to calibrate a VNA – pointing out the need to do this whenever the radio frequency is changed.

I've always wondered what it is really like at the Youngsters on the Air (YOTA) events. Well, the YOTA team gave an excellent presentation on this year's event in Hungary.

The recent Ofcom Consultation was a topic of informal discussions with other attendees. **Murray Niman G6JYB** covered the consultation and looked to the future in his talk.

The talks I've covered so far reflect the current state of the art for amateur radio and the future. There were also a few talks looking back, including **Professor Simon Watts G3XXH** talking about VHF airborne radio in the Second World War and **Derek Cooper M0YAW** looking at radio communication during the Falklands conflict.

If among these lectures there was nothing to tempt you, then space prevents me from listing a further 20 or so sessions on subjects as diverse as 23cm, EMC, RAYNET, learning and improving your Morse skills, besides a Buildathon. I'm really pleased that the RSGB arranged for the lectures to be recorded for subsequent publishing on YouTube as there were several that I wanted to attend that clashed with another, including one by another *PW* author **Mike Richards G4WNC**, who spoke about VarAC digital transmissions. **PW**

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

1

That severe ATC problem explained

David Smith has the latest airband news, starting with a discussion of the recent UK ATC problems.

David Smith
dj.daviator@btinternet.com

The much publicised incident on 28 August and succeeding days, when the UK's en route air control traffic control system virtually shut down, has since been explained in an official report. At 0832 on that date, the NATS ATC system received a flight plan for a transatlantic aircraft that was due to overfly the UK. The flight plan had been handed on routinely by Eurocontrol's Integrated Initial Flight Plan Processing System. Eurocontrol, based in Brussels, is the pan-European organisation that coordinates air navigation.

Normally the NATS system extracts the relevant UK portion of the flight and presents it to controllers. However, data in the flight plan triggered the shutdown of the entire system and its back-up (technically, they were both put into 'maintenance mode'). The report says the system 'was unable to establish a reasonable course of action that would preserve safety and so raised a 'critical exception'.

A 'critical exception' is the planned last resort – the point at which the affected system cannot continue. Without the automated system to assist them, controllers could handle far fewer flights – just 15% of the normal flow. While aircraft that were in flight were able to continue without diverting, most were kept on the ground to avoid adding to the controllers' workload.

Normally the NATS system extracts the relevant UK portion of the flight and presents it to controllers.

The big problem with the 'rogue' flight plan was that it contained duplicate waypoints. As described in some detail in this column in the August issue, these are specific locations with five-letter pronounceable names.

There are some duplicates but supposedly so far apart geographically that they are very unlikely to cause confusion. Not so in this instance!

Flight plans for aircraft overflying the UK, as this one was, must contain a waypoint where the pilots intended to enter British airspace. They need not contain a waypoint at the exit point from UK skies. The NATS system is programmed to search on a database for the nearest waypoint beyond British control. It appears that this was a duplicate of another waypoint in the flight plan.

The report states *"Since flight data is safety critical information passed to controllers the system must be sure it is correct and could not do so in this case. It therefore stopped operating, avoiding any opportunity for incorrect data being passed to a controller"*. In other words, it failed safe, although it does seem strange that the flight plan was not merely rejected rather than affecting the whole system. The report confirms that safety was maintained throughout the incident and that a solution has been implemented to avoid any possible recurrence.

UK radio beacon reduction

In 2009, the Civil Aviation Authority (CAA) undertook a consultation on rationalising the UK VOR beacon infrastructure. A VOR is a VHF Omni-Directional Range and at that time there were 46 VORs, the initial aim being to reduce the number to 19 and also remove the 10 en route NDBs (Non-Directional Beacons) operated by NATS. The number of VORs still in service is now 21, the latest to go being the Ockham VOR in Surrey scheduled for the last day of 2023. This and most of the other sites retains its associated DME (Distance Measuring Equipment). All the en route NDBs are long gone.

Photo 1: Spitfire at National Museum of Flight, East Fortune, Scotland.
Photo 2: McDonnell Phantom, Hellenic Air Force, Fairford 2023.

The NATS Enroute procedures such as STARs (Standard Terminal Arrival Routes) and Holding Patterns that depended on the navigation aid become invalid when it is taken out of service. Before this occurs, replacement procedures independent of the navigation aid are put into effect, using RNAV (Area Navigation). RNAV substitution means that the current profiles and procedures are replicated in the aircraft's FMS (Flight Management System) so that there is no change to any track over the ground or flight profile flown. The CAA's document CAP1781, available online, details the whole complicated subject.

GPS Spoofing in the Middle East

A troubling new development in en route airspace is emerging: aircraft are being targeted with fake GPS signals, quickly leading to complete loss of navigational capability. There have been a number of reports of such occurrences and in most cases the Inertial Reference System (IRS) becomes unusable. IRS refers to a solid-state unit of three Ring Laser Gyros detecting accelerations in three dimensions. VOR/DME sensor inputs fail, the aircraft UTC clock fails, and the crew have been forced to request radar vectors from ATC to navigate.

Aircraft involved include the Boeing 737, 747 and 777, Falcon 8X and Global Express. In one event in the Baghdad Flight Information Region, the crew of a 777 en route were essentially forced to ask, *"What time is it, and where are we?"* It seems that this is occurring in an already high-risk area, over an active conflict zone, close to the Iranian border. The potential for this type of event to be encountered elsewhere is now a distinct possibility.

If the sneak signals are entering through the infected GPS signal, it may be possible to erect a firewall to stop them getting into the IRS. Since this is a rapidly emerging new threat, much work must now be done to detect how these menacing signals are able to sneak through the software. This is likely to require a multi-layered solution to include a software fix from the manufacturers to find the sneak circuit and erect the equivalent of a firewall.

Manufacturers of military navigation systems have already been developing a multi-layered approach to combat the problem of GPS disruptions. For instance, Honeywell has introduced a multitude of alternative navigation systems to augment the availability, integrity and performance of inertia navigation. They have developed a Vision Aided Navigation System using a live camera (optical and/or IR), which compares the image with maps to provide an un-jammable position with a horizontal position accuracy of 10m.


2

Their Celestial Aided Navigation system utilises a star tracker. It is likewise un-jammable and recently demonstrated an accuracy of 30m. An Embraer 170 was recently used as a test platform to demonstrate the effectiveness of Honeywell's Magnetic Anomaly Aided system, which measures the earth's magnetic strength to compare with magnetic maps to identify a vehicle's position. Honeywell's Radar Aided system uses radars to measure velocity and provide this information to the INS (Inertial Navigation System), thus improving the INS's accuracy.

While some of the avionics manufacturers already have this expertise, will these methods be readily adapted for civilian use? Perhaps not due to their complexity and expense, but extensive studies have already been done trying to solve this problem for the military. The knowledge learned may be useful in solving this new threat in the civilian sector.

Blocked transmissions

The VHF frequencies commonly used in ATC do not allow simultaneous transmissions. When a pilot or a controller presses his transmit button at the same time as another pilot or controller is already transmitting, one blocks the other. Sometimes there's a squeal, sometimes garbling, sometimes one transmission overpowers the other, but generally the outcome is that the transmitted messages don't get through. Blocked radio transmissions have caused accidents, near-accidents, and runway incursions many times. A blocked transmission was a partial cause of the devastating runway collision between two Boeing 747s at Tenerife in 1977.

The idea for an anti-blocking circuit in aviation radios has been around since 2001 when retired American Airlines captain **John Rutty** suggested it. In his words, *"An anti-blocking circuit can prevent a pilot from stepping on an ongoing voice transmission, allowing the other transmission to be completed, uninterrupted. The valid signal in the receiver is sensed and the switch or transfer from receive to transmit is inhibited. The pilot hears an audible beep, which tells him he is not transmitting and, by remaining in the receiver mode, the pilot for sure hears the incoming message, which otherwise would have been blocked".*

Captain Rutty went on to suggest starting with just controllers' radios. An alerting beep on the controller's radio would let him or her know the information was not being received by at least one aircraft on the same frequency. Even though it had some congressional support and the president of the Air Line Pilots Association was behind the anti-blocking circuit technology, it was not implemented.

However, there is currently a lot of concern about runway incursions in the USA. The Federal Aviation Administration has cited six serious incursions that have recently occurred, most of which involved blocked transmissions. It would seem that now is the time to implement worldwide a simple safety tool that has been overlooked for so long.

Frequency & operational news

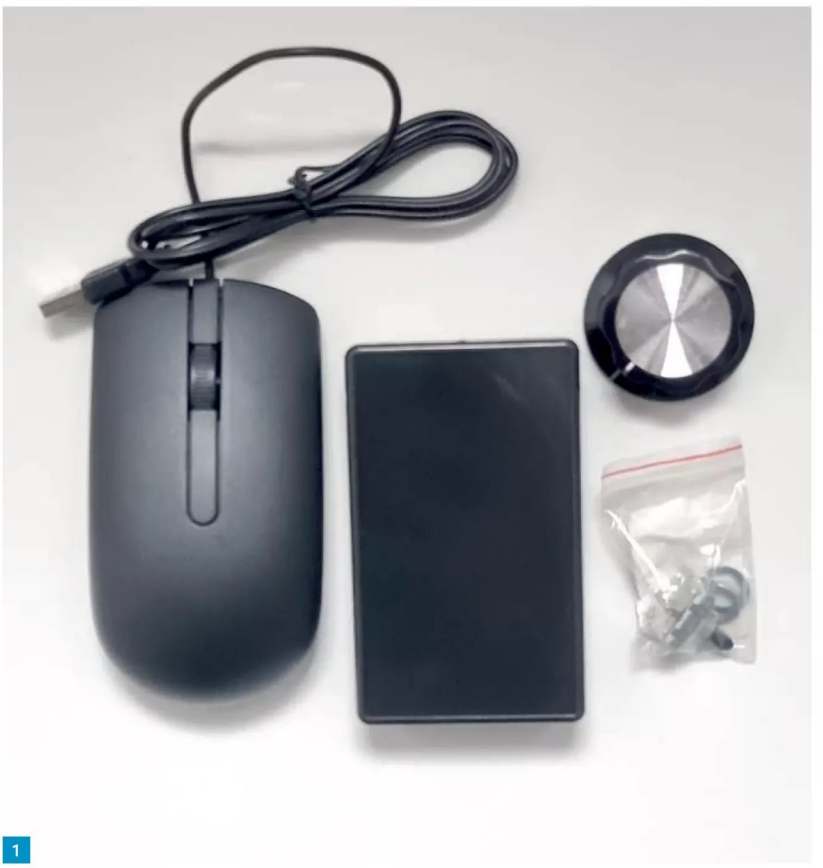
Contributed by reader **Godfrey Manning G4GLM**.

- At Bristol, handling agent Centreline frequency changes from 130.625 to 131.965MHz.
- Guernsey Radar 118.9 replaced by 124.505MHz.
- Walney AFIS changes from 123.205 to 118.080MHz.
- Gloucestershire Airport has been allocated SSR 'Squawk' codes 4530 and 4531.
- SSR codes 5140-5177 can be allocated centrally by Eurocontrol.

Pilots must consult official promulgations. **PW**

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

Billy McFarland GM6DX
gm6dx@outlook.com



1

Turn the Knob

Billy McFarland GM6DX creates a remote tuning knob for SDR radios.

The use of SDRs within the short-wave listening scene is becoming the norm. The ability to have wideband reception by the simple click of a PC button or a rotation of a mouse wheel on a waterfall can save lots of time picking out those wanted signals. Traditionally the listener would need to turn the large knob on the front of the receiver to hone in on those signals. The PC mouse wheel has replaced the traditional VFO tuning but for many this can be cumbersome and, after all, people can be set in their old ways. One method to overcome this is by converting your traditional PC mouse wheel into a large tuning knob giving you the ability to tune a modern SDR using traditional VFO tuning. In order to do this you will need the following parts:

- 1 x USB mouse (I used a Dell but it can be any make and you can use a wireless version but you will need a small battery pack that will fit into your project box to power the mouse)
- 1 x Project box (75x100x25mm)
- 1 x Large knob (must fit the EC16 encoder, usually 6mm shaft)
- 1 x EC16 rotary encoder (without switch)
- 3 x 150mm length of wire
- 4 x Sticky rubber feet
- Some hot glue

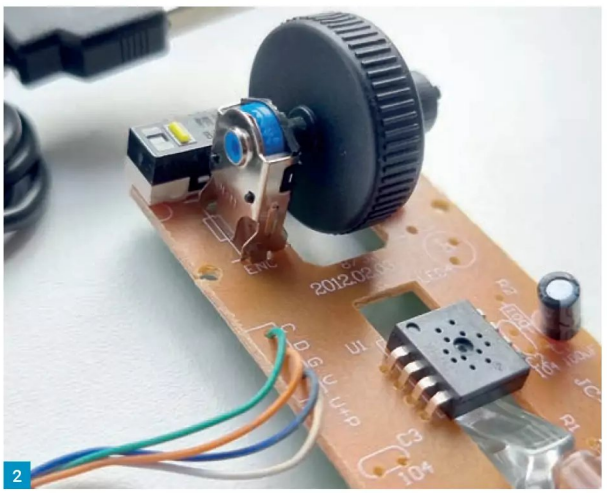
These parts can be seen in **Fig. 1**.

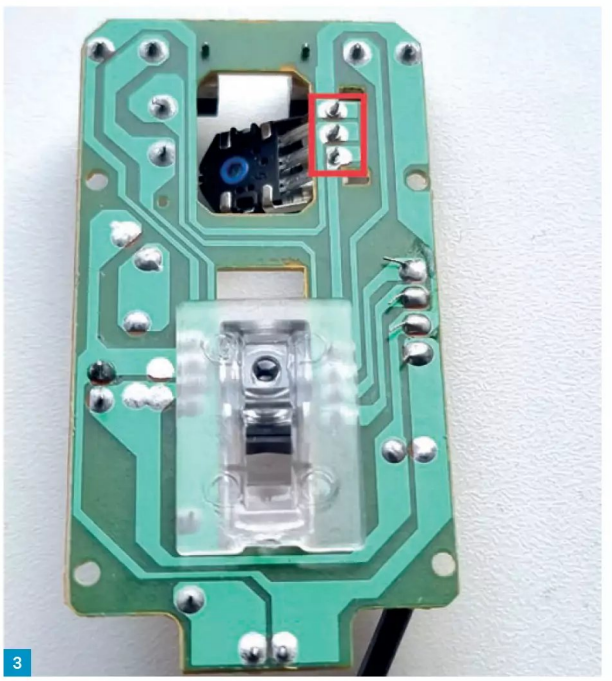
The first step is to strip down the PCB from the plastic housing. Be careful when doing this as broken plastic can leave sharp edges. Every mouse type will vary and some might even have a screw holding the two housing pieces together. Remove the PCB and USB cable gently. When looking at the PCB board you will notice two microswitches, which are the left and right buttons of your mouse. Just below them there is a wheel sitting in a housing as seen in **Fig. 2**. Remove the plastic wheel from the housing and locate the three contact points of the mouse wheel (usually on the back side of the PCB). Now solder a piece of wire to each tab. Use different colours of wire if possible as it helps you identify each connection point**. Figs 3** and **4** show the tabs and wire attached. Put the PCB aside and pick up the large rotary knob. You will notice that the large knob is quite light. In order to make it feel better in the hand as well adding to the ease of turning we need to add some weight to it. Look at the backside of the knob and fill in the cavity with some weight and thereafter cover with hot glue. You can use fishing shot, or small screws etc, just as long as it is well glued in place so that none of the parts used for the weight comes loose when turning. **Figs 5** and **6** show the before and after of the knob modification. Now find the centre position of your project box and drill a hole in the centre. This hole is to allow the EC16 encoder to pop through where a nut and some hot glue then holds the encoder in situ on the project box, as seen in **Fig. 7**.

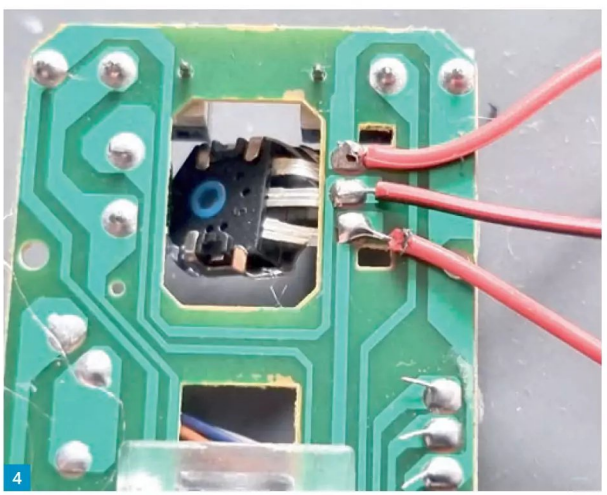
We now need to solder the three wires from the PCB onto the EC16 encoder. Looking at the PCB with the three tabs to the right-hand side the connections are as follows to the EC16 encoder which tabs are to the left hand side. The bottom wire of the PCB tab goes to the top tab of the EC16 encoder. The middle PCB tab wire goes to the middle of the EC16 encoder. Finally, the top PCB tab goes to the bottom of the EC16 encoder connections. These connections can be seen in **Fig. 8**. That is the electrical connections complete and it's now time to finish off the project. Take a small notch out of the lid of the project box (or where the lid and project box meet) to allow the USB cable to pass through the box without damage and then hot glue the cable in place. Sit the mouse PCB into the project box and also glue in place. With the PCB glued in place, now cut off the remaining part of the mouse wheel. The connections will still be made as you solder these to the underside of the PCB. This can be seen in **Fig. 9**. The final step is to re-assemble the project box and install the four rubber feet to the underside for stability. The finished product can be seen in **Fig. 10**. Simply plug your new VFO controller into the PC and rotate the knob in your SDR software to scan through the bands effortlessly. It is of note that you will still require a PC mouse for clicking options on the computer unless you add buttons onto your project box and connect them to the microswitches located on the PCB.

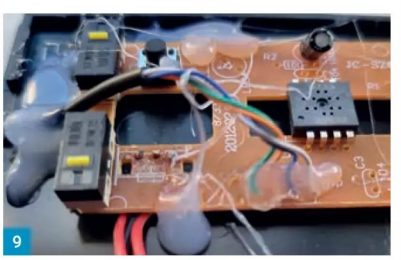
In short, this is a very simple project and only requires basic soldering skills. You can watch my step-by-step video of me making this project here:
https://tinyurl.com/3a7vmuab

As always, any questions please email me at **gm6dx@outlook.com.**









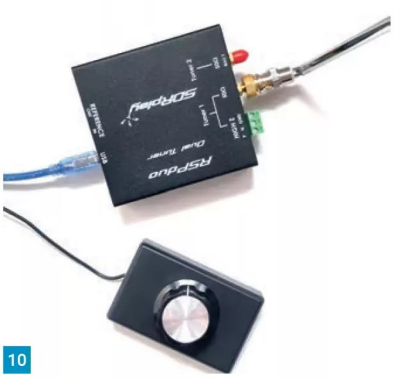


Fig. 1: Parts used in the project. Fig. 2: The mouse wheel. Fig. 3: The points at which to connect to the mouse wheel. Fig. 4: The connections made. Fig. 5: Before the knob modification. Fig. 6: The modified knob. Fig. 7: Mounting the encoder in the box. Fig. 8: The encoder connections. Fig. 9: Connections made to underside of PCB and hot-glued into place. Fig. 10: The completed tuning knob.

1

David Charnock G0BCU
practicalwireless@warnersgroup.co.uk

Managing the UK radio spectrum

David Charnock G0BCU reports on Warrington Radio Club's visit to Ofcom's Baldock Receiving Station.

The wide-ranging new proposals from the UK's communications regulatory body Ofcom have been the subject of club discussions all over the UK over the past few months. It was all the more appropriate and timely, therefore, that my club – the Warrington Amateur Radio Club based in Grappenhall, Cheshire – recently received a welcome invitation from Ofcom's Spectrum Assurance Team to visit their station at Baldock, Hertfordshire for a guided tour.

The Club already had close and friendly relations with Ofcom. A year ago we were contacted by the Spectrum Assurance team who were developing a staff awareness program for newer Ofcom engineering members. The Ofcom local regional office, based in Warrington, wondered if our Club would consider assisting them by providing access to a working amateur radio station in order to provide an overview of the different bands and modes in common use. Over the following weeks a programme was jointly developed and expanded to include the wider scope of the hobby, emerging technologies and club culture.

Our visit to the Baldock Monitoring Station took place on 19 August 2023. On arrival we were met by our host and guide for the day **David Thorpe**, Senior Radio Broadcast Engineer. The tour started with an introduction to the history of the Monitoring Station, which has occupied this site in rural Hertfordshire since it opened in 1929 and has seen many changes in the intervening years.

Early History

Initially, as global communication developed, Britain needed to set up communication links with the Commonwealth and with major capitals around the world. For that purpose, telephone landlines were installed on the site to relay received voice messages to the telephone exchange, with a similar setup mirrored at a remote transmitting site. The first transatlantic radiotelephone call was completed through this station from Rocky Point, New Jersey on 1 June 1929. In those very early days the station could handle 50 radiotelephone calls per day, increasing to over 100 a decade later.

During the 1930s the station became a strategic part of the General Post Office radio frequency monitoring service, tasked with cooperating with similar monitoring stations abroad, keeping the spectrum clear of interference and maintaining the international radio service.

WWII

During WWII, Baldock was a receiving station duplexed with Rugby Radio. Together they provided HF radio telephone traffic controlled by the Radio Telephony Terminal, later to become the International Telephone Exchange in London.

Together with Rugby the station maintained dedicated LF radiotelephone services between the Allied Governments until Cooling Radio Station in Kent became operational in 1942. There is evidence that the station provided daily listening reports, which were returned to Bletchley Park by motorcycle courier. There are also a number of references to Baldock being one of a number of radio direction finding (DF) stations in operation.

Post-war

In the 1950s Baldock became part of the United Kingdom's early long-range radiotelephony service, operated via the International Telephone Exchange in London and including the maritime ship-to-shore service. The radio transmitting stations for this service were located at Rugby and Criggion and the receiving stations at Baldock and Bearley. Circuits from the International Exchange were routed to the transmitting and receiving stations via the radio terminal at Brent.

In the 1970s handling radiotelephony was transferred to other UK sites, leaving Baldock to concentrate on monitoring and managing the radio frequency spectrum.

The station today

Today, critical aeronautical and marine frequencies are constantly monitored to ensure these services remain free from interference. The Receiving Station is operational round the clock, 365 days a year, with a team of dedicated professional staff. Reports of interference trigger an investigation, which can be undertaken from Baldock or by dispatching mobile teams equipped with DF equipment to track down and identify the source and location of the interference. Another equally

Fig. 1: Spectrum Management Centre. Fig. 2: The visitors from WARC with host Dave Thorpe, l to r: Roger Dowling G3NKH, Vincent Lynch M0LCR, Dave Tarbatt G7SKR, Slawek Kubeki M0SQJ, Dave Thorpe. Mike Isherwood G4VSS, David Charnock G0BCU, Carmel Isherwood M3CFI, Alan Vaughan G8WQE, James Lang G5JIM, Ray Koster G7BHQ, Steve Pettitt M0MOI. Fig. 3: Log-periodic Yagi array covering 6-30MHz. Fig. 4: Wide-band Inverted Cone Antenna covering 100kHz-30MHz. Fig. 5: Anechoic chamber with calibration antenna in position. Fig. 6: Modified commercial drone fitted with spectrum analyser. Fig 7: One of the range of fully-equipped technical vehicles available to the Receiving Station.

important role of Baldock is cooperating with other international bodies to locate sources of interference to legitimate users from illegal stations, inadvertent transmissions or radiation from faulty equipment. This is achieved by combining together the bearings from a number of DF stations to narrow down the precise location of the emission source.

At the heart of the Baldock monitoring station is the Spectrum Management Centre, **Fig. 1**. The first impressions of our club group, **Fig. 2**, when entering the Spectrum Management Centre was of the impressive array of receivers, desktop and wall mounted display monitors, displaying vital geographical and monitoring information.

The Spectrum Management Centre is connected to a number of external antennas installed in the surrounding fields. These include a rotatable log-periodic antenna covering 6 - 30MHz mounted on a telescopic mast, **Fig. 3**. For low and medium frequency bands, a long-wire Beverage style antenna mounted on a series of poles disappears into the distance across the surrounding farmland. An Inverted Cone antenna array, **Fig. 4**, provides wideband receiving capabilities.

It would be wrong to assume that the role of the site is limited to just being a monitoring station on a single site. To fulfil their role of managing the radio frequency spectrum all over the UK they must be able to deploy equipment and staff to various locations throughout the country. Remotely operated receivers are strategically located around the country providing enhanced coverage.

The Baldock site has specialist areas to test emissions from electronic equipment for compliance with the appropriate standards. These include anechoic chambers, **Fig. 5**, designed to measure radio frequency emissions from electronic equipment. The walls, ceiling and floor surfaces are fitted with special non-reflective material to eliminated electromagnetic reflections, housed within a Faraday cage to shield the interior from external radio signals. Two other rooms are available, a semi-anechoic chamber with a reflective flat floor for larger or heavier equipment, and a shielded room for general testing.

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


4


5

6


7

The engineers have modified a large commercial drone, **Fig. 6**, to carry modular spectrum analysers for field strength measurements around transmitter antennas. Engineers can now undertake accurate field strength measurements from the relative safety of the ground.

Outside the main building, but still within the compound, is a variety of mobile vehicles and trailers used to undertake investigations, field measurements and monitoring activities, **Fig. 7**. The largest of these vehicles is equipped with a built-in generator to power measurement and monitoring equipment and is also fitted with a 20m pump-up telescopic mast for the deployment of various antennas. Other vehicles in the fleet include smaller transit-type vehicles with10m pump-up telescopic masts, and there is a variety of trailer masts that can also be deployed.

Typical uses include interference direction finding and calibrated field strength measurements for broadcast TV and radio installations. The vehicles and staff are deployed at major national events to ensure that communication equipment used by the world's broadcasting and media organisations work without causing interference to other users of the radio frequency spectrum.

This isn't just a monitoring exercise but a more proactive role that starts prior to the event taking place, involving cataloguing and registering the frequencies, mode and power outputs of all equipment and devices. Recent events have included the state funeral of **HM Queen Elizabeth II**, the Commonwealth Games and the 2012 Olympic Games.

New technologies and services continue to put pressure on releasing more of the radio spectrum. For example, the move from analogue to digital terrestrial broadcasting allowed sections of the UHF band IV - V to be reallocated to the 4G data network, necessitating occasional retuning of digital TV receivers. So, in this ever-changing environment, the Baldock Monitoring Station continues to play an important and pivotal role to ensure that the frequency spectrum remains available, without interference, to all users.

Finally, my thanks to David Thorpe and his colleagues for their warm welcome at the Baldock Monitoring Station and for taking time to explain to our club members the vital service provided by Ofcom to monitor the radio spectrum. **PW**

TECSUN®

Multiband Receivers

Tecsun S-2000
LW/MW/FM-Stereo/SW (with SSB) and Airband

- 1000 station memories
- Signal Attenuator

£299.95

Tecsun H-501x
Worldband Receiver with Bluetooth

- Covers: LW, MW, SW, FM (64-108 MHz)
- All mode reception incl. SSB
- Local, medium, DX selector
- ATS: Auto search and storage
- SD slot with 16Gb card supplied
- 3150 memories in 25 pages.
- USB sound card function
- Two channel Stereo speakers

£299.95

Tecsun PL-990x
Portable Radio with Bluetooth

- Covers: LW, MW, FM, SW
- MP3 player via SD port
- Memories: 3150
- Local, Medium, DX input selector
- Synchronous detector

£269.95

Tecsun PL-880
SSB Portable Radio

- FM,SW, MW, LW
- DSP technology
- 3050 station memories

£199.95

Tecsun PL-680
World Band Receiver with SSB

- Full frequency coverage
- SW SSB with BFO control
- 1900 station memories

£149.95

Tecsun PL-368
Multiband with SSB

- Covers: LW, MW, SW, FM
- DSP technology
- Supplied c/w:
  - Stereo earphones,
  - USB charging cable,
  - Rechargeable battery

£79.95

Tecsun PL-330
SSB SW Radio

- FM stereo, LW/MW/FM/SW
- 650 memories
- DSP technology

£69.95

Tecsun PL-380
Multi-band Radio

- FM/LW/MW/FM/SW
- Easy tuning mode
- 550 memories

£49.95

Tecsun PL-360
Pocket size multiband radio

- DSP technology
- MW, LW, SW, FM, FM stereo via stereo earphone

£44.99

www.moonrakeronline.com

MOONRAKER The Tecsun Specialists

call 01908 281705 email sales@moonrakeronline.com

Tim Kirby GW4VXE
gw4vxe@icloud.com

1

Another 145 Alive lights up the 2m FM band

Tim Kirby GW4VXE has another packed column, including reports of some excellent tropo on 2m.

Earlier in the year, I reported on the success of a Saturday afternoon event called '145 Alive'. Dreamt up and co-ordinated by **Tim Hughes G5TM**, this consists of a two-hour session on a Saturday afternoon where various nets are run on 2m FM. With the net controllers for each area in good locations, the controllers try to ensure that as many people hearing them can call in to the nets, and where possible, make contact with others on the net.

The latest session was held on Saturday 30 September. Although I don't have the final details of the numbers of QSOs made, it was apparent that the event was very successful. Tuning around the 2m FM segment from Pembrokeshire was fairly quiet, it was apparent that most channels had some activity, with some signals peaking up for a few seconds on aircraft reflection or tropo. Tim G5TM had done a very successful job in co-ordinating activity in several areas of the country where there had been no previous '145 Alive' activity. Even better for me, there was excellent activity from Eire, with a number of nets active.

Ian Bevan G0YAP took part from Thorpe Abbotts airfield in Norfolk and had a great time. He noticed a microlight give him a wingwave and subsequently discovered it was his friend **Rob M0UGG**, who sent Ian some pictures of his station from the air! **Ian Miles G0CNN** operated portable from Wensleydale in North Yorkshire from an altitude of around 460m ASL, **Fig. 1**. Ian says that 28 stations formed the net, from as far away as Durham, South Lakes, North Wales and Lincoln, which was the furthest contact at around 150km. Ian used a TS-2000 running 100W to a Diamond X-300 at around 7m AGL. **John Stringer M5JFS** went portable from near Portsmouth using his Yaesu FT-817, 10m of LMR240UF coax into an Arrow antenna with the 70cm elements removed, 4.5m above ground on a PVC pipe, which was slid over the pole of a tripod stand, **Fig. 2**. John worked 13 stations, with the best DX being G0JBA in Sandwich, Kent, a distance of around 155km. John tuned around during the event and heard lots of activity on other channels away from his local net, including hearing the control station of the South Wales net as well as a station on Winter Hill, running the North West net. John concludes by saying, *"what a great way to spend a couple of hours on a warm autumn afternoon"*. **Dave Ackrill G0DJA** took part too, portable in Derbyshire. He made seven contacts, with a best DX of around 70km. Dave notes that most people seemed to be using wide deviation and that he struggled to be heard until he went from narrow to wide deviation.

Here in West Wales, I could hear the North Wales net, although couldn't not break in. Prior to the event, I heard stations in Cornwall, but unfortunately by the time the event started, conditions seemed to have deteriorated in that direction. I was more successful working west into Eire and my best QSO was with **Owen EI4GGB/M** parked up near Killarney, a distance of around 320km – not at all bad for FM.

The 145 Alive events have really taken off and it was nice to hear, during the live streaming of the RSGB's 2023 Convention, that the IRTS president **Enda EI2II** and RSGB president **John GI4BWM** were commenting on the event's success.

The 8m band

Roger Lapthorn G3XBM (Cambridge) runs 2.5W of FT8 on the band and has been spotted in the USA, Canada, Caribbean, Slovenia and Portugal. Roger has heard signals from both Canada and South Africa.

Paul Farley G7PUV (Sussex) who operates as G9PUV on the band, writes, *"40MHz is starting to improve as we head into F2 season and I've already made a number of contacts across the Atlantic. ZF1EJ and PJ4MM are about most days now along with stations from South Africa.*

*"On 10 October I worked **Tom WM2XEJ** not on FT8 but USB. It was good to have a traditional QSO with one of the US experimental licences before they all lose the privilege. For whatever, reason the FCC has chosen not to renew any of them. On the 14th I worked VA2CYX in FN46, the first time this autumn the path has opened that far north.*

"Although not strictly amateur radio, a friend in Perth, Australia has recently set up three beacons, each one running 100mW ERP via dipoles using their low interference potential devices (LIPD) class of licence. All three have the same simple dash dash keying. The three frequencies are 30.87611, 36.60713 and 39.14673MHz. I've only heard the 30MHz beacon so far but a friend in Portugal has also received the one on 36MHz".

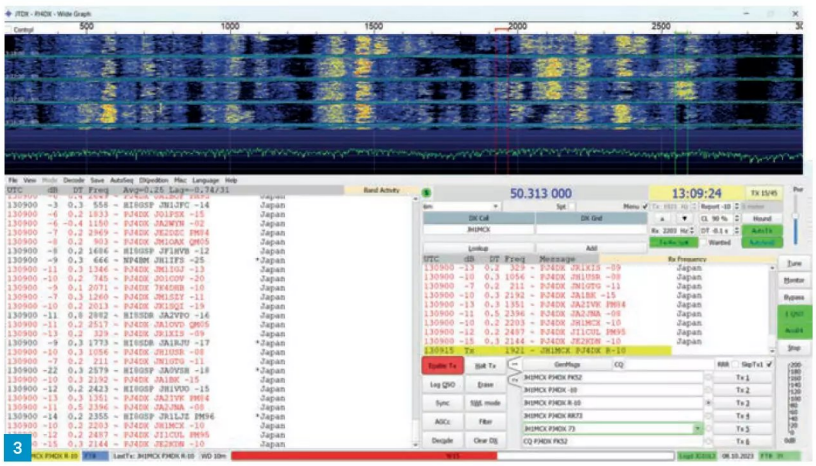


Fig. 1: Ian Miles G0CNN operated portable during the 145 Alive event. Fig. 2: John Stringer M5JFS used a simple but effective aerial during the 145 Alive event. Fig. 3: A screenshot showing 50MHz signals from Japan, as received on the long path by Steve PJ4DX. Fig. 4: Tim Hague M0AFJ's station in Helston, Cornwall. Fig. 5: M1CRO/P's 23cm QSOs during the recent trophy event.

The 6m band

Steve Telenius-Lowe PJ4DX wrote: *"During the whole of September I took part in the CDXC HF Challenge, which includes 6m as well as the 10, 12 and 15m HF bands. 6m turned out to be completely dead from the 1st until the 8th, when I worked several Americans and a single Cuban: no great DX from here, but at least the band was beginning to show some signs of life. On the 10th I worked my first 'real' DX station in several months: EA7/YL3GS.*

"The following day, 9 September, the autumn Trans Equatorial Propagation (TEP) season began here, allowing for easy QSOs over the next few days with CE, CX, HC, HK, LU, OA, PY and ZP. But there was no other DX until the 27th, when I worked four Central American countries, HR, TG, TI and YS as well as ZD7MY.

"Good propagation to Africa and the Middle East on the 28th, when 7Q7EMH and 6W/IV3FSG made it into my log for two 6m new ones, plus HZ1SK, who was workable for several days at the end of September and into October. The following day ***Antoine 3D2AG*** *was another nice DX catch.*

"6m really started to open up nicely, though, on 4 October with VU3WEW and, on the 5th, A92AA and A71XX for two more 6m new ones".

"On the 6th there was an early morning opening to Japan via long path. The screen was full of JA stations along with a single Aussie, VK8DR, near Darwin and four Indonesians, all at >19,000km. It was the same scenario the following morning, although I was a little late on parade and, by 1245UTC, the JA opening was coming to an end. A little later, though, five more Indonesians were worked.

"On Sunday 8th, not wanting to be late on parade again, I was up early and left the receiver running on 50313. The first JA station did not appear until 1255UTC (8.55am here), quite a bit later than the previous two days. I put out a single "CQ JA" call at 1307 and the screen immediately filled with JA stations calling me (**Fig. 3**) – *the waterfall display looked like 20m on a good day. I worked* ***Kazu JA1RJU*** *with whom I had operated on the 9M0C and D68C DXpeditions, and well-known HF DXers* ***Masaru JA5AQC*** *and* ***Kan JA1BK*** *along with many others. It was like every radio amateur in Japan was on 6m on their Sunday evening.*

"After a while I QSYed to 50318 FT4 to speed things up a bit and it was the same story with the screen full of JA stations calling. JN1NDY was received at +17dB and I even received a +20dB report from JH4UYB. Astonishing!

"I handed over to my wife ***Eva PJ4EVA*** *who worked more JAs on FT8 and then the opening came to an abrupt end at 1409UTC, one and a quarter hours of the most amazing propagation I have experienced on 6m.*

"The next day, the 9th, was disappointing when compared with the previous three days. There was still an opening to Japan but it only lasted 20 minutes and I only worked two more stations, plus a few Indonesians later on. Then on the 10th I only worked one JA but at 1310UTC I was both surprised and delighted to work DU6/PE1NSQ for the fifth 6m new one this month.

"The JA openings were definitely via long path. When I turned on the rig on the 6th I saw many JA stations being decoded, so I turned the beam towards Japan – and every single one of them disappeared completely. I realised that I had left the Hexbeam in the opposite direction after chasing ZD9W on HF the previous evening, so turned it to JA via long path and there they all were again. Even though the Hexbeam only has two elements, the front-to-back ratio was high enough to establish clearly that this was long path propagation".

Stewart Wilkinson G0LGS (Cheltenham) worked CX6VM for a new country on 5 October and then

on 10 October worked 6W/IV3FSG for another new country.

The 2m band

Dave G0DJA (Bolsover) has been active on FT8, though he prefers CW. In early October, he made a good number of QSOs, including DK0A (JN48). Dave uses an 18-element Yagi.

Jef Van Raepenbusch ON8NT (Aalter) worked G8XVJ/P (IO93) and DR9A (JN48) during the IARU 2m trophy on 2/3 September. During the UK Activity contest on 5 September, Jef worked G0LTG/P (IO81) and M0ICK/P (IO93). Next day, during the FT8 Activity period, Jef worked OV3T (JO46), GW4HDF (IO81), G0GFC (IO92), G3WAG/P (IO82) and G7RAU (IN79).

Tony Collett G4NBS (Cambridge) worked a few meteor scatter QSOs during the Perseids, including T77GO who was a new DXCC for Tony. He wonders if anyone knows a QSL route for the operation? On 22 August, Tony caught an opening to the south west and worked F5MLG (IN88), F6IFX/P (IN87), GU6EFB (IN89) and F8DBF (IN78). Tantalisingly, Tony had a single decode from CT9/OM3RG. On 3 October, for the UK Activity Contest, for once, Tony had no noise, so was pleased to work OZ1BEF and OV3T on SSB. Next day, after the FT8 Activity contest, Tony was able to work EA2XR (IN83 with marginal signals on FT8. Signals had picked up more the following day, and Tony worked EA2XR with better signals, also working F1GTU (JN05). Tony could see others working CT9, but couldn't hear anything. However, on 6 October, Tony could see that **Steve CT9/OM3RG** was hearing him, but that Steve was not QRV. Fortunately, two hours later, Steve came on the band, an easy QSO followed for a new DXCC country for Tony.

Massive congratulations to **Roger Daniel G4RUW** (Newbury) who worked CT9/OM3RG (IM12) on the morning of 6 October. With that contact, Roger completed a challenge he had set himself, to work 50 countries on 2m – with 10 watts! 50 countries takes a bit of doing on 2m, but doing it with 10W is quite special. Well done Roger – and he wonders whether anyone else has done the same?

Keith Watkins G8IXN (Redruth) was hearing GB3GD in the Isle of Man at S9+20dB on the morning of 7 October and could hear mobiles on the input of the repeater. Keith also noted a new beacon on 144.497 from JN09CM. It's run by F6KOH, but Keith wasn't sure of its callsign.

Ian Bontoft G4ELW (Bridgwater) thought it was going to be a quiet month and then the tropo at the beginning of October happened! Highlights of Ian's excellent log include EA1CGN (IN73) on 1 October; EA2XR and EA1HRR (IN83) on 5 October; CT9/OM3RG on 6 October; DK5WO (JO30) on 8 October; EA1UR (IN53) on 9 October and EA8FB (IL18) on 10 October. Ian runs 15W of FT8 to a 5-element Yagi about 4m off the ground.

Stewart G0LGS found there were good signals from Scotland during the October UK Activity Contest. He also worked EA1UR on FT8 on the evening of 9 October.

5

Keith Nolan EI5IN (Co Westmeath) worked EA2KK and EA1LB over the weekend 6-8 October. Keith mentions a fledgling packet network being established in Ireland and that **John EI5INB** near Athlone, reported receiving a packet from MB7NSC nearly 480km away.

Phil Oakley G0BVD (Great Torrington) made a few SSB QSOs over the weekend of 6 to 8 October, working EI7GUB, EI6EG, F0DBU as well as a number of G stations.

Tim Hague M0AFJ (Helston), **Fig. 4**, says it seems like it's been a long time since we had some good extended tropo to talk about. It started with him on 4 October with a quick QSO to EA2XR (IN83) and then EA1HRR (IN83). Things really started to get going on the 5 October with huge signals from CT9/OM3RG (IM12). Other highlights on the same day were EA8TX, EA8AQV, EA8CXN (IL18), F5DYD (JN03). On 8 October, Tim worked CT3KN (IM12) along with a number of French and German stations, but CT7ABA (IN60) was a very nice one. Tim says that he missed a couple of Italian stations and he wonders how far the propagation was reaching to the south. Certainly, the Hepburn tropo site showed the duct reaching D4. Things were good enough that Tim worked one of the EA8s with a watt on SSB. Tim continues, *"this was the first good opening using my new setup, the driver is the FT-710 driving QS transverters for 2 and 70cm and Gemini amps for 2 and 70. The FT-710 has proved to be a superb driver. I limit the output to 5W, which suits the transverters well. All the station is locked at 10MHz via a Leo Bodnar GPSDO"*.

Here at **GW4VXE** (Goodwick) I had 50W of FT8 and a vertical available for the tropo, but was delighted at what it was possible to work, including EA8RS (IL18), EA8CXN (IL18), F4GWG (IN77), EA1UR (IN53), CT3KN (IM12), EA8AQV (IL28) and CT9/OM3RG (IM12). It was a really great opening. Things were so good that **Mark EI3KD** and EA8AQV were swapping SSTV pictures!

The 70cm band

Dave G0DJA lists two contacts, both on FT8, F5APQ (JO00) on 7 October and GM4FVM (IO85) on 9 October.

During the FT8 Activity period on 13 September, Jef ON8NT worked G4CBW (IO83) and GD0TEP (IO74).

Kevin Hewitt ZB2GI monitors the ZB2BU/R repeater situated at the top of the Rock of Gibraltar and was pleased to work **Damian G4JEF/MM** who was aboard *Ramform Hyperion*, a Research and Survey Vessel, which was berthed in the port of Algeciras.

Tony G4NBS lists some nice QSOs during the month. On 4 September, Tony worked SQ1FYB (JO73) on FT8. DF2FQ (JN58) followed next day and on 7 September, things were good to Sweden and Germany with SM7KOJ (JO66), SM7SPG (JO66), SM6CEN (JO67), SM6TZL (JO67) and DH8BS (JO63) worked. On 5 October, Tony worked F1GTU (JN05), F4IAA (JN05), F4FMB (IN96), EA2XR and EA1HRR (IN83).

Tony operated the October UHF/SHF contest with the M1CRO/P group from Walton on the Naze. On Saturday evening EA1IT was a big signal on 70cm.

Gus Coleman G3ZEZ (Clacton on Sea) worked HB9XC (JN37) during the October UHF contest and says that there were many French stations audible too.

Stewart G0LGS was pleased to work EA1IT on SSB for a new country on 7 October and says that there were several very strong French stations during the UK Activity Contest on 9 October.

During the tropo, I tried 50W to a vertical here at GW4VXE and was delighted to work a few new squares on the band and some nice contacts, including EB1B (IN73), G7RAU (IN79), EI9KP (IO54), EA1UE (IN53), GD4SVD (IO74), F1FPL (JN09) and GI6ATZ (IO74).

The 23cm band and above

Operating with the M1CRO/P group from Walton on the Naze, Tony G4NBS says that DR9A were a tremendous signal throughout the weekend from JN48 – they were a genuine S9+20dB most of the time. Tony also kindly included a map, **Fig. 5**, showing the contacts made by M1CRO/P on the band during the weekend.

Gus G3ZEZ worked HB9XC during the October UHF but most excitingly, he worked LX/ON4MU/P (JN29) on 10GHz at a distance of 398km and wonders if it is a G to LX first on 10GHz?

Stewart G0LGS was pleased to work EA1IT on SSB during the Trophy contest on 7 October, as did Matt 2E0MDJ for new countries on the band.

Satellites

Kev ZB2GI operated through the Tevel FM satellites using his FT-817 and a manually tracked 2m/70cm log periodic. Kev worked EA1PA (IN71) and CT1ETE (IN51). Through QO-100, operating from the GARS Club station with **John ZB2JK**, Kev and John worked a good number of stations, including 4Z1KD (KM73) and R9LR (MO27) along with a good number of Europeans.

Jef ON8NT monitored an ISS contact using the Goonhilly SDR on 22 September at 1619UTC.

Patrick Stoddard WD9EWK (Phoenix) writes, *"IO-117 or 'GreenCube', continues to be the game-changer for satellite operators. The W8S expedition from Swains Island had a station for IO-117, making lots of satellite operators happy. Other operators who enjoy travelling have included a station for IO-117. **Carsten OZ9AAR** has a terminal program that works with a special version of UZ7HO's SoundModem program for IO-117, making it easier to manage pileups on that satellite. Now I need to get working on a setup for IO-117.*

*"A satellite operator who is popular on both sides of the Atlantic, **John VE1CWJ**, recently worked the last of the 488 grids in the continental USA. John needed DL88 in Texas, and **Jeffrey KI0KB** went down there for a couple of days operating as K5Z (in part) to get John that last grid for the continental USA using IO-117. Congratulations to John, who has done a bit of roving around eastern Canada, along with his 2022 trip to Bermuda making satellite operators (including me) happy!"*

FM and DAB

Simon Evans (Twyning) writes, *"Early October has produced lots of days with tropo enhancement to VHF propagation. But, one day in particular was different with both tropo and Sporadic E going on. On 10 October I had, for some days, been receiving FM broadcasts from three sites on the north coast of Spain: Lierganes near Satander, Quiros and Culleredo in Galicia. Then during the afternoon of the 10th we had a major Sporadic E opening bringing stations in from North Africa, Portugal and Spain.*

"My TEF6686 radio has been upgraded to v.2 beta with even more facilities.

We have had extended periods of tropo for Band III as well allowing many French DAB signals to be received well away from their intended area. My best DX was a local DAB mux intended for Limoges on 5C 740km from Twyning. I now run version 4.1.2 of the QIRX software with even more facilities".

It's been an exciting month on VHF/UHF – thanks to everyone for their news and information. See you next time. **PW**

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

Keith Rawlings G4MIU
keith.g4miu@gmail.com

1

Planning my new antenna systems

Keith Rawlings G4MIU plans a new antenna system based around a portable mast.

As I start to put together this December column it is a nice warm late September afternoon and I am presently planning to rebuild my antenna systems before the oncoming winter and the cold wet weather get here. I will be almost starting from scratch due to some tree 'trimming' in my back garden, which was some while ago. This has resulted in my losing a number of important anchor points that were used for my HF wire antennas.

In addition a mast and bracket that were attached to the side of my house have been taken down. These held a VHF/UHF Diamond V2000 vertical, a Discone and a pulley and lanyard for attaching a wire antenna. Being in place for over 20 years the assembly was looking the worse for wear. It was leaving rust streaks running down the house paintwork as the brackets themselves had become very rusty.

As we have a mind to move house in the hopefully not too distant future I did not replace the assembly but filled the bolt holes with chemical resin and painted over them when I repainted the house. Consequently, I also lost an anchor point for a wire antenna. In the corner of the garden I had a pulley and lanyard attached to a tree branch that was removed. Thus, I lost the other anchor point I used for my wire antennas.

At the same time I removed my 40ft telescopic pump up mast, which was ground mounted and fixed to the opposite end of the house to the other one. This mast is a Scam 40 and is about as solid as they come. It is very sturdy and ideal for antenna experimenting and evaluation, which is what it was mainly bought for in the first place. I have had it for 30 years plus and it too is suffering from the ravages of the weather. Due to its weight I was worried that in my 'old age' it might be a problem for me if it were to get stuck in the air at some height or other, therefore I decided to retire it while I consider its future.

The mast was held in a strong welded mounting bracket, which I fabricated myself. It was affixed to the lower part of the house wall by M12 A4 stainless steel studding, which was fixed into holes drilled in the brickwork by resin. The mast itself rested on a packing piece on the ground so no weight was placed on the bracket, which just had to take lateral movement. In later years I rarely used it above 30ft anyway, and then only with light antennas. So this has all been removed and the protruding studs cut off using an angle grinder.

All in all this has left me with no permanent transmitting antennas for HF other than 'temporary' ones and for VHF/UHF the V2000 and discone have been temporarily mounted in the attic. For receiving on HF I still have a 66ft inverted-L, which runs from ground level to a soffit and along to a glass fibre pole where it is tied with a bit of rope to the trunk of a young horse chestnut tree. I have 'Wellgood' loop, which is a homemade variant of a Wellbrook loop. I also have a genuine Wellbrook loop, which occasionally gets used along with a PA0RDT miniwhip.

So, I needed to plan out a new antenna system. I decided to start off by replacing the pump-up mast with something lighter. It had to be, obviously, lightweight, relatively inexpensive as it would likely only be used as a stop-gap, it needed to go into the same spot as the pump-up mast as this was the most convenient spot for it and I already had cables running there anyway, and I wanted it to be telescopic as well so it could let down easily when not in use. In addition, I wanted to be able to

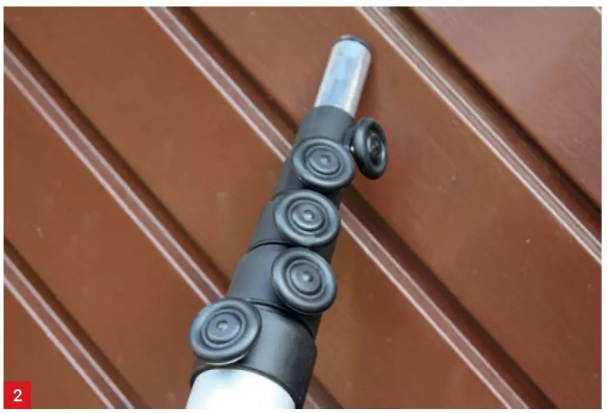


Fig. 1: LMA-L 33ft Mast.
Fig. 2: Closer view of the clamping assembly.
Fig. 3: Detailed view of a clamp section and brass insert. Fig. 4: Supplied thumb screw.
Fig. 5: Red and Green rings marked on the telescoping sections. Fig. 6: Improved SWR graph of the October dual-band antenna.
Fig. 7: TK-12 heavy duty mounting brackets.

fix a tiltover base mount in the same position so that I could substitute an aluminium scaffold pole if needed.

I discounted fibreglass poles as these would not likely be strong enough for what I wanted to do. So, an aluminium model was my preferred choice and there are quite a few to choose from if bought commercially. Initially considered was the Spiderbeam range and these looked to be very good quality. I liked the stainless steel tube clamps, which are tightened with an Allen Key (hex key), as this method is unlikely to cause problems by crushing the tubes. Ultimately though I considered them too expensive for what is intended to be a temporary solution.

I also looked at Comet and MFJ masts but after reading user reviews on the Moonraker website I finally plumped for one of the cheaper LMA portable masts from that emporium. Looking at the range I thought the 17ft mast too short, I did consider the 26ft model but wanting a bit more height I went for the 33ft version. This was bearing in mind that I may not be using the thinner and weaker top section as I also may want to occasionally employ a small rotator and VHF/UHF Log Periodic.

To go with the mast I would need some new wall brackets and while I thought about making some I decided to also get these from Moonraker along with a couple of 2in U-Bolts to match the major diameter of the mast.

Moonraker LMA-L 33ft Portable Mast.

I ordered online and the mast and brackets, **Fig. 1**, arrived next day. Although stated as portable the mast is quite heavy and I'm not sure I'd want to cart it up a mountainside but it would be fine for operating if not too far from a source of transport. The mast comes with a set of sturdy guy rings but users will have to supply their own rope and ground stakes. The top of each section (apart from the top one) has a moulded plastic mast clamp, **Fig. 2**. This has an M8 brass insert pressed fitted into it, **Fig. 3**. This takes an M8 'thumb screw' and this is used to screw up against and lock the relevant section, **Fig. 4**.

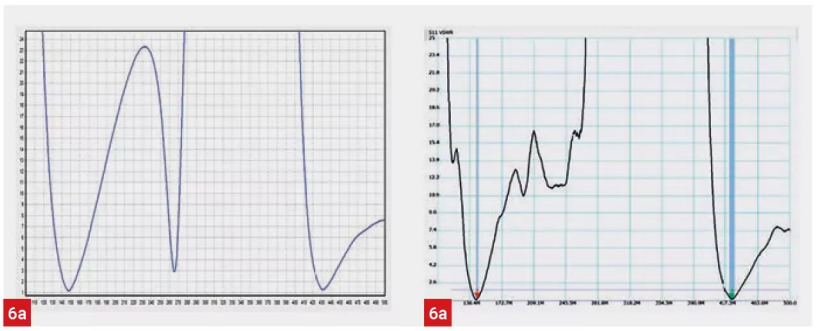
Each section easily telescopes up and down within the last one and there is nothing physical to stop the section being pulled out of the lower tube. There are two markings on the tubes, Red and Green, to warn the user of possible impending disaster, but it would not be a good thing to overdo it and have the tube come out, especially if extending to 33ft, **Fig. 5**!

When not extended the mast is about 7ft tall. This does make it slightly difficult as, at a tad under 6ft tall, I found it awkward to reach up and get enough purchase to lift the poles up and also access the locking screws. Consequently, most users may find a little 'hop up' a useful accessory to the mast.

The overall quality of the mast is good and as each section slides and remains in metal-to-metal contact with each other I see no reason why the mast could not be used as a vertical radiator. Clearly the mast would need to be isolated from contact with the ground but with the addition of a few radial wires it should be possible to use it as a vertical on 7MHz and up by adjusting the length. This may be of interest to portable users.

On my mast I have now added another mark on the tubes a couple of inches further up as I felt that if used fully extended, I would like to have a little more 'meat' inside the pole. The mast is well built but I feel the locking assembly needs using with a little care.

As the end of the thumb screws are a bit rough (See Fig. 3 again) they may damage the poles if tightened heavily. I would recommend using something to pad out the screw and for this I


6a


7

3D-printed some spacers 6mm in diameter and 2mm thick. How the joints stand up to corrosion after extended use only outside time will tell.

Overall, I am happy with the mast so far and I think it will do exactly what I want of it. The present cost of the mast is £129.99 +PP. Moonraker also stock a complete set of replacement mast clamps. The kit includes plastic clamps that go over the tops of the aluminium poles, thumbscrews and guy rings. **Justin** at Moonraker tells me they fit all LMA masts and retail at £29.95+PP. A link to the mast and customer reviews can be found here:

https://tinyurl.com/ydj8zrby

Specifications for the mast and a list of accessories for it may be found in the sidebar.

Mast mountings.

As mentioned, to mount the mast I also bought a pair of TK-12 heavy duty mounting brackets and a couple of U-Bolts, **Fig. 7**. These cost me £19.99 and £3.50 respectively. The story will continue next month!

Follow up on the simple 2m/70cm vertical

In the October issue I described the construction of a simple dual-band vertical based on an existing ARRL publication design. To confirm the dimensions I used the AN-SOF simulator to prove the design before building it. While I used an appropriate number of segments for my model, the information presented in the article was based on a model using less than 50 segments, demonstrating what results could be expected if readers chose to model the antenna in the free trial version. The demonstrated AN-SOF VSWR plot in Fig. 4 using 50 segments was shown alongside the 'real world' measurement taken from an antenna analyser.

On reflection, this was not a fair demonstration of the software's capabilities. **Fig. 6** provides a better representation of the original as it has comparable graph scales and uses an appropriate segment number for the model.

It should be noted that to obtain the best accuracy for a model such as the dual-band depicted in the column more than 50 segments would be needed.

Incidentally, in both the full and trial versions it's possible to designate a '0' (zero) as the number of segments while drawing wires. In doing this AN-SOF will automatically divide the wires into the minimum number of segments advised, with consideration given to the shortest wavelength in the frequency range (restricted to no more than 50 in the trial version). This will give a good starting point for the model.

That's it for this this year. Season's greetings to all and I will see you in 2024! **PW**

LMA-L 33ft portable telescopic mast specifications

6 section telescopic mast from 2in to 1in diameter giving a 33ft total extension.
Ideal for lightweight VHF/UHF antennas or similar.

Key Features/Specifications:

- Type: Aluminium portable telescopic mast
- Length: 33ft open (approx) 7.2ft collapsed
- Diameter: 2-1in
- Sections: 6 x 80in each
- Weight: 6kg approx
- Includes guy rings

Accessories:

MASTRANT-P5 GUY SET – 30m

Key Features:

- Maximal height: 21m
- Length of Guy: 30m
- Set of rope Mastrant P 5mm
- Linelok Tensioner CL276
- Chain Coupler 6mm
- 6mm Shackle

This is a complete guying kit for approximately 10m height depending on guying angle but can be cut to length or adjusted to suit any application. All ready assembled for immediate use.

Key Features/Specifications:

- 3 x Light duty aluminium ground stakes
- 3 x 10m UV protected nylon rope
- 3 x Rope grips
- 3 x Wire thimble
- 3 x Turnbuckles
- 1 x 3-way spider

Current Price £29.95

MASTRANT-P6 GUY SET – 30m

- Maximal height: 21m
- Length of Guy: 30m
- Includes:
- Set of rope Mastrant P 6mm
- Linelok Tensioner CL276
- Chain Coupler 6mm
- 6mm Shackle

Current Price £39.95

LIGHTWEIGHT GUYING KIT

This is a complete guying kit for 10m height depending on guying angle but can be cut to length or adjusted to suit any application. All ready assembled for immediate use.

Key Features/Specifications:

- 3 x Light duty aluminium ground stakes
- 3 x 10m UV protected nylon rope
- 3 x Rope grips
- 3 x Wire thimble
- 3 x Turnbuckles
- 1 x 3-way spider

Current Price £49.95

The Battle of the Beams

This month **David Harris** looks at a book telling the story of radar during WWII.

David Harris
mydogisfinn@gmail.com

This book is about how both the British and Germans pioneered the use of radar and radio direction finding during the Second World War. **Tom Whipple** is Science Editor of *The Times* and this is his fifth book. The book closely follows the war time career of **Reginald Victor Jones** (1911 – 1997) who held the post of Assistant Director of Intelligence (Science) in the Air Ministry. His role was to advise the war government on the use of technology. RV Jones is almost unknown today but his role during the war was to predict what the Germans were doing with radar and radio direction finding technology.

When WW2 started Britain had a chain of radar stations that could detect enemy aircraft as they approached the British coast. The British assumed that the Germans had not yet caught up with this new technology. Another assumption was that celestial navigation (navigating using the stars) was accurate enough to direct RAF bombers on missions to destroy German cities. In fact intelligence showed that RAF bombing was very inaccurate with few bombs actually reaching their targets.

Whipple makes the point that radar and radio navigation was just as important in helping the Allies win the war as the Enigma decodes of German radio signals and the creation of the atomic bomb. Air superiority for Britain also meant airwave superiority. Britain had some idea of German technological advances through a report passed to them in late 1939 by **Hans Meyer**, a German scientist working for Siemens. Meyer was appalled by the Nazis and wrote a lengthy document in which he sketched out some of the technology that he had been working on at Siemens.

German bombing raids on Britain were fairly accurate. RV Jones believed that radio waves were being used to help bombers pinpoint their targets. Interrogation of captured German aircrew, covert surveillance of POW accommodation and examination of the wreckage of German aircraft showed that the Nazis were using a radio navigation system known as X Gerat (X equipment) or Knickebein. This was a variation of the Lorenz blind landing system, which used a radio beam to precisely guide a plane onto a runway during bad weather. The Knickebein system involved two radio beams transmitted from different stations in occupied Europe. Where the beams crossed was the bomber's target. The plane followed the path of the beam but if it deviated, the pilot received either dots or dashes sent in Morse code.

In order to thwart German bombers Britain began to develop electronic counter measures to jam the Lorenz beams that guided the bombers. Britain also began spoofing German navigational radio beacons that were transmitting from the French coast. By setting up phoney beacons (known as 'Meacons') German planes became disorientated and unable to reach their targets. The Germans improved the Knickebein system to enable it to use three radio beams, which gave greater accuracy for their bombers. The system was highly automated with equipment in the cockpit to enable the crew to know precisely when to drop the bombs. Not all German bombers had this system, which gave rise to the concept of pathfinder planes who navigated electronically to the target site and then released incendiary bombs. The subsequent fires lit up the skies and enabled the other bombers who lacked the radio equipment to see the target. In November 1940 a German pathfinder bomber crashed on Chesil beach in Dorset. The X Gerat equipment was salvaged and enabled the Allies to adopt new electronic counter measures against the Germans.

Britain also adopted the subterfuge of starting fires in rural areas to act as decoys to the German bombers. It was very much a cat and mouse game with each side developing new technologies, which the other would try to thwart. RV Jones' role was to try to guess what the Germans might come up with next and his speculations were backed up with Enigma intercepts of German communications, photo reconnaissance, POW interrogations and intelligence supplied by French resistance agents.

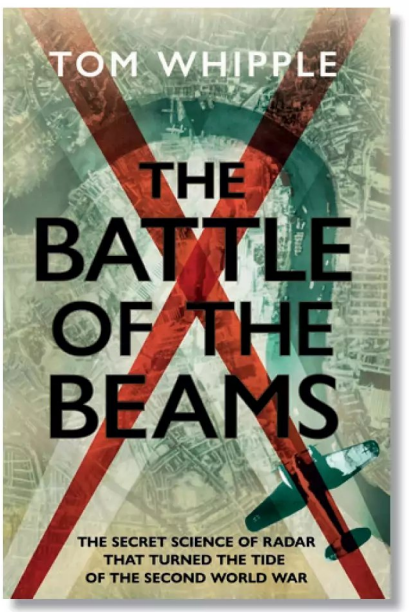
Radar development was not just focused on aviation. The Germans had also developed radar for marine use and the battleship *Graf Spee* had a radar tower, which was clearly visible when she was scuttled off Montevideo, Uruguay in December 1939. In early 1941 *HMS Delight* was sunk in the English Channel by dive bombers who were guided to her by a German radar station based in Cherbourg. As the Germans swept across Europe they quickly established a chain of radar stations from the far north of Norway to Bordeaux and across the Balkans.

The British were keen to get their hands on German radar technology and planned the Bruneval Raid, which took place on 27-28 February 1942. British paratroopers landed near to the village of Bruneval, which is on the French coast, just north of Le Havre. They succeeded in attacking the troops guarding the radar installation and were able to dismantle the radar equipment, which was then taken by landing craft to a bigger ship and back to Britain for examination. RV Jones received the CBE for his part in the planning of this raid.

The next breakthrough made by Britain was the development of airborne radar, which the Germans had already started installing in their night fighters. Another invention was the use of chaff (airborne particles of metal foil) used to confuse enemy radar.

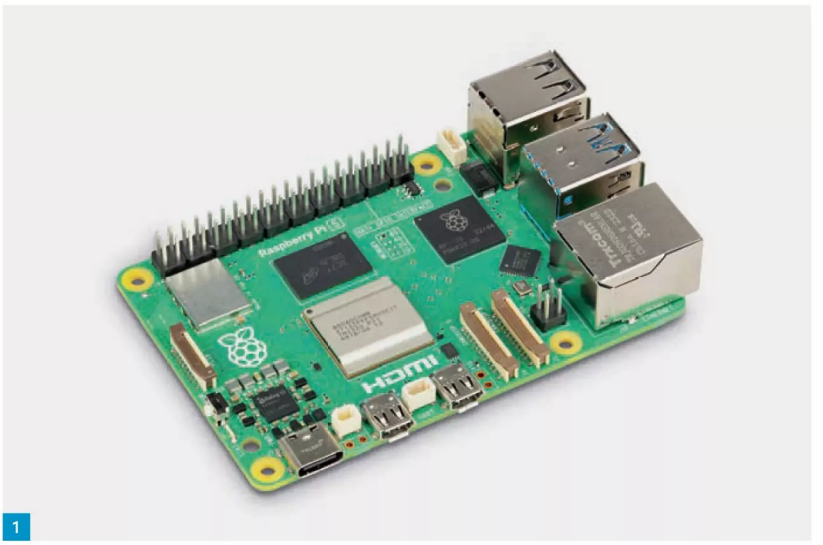
Electronic warfare was further expanded in 1943 when the British started transmitting bogus voice commands to German aircraft.

This is a very well written and informative book about radar, radio direction finding and electronic warfare. Whipple is able to explain clearly some technical concepts and he does make a compelling case about the importance of these areas and the role of RV Jones in predicting many of the advances in electronics made by the Germans. After the war RV Jones was appointed Professor of Physics at Aberdeen University where he remained until his retirement. In 1978 he published his own account, *Most Secret War,* which is still in print, Penguin £12.99. **PW**



The Battle of the Beams. The Secret Science of Radar That Turned the Tide of the Second World War, by Tom Whipple.
Bantam Press. 2023. Hbk. 299 pp. £20.
ISBN 9781787634138
www.penguin.co.uk

Mike Richards G4WNC
practicalwireless@warnersgroup.co.uk



1

A new Pi for Christmas!

Just in time for Christmas, we have a new Raspberry Pi model, plus **Mike Richards G4WNC** continues his look at Node-RED in the shack.

We've been expecting the Raspberry Pi 5 for a long time but, like many projects, the global component shortage has hampered work on the new Pi 5. Unusually for the Raspberry Pi team, the Pi 5 was given a pre-launch announcement, with first deliveries expected about four weeks later. All previous launches have been something of a surprise, with the product available immediately. I suspect this approach is an attempt to gauge and manage the demand and hopefully avoid the disappointment of previous launches where the product sells out quickly. I'm sure the demand for the Pi 5 will be huge, especially as it has many mouthwatering features. I'm still awaiting delivery at the time of writing, but I can tell you how its new features will impact its use in amateur radio. The first headline is that almost everything in the new model is faster, **Fig. 1**.

The processor is now a 64-bit quad-core ARM Cortex-A76 unit running at 2.4GHz and with more cache memory than previous models. This is supported by a new 800MHz VideoCore VII Graphics Processing Unit (GPU), which can drive two 4k monitors at 60fps. This should provide for stunning displays with suitable monitors. Initially, the Pi 5 will be available in 8GB and 4GB RAM versions at £78.90 and £59.40, respectively.

The Raspberry Pi team have been building their chip design capabilities and have produced the RP1 Southbridge chip. This specialist chip handles the Pi 5 inputs and outputs, directly affecting the USB, SD card, camera, display and more. This new chip has been responsible for many of the enhanced speeds of the Pi 5. The aggregate USB bandwidth (the total bandwidth of all USB ports combined) has been doubled. This is good for those using external SSDs (Solid State Drives) to boot the Pi. The Pi 5 also has two camera and one serial display port, now fed by a pair of 4-lane 1.5Gbps MIPI (Mobile Industry Processor Interface), tripling the total bandwidth. This should provide better performance with Pi cameras, especially when using high-resolution models.

The new RP1 also adds the SDR104 high-speed mode to the SD card interface, potentially doubling the bandwidth to just over 100MB/s when using compatible cards. This should give a welcome speed increase during boot-up and program loading. The new chip has many other benefits, but one headline is the provision of the PCI (Peripheral Component Interconnect) Express 2.0 interface. Accessing this requires fitting an additional hat and will allow the connection of high-speed peripherals such as NVMe drives for much faster disk access.

Great news for amateur radio applications is the inclusion of a real-time clock. This requires a battery to keep running when the Pi is disconnected. The best solution is the Official RTC battery (£4.90). This is a Panasonic lithium manganese rechargeable battery, so it will be charging while the Pi is powered up and keep the clock going when it shuts down.

With so many improvements, it's no surprise that the board layout has changed, which means a new range of cases will be required. The new Pi Official case (£9.90) will be ideal for many. Although similar to the previous case, the new model includes a fan and additional ventilation slots to improve the airflow. The extra processing power of the Pi inevitably means it will run hotter, but the new Pi case should solve that issue. For those intending to work the Pi hard without a case, there is an official Active Cooler at just £4.90, which employs a fan and a large heatsink. The Pi 5 power requirements have also increased, and this is supported by a new Official 27W PSU that delivers up to 5.1V at 5A and costs just £11.90.

Pi 5 Summary

As you can see, the Pi 5 is an exciting new budget computer with plenty of performance for amateur radio applications. It will be exciting to see how it fares running SDR software such as Pi-HPSDR and the like. Supporting the Pi 5, and due for launch in mid-October, is a new Raspberry Pi Operating System (Bookworm). As always, the new Pi OS will be backwards compatible with previous Pi models. As soon as my Pi 5 is delivered, I will upgrade all my pre-formatted amateur radio microSD cards. These will be available via my webshop at:

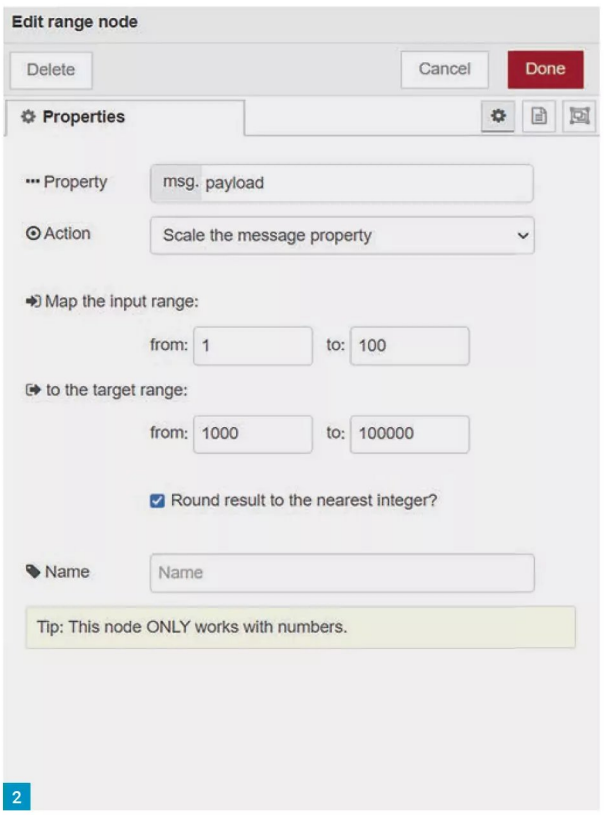
g4wnc.com/shop-2

Of these cards, the most popular is my DataModes card, which is preloaded with the latest operating system, popular apps such as LibreOffice and, of course, the following radio apps: WSJT-X, JTDX, QSSTV, FLDIGI, FLmsg, FLrig and JS8CALL.

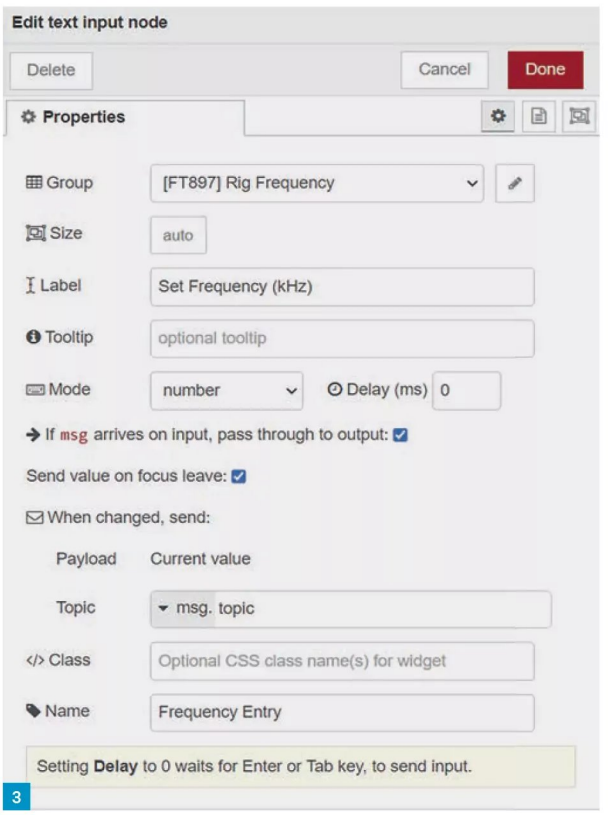
Node-RED – rig control

Last month I introduced you to using Node-RED to send simple commands to your rig, so this time I'll show you how to add a Graphic User Interface (GUI). The ease with which a GUI can be added transforms Node-RED into a handy tool for customising your station. Before I show you how to build your own GUI, I ought to explain a little more about how Node-RED operates. Its primary function is to pass messages between Nodes. For example, if you want to change your rig's frequency, you would enter the new frequency into a Node that can accept numbers. Once you've entered the frequency and pressed return, the value leaves that Node as a JSON message and passes to the rig control Node that extracts the frequency information from the JSON message and sends it to your rig in the correct format. Nodes can also perform actions on JSON messages. For example, you might prefer to enter your rig's frequency in kHz, but rig control expects to see the frequency in Hz. That's easy to fix by adding a Range node, **Fig. 2**. This can scale a number series up or down and makes light work of converting frequency from kHz to Hz. We can use the same process in reverse if we want to display the rig's current frequency in kHz rather than Hz. With that basic concept covered, let's look at the GUI and create an example.

In Node-RED, the GUI is known as a dashboard be-



2



3

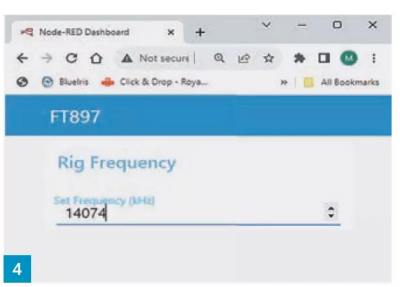
cause it is most often used to display the status of all the items controlled by Node-RED. Several dashboards are available for installation, but I suggest you start with the official Dashboard. To install this, follow these steps.

- With your Node-RED workspace in a browser, go to the Node-RED menu (three horizontal lines in the top-right corner) and select Manage Palette.
- Click on the Install tab and enter: Dashboard in the search box
- Look for the entry titled 'node-red-dashboard'. It should be version 3.6.0 or later
- Click the Install button and follow the prompts to complete the installation

If you scroll down the left-hand side of the Node-RED workspace, you will see the new entry for Dashboard along with a long list of the available Dashboard Nodes. To develop our flow, let's add a Text Node to set the rig's frequency. From the Dashboard section, drag a Text Node onto your flow. We will use this with the RigControl Node we used last month, but don't wire it up yet. Before using the Text Node, we must configure it by double-clicking on the Node, **Fig. 3**. The first task is to add a new Dashboard group. To help organise the GUI, Node-RED forces you to allocate controls to Groups and Tabs. This is a simple system that helps to keep the GUI well organised.

We'll create a new Group called Frequency for our frequency entry Text Node. Click on the pencil icon in the Text Node and give the Group the name Rig Frequency. You will see that we also need to add a new tab, so click that pencil icon and provide the new tab with the name of your rig. I'm using an FT-897 in this example, so I'll use that. Once entered, you will return to the Group setup, where you click Add. That will return us to the Text node, where we can change the Label to: 'Enter Frequency': Next, we must move down to the Mode field and set it to 'number'. This field ensures the user doesn't enter any characters that can't be processed. You have now added a text entry Node to enter the desired rig frequency, **Fig. 3**. Before moving on, you must hit the Deploy button to activate your changes. You will need to get used to hitting Deploy because modifications to the flow are only implemented when you Deploy them. I've confused myself many times by forgetting to hit Deploy! To see your new GUI, enter the IP address of your NodeRED workspace but add /ui, **Fig. 4**. Here's an example URL for my setup where NodeRed is on 192.168.1.237: http://192.168.1.237:1880/ui

At this point, whatever number we enter will appear on the output of the Text Node when we press Tab or Enter. This number forms what's known as the payload of the JSON message. You can view the message by adding a Debug Node to the flow and connecting it to the output of the Text Node. Hit Deploy and open a second browser window showing the GUI. If all is well, every time you press return or tab after entering a frequency, you should see the number appear in the Debug output, **Fig. 5**. We need



4

to format the message correctly before we connect the Text Node output to the RigControl Node. To reliably change the frequency of the rig, we need to add a capital F followed by a space, then the frequency in Hz followed by another space and a new line character like so:

F 14074000

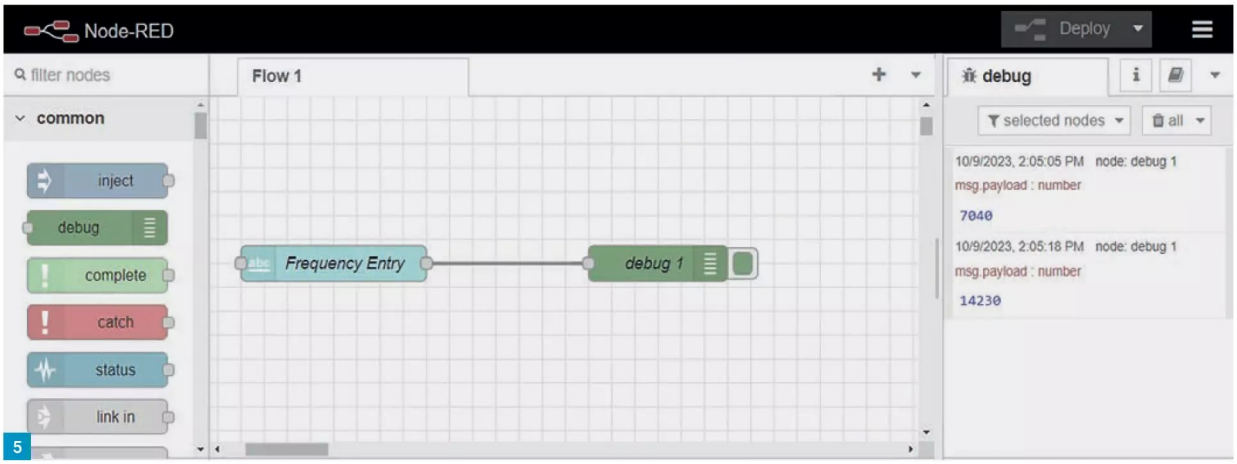
To get the correct message format, we need to do the following:

- Add the 'F' to the beginning
- Multiply the frequency by 1000 to change from kHz to Hz
- Add a line feed character to the end.

While we could use the Range Node as mentioned earlier, we can perform the entire conversion with two lines of JavaScript like this:

```
msg.payload = "F " + (msg.payload * 1000) + " \n"
return msg.payload
```

Let me explain how this works. The term msg.payload is how we access the content of a simple



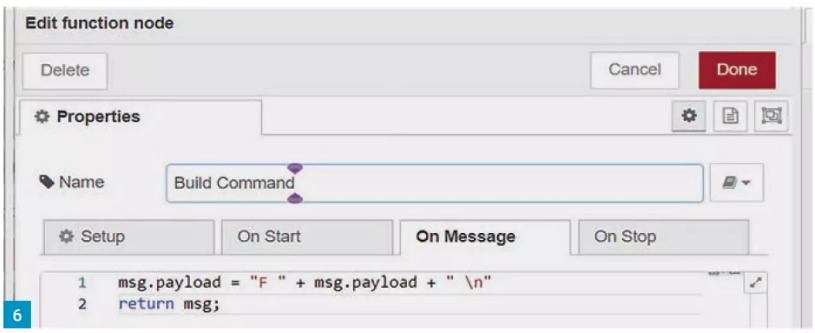
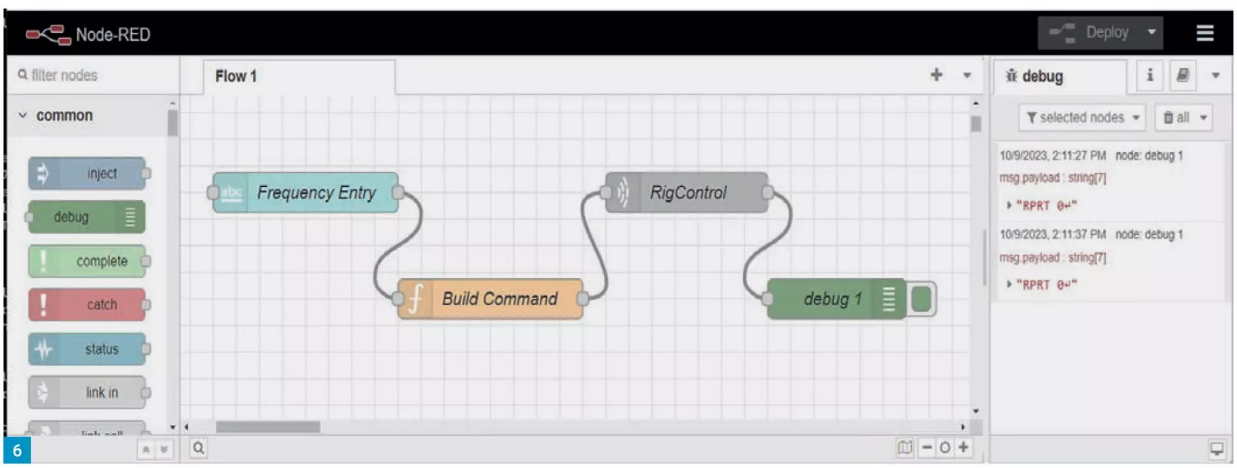


Fig. 1: The new Raspberry Pi 5.
Fig. 2: Range Node for converting number ranges. Fig. 3: Text Node configured for frequency entry. Fig. 4: Simple Node-Red frequency entry GUI. Fig. 5: Node-RED frequency entry Node connected to a Debug Node. Fig. 6: Node-RED function Node to build the command for RIGCTLD.
Fig. 7: Final frequency setting flow.



Node-RED message. In this case, msg.payload reveals the number we entered in the Text Node. The text inside quotes is what we're adding to the message, and the + adds the components together. The "\n" used at the end is the standard way of adding a new line character. The * 1000 multiplies the entered frequency by 1000 to convert from kHz to Hz. To add this code to our flow, we use a Function Node. This is a very powerful Node that lets us include JavaScript programming in our flows. I've shown the completed Function Node in **Fig. 6**. Please note that there is a space in the quotes after F and before \n.

As a final check, we can add a Debug Node to the right-hand side of the Rig control Node, **Fig. 7**. This will collect any messages from the rig and can be helpful for spotting errors. If all is well, you will see the message "RPRT 0" after each frequency entry. This is confirmation that the command was executed with no errors.

NB: If using Node-RED to control your rig while WSJT-X is running, you must let WSJT-X connect before starting the Node-RED connection. The start-up sequence should be:

- Start rigctld-wsjtx
- Start WSJT-X with the Radio set to: Hamlib NET rigctl. The Server field can be left blank provided RIGCTLD is running on the same PC as WSJT-X
- Start Node-RED rig control flow.

To help you get started, I've shared an example flow on the Node-RED website. You can access and download this free of charge, by visiting the Node-RED site (**nodered.org**) and choosing the Flows menu. Just enter G4WNC in the search field to see all my shared flows. The example for this column is titled: "G4WNC – Rigctld basic frequency control GUI".

That's enough for this month, and next time I'll show you how to add buttons, knobs and control relays. **PW**

We're sorry we didn't see you all at the Newark Ham Fest this year, but hopefully the 2-day event will be up and running for 2024. The 'Fest' has become the UK's largest & best run show for Amateur Radio and it's definitely my favourite. To compensate for no show in 2023, I've told the lads to work on mad prices for kit during our **Open Day on the 25th of November**.

Doors open at 8am and close at 4pm

Save the date!

M&S 4.9

Trustpilot HamRadio Reviews
Like our service? Why not leave a review?
https://uk.trustpilot.com/review/www.hamradio.co.uk

MARTIN LYNCH & SONS LTD
THE WORLD FAMOUS HAM RADIO STORE
Wessex House, Drake Avenue, Staines, Middlesex TW18 2AP
E-mail: sales@hamradio.co.uk
Opening Hours: Mon - Fri: 8.30am to 5pm. Sat: 9am to 4.30pm
Tel: **0345 2300 599**
International Tel: +44 1932 567 333
www.HamRadio.co.uk
SAFE ONLINE SHOPPING. E&OE

The store will be set out like our famous rally stands - **tons of gear all stacked up and marked DOWN in price**. So rather than sitting at home and getting bored on a Saturday, grab some friends and pop down to see the Lynch Mob and be fed and watered for **FREE**. Not sure there will be an actual hog again this year (£2k for a hog anyone??) so we've invited back the best burger man in west London to feed all your smiley faces. Judging by the amount eaten last year I'd say it was a hit.

Don't miss it - save the date!

ML&S Trusted by the World's Most Famous Brands

THE ML&S STORE IS OUTSIDE THE LONDON ULEZ ZONE — ULEZ FREE

YAESU

ML&S Officially The Largest UK Dealer & Distributor of Yaesu Musen Products

This month's Featured Yaesu Radio
Yaesu FT-710 Field (No Speaker)

HF/70MHZ/50MHz SDR Transceiver

A remarkable device crafted specifically for field operations. Please note that the package does not include the SP-40, which is used for the Acoustic Enhancement Speaker System (AESS). However, worry not! The FT-710 Field package comes complete with a handy Carrying Belt kit designed to meet your on-the-go requirements. The SP-40 remains available as an optional accessory.

Available from stock at only £979.99

FT-710 AESS FREE SP-40 SPEAKER, HAT & SMB-209 AND FREE UK MAINLAND DELIVERY
HF/6/4m All Mode Compact Transceiver.
Perfectly sized & simple to use.....**£1050.00**

Yaesu FTM-5000E SPECIAL OFFER WHILST STOCKS LAST
2/70 50W C4FM Digital FM Transceiver..... **ONLY £599.95**

Yaesu FTM-6000E
Dual Band 50W 2/70 FM Mobile Transceiver.....**£229.99**

Yaesu FTM-300DE 50W C4FM/FM 144/430MHz Dual Band Digital Mobile Transceiver.....**£389.00**

Yaesu FTM-200DE Single RX C4FM Mob **SPECIAL PRICE £299.99**

Yaesu FTdx101D & MP Our current favourite Base Station Bundles from Yaesu. Choose between 100W & 200W versions

FTdx101D **£3099.95**

FTdx101MP **£4199.99**

Yaesu FTdx10 HF+6+4m Hybrid
SDR Base Station Bundle **£1499.99**

Yaesu FT-891 HF/6m Base/Mobile.....**£649.00**

FT-891+FC-50 Bundle
Buy an FT-891 with an FC-50 Auto-Tuner and save! .....**Just £869.95**

Yaesu FT-5DE IPX7 Dual C4FM RX Handie **£399.95**

Yaesu 70DE C4FM/FM 144-430MHz Dual Band Handie.....**£169.95**

Yaesu DR-2XE C4FM Repeater. In stock **£1249.99**

Yaesu FT-65E VHF/UHF 2m/70cm Dual Band FM Handie **£84.95**

Yaesu FT-4XE 5W VHF/UHF FM Portable Transceiver.....**£62.95**

Yaesu M-70 Desktop Microphone **£129.95**

Yaesu M-90MS Microphone Stand Kit **£169.95**

SDRplay

As the UK's Ham radio distributor of British made and designed SDRplay products, we have all models available ex-stock for immediate shipping.

SDRplay RSP-1A Superb entry level SDR from SDRplay..... **£99.96**

SDRplay RSPdx Wide Coverage SDR.....**£194.95**

SDRplay RSPduo The ultimate Plug-in SDR.
Dual Tuner 14bt SDR.....**£239.95**

USB A-B Cable
for SDR Play RSP.....**£2.65**

Follow ML&S on our Media Platforms

ML&S

4.9 ★★★★★ Trustpilot HamRadio Reviews
Like our service? Why not leave a review? https://uk.trustpilot.com/review/www.hamradio.co.uk

MARTIN LYNCH & SONS LTD
THE WORLD FAMOUS HAM RADIO STORE
Wessex House, Drake Avenue, Staines, Middlesex TW18 2AP
E-mail: sales@hamradio.co.uk
Opening Hours: Mon - Fri: 8.30am to 5pm. Sat: 9am to 4.30pm

Tel: 0345 2300 599
International Tel: +44 1932 567 333

www.HamRadio.co.uk

SAFE ONLINE SHOPPING. E&OE

Point your camera to this, the only QR Code for Ham Radio you'll ever need, it takes you directly to our web site!

KENWOOD

ML&S Officially Appointed UK Sole Distributor & Repair Workshop for JVC-Kenwood's Ham Radio Products

This month's Featured Kenwood Radio
JVC-Kenwood TS-890S

SAVE £125!
RRP: £4124.99
Winter Offer: £3999.99

Kenwood TS-890S The excellent TS-890S is now back in stock & FRESH off the Japanese production line **£3999.99**
See HamRadio.co.uk/TS890

NEW Kenwood TH-D75 144/430MHz Handie
It's new & it's arriving before the end of 2023. £50 Deposit.
Kenwood TS-590SG 160-6m Base with ATU.....**£1599.95**

For full specifications, photographs, reviews, shipping details and special offers see www.HamRadio.co.uk or call the team on 0345 2300 599

Icom

ML&S Stock the Full Range of New Icom Products

This month's Featured Icom Radio
Icom IC-7300

Best selling 100 Watt - HF/50/70MHz Transceiver with SSB / CW / RTTY / AM / FM
CHECK WEBSITE FOR BUNDLE DEALS

Icom IC-905 VHF/UHF/SHF D-Star Transceiver
The IC-905 is a versatile all-mode transceiver that covers 144-5600MHz and includes a 10GHz trsnsverter option, providing access to VHF/UHF and SHF frequencies.....**£3549.95**

Icom CX-10G is NOW AVAILABLE
10GHz Transverter.....**£1499.99**
The Icom CX-10G 10GHz Transverter is a high-performance radio frequency (RF) converter designed for amateur radio enthusiasts and radio experimenters.

NEW

Icom ID-50E 2/70 D-Star Handie
A cut down version of the ever popular ID-52e at a lower price.....**£449.95**
See HamRadio.co.uk/ID50 for more details

Icom IC-7610 SDR HF/50MHz Transceiver with **FREE SPEAKER and MIC (worth £324)**.....**£3299.99**
Icom ID-52E Big Brother of the ID-50E, 2,3" display D-Star etc. Come compare!.....**£549.99**
Icom IC-705 The worlds best selling All-Band All Mode Transportable 160m-70cm.....**£1349.99**
Icom AH-705 Random wire auto tuner for IC-705.....**£299.99**
Icom IC-7300 Best selling 100 Watt - HF/50/70MHz Transceiver with SSB / CW / RTTY / AM / FM ... **CHECK WEBSITE FOR BUNDLE DEALS**
PTRX-7300
High quality RF interface module for the IC-7300.....**£199.95**
PTRX-9700 NOW IN STOCK. FREE SHIPPING.....**£279.95**
Icom IC-7610 Brilliant Dual Band Transceiver..... **£3299.95**
With FREE SP-41 base speaker
Icom IC-9700
Base Station 2/70/23 all mode including D-Star **£1899.95**
Icom IC-7100 HF/6m/4m/2m/70cm Base & Mobile Transceiver including D-Star with remote control head unit.....**£1124.95**
Icom IC-R8600 New 100kHz-3GHz Receiver with SDR technology from IC-7300.....**£2549.99**
Icom ID-5100
Latest 2/70 D-Star Touch Screen Transceiver **£619.99**
Deluxe Version also available

NEW! Icom AH-730
100W Remote Auto-ATU **£569.95**

Wouxun KG-UV9K
2m + 70cm Handie Pro Pack £169.99
Now with 8.33 step for Airband Channel Spacing Changes.

Wouxun KG-UV8G
2m + 4m Handie Pro Pack £187.00
The original & the only 2+4m Handie
The Wouxun KG-UV8G is our best selling 2m & 70cm Handie in the U.K, so we persuaded the factory to offer the 2m+4m version as a 'ProPack' with all your favourite accessories and placed them inside a presentation box.

WOUXUN

The New KG-UV9D Mate £139.95
Wouxun KG-UV980PL £299.99
with FREE Shipping

Pro Pack Bundles include:
- KG-UV9K or KG-UV8G Transceiver
- Two batteries
- Two belt-clips
- Software and transfer data cable
- Fast charger dock and Power Supply
- Hand speaker mic
- Battery eliminator
- Manual
- Wrist strap
- Leather case
- In-car charger
- SMA-PL259 adaptor
- Hands-Free kit

SOMETHING FOR THE WEEKEND...
Sign up to our mailing list at HamRadio.co.uk for weekly updates, bargains, news and much more!

Have you watched www.MLandS.TV yet?
Every week there's something new.

YouTube

- Buy stuff (any stuff) via our website & get 1% CREDIT back on the money you spent after VAT
- You can use the CREDIT the next time you order via our website, or you can save your CREDIT for future purchases
- The CREDIT won't expire for a whole 12 months so you will have more than enough time to use it
- It's simple and it's FREE. You spend money with us via our website and we give you money back to spend on our website on further purchases.

ML&S CREDIT

For more information on our FREE MONEY offer see HamRadio.co.uk/CREDIT

FOLLOW US ON TWITTER AND FACEBOOK HamRadioUK Watch our YouTube Channel on www.MLandS.TV

Check out our HUGE RANGE of products at the Lynchy Store

NEW SteppIR Stealth Antenna Coming Soon!

The elegant solution for potential restrictions or neighborhood issues! Base antenna is 20m-6m with available 80m/60m/40m/30m or 40m/30m stepper motor controlled coil. Ground radial systems are also available.

SteppIR 3-Element Yagi Package £4249.95

When SteppIR chose ML&S to distribute their range of antennas here in the UK we were delighted. Thousands of top DX'ers use SteppIR, including some very prominent Hams close to the store. We stock the range and being factory appointed is peace of mind for anyone thinking of investing in arguably the most advanced antenna design in the world.

For more information on our complete SteppIR Range see HamRadio.co.uk

NEW Wouxun KG-Q336 Tri-band 4/2/70cm Handheld Tranceiver

Experience the cutting-edge WOUXUN KG-Q336 Tri-Band 4/2/70cm Handheld Transceiver. This state-of-the-art device offers a plethora of advanced features, including crossband repeat, vox, scrambler, priority channel, compander, and more. With dual reception and high contrast backlit screens, the KG-Q336 is a remarkable addition to WOUXUN's latest radio lineup. **£159.95**

Upgrade your communication experience with the WOUXUN KG-Q336 Tri-Band 4/2/70cm Handheld Transceiver. Explore its impressive features and unlock a world of possibilities.

KEY FEATURES:

- Tri-band coverage: Transmit on frequencies 66-88MHz, 136-174MHz, and 400-480MHz
- Crossband repeat functionality
- Secure communication with scrambler feature
- Enhanced audio quality with compander technology
- Efficient scanning with scan and reverse scan options
- Convenient DTMF capability
- Built-in flashlight for added utility
- Compatibility with CTCSS and DCS codes
- Versatile with 4 work modes
- Adjustable offset for flexible operation
- Voice guide for intuitive navigation
- **Additional accessories included:** Battery pack, desktop charger, PSU adapter, hand strap, 14.5cm and 18cm antennas and belt clip.

ML&S UK Distributor for SANGEAN

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

Sangean U4-DBT-Plus

Black / FM-RDS / Bluetooth / Aux-in / USB Playback Ultra Rugged Digital Tuning Receiver

The Utility 40 is an DAB+/FM radio designed to withstand all job site conditions with IP64 water and dust resistance. Built with a protective roll cage, this radio is shock resistant and ready for any job site. **£99.95**

Sangean ATS-909X2

Graphite Black. The Ultimate FM / SW / MW/ LW/ Air / Multi-Band Receiver

White version in stock available now!

The perfect world band radio to roam the globe with..... **£224.95**

Deals on Yaesu Speakers & Microphones

Save £10 on each using code YSPOA at checkout

These speakers reproduce the high quality output sound these receivers generate and thereby providing clear and crisp audio for reliable communications on all HF and V/UHF.

Yaesu SP-10 External Speaker For FT-991A/FT-991. **£109.96**

Yaesu SP-30 Desktop loudspeaker, optically and electrically matching to the FTdx10 transceiver. **£94.96**

Yaesu SP-20 External Speaker for FTdx3000D/FTdx1200. ..... **£129.95**

Yaesu SP-101 Desktop External Speaker. Maximum input: 7W. Impedance: 8 Ohm. **£139.96**

Yaesu M-70 Desktop Microphone Desktop Microphone for the family of Yaesu HF transceivers. **£129.95**

Yaesu M-90D Desktop Microphone.
Equipped with both a round 8-pin jack and an 8-pin modular jack. Supplied microphone cable (round 8-pin to 8-pin modular) can be connected to either jack of the M-90D. The M-90D does not require the SCU-53. ..... **£179.95**

Yaesu M-100 Dual Element Microphone
Features a hybrid design integrating both a high-quality Condenser *and* Dynamic element. **£329.95**

Yaesu M-1 Reference Microphone
The ultimate, high-quality, innovative desktop microphone. **£599.95**

LazTuners

Very high-end antenna coupler.
Made in France, LAZTUNER tuners are manufactured with particular care and finish. The quality of production as well as the choice of components and materials selected for this line of equipment make it an exceptional brand. Available in several versions with always the same quality!
High-end tuning box, Frequency 1.8-30Mhz, Admissible power: 4kW, Basic version: Black aluminum front panel / N connectors, 100% French manufacturing.

LazTuner LT-Classic 4..... **£2350.99**
LazTuner LT-4B..... **£1999.99**
LazTuner LT-4C..... **£1949.99**
LazTuner LT-4CX..... **£1669.99**

RF2K-S

Solid State No-Tune RF Kit Amplifier.

Ground-breaking features that push the envelope of present-day linear amplifier designs. Full legal limit capabilities across all Amateur Bands, 160 through 10 meters, 1,100 watts on 6 meters, updated speed controlled low noise fans and pin diode T/R switching for extra quiet QSK operation. The on-board whisper quiet switching power supply supports operation on mains from 90 to 290 Vac. With a nominal RF input of 55 watts, this amplifier achieves 800 watts output running on 110 – 120 Vac and 1,500 watts out running on 230 – 240 Vac. **£5799.00**

Xiegu X6100 £589.99

Ultra Portable Shortwave Transceiver Radio.

Adopting SDR software radio platform architecture with excellent performance, which carries powerful baseband and RF, integrating rich and diversified operating functions bringing a brand-new recognition and experience on amateur radio. With its compact structure and tiny appearance you can immediately set forth on a journey, get close to nature, and enjoy the fun of outdoor communication..... **£589.99**

JNC Radio SV6301A 6G

Portable 7" 1MHz-6GHz Vector Network Analyser

Superbly constructed in a metal enclosure with bright colour 1024x600 display & internally battery powered.
Supplied with calibration kit, RF adapters, USB-C cable, 500mm 2 x SMA male fly leads, carry case. ..... **Only £789.99**

TS100 Soldering Iron

STM32 microcontroller, programmable via micro USB (USB cable not included), Dual temperature sensors, OLED screen, DC5525 barrel jack connector for power. **£59.99**

Rig Expert Powerful Antenna Analysers

New! AA-3000 ZOOM
The flagship Antenna and Cable analyser with a range from 0.1 to 3000MHz and a Big Blanview® ZOOM display. **£1199.99**

New! AA-650 ZOOM 100kHz-650MHz graphical display, 1kHz resolution **£619.95**

New! AA-1500 ZOOM
100kHz-1500MHz professional analyser available from stock **£739.95**

AA-1000 100kHz-1GHz, Graphical SWR, PC Connection, Built-in TDR, Smith/Polar Charts **£649.95**

AA-230 ZOOM 1 Bluetooth Version
00kHz-230MHz, Graphical SWR, PC Connection, Built-in TDR ..... **SPECIAL PRICE £329.00**

AA-55 ZOOM 60kHz-54MHz, 100kHz-54MHz, Graphical SWR, PC Connection, Built-in TDR ..... **SPECIAL PRICE £280.00**

AA-35 ZOOM 60kHz-35MHz, 100kHz-35MHz, Graphical SWR, PC Connection, Built-in TDR ..... **SPECIAL PRICE £269.00**

Those listed with "ZOOM" capability makes graphical measurements especially effective.

mAT Y-200

160-6m High Speed Auto Tuner for Yaesu Radio. £229.95

ZUM Radio Elite

Small and efficient Multi-Mode Digital Hotspot. Only £279.95
See HamRadio.co.uk/ZUMRE

The whole Flex/403A range is now available

Antenna Genius Antenna-Switch 8:1

Right from the beginning of the development, attention was paid to being able to operate this switch directly from a distance via an Ethernet interface. Another point was the requirement that all Genius devices such as the interface, antenna switch, rotor controller and station controller are compatible with each other. Each Genius device has an interface (API) to work with different devices and software (e.g. log software, contest software, digital modes).
Antenna Genius control is officially supported by the N4PY software. Communication is via a TCP/IP connection. For more information, please consult the N4PY help files. **£699.95**

4O3A Noise Cancelling Headset NC-1 BT

Offers ideal suppression of external noise in any situation. Thus, thanks to ANC (active noice cancelling), you can perfectly concentrate on quiet and weak signals even in noisy environments and are less distracted. In hectic contest operations, this can be a clear advantage!..... **£269.95**

Flex Power Genius XL
There's power. And then there is POWER! Chances are, your existing radio does everything promised and then some. It functions flawlessly and performs at a level with little left to be desired. But one can never have too much power. Which is where the Power Genius XL amplifier comes into play. The Power Genius XL takes your perfectly good radio and amplifies its performance exponentially. **£6899.99**

DigiRig Isolater

Eliminate audio noise caused by ground loops by isolating your PC from transceiver... **£29.95**

CHA LEFS (Lightweight End Fed Sloper) EFHW - Chameleon Antenna

The CHA LEFS is a six-band, no-tuner, High Frequency (HF) antenna for use on the 40, 20, 17, 15, 12, and 10 meter Amateur Radio Service (ham) bands. It's minimalistic design and lightweight components are intended for the serious backpacker and outdoor adventurer **£239.99**

DigiRig Mobile

Tiny new digital modes interface

- Combines audio codec, serial CAT interface and PTT switch
- Supports full featured CAT interface: PTT, bands, tuning etc. (not just VOX based PTT)
- Uses a single USB connection to computer minimizing the cables mess
- Serial computer aided transceiver (CAT) port can be configured for logic levels, RS-232, CI-V or TX-500
- Works with all major OS flavours: Windows, MacOS and Linux
- Permanently available independently from CAT port an open-collector PTT switch controlled by RTS signal of the COM port to interface Handies/Mobiles etc.
- Axillary connection points to CM108 codec
- Uses widely supported CP2102 serial interface & CM108 audio codec

For more details see HamRadio.co.uk/DigiRig

CG Antenna BL-49:1 Un-Un 600W

Tested by our own Richard 2E0SXX

Hi Power Matching Transformer suitable for Multi Band End Fed Half Wave antennas. Ideal for home or field use. All you need to do is add 10, 20 or 40m of antenna wire - the Messi & Paoloni Dipoflex wire is ideal. **£74.99**

LM-V2 Straight Key

This heavy duty morse key is beautifully made and has an elliptical double electroplated base. Weighing 1100g and fitted with rubber pads on the base, this key is as solid as a rock.
£160.00

£15 off using code PW15 at checkout or call.

It's NEW! The M&P UltraFlex 7 "Sahara" in white

Ultraflex 7 and 10 sahara (white). £2.00 per metre.
Purchase 100m+ and get 10% off!

NOW IN STOCK! New! Acom 06AT

1.5kW remote Auto ATU & 4-Way Switch. Powered by all Solid State Acom amplifiers. **£1150.00**

ML&S are ALWAYS adding new manufacturers and products to our vast range

You can now order from ML&S for delivery on a Saturday or Sunday!
Order before 2pm as late as Friday of each week and see it delivered at the weekend.

Web purchases: Just select Saturday or Sunday at the check-out.
Or call to place your order for Saturday or Sunday delivery on 0345 2300 599

Steve Telenius-Lowe PJ4DX
teleniuslowe@gmail.com


1

A busy month

With multiple DXpeditions active, **Steve Telenius-Lowe PJ4DX** has lots to report.

Welcome to the December *HF Highlights* and a very Merry Christmas or Happy Hanukkah to all readers. **Neil Clarke G0CAS** sent in his regular 28MHz beacon report for the month of September:

This summer's Sporadic E season appears to be somewhat down on recent years and September continued with a lower number of beacons heard compared with the same month last year. Some of the more regular beacons were DL0IGI 28205, heard on six days, and IQ8BB 28260 was heard on 14 days. During the height of the season numerous beacons were logged on more than 20 days a month but were down into single figures in September. For example, IZ8RVA 28240 was heard every day in June but only on four days during the entire month of September.

There was better news on the beacons heard via the F2 layer with SV5TEN 28189 and YM7TEN heard on 21 and 19 days respectively. In North America, all USA call areas other than area 7 were logged. W call areas 4 and 5 were heard the most, on 11 and 13 days receptively. On the 28200 worldwide beacon network, 4X6TU was heard on 26 days. Towards South America LU4AA and OA4B were logged on eight and 14 days respectively. YV5B was not heard at all and was off air. It looks to be the same for 4U1UN in New York, which has not been logged since the 22nd but was logged on the eight days prior to that. CS3B returned back on air around the 15th after being QRT since the middle of August.

The month on the air

During the whole of September I took part in the annual CDXC HF Challenge. The idea is to work as many DXCC entities as possible using the 21, 24, 28 and 50MHz bands. Entrants can use 'traditional' modes (CW and SSB) or 'Machine-Generated Modes' (i.e. FT8, FT4, RTTY etc). I decided to use mainly FT8/FT4, although I also participated in the Worked All Europe contest on SSB. I ended up with 183 entities, which looks like being the winning score on FT8/FT4, while **Norman 5B4AIF** worked an impressive 191 DXCCs using all modes.

The DXpedition 'season' started with a bang in mid-September. **Holger ZL3IO** kicked things off on the 17th as ZL7IO from the Chatham Islands. His single-handed 11-day operation netted nearly 14,000 QSOs.

Closer to home, OH0RY was an operation by a four-man Dutch group from the Åland Islands between 17 and 30 September. Their activity was primarily for the CQWW RTTY contest but they also operated CW and FT8/FT4.

The Rebel DX Group's operation from Tuvalu, T22T, was on the air from 20 September to 4 October and was relatively easy to work on the high bands, at least here on Bonaire.

Next was **Yuris YL2GM** who braved the long sea voyage from Cape Town to Tristan da Cunha, **Fig. 1**, from where he was active as ZD9W. I believe this was the first-ever operation from Tristan da Cunha on FT8 and while monitoring ZD9W I decoded the largest number of callers I have ever seen in a single period: 86, almost all of which were calling Yuris. I worked ZD9W on SSB, CW and FT8 and was astonished to work him on all bands from 1.8MHz to 28MHz.

By this time the DXpeditions were coming thick and fast! The next day, 21 September, saw VK9LAA, a two-man operation from Lord Howe Island, start operations.

A couple of days later **Elvira** came on the air as **6W/IV3FSG** from Senegal and she was still going strong as this column was being put to bed on 11 October.

On 29 September 5X3K, operated by a group of DXpeditioners from Czechia came on the air from Uganda.

Into October and a Croatian-Slovenian group became active as 5W0LM from near Apia in Samoa (**Fig. 2**) on the 1st. Unlike many recent DXpeditions, this one favoured CW with some SSB, and *"FT8 just for relax"*.

The next day a German group started up as TX6D from Tahiti. Perhaps because there were now seven DXpeditions operating simultaneously, TX6D proved very easy to work from here on Bonaire, with six FT8 QSOs by myself and **Eva PJ4EVA** on 10, 12 and 15m all being made immediately, after just one call (compare this with over an hour of calling to make the first contact with ZD9W on 15m!).

Next to hit the airwaves was W8S from Swains Island on 7 October. This mainly European team (including **Johannes PA5X/5T5PA**, **Fig. 3**) has been looking specifically for European contacts. Part of American Samoa but a separate entity for DXCC, Swains has an interesting history: take a look at Wikipedia.

On 10 October yet more DXpeditions hit the airwaves: E6AM (Niue), T2C (Tuvalu) and TO8FH (Mayotte). This is indeed a time of plenty for HF operators!

November/December DXpeditions

Things quieten down a little in December, with only one major DXpedition announced for the month: V6EU from Chuuk in Micronesia between 4 and 16 December. This German group plans to run two stations 24/7.

In addition, there are several DXpeditions that start in November but which should still be on the air when this issue of *PW* becomes available: TX7L, 4W8X, H44WA, XW4DX, VK9XGM and 9L5M (see last month's *HF Highlights*).

Readers' news

First in this month was **Jim Bovill PA3FDR** who wrote: *"Well, this month got off to a good start with my first QSO with PJ4DX on the 8th... Japanese operators have once again topped my monthly DX contacts, followed closely by the USA. Indeed, soon after my QSO with you I had an exceptional run of 15 consecutive QSOs with Japan in the space*

2

3


4

5

Fig. 1: Tristan da Cunha, as seen from the International Space Station (photo: NASA / Wikipedia). Fig. 2: The clock tower in the centre of Apia, capital of Samoa. Fig. 3: W8S Swains Island operator Johannes PA5X (right) with Steve PJ4DX during Johannes's visit to Bonaire in December 2020. Fig. 4: Simon G4WQG operating as ZB2BU from the Rock. Fig. 5: The 280 FT8 QSOs made by ZG2GI across five bands. Fig. 6: 2E0HPI/P operating location on Roseberry Topping, North Yorkshire at 1030ft ASL. The antenna is a 'Slidewinder' vertical. Fig. 7: The Hustler 4BTV antenna on Martin VK4CG, with Comet ground plane kit attached. Fig. 8: OS8D/P activating another Belgian castle on 21 September.

of just 20 minutes. As like most in our hobby I am always on the look-out for new or rare DX entities and this month again I managed a few new ones, Liberia (EL2BG), Barbados (8P6ET) and the ITU HQ in Geneva (4U1ITU). Also managed contacts for only the second time in many years with Kyrgyzstan (EX8BT) and Reunion Island (FR4OS). Although contacts in the 10m and 12m bands with non-European stations have been scarce recently they have picked up somewhat this month in both these bands as can be seen in my [Band highlights] report."

As usual, **Kev Hewitt ZB2GI** operated from his home and the Gibraltar ARS club station but this month he also operated portable from the Rock with visitor **Simon Harris G4WQG, Fig. 4**. Kev reported: *"National Day celebrations returned to the Rock following a four-year break due to Covid and the death of Queen Elizabeth II in 2022... National Day is celebrated annually on 10 September: the day commemorates the referendum of 1967, in which the citizens of Gibraltar voted to remain under British sovereignty. I operated as ZG2GI to commemorate the 56th anniversary of the referendum."* ZG is the special prefix for National Day and is valid from 5 to 10 September. Kev sent images of the Gibraltar and British flags on display around the Rock using SSTV on 14MHz and made a total of 280 QSOs with the special call, **Fig. 5** (including one with PJ4DX on 28MHz!).

Carl Mason GW0VSW has had a little more time recently to give FT8 a try, using 5W from a Yaesu FT-857 to his indoor 'Crown' wire loop antenna and a G5RV. *"Conditions may have improved a bit but working QRP is a bit of a struggle against so many high power stations. Why any need to use more than 100W is beyond me!"* Carl commented. Regarding the stations worked, some of which are shown in the 'Band highlights' below, Carl said he was *"Quite pleased, considering the antenna. It only cost a few pounds to make but has worked its fair share of DX over the years."*

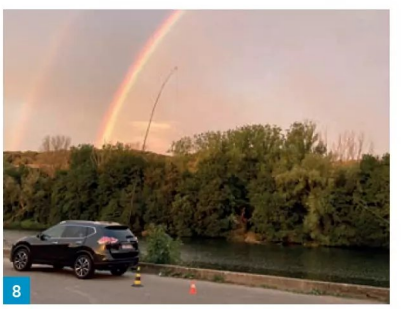
Owen Williams G0PHY wrote: *"The second day of the Worked All Europe contest produced contacts with TI, VK, FY and JA on 14MHz and JA and V3 on 21MHz. There were also contacts with Eastern USA on 28MHz. The Czech DXpedition to Uganda gave me two new band slots and the month finished with the Oceania SSB contest with ten VK QSOs but disappointingly only one ZL. 5W0LM has been audible once on 14MHz... This morning... I turned the rig on and tuned to 14.181 at about 9.00am BST. I was delighted to hear W8S* [Swains Island – ***Ed***] *saying he was listening on 14.225. I switched on the amplifier and... called using 400 watts. After he'd worked a UA station he came back to me with my correct call."* Owen sent a P.S. to say that he was pleased to see that the W8S QSO appeared in their online log the next day!

Tim Kirby GW4VXE operating as **GW4MM** doesn't normally use RTTY much but, during the CQWW RTTY contest at the end of September, he used the RTTY features on his FTdx10 to make a few QSOs

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


6


7


8

on 15m. It made a nice change with the highlights being 3V8SS, ZP9MCE, V31MA, JR4OZR, VE5CPU, NP4Z, PV2K and A44A. Tim felt that the conditions over the month on the higher bands have been generally good with the occasional poor day caused by solar disturbances.

Carl Gorse 2E0HPI has been really busy when out portable, **Fig. 6**. He reports that he made 3483 QSOs in September and 1213 *"so far"* in October (by the 8th). One of his highlights was working KW2FLY/AM flying a United Airlines Boeing 777-300 across the Atlantic to Houston. Carl added *"I am also looking forward to the CQWW SSB contest, trying to get some new DXCCs; currently on 129."*

Martin Burch VK4CG wrote about the improvements he has been making to his antenna, a Hustler 4BTV vertical, **Fig. 7**. *"When it first was put into place I was using RG-58U, about 25 metres, and no ground plane."* He replaced the feeder with better quality F5DFB/CMT300 cable, good quality PL-259 plugs and *"I have also installed the Comet CGW-560 ground plane kit."* Martin says these improvements have increased his transmitted signal by about two S-points. A longer-term plan is to fabricate a radial plate and run radial wires under the lawn. Martin concludes by saying *"If you have a clear area to plant it (plenty here!)... or, in cases like myself, time strapped, then this HF antenna deserves consideration."*

Etienne Vrebos OS8D continues to be busy activating Belgian castles and fortresses, **Fig. 8**, and has reached a total of almost 200 in nine months. *"But I still have time to work some DX at home too, nothing special except that I worked my first US castle as a chaser."* Taking advantage of the unseasonably warm weather, Etienne has been out and about on his motorbike but *"Whenever I can I'm looking for a nice place to put the antenna and car in the neighbourhood of a castle."*

Band highlights

Jim PA3FDR: 10MHz FT8: 4L8A, 4U1ITU, TA2EE, VK5PO, YB1LIN. **14MHz FT4:** 7K1CPT, A71AE, JR1BLX, K7ZV, VK3AFW, VU2WJ, VU3FGJ, XE1YD. **14MHz FT8:** 9M66MB, BD4UJ, BG3GFI, BG7XVX, JF1LMB, UN7EG, VK6AS, YE1GXQ. **18MHz FT4:** 7K4DHB, FR4OS, HK3W, JA6BCV, K0TT, UN7LEW, YB2BNN. **18MHz FT8:** 5Z4VJ, 7Q7EMH, 9H1KR, A61MW, BG7SAY, CO7FR, JK1SQI, LU8EKC, RU0LL, UN7EG, W7ZR, YB1OVY. **21MHz FT4:** 3C3CA, 4E1FKB, 8P6ET, 9K2NO, HS0ACS, JA3FQO, JH2KVP, JR1EYT, N9AKR, PY2SRL, PY5EJ, PZ5RA, YF1BFG. **21MHz FT8:** 4L7O, BG0CAB, BG7YID, EX8BT, HS0ZGV, JA1UQA, JA2FJP, KP2B, LU4DRH, NK7I, PY2TTN, UA0QQE, VK3AUX. **24MHz FT4:** NE8Z. **24MHz FT8:** CX1VH, EL2BG, HL2IFR, JA4OK, K9NR, LU2CHP, LU5DMP, PJ4DX, PP5TG, PY8WW, ZV201ID. **28MHz FT4:** HI8S, LW6EQG, N9AAA, VE2WAT, ZS4JAN. **28MHz FT8:** 7Z1OO, BH6LIG, JT1BV, UA0SR.

Kev ZB2GI: 14MHz SSB: KC8RMR. **21MHz SSB:** EA8XNX, K1RX. **21MHz FT8:** KK7BSQ, VE7DX. **24MHz FT8:** K6RLQ, N7GRB, VA3QK. **28MHz FT8:** JH4JNG, N7ML, VE1ZA/9.

Kev operating as ZG2GI: 14MHz SSB: KA2NVF, NP3HF/M, PY2EX. **14MHz FT8:** 4L4DX, KF0IAP, VK2AUA, VK3BAC, VK7MHZ. **18MHz FT8:** 9V1SA, JA4FSH, JE1CSW, JE2EHP, KW4YA, VK2ALS, VK2YZ, VK3DWS, VK6ABC, ZL1GMW, ZL3TE. **21MHz SSB:** AA5NT, CX7SS, NP2X, PR1T, PT2TD, PT5J, VE2HIT, YV6BXN. **21MHz FT8:** 9K2YD, BA5CJ, JR1FYS, PP5DZ, PU2PGQ, VE2LBI, WY6Y. **24MHz FT8:** CO3WR, CO8NMN, KF0X, PU2OZU, PU4MRA, PY5HOT, VE3EJ, W7DO. **28MHz FT8:** CA3TSK, CA4CUT, HJ6AZV, K7BV, KP4OMR, LU1EFX, PJ4DX, PP1GS, PT2DAC, ZS1A, ZW2RA.

Kev ZB2GI and Simon G4WQG, operating as ZB2BU: 14MHz SSB: S01A, WW4DX.

Carl GW0VSW: 3.5MHz FT8: HF4112P, YR2023SIMPO. **5MHz FT8:** CN8DN, J88IH, K8QKY, VE1YX. **7MHz FT8:** 9Y4DG. **10MHz FT8:** A61QQ, W3SCB. **14MHz FT8:** 3A2MW, OD5ZZ. **18MHz FT8:** 5Z4VJ, 7X2TT, WW1WW. **21MHz FT8:** 7X2KF. **24MHz FT8:** 6W/IV3FSG, 7Q7EMH, PP5TG. **28MHz FT8:** CT3MD, CU3HN, PU5CVB, TC29EKIM.

Owen G0PHY: 14MHz SSB: 4L2M, 5X3K, TI1E, FY5KE, JE6RPM, OX3LX, VK2YI, VK7C, VK5PAS, VL4U, W8S, ZL2UO. **18MHz SSB:** 5X3K. **21MHz SSB:** 5X3K, JA7NVF, V3O. **28MHz SSB:** NE1C.

Tim GW4MM: 14MHz CW: CX3SR, VK2GR, XQ6CF. **21MHz CW:** CO8NMN, LW5HR, OA1F, ZA1RR. **28MHz CW:** 9N7AA, BY3GA, CX5FK, KP4TF, LW9EKA, S01WS, TZ4AM, V26K, XQ3OP, ZF2MJ.

Carl 2E0HPI/P: 14MHz SSB: PY6FP. **18MHz SSB:** AL7KC, VK3QI. **21MHz SSB:** A62A, A65PX, HI8D, JY5MM, K1NF, VE9WH, VK3EH. **28MHz SSB:** CE3GKU, N2BTD.

Martin VK4CG: 7MHz SSB: NR7RY, OH7WP. **14MHz SSB:** 6M23VGC, G1IBS, HA3NU, HL5KY, JR2EWP, LX2JJ, SP8K, W3PAW. **21MHz SSB:** 7B9K, 9M2M, BD4QA, CT1BWW, F5SIH, G6ZZ, JA7NVF, M0ZNK, OH6RM, RT0F, YB9SS, YF8DJ. **28MHz SSB:** 7L4LKK, A44A, KH6PE, JA5EWQ, JM7SKE, N6OKU, ON4LAN, R0CDO, VU2XO.

Etienne OS8D: 18MHz SSB: 5X3K, OX0J, VI7ALARA. **21MHz SSB**: 5X3K, 9Q2WX, BH4AAD, BI4VIP, HL4SF, JA2ULV, JE6RPM, UN6LN, YC1FBG. **24MHz SSB:** 5X3K, YB2MVD. **28MHz SSB:** 5X3K, AZ1D (Argentina), CX3AT, CX8DS, FY5KE, HC1JQ, LU1DX, PJ4DX, PZ5RA, UK8OM, V3O.

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 February issue the deadline is 11 December. 73, Steve PJ4DX. **PW**

Colin Redwood G6MXL
practicalwireless@warnersgroup.co.uk


1

Lighthouses on the Air

Colin Redwood G6MXL looks at a range of awards schemes and operating periods linked to lighthouses and other aids to marine navigation.

Over the years I have covered a number of award schemes, including Worked All Britain (WAB), Summits on the Air (SOTA), HUMPS/HEMA, World-wide Fauna and Flora (WWFF), Parks on the Air (POTA) and Castles on the Air (COTA). This month I am looking at several award schemes based around lighthouses.

Several schemes?

As with many of award schemes based on 'things' on the air, there is more than one award scheme plus a couple of lighthouse weekends! They each have their own characteristics, with their own definitions of lighthouses and quite different numbers of lighthouses, **Table 1**. For the purposes of this article, I will use the term 'lighthouse' to cover whatever is in scope of the various award schemes, some of which include lightships, for example.

World Lighthouse on the Air

World Lighthouse on the Air (WLOTA) claims to be the oldest of the lighthouse award schemes. WLOTA (previously known as WLH-Award) was created in 1997 by four French amateurs. In 2005, the name was changed to become today's WLOTA. Its aim is to establish radio links with and from the lighthouses in the sea, or on rocks or islands. For a lighthouse to be considered for inclusion in WLOTA, it must be located on an island and have a minimum beam distance of 10 nautical miles. Activation of more remote islands require prior authorisation by the WLOTA committee. Confirmation of contacts by QSL cards is required for the WLOTA awards. While parts of its website are in French, most is now in English. Membership, by means of a donation via Paypal, entitles those who join to obtains awards that they qualify for a year with no further charge:

www.wlota.com

My impression is that WLOTA is aimed at the more ambitious activator (it includes Rockall for example) and realistically its requirements for activators are beyond the capabilities of all but the hardiest amateurs unless they are prepared to go to sea to visit offshore lighthouses. Lighthouses qualifying for the WLOTA scheme are given a unique four-digit reference. The WLOTA latest directory of lighthouses is over four years old (dated 2019) and contains 3517 lighthouses worldwide. It appears to be incomplete in respect of the lists for the British Isles.

Amateur Radio Lighthouse Society

The Amateur Radio Lighthouse Society (ARLHS) has much more realistic requirements for its activators than WLOTA. Membership costs US$15 per annum. Looking through the membership list, I noted a few UK callsigns among a predominantly US membership. Perhaps the most useful aspect of the website is the list of lighthouses that qualify for its awards. Unlike the WLOTA scheme, there are plenty of lighthouses listed on the ARLHS website (see **Table 1** for the British Isles). The search facilities are particularly good. Being able to search by large locator (grid) square (e.g. IO80) is particularly useful if you are planning to visit an unfamiliar area or you are unsure of the name of a lighthouse, **Fig. 2**.

https://arlhs.com

English Lighthouse Castle Awards

Associated with the ARLHS scheme, there are the English Lighthouse Awards (ELA):

https://englishlighthouseawards.uk

Only QSOs from 1 May 2021 and later count for the ELA. The ELA scheme is run by **Bob Saunders M0MJA**, the English Lighthouse Awards founder and awards creator/manager. He also looks after the English Castles on the Air (ECA) reference list and is also the World Castles Awards Coordinator for England. As far as I am aware, there aren't separate lighthouse award schemes for other parts of the British Isles, so if you want to activate or chase lighthouses situated in Scotland or Wales, for example, then you are limited to either the WLOTA or ARLHS award schemes.

The ELA scheme has its own Facebook Group, which it shares with the English Castles Awards. I'd certainly recommend joining this group and using it to publicise forthcoming activations:

www.facebook.com/groups/769396154323594

Activators and hunters

In common with several other awards schemes, both the ARLHS and ELA schemes distinguish between activators and hunters. Activators are amateurs who operate from within 1km of a lighthouse. The 1km rule is quite convenient in several respects. It means that you don't need to take your station up to the lighthouse premises itself, which may not permit entry by the general

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

Fig. 1: Anvil Point Lighthouse in Dorset is not listed on the WLOTA list and is ARLHS Reference ENG 001. Fig. 2: Trwyn Du / Puffin Island / Penmon Point lighthouse on Anglesey, North Wales is WLOTA 0555, ALRHS WAL 031. Fig. 3: Lindsay Divall 2E0VDD operating near the Needles Point lighthouse on the Isle of Wight, is WLOTA 0464, ARLHS ENG 083. Photo curtesy of Helen Moore. Fig. 4: South Stack / Ynys Lawd lighthouse Holyhead, Anglesey, North Wales is WLOTA 025, ARLHS WAL 025.

public or be inaccessible due to tides etc. You might be able to operate from the comfort of your car in an adjacent car park or a nearby bench for example. Exceptionally the ARLHS scheme permits operation beyond the 1km limit in situations where the 1km limit is not physically possible, is dangerous or prohibited. In this case the operation should take place as close as physically possible while at the same time ensuring safe operation and abidance with all laws. As with other award schemes, activators are expected to act responsibly and not cause harm to the lighthouses or disturb visitors and not trespass etc.

Hunters are those amateurs who make contact with activators. Hunters for both award schemes may operate from wherever they choose worldwide, including from the comfort of their home shacks or elsewhere.

Activation Rules

For an activation to count for ELA and ARLHS, you must make at least 25 QSOs from within a 1km radius of a lighthouse. The QSOs may be spread over a number of operating sessions over any period of time you choose, but duplicate slots (same callsign worked on the same band and same mode) don't count. Many lighthouses are located within 1km of a second lighthouse, so with careful planning, you may be able to activate more than one lighthouse simultaneously.

It is also worth noting that many lighthouses are located within areas of Outstanding Natural Beauty and National Parks, so activating a lighthouse may also count towards World Wide Flora and Fauna (WWFF) and Parks on the Air (POTA) award schemes. In addition, activations will also count towards Worked All Britain (WAB) awards.

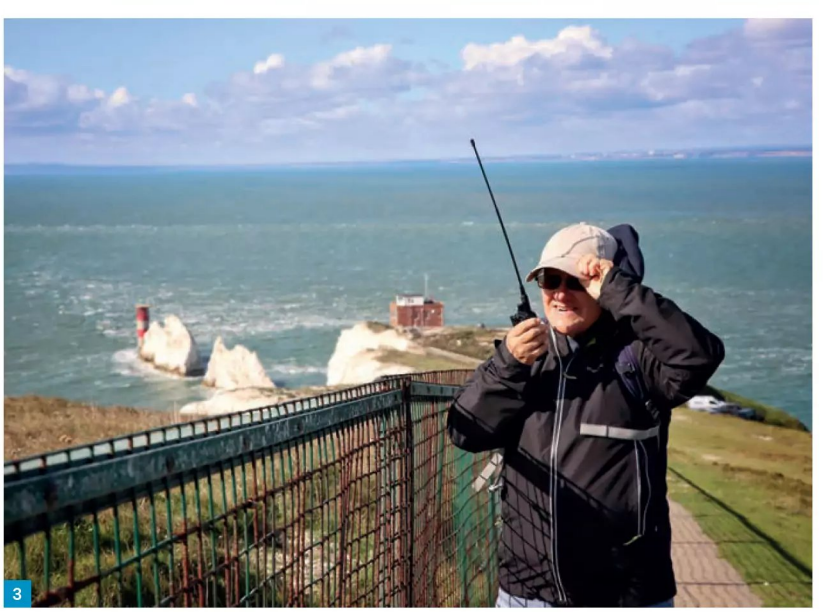
Activator logs

Only activators need to upload their logs. Activators can have their logs uploaded to a central database, and hunters can see their contacts listed. Logs for ECA should be submitted in .adi format by email, including the relevant lighthouse reference(s) in the email header to

logs@englishlighthouseawards.uk

Full details can be found on the ECA website.

2


3

DXCC ENTITY	ARLHS		WLOTA		ILLW	
	Reference Format	Number of Lighhouses	Format	Number of Lighthouses	Format	Number of Lighthouses
England	ENG nnn	301	nnnn	17	UKnnnn	100
Gurnesey	GUE nnn	16	nnnn	6	GGnnnn	1
Ireland	IRE nnn	128	nnnn	37	IEnnnn	30
Isle of Man	IOM nnn	29	nnnn	3	IMnnnn	1
Jersey	JER nnn	15	nnnn	2	JEnnnn	1
Northern Ireland	NTI nnn	33	nnnn	7	UKnnnn	9
Scotland	SCO nnn	320	nnnn	59	UKnnnn	143
Wales	WAL nnn	50	nnnn	16	UKnnnn	16

Table 1: Comparison of the number of lighthouses in the British Isles for each of the schemes.

Frequencies

While it is possible to use any bands, modes and frequencies which you are licensed to use for ARLHS and ELA contacts, I'd suggest that the 80m and 40m bands are a good choice with perhaps 2m for some local contacts, **Fig. 3**.

Claiming awards

Both ARLHS and ELA offer a range of awards for activators and chasers. The ARLHS offers an award for activating 25 lighthouses, each with a minimum of 25 QSOs, while the ELA requires just ten activations each of at least 25 QSOs. For chasers the ELA awards, you'll need to be in the log of a minimum of ten English Lighthouse Award activations starting from 1 May 2021. There is a very basic web-based enquiry to see progress towards the ELA awards.

ARLHS requires that you possess QSL or eQSL cards, but scanned images of them is acceptable.

Historic lighthouses

For certain 'historic' lighthouses where structures or remnants of the lighthouse no longer exist, as specifically marked on the official ELA reference map, the 1km rule does not apply. Operation must take place from the site where the 'historic' lighthouse once stood or be immediately adjacent to it. For historic lighthouses where structures still exist, the usual 1km rule applies.

Safety

No matter which scheme you use for activations, you'll need to consider the safety aspects of your operations. Almost by definition, lighthouses are located close to often dangerous and exposed coastlines, **Fig. 4**. Please take sensible precautions by staying away from cliff edges and the base of cliffs, areas which might get covered by incoming tides preventing return to land, areas which could be submerged by abnormal waves, and be careful with areas covered in slippery seaweed.

International Lighthouse Lightship Weekend

The international lighthouse lightship weekend (ILLW) came into being in 1998 as the Scottish Northern Lights Award run by the Ayr Amateur Radio Group. The ILLW usually takes place on the third full weekend in August each year and attracts over 500 lighthouse entries located in over 40 countries. It is one of the most popular international amateur radio events in existence, probably because there are very few rules and it is not the usual contest type event. It is also free and there are no prizes for contacting large numbers of other stations. August has become 'Lighthouse Month' due largely to the popularity and growth of the ILLW.

https://illw.net

4

The Lighthouse Challenge

Another week-long operating period is organised by the ELA. This takes place in October each year. The most recent one took place between Saturday 21 October 2023 at 0000UTC and Friday 27 October 2023 at 2359UTC. The aim is to encourage activity from lighthouses towards the ELA scheme. In addition, there are special awards associated with the Lighthouse Challenge. Hunters are asked to pre-register if they wish to claim the hunter award associated with the Lighthouse Challenge.

Conclusions

While there are clearly differences in the definitions of what counts for each of the award schemes, I still find it amazing that there are such large discrepancies in the numbers of lighthouses identified by the various award schemes etc. Having said that, you could choose a lighthouse near to your home and operate from it to get a feel for the exposed location. **PW**

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

Morse keys

Roger Cooke G3LDI has more on procedural signals before moving on to the latest Bootcamp news.

Roger J Cooke G3LDI
roger@g3ldi.co.uk

It really is amazing how often old Morse keys seem to crop up. I was sent the pictures by a friend of mine **Pete G0FVG**. Apparently, this key was found when clearing out the possessions of somebody who had died. He was not a radio amateur, but this key was found in his shed. Pete would be interested if anybody could identify it or suggest where it came from. The pictures show several different views.

It is rather dirty after being stored in a shed, but it does look to be very unusual. According to the label, not totally legible, it originated in London. If anybody has any details, please email Pete direct: **peter.fvg@gmail.com**

Procedural signals again

Tony G4NBS sent the following: *"Changing modes to CW, I read your comments in* PW *and 100% agree. As I am not overly proficient I find cut numbers throw me, and omitting 599 can also catch me out! Worst case of cut numbers was working a German on UHF via Aircraft Scatter in a contest and I just received a sequence of letters that made absolutely no sense to me. Luckily he sent the full numbers when I asked for a repeat but could have lost the QSO as reflection time was short. BTW, I take it there is a typo in the article – I thought D would be 7?*

"Regarding lack of ID, especially in major contests. One can only assume the RBN/cluster is the reason? It seems those that are SO2R [single-operator, two radio] *are the worst culprits. I have often sat listening for ages to wait for an ID and noticed new callers make a QSO without ever hearing the call of what they have just 'worked' (also on SSB). Frustrating when operating unassisted.*

"I have long held the view that SO2R operators should be in a category of their own. This would help assuage the problem of sitting and waiting for a response while the SO2R op makes a QSO on 'his' second frequency. I think that would only be fair."

As to Tony's comment about cut numbers, yes, logically one would think that D would be 7 but no. I can assure you it is 8.

Cut numbers

Cut numbers are letters that are used in place of a number. You will most often hear them in a signal report. Instead of 599, 5NN is sent instead. The numbers 0 and 9 are frequently substituted with T and N respectively. Some of the cut numbers are uncommon, and using all of them is known as using full cut numbers.

Cut numbers can only be used when it is evident that a number should be received. You may frequently encounter cut numbers in serial numbers during a contest exchange. See **Table 1** for the letters that may stand in for a number.

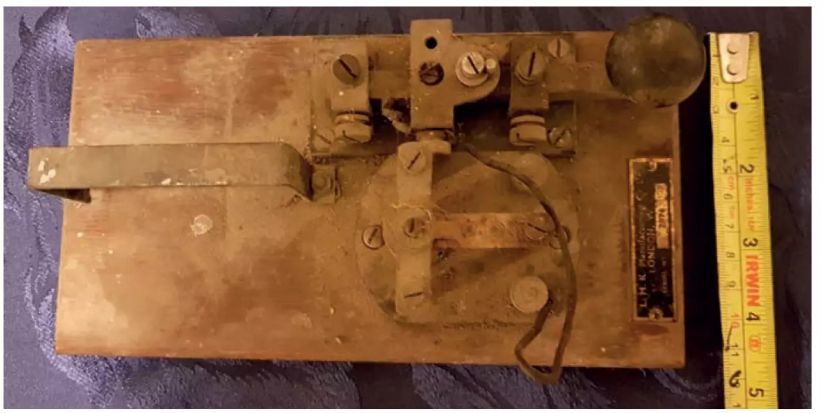
Most people never use the full range, just the obvious ones. It could get confusing and this is what does confuse the beginner trying to learn Morse.

I was correct in quoting **Gerald G3MCK**. I did receive a snail mail from him. Gerald states that when using CW always think of the other person. I quote this too in my teaching. It is so easy to be complacent when operating and assume that the other party is cognisant with every aspect of Morse Code, when this could be far from the truth. Consideration is the name of the game and this is lacking in a lot of cases. By the same token, never use a speed that YOU are not comfortable with because when attracting responses this could land you in trouble!

Gerald quotes his pet hate of when calling CQ somebody drops just a callsign on the frequency. Not quite the etiquette a response should be. Use a standard 1x2 response at least.

Ian G4ELW has one student who can head copy competently at around 15wpm. He has been encouraged to practise by having some QSOs on air (he likes QRP) and on more than one occasion has been called by a station at 20wpm or more who refuses to slow down even when requested. He can't copy at this speed and comes away from the QSO with his confidence in tatters!

This serves to show a lack of consideration as mentioned above. I would ignore the other person, QSY and call CQ again. A good operator will respond to a QRS request every time.



Bootcamps

Here in Norfolk we are taking a break from running a Bootcamp this autumn. We have a few medical problems that tutors are coping with and we are leaving our usual Bootcamp until the spring. However, there is interest elsewhere.

Ian G4ELW lives in Somerset and is helping two or three local amateurs to learn CW (running some practice sessions etc). It's refreshing that CW seems to be enjoying a bit of a renaissance in interest in this part of the world.

"I am acutely aware of my own limitations as a tutor (and some of the bad habits that I have picked up over the years!).

"I have read about CW Bootcamps in RadCom *etc and I think that something like this could be of great benefit, but I have never heard of anything in this part of the country. I just wondered if you knew of anything happening from (say) Bath/ Bristol through to the Exeter areas?"*

Graham G4NMD also wishes to run a Bootcamp: *"I would like to organise a weekend bootcamp for the SEMARC club (G8KVU on **QRZ.com**) both as a benefit to the club and as a wake-up call to me."*

The interest in Bootcamps seems to be increasing! I advised the above about the article in *RadCom*. **Andy G0IBN** from the Essex CW Club has a village hall where he can cope with a large number of people.

A good general piece of advice from Andy: *"Your CW Boot Camp can be as big or small as you wish – either a couple of clubs get together or advertise across your region! See* RadCom *June 2020, page 46,* Organising a CW Boot Camp.

"Below is a general guide which I hope you will find of interest.

"Firstly, find a date which looks clear, Christmas and Summer holidays are not a good idea, January it could be snowing!

"Once you have decided a date:

"Send date etc to RADCOM EVENTS.

"Send the date to all the clubs which are in your area see RadCom events page.

"Decide whether there is going to be a charge. This can be a minimal amount of £10 to cover the cost of the event, tea coffee, postage of the box to the next event. Collect any monies before the event, you will then know how many to expect. Display signs to the event for those who do not know the area.

"We suggest that the tables should be in a round configuration rather than a long configuration, with the instructor seated in the middle.

"Before the event inform attendees that they should ensure their keys and headphones are configured correctly. Instructions are given in the folder in the box.

"If possible, set the tables in separate rooms or well separated.

"Attendees cards should be displayed on each table with their callsigns.

"If you are not going to provide food, remind attendees to bring their own lunch – tea and coffee should be provided.

Replacements

0	T
1	A
2	U
3	V
4	4
5	E
6	6
7	B
8	D
9	N

Table: Cut numbers – numbers and their letter replacements

"Perhaps have a working station to demonstrate.

"Overhead projector for anyone giving a talk.

"On arrival distribute an attendance certificate, if you have one, and the information notes provided or make your own details of interest.

"Above is just a short guide, once you have made the decision we will send you all the equipment needed, headphone amplifiers and keying units plus a folder of additional information.

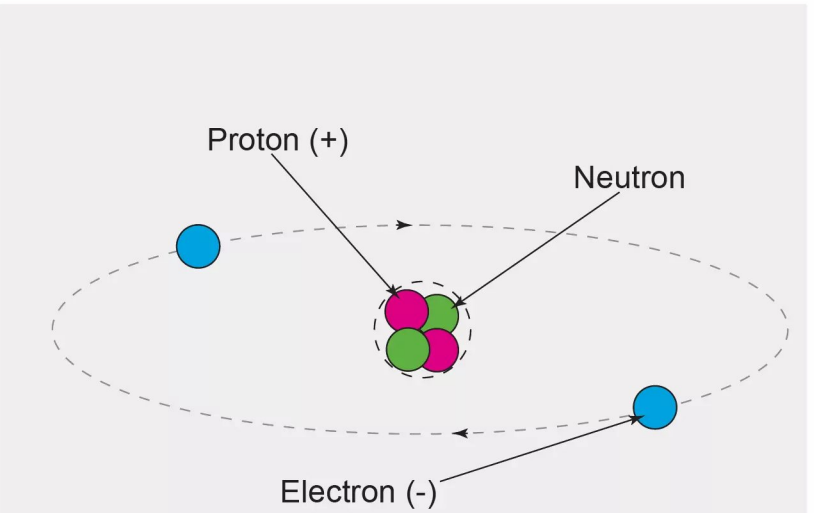
"Any questions then please contact by email G0IBN or Essex CW."

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

roger@g3ldi.co.uk

73 and may the Morse be with you! Roger G3LDI. **PW**

Chris Murphy M0HLS
practicalwireless@warnersgroup.co.uk



1

Capacitors (Part I)

Jeff and Natalie start a discussion about the theory and practice behind capacitors.

It was early morning when Natalie arrived at the lab. Jeff as usual was already there with a cup of tea while he browsed his latest copy of *Practical Wireless*. *"Morning Jeff"*, Natalie said as she walked to her desk. *"Morning Natalie, good day at college?"* Jeff replied. *"Yes"*, Natalie went on. *"We covered capacitors". "OK"*, Jeff mused, *"So I suppose we'll be spending lunchtime talking about them". "Yes please"*, Natalie replied, *"Archie says that he is going to spend a couple of weeks talking about passive components that work differently for alternating current than they do for direct current".*

Lunchtime arrived and after they'd consumed their lunches, Natalie wandered over to Jeff's desk. *"Right, let's talk capacitors shall we"*, said Jeff. *"Actually, there is quite a lot to talk about with capacitors and we'd be here all day. So, since we've got less than an hour, we'll just have a quick cantor through capacitor basics, how they work and some of the more well-known parameters. We'll have a look at the different types of capacitors later." "OK. Fine"*, said Natalie.

"A capacitor is basically a passive component that has the ability to store energy in the form of an electrical field. The ability to store this charge is called, as you might have guessed capacitance, and is measured in Farads." OK", said Natalie, *"but we usually use microfarads and that don't we?" "Correct"*, said Jeff. *"Capacitors are available in a wide range of types and values of capacitance. Capacitors with values of several Farads are available but, as you say, we usually use capacitors with much smaller values such as microfarads, nanofarads, and picofarads".* Jeff wrote down the list:

$1\mu F = 1.0 \times 10^{-6} F$
$1nF = 1.0 \times 10^{-9} F$
$1pF = 1.0 \times 10^{-12} F$

"Anyway, before we talk about capacitors, let's have a bit of physics revision about electric fields as they're fundamental to understanding how a capacitor works". "OK, fine", said Natalie. *"As you know an atom consists of a nucleus that contains neutrons and protons and has a positive charge. The nucleus is surrounded by a cloud of electrons, which are arranged in shells in orbit around the nucleus and negatively charged* (**Fig. 1**). *If you remember experiments with magnets at school, you will remember that if you try to push two like poles of a magnet, two North poles say, together they will repel each other whereas a North and South pole will attract each other. A magnet will also produce a magnetic field between the two poles". "Yes, remember that"*, Said Natalie.

"OK, well in a similar manner, an electrically charged body will produce an electric field, denoted by the letter E, around it in which protons will repel other protons but attract electrons. Let's draw diagrams to show the electric field between a proton and a neutron, and that of two like charges, let's say electrons." (**Fig. 2**). *"Yes, got that". "Now"*, said Jeff, *"Let's look at what happens if we have two plates of metal and we connect a battery across them like this* (**Fig. 3**). *As you can see an electric field will be set up between the two plates. We'll have a look at the mechanics behind this shortly."*

"Mmm", Natalie mused, *"How do we know how much of an electric field there is?" "Well, the amount of electric field as you put it is called the Electric Field Strength, which we denote by the letter E, and is found by dividing the applied voltage by the distance between the plates in metres. It has the unit of Volts per metre, V/m"*:

$E = V/d \; V/m$

"Can we do an example", Natalie asked. *"OK"*, said Jeff. *"Let's say that we have two metal plates five millimetres apart and we apply a voltage of five hundred volts across them"*:

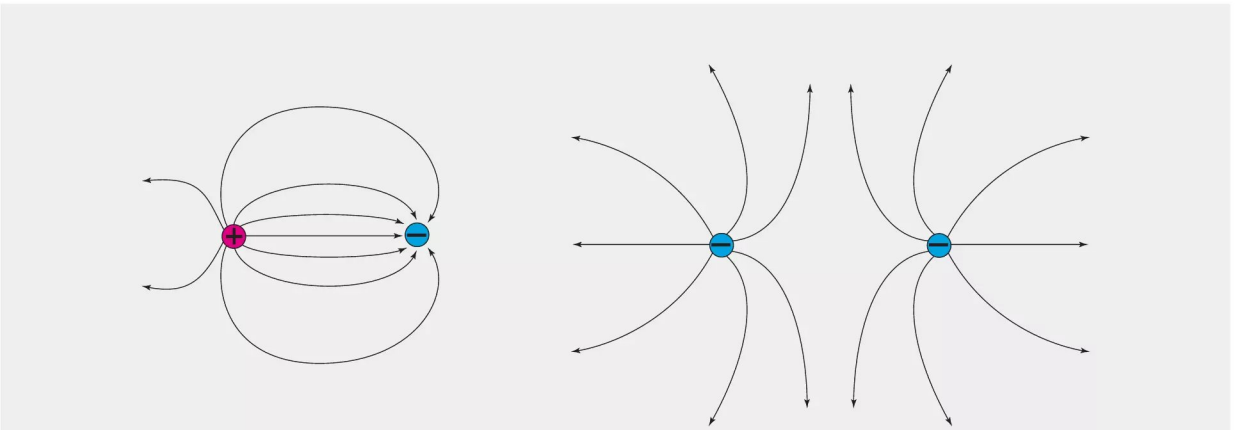
$E = V/d \; E = 500/ 5 \times 10^{-3} \; E = 100{,}000 V/m \; E = 100 kV/m$

"Anyway", said Jeff, *"We'll return to this when we look at some of the characteristics of capacitors. So let's start by looking at what a capacitor is".*

"Let's consider a capacitor in what is probably its simplest form, which is two metallic plates separated by a thin layer of air". Jeff sketched the arrangement (**Fig. 4**). *"See how the basic arrangement resembles the symbol that we use for capacitors in circuit diagrams? The material between the plates, as we'll see later, doesn't have to be air and is called the dielectric"*, Jeff explained. *"Yes, got that"*, said Natalie, *"but how do we know what the capacitance is?" "The capacitance of this simple capacitor is determined by three things"*, Jeff explained. *"Firstly, there is the surface area of the metallic plates, second the distance between them, and third by what we call the permittivity of free space, which we represent by the Greek letter Epsilon with the subscript 'o' and has a value of eight point eight five four times ten to the power minus twelve and is measured in Farads per metre."*

$\varepsilon_0 = 8.854 \times 10^{-12} F/m$

"Yes, we've covered that in engineering science with Arthur", said Natalie. *"So"*, Jeff continued, *"To find the capacitance, we multiply the permittivity of free space by the area of the plates and then divide by the distance between them. The area and distance have to be stated*



2

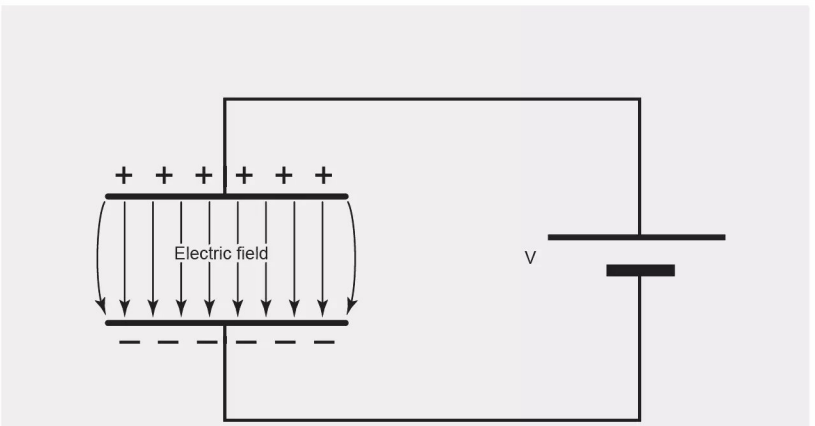
Fig. 1: Make up of an atom.
Fig. 2: Fields between unlike and like poles.
Fig. 3: Field resulting from connecting a battery.
Fig. 4: Basic configuration of a capacitor.
Fig. 5: Adding more plates to increase capacitance. Fig. 6: Every capacitor will have some resistance and inductance.

in metres by the way. Let's do an example. Let's find the capacitance of a capacitor that consists of two plates with a surface area of thirty centimetres squared and are separated by nought point two millimetres":

$$C = \varepsilon_0 A/d$$
$$C = 8.854 \times 10^{-12} \times 0.003 / 0.0002$$
$$C = 1.33 \times 10^{-9}\ F = 133pF$$

"OK", said Natalie. *"But you're talking about a capacitor that is made up of metal plates separated by air. I don't think that I've ever seen a capacitor like that". "Well"*, Jeff replied, *"They're not all that common these days but in the old days most of the variable capacitors that were used for tuning in radios were based around metal plates separated by air. Well-known manufacturers were Jackson brothers. These variable capacitors had two sets of metal plates. One set was fixed but the other set could be rotated in and out in relation to the fixed set. Doing this varied the surface area between the two sets of plates and hence the capacitance. You can still get such variable capacitors at radio rallies and so on but most variable capacitors these days – often called trimmers – use some form of plastic as the dielectric".*

"OK", said Natalie, *"But what about capacitors that do have a different dielectric than air". "Well as you obviously realise, most capacitors do have a dielectric other than air – usually of a solid material such as paper, and polymer materials such as polystyrene or polyester.*



3

Some very large capacitors use oil as the dielectric." "Yes", said Natalie, *"I've seen catalogues with those types of capacitors in them".*

"Ok", Jeff went on, *"For these capacitors we have to introduce a further term in our formula for calculating the capacitance known as relative permittivity. The permittivity of a vacuum or dry air, which we've used so far, is given a value of one so we can use this as a reference value. Relative permittivity is a measure of the permittivity of a material relative to the permittivity of a vacuum or dry air. I'll write typical values for some common materials down for you shortly. So, we multiply the top line of our formula by the relative permittivity and the formula becomes":*

$$C = \varepsilon_0 \varepsilon_R A/d$$

"If you're planning to do a lot of calculations using the same dielectric, it's worth lumping the permittivity's together. We use the letter 'K' to represent this".

$$K = \varepsilon_0 \varepsilon_R$$
$$C = KA/d$$

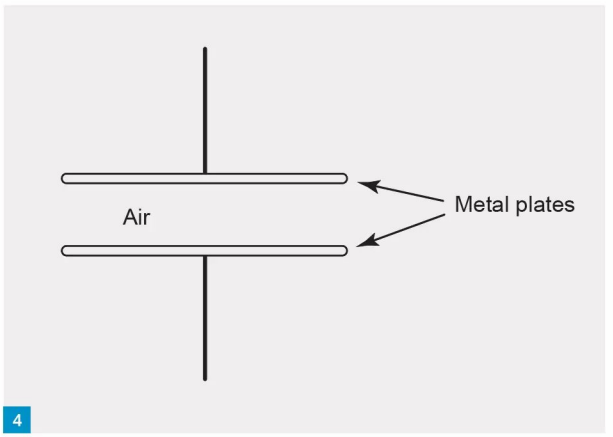
"So, if we have a capacitor where the area of the plates is fifty square centimetres, the distance between them is 0.1 millimetre and the dielectric has a relative permittivity of four, the capacitance will be":

$$C = 8.854 \times 10^{-12} \times 4 \times 5 \times 10^{-3} / 1.0 \times 10^{-4} = 1.77nF$$

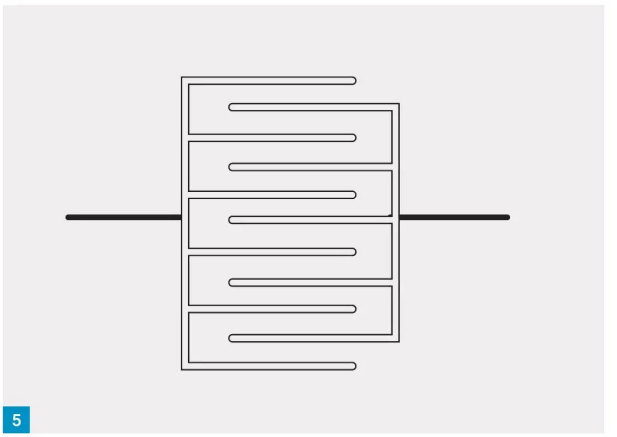
"Does the type of dielectric affect what values of capacitor are available for that type of dielectric?"

"I suspected that you'd ask this so I made a list of various kinds of capacitors from the website of a well-known component supplier during my morning break along with typical ranges of values and working voltages. I'll show you when we've discussed a few other things."

"So", said Natalie, *"There are three things that the capacitance depends upon – the area of the plates, the distance between them and the*



4



5

type of dielectric. So, if we increase the surface area of the plates we increase the capacitance, but what happens if we increase the distance between them?" "The opposite," said Jeff. *"If we keep the surface area the same and let's, say, double the distance between them, what we're effectively doing is putting two capacitors of equal value in series, which from the formula for capacitors in series will give us a capacitance of half the value of each of the capacitors. Let's say we have a capacitor of ten nanofarads, and we double the distance between the plates then we'd end up with a five nanofarad capacitor"*:

$$1/C_T = 1/10 + 1/10 = 5nF$$

"Ok, I see", said Natalie, *"But a capacitor like what we've talked about doesn't sound very practical and if we want to increase the capacitance, we have to make the plates bigger, which seems even less practical"*.

"No, it isn't very practical", Jeff agreed. *"But if both the plates and the dielectric are thin and flexible, they can be rolled into a tube shape to make the physical size smaller. And making the plates bigger isn't the only way of increasing the capacitance". "Oh"*, said Natalie, *"How else can the capacitance be increased?" "Add more plates"*, Jeff explained, *"Like this"*. Jeff drew another diagram, **Fig 5**.

"How do we find the capacitance of a multiplate capacitor like that", Natalie asked. *"Quite easily"*, Jeff replied, *"All we need to do is to multiply the top line of our formula for calculating capacitance by the number of plates minus one. Let's do an example. Let's say that we have a capacitor made up of eight plates each having an area of thirty square centimetres separated by a dielectric that is nought point one millimetres thick and with a relative permittivity of three"*:

$$C = \varepsilon_0\varepsilon_R A\,(n-1)/d$$
$$C = 8.854 \times 10^{-12} \times 3 \times 0.003 \times 7 / 0.0001$$
$$C = 5.58nF$$

"Anyway, let's have a look at some of the parameters or properties that capacitors possess."

"The first one is the nominal capacitance, and it is this that most people use as the starting point when selecting a capacitor for a particular application. As we've already said the nominal capacitance is usually stated in picofarads, nanofarads, or microfarads."

"I've seen something called working voltage mentioned", said Natalie, *"What's that?" "The working voltage of a capacitor"*, Jeff explained, *"Is the maximum voltage that can be applied to a capacitor without damaging it. The working voltage for a capacitor may be stated as being Volts DC or Volts AC. If the AC voltage is stated, this will be the root mean square, r.m.s value and the peak value will be 1.414 times the r.m.s. value. Bear in mind that in power supply circuits that usually use large electrolytic capacitors for smoothing, the ripple voltages may be quite significant, especially at high currents, which will be superimposed on the nominal direct voltage, and we need to be careful that these don't exceed the working voltage of the capacitor. It's best to apply a reasonable margin of safety so if the nominal voltage is, say, fifty volts then select a capacitor with a working voltage of about one hundred volts or more"*.

"Ok", said Natalie, *"What happens if the maximum voltage is exceeded?"*

"The damage usually occurs when the voltage is so high that it breaks down the dielectric and then a short circuit can occur which brings us to something called dielectric strength". "Yes, we've talked about dielectric strength in engineering science with Arthur", Natalie recalled.

"The dielectric strength of a material is basically the highest voltage that can be applied to it before it breaks down and loses its insulating properties. We quote the dielectric strength in volts per metre or because most insulating materials can withstand very high voltages, mega volts per metre. I'll write some typical values for some common materials down for you along with their relative permittivitys", **Table 1**.

"These figures, however, are for pure materials and in practice maybe somewhat lower". "What can affect them", asked Natalie. *"A number of things"*, Jeff explained, *"Like whether the applied voltage is direct or alternating, impurities in the material, temperature. And don't forget that these figures are for a piece of material one metre thick and obviously the dielectric in most capacitors is much thinner than one metre". "OK"*, said Natalie, *"So what we do to find the maximum voltage that we can apply is to multiply the dielectric strength by the thickness of the dielectric. Can we do an example?" "Of course"*, said Jeff, *"Let's say that we have two metal plates four millimetres apart separated by a dielectric with a dielectric strength of fifty thousand volts per metre. Then the maximum voltage we can apply is"*:

$$V_{max} = 50{,}000 \times 0.004 = 2000V$$

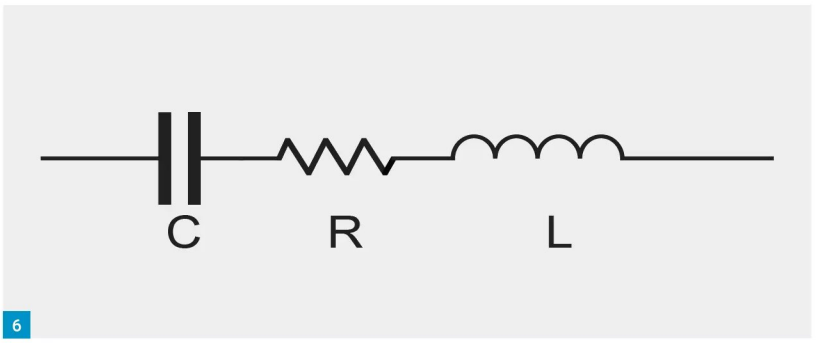
"In conjunction with the breakdown voltage, we should also consider Leakage Current. In a perfect capacitor, because the dielectric is an insulator no DC current can flow between the two plates. In practice, however, a very small current, usually in the order of nano amps, may flow and we call this Leakage Current. If the dielectric has been damaged the Leakage Current will increase and can lead to further damage to the capacitor and also possibly to other components to which it is connected".

"What else do we need to consider?" Natalie asked.

"Well", Jeff replied, *"Like most passive components, the nominal value will be subject to a tolerance. Tolerance is usually stated as a percentage above and below the nominal value. Plus and minus ten percent for example. For capacitors with very small capacitances, the tolerance may be stated as being plus and minus a few picofarads. Some capacitors can have very tight tolerances as low as one*

Material	εR	Dielectric Strength kV/m
Air	1	3
Mica	3 to 7	150
Ceramics	5 to 1000	Up to 10
Polyester	3	16
Polythene	2.25	50

Table 1: Permittivity values of common materials.



6

Type	Capacitance range	Working voltage (V)	Tolerance (%)	Temp Coefficient (ppm/°C)	Temp range (°C)
Polystyrene	10pF to 22nF	Up to 100	+/- 5	-200	-40 to +100
Polyester	10nF to 2.2µF	Up to 2000	+/- 10	+100 to +200	-55 to +125
Silver Mica	4.7pF to 4700pF	Up to 350	+/-1	+50	-40 to +125
Ceramic	2.2pF to 1µF	Up to 200	+/- 1	+100 to +4500	-50 to +120

Table 2: Typical characteristics of various types of capacitor.

percent, ±1%, whereas others, electrolytics for example can have a tolerance in the order of minus twenty percent to plus eighty percent, -20 to +80%".

"Then", Jeff continued, *"We also have Temperature Coefficient, which is the amount that the capacitance will wander from its nominal value due to changes in temperature. It's usually quoted in parts per million per degree Celsius, ppm/°C". "Can the temperature coefficient be positive or negative like for resistors?"* Natalie asked. *"Correct"*, said Jeff. *"Capacitors whose value rises in accordance with temperature are said to have a positive temperature coefficient and those whose value drops a negative temperature coefficient."*

"And then we have working temperature", Jeff continued. *"No matter what type of capacitor is being used it will have a range of temperatures across which we can expect it to work within its specifications. The temperature range is usually quoted by a negative temperature followed by a positive temperature, let's say minus forty degrees Celsius to plus one hundred degrees Celsius":*

Working temperature = -40°C/+100°C

"One thing to be aware of here", Jeff explained, *"Is while it's often the upper limit that concerns us, for electrolytics the lower limit can be important since it is possible for the electrolyte to freeze."*

"Ok, got that", Natalie replied.

"Did Archie talk about Effective Series Resistance?" Jeff asked. *"No, I don't recall it. What's that? Strangely enough Poppy mentioned something about it"*, Natalie replied. *"Well in most cases"*, Jeff explained, *"We can accept that a capacitor possesses pure capacitance, but in practice they will also possess some resistance and this resistance is called the Effective Series Resistance or ESR". "How do we know what the ESR is?"* Natalie asked. *"There are experimental ways of measuring it"*, said Jeff, *"And some manufacturers but not all, quote it on their datasheets, usually at a particular frequency".*

"Where does this resistance come from?" Natalie asked. *"Consider the construction of a simple capacitor"*, Jeff explained. *"There is a chain of conductors and connections and all these have resistance. For example, there is the resistance of the connecting leads, the metallic plates and the joint between the plates and the leads. Even the dielectric will have some resistance although it will be very high. Also bear in mind that there will very likely be some inductance present, so we can model a capacitor like this"*, **Fig. 6**. *"The inductance can become important at high frequencies"*, Jeff explained, *"Because in conjunction with the capacitance it can result in a resonant circuit".*

"What effect does the resistance have on a circuit", Natalie asked Jeff. *"Well"*, Jeff explained, *"Like any resistance it will have a voltage drop across it and if we apply the formula for power where we square the current and multiply by resistance, we can see that it will generate some power that is dissipated in the form of heat. And even if the resistance is small, if the current is high the heat generated may be considerable and as with temperature rises in other components this may degrade the performance of the component and the circuit that it's used in".*

"Anyway", Jeff continued, *"I know that we said that we wouldn't discuss the various types of capacitors that are available but to help you understand the things that we've just talked about I've jotted down a few things from the online catalogue of a well known supplier"*, **Table 2**.

"OK, I'll keep that with my college notes", said Natalie.

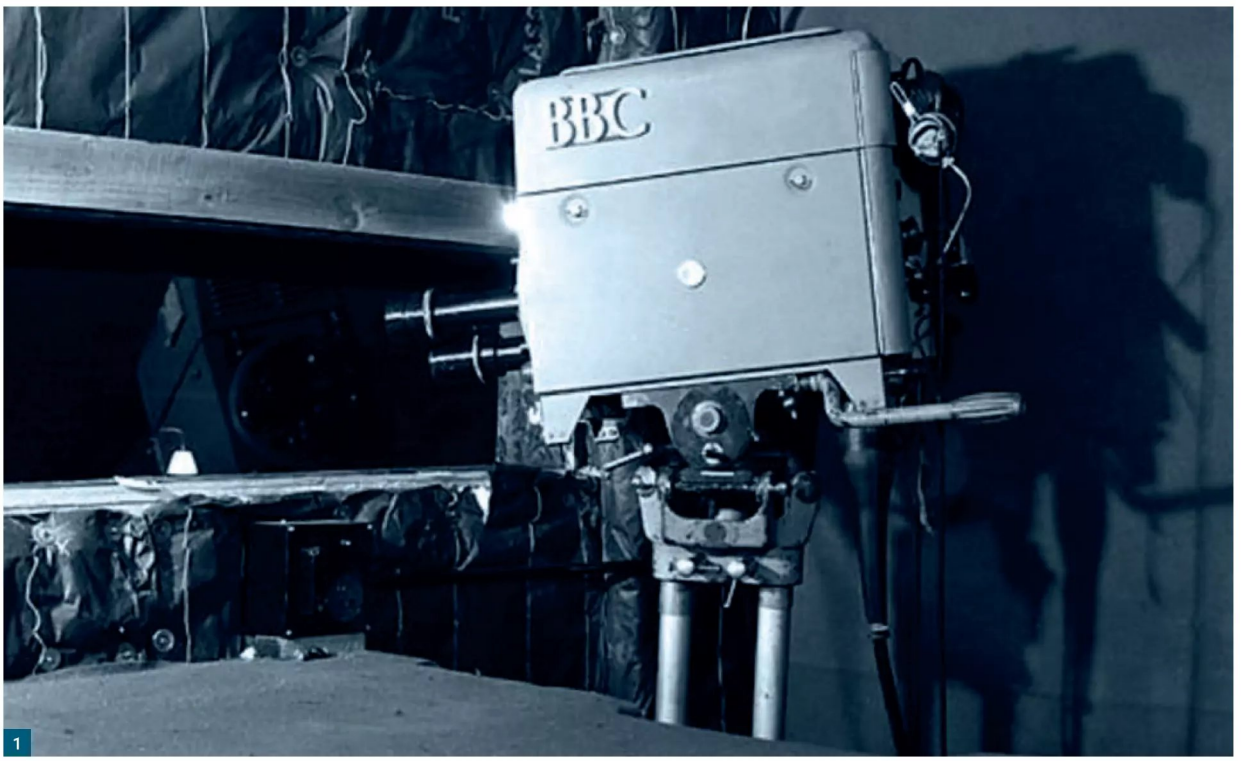
"One final thing before we finish", said Jeff. *"Most capacitors are non-polarised. That is to say that it doesn't matter which way round we connect them in a circuit. But for some capacitors, polarised capacitors, it does matter. The most common polarised capacitors are Electrolytics. The difference between polarised and non-polarised capacitors is that polarised ones MUST be connected the right way round in a circuit otherwise they will fail – often with spectacular results as I know from experience"*, said Jeff with a grin. *"Electrolytic capacitors may be of either axial or radial construction and either the positive lead or negative lead may be marked. On radial capacitors, the positive connection often has a longer lead than the negative lead – when it's new of course".*

"Anyway, we're running out of time", said Jeff glancing at the clock on the wall. *"There's more to tell but that will do for today. We'll have a look at how capacitors work another time."*

"OK", said Natalie. *"But can you let me have a few problems to solve? I'll pass them on to Poppy and Isla as usual". "Yes, no probs,"* said Jeff.

Jeffs questions

1. What is the capacitance of two metallic plates each of 10cm^2, 0.3mm apart and separated by air? (29.5pF)
2. Two plates of 25cm^2 in area have to create a capacitance of 20pF. What will the distance between them be? (1.1mm)
3. What is the capacitance of a capacitor consisting of two plates with an area of 40cm^2 and are 0.4mm apart if the dielectric has a relative permittivity of 6? (531pF)
4. A multi-plate capacitor is constructed of 11 plates having an area of 35cm^2 and 0.2mm apart. Calculate the capacitance if the dielectric has a relative permittivity of 8. (12.4nF)
5. If a voltage of 1000V is connected across two plates which are 6mm apart, what will the Electric Field Strength be? (166.67kV/m)
6. What is the maximum voltage that can be applied to a capacitor consisting of two metal plates 2mm apart with a dielectric strength of 30kV/m? (60V) **PW**



1

BBC coronations, Part VIII

Keith Hamer
Keith405625.kh1@gmail.com
Garry Smith
Garry405625.gs@gmail.com

Keith Hamer and **Garry Smith** continue the special series looking back at the BBC's coverage of Coronations since 1937, this time moving on to 2 June 1953, and the Coronation of Queen Elizabeth II. There is also a Coronation vintage television advertisement from the archives, including a description of 'Regentone' and their various associated companies. The series about Roland Pièce, the pioneer of Swiss radio broadcasts, also continues with more unique family archives supplied by his Grand-Nephew, and PW reader, Pierre Yves-Pièce. A new series begins this month charting the rise and fall of BBC 198kHz transmissions. We also continue our series about the development of Swiss Radio and Television since 1922.

Following the conclusion of our in-depth coverage of the Coronation in 1937 of **King George VI** and **Queen Elizabeth**, we now focus on the Coronation of the late Queen.

The engineering planning to cover the Coronation of **Queen Elizabeth II** on Tuesday 2 June 1953, began twelve months before the event. The general responsibility for organising the main broadcasts in sound and by television was devolved entirely to the two Outside Broadcasts departments concerned. As the scheme took shape, however, it became apparent that virtually every BBC department would have to be involved and coverage would be a massive technical operation.

For the Coronation of King George VI in 1937, there were 17 sound commentary positions in all, including ten for overseas services. In 1953, the plan provided for 95 commentary positions for sound, of which 84 were for overseas services. Six BBC transmitters were used in 1937 to broadcast to overseas audiences, as compared with 48 in 1953.

Television, in its infancy in 1937, was represented at King George's Coronation by a single mobile unit operating three cameras stationed near *Hyde Park Corner*, and by a single transmitter. In 1953, five television cameras were stationed in *Westminster Abbey* and 16 more at four different positions along the route. The camera positioned in the Abbey's *South Transept* is shown in **Fig. 1**. For the first time, a van carrying a mobile temporary transmitter was used, **Fig. 2**. The resulting television programme was transmitted by five high-power stations and three low-power outlets, which were installed just in time for the Coronation. One was located at Pontop Pike, near Newcastle, a second at Glencairn, not far from Belfast, and a third close to Brighton. The programme was carried by specially established links to the Continent.

The BBC's Engineering Division had the onerous responsibility for the success of the whole scheme, which included designing, installing, and operating the intricate system of control and inter-communications needed to ensure that each phase of the operation could be carried out as planned. Provision also had to be made for any technical emergencies, wherever they might occur. The department was also responsible for channelling each component part of every broadcast to its proper destination as well as devising innovative equipment and techniques, either to meet new circumstances or to improve on existing standards.

Fig. 1: The camera positioned in Westminster Abbey's South Transept during the 1953 Coronation. Fig. 2: The BBC van carrying a mobile temporary transmitter was used for the first time on 2 June 1953. Fig. 3: A Coronation advertisement for the 'Regentone 15/5 Table TV' in 1953. Fig. 4: The portable wireless receiver, complete with an electrolytic detector, used by Paul-Louis Mercanton for the Swiss expedition to Greenland. Fig. 5: The young Roland Pièce. Fig. 6: The Swiss 'Glückskette' charity event began in 1946.

Vintage coronation television equipment

This month's rove through vintage copies of cobwebby newspapers and magazines has identified an advertisement by *Regentone* that was released to the public in time for the 1953 Coronation, held on 2 June, **Fig. 3**. The advertisement, complete with bunting, dates from 15 May 1953. The text has been left in its original format to reflect the spelling, grammar and punctuation of the time.

This is the full, if rather brief, description of the 1953 ***Regentone 15/5 Table TV***.

"June 2nd.

You'd better get a REGENTONE by the look of it!

BIG 15/5 Table TV.

Bigger than normal picture from a 15" ***aluminised*** *tube.*

Five channel tuning. Superb 'new look' cabinet. It's TV you can ***depend*** *on for Coronation viewing.*

79 GNS. TAX PAID

See Regentone at your Dealers or write for leaflets.

Hire Purchase facilities available.

Issued by REGENTONE RADIO & TELEVISION LTD., EASTERN AVENUE, ROMFORD, ESSEX."

The style of advertisements for television and wireless receivers in 1953 is in stark contrast to the ones we have been presenting for the 1937 Coronation. Gone are all technical terms such as *"nine-stage superhet"*, *"superinductance"*, *"response curves"*, *"lowering the bass resonance to 45 cycles"*, *"special cross-braced cabinet"*, *"supersonic heterodyne"*, *"alphabetical tuning scale"*, *"noise suppression"*, and *"improved mechanical 'vernier' devices"*, not to mention that the receiver is housed in a *"beautiful cabinet in figured Walnut"*. These descriptions all appeared in standard newspaper advertisements, not in technical journals. It makes one wonder if prospective purchasers in 1937 actually understood any of the technical terminology. In 1953, advertisements were very short with virtually no technical jargon. Going through the archives for 1953, which involved checking over 2,600 pages in assorted newspapers and magazines, there were very few advertisements for wireless receivers. In fact, there were many more for auto-change record-players!

The story surrounding the *Regentone* brand is fascinating, as well as complicated. It took the authors literally hours to research the following details!

2

3

Regentone unveiled their first television models at the *British Industries Fair* on 2 May 1949. The company was originally part of *British Overseas Radiovision Ltd.*, based at 191 Frances Road, Leyton in London. The name was changed in 1950 when the firm went into receivership and later acquired by the *Regentone Group*. There was also an associate manufacturer of radio, radiogram and television equipment in the early Fifties called *Argosy Radiovision Ltd.*, established at the *Argosy Works, Hertford Road, Barking, Essex*. The cabinets for all the various types of equipment were made by yet another company called *Argosy Cabinets Ltd*.

A rival company called *Radio Gramophone Development Co. Ltd.* (usually referred to as R.G.D.), was one of a limited number of British manufacturers that specialised in the production of radio, gramophone and television equipment. The company gained their reputation by offering up-market, well-engineered, but very expensive, equipment. The firm, based at Globe Works, Newtown Row in Birmingham, was established in 1929. It was taken over by Regentone in 1952, but the R.G.D. brand name continued and its equipment was regarded as being superior to Regentone receivers in that they used much larger, better quality loudspeakers.

In the early Sixties, R.G.D. was bought by *Standard Telephones & Cables Ltd.* (ST&C), along with the *Regentone* and *Argosy* brands. ST&C was a subsidiary of the *International Telephone & Telegraph Corporation* (ITT) in the USA.

The 15in *aluminised* tube referred to in the advertisement was an effort to improve the overall brightness of the picture and also to reduce ion burns within the cathode-ray tube. Problems with ion burns were inherent with pre-war televisions due to equipment designs and technology available to manufacturers at that time. Many post-war receivers, including the *Big Regentone 15/5 Table TV*, incorporated ion traps and tube aluminising. The ion burns caused relatively large, slightly tinted, areas in the middle of the screen, which were not too noticeable while watching a programme, but there was a tendency for a small, very dark spot to develop in the middle, which appeared to be much more serious and very distracting for the viewer.

Incidentally, the '5' mentioned in the *Big Regentone 15/5 Table TV* advertisement refers to the five BBC-TV Band I channels that existed at the time of the Coronation in 1953. Television rivals in Band III didn't arrive until 22 September 1955!

Roland Pièce archives: Part II

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

In Lausanne, it was **Professor Paul-Louis Mercanton** (1876-1963), an electrical engineer and doctor of physics, who was the first to succeed in receiving the time signals emitted from the Eiffel Tower (radio FL, 24kW / 2200m) by means of a receiver built by his student **Jules Meystre** (1891-1920). This was in May 1911. In November of the same year, he obtained the first concession of wireless telegraphy by the authorities in Switzerland. During the 1912-1913 Swiss expedition to Greenland, Paul-Louis Mercanton had taken a portable wireless receiver in a wooden case, with an electrolytic detector, also made by Jules Meystre, **Fig. 4**. Unfortunately, the tests to receive the Eiffel Tower signals were unsuccessful.

At the same time in Bex (Canton Vaud), a town once famous for its saltwater cures, the young **Roland Pièce**, **Fig. 5**, born on 15 February 1897, son of **Paul Pièce** (1870-1955) and **Elise Minod** (1870-1932), was strongly impressed by the story of the sinking of the British luxury passenger liner, *RMS Titanic* on 14 April 1912. A few years earlier, Roland Pièce had already discovered an article on Marconi's first experiments in the *Almanach du Messager boiteux* publication of 1905 and found it wonderful. As the use of wireless technology saved many lives, the young student decided that he would make a career in this exciting field. He immediately tried to reproduce Marconi's experiments at the family home in Bex, which his father, who had become a justice of the peace in 1897, had built at the Avenue de la Gare. He used a *spark transmitter* consisting of a *Ruhmkorff*

4

Coil and a *Herz Exciter* made from two tin cans and two brass balls. For the receiver, he used a Leclanché battery, a Branly coherer made from a glass tube, some metal filings and two sewing needles borrowed from his mother. An old doorbell, salvaged from the nearby *Grand-Hôtel des Bains*, completed the device. Every time a spark was generated in the kitchen, the bell in the dining-room would ring. "*It was more exciting and moving than listening to a concert on the radio*," recalled Roland Pièce in *La Radio ma vie*.

We are indebted to Pierre-Yves Pièce in Bex (Canton Vaud, Switzerland) for sharing his personal memories and rare family photographs associated with Roland Pièce and the start of Swiss broadcasting in 1922.

The rise and fall of 198kHz, Part I

Last July, **Pat Bracken 2M1CKE** wrote to ask if we could do some detective work regarding the decline of transmissions on 198kHz. Well Pat, your wish is our command!

Following recent official announcements, transmissions on 198kHz are certainly doomed as far as the BBC are concerned. The BBC's Director-General, **Tim Davie**, intimated that plans were quickly progressing to end the scheduling of separate content on *Radio 4 Long-Wave* (198kHz). It is unclear at the moment how this will affect *The Daily Service* and *The Shipping Forecast* long-wave opt-outs. Regarding the latter, the BBC said that consultations will be held with the *Maritime and Coastguard Agency* ahead of the complete closure of the LW platform.

When public broadcasting began in the UK back in 1922, transmissions were radiated from medium-wave transmitters. Even at that early stage in broadcasting, plans were being developed to introduce transmissions on long-wave.

The *British Broadcasting Company, Limited* (as the organisation was originally known) was formed on 18 October 1922, by a group of wireless manufacturers, including **Marconi**. The Postmaster-General granted permission for the BBC to be established in May 1922. Between

5

1922 and 1929, a total of eight cities were allowed to have their own local transmitter, each with an ERP (Effective Radiated Power) of approximately 1kW, or less. Each city had their own studio and, from August 1923, regular news bulletins were fed from London. Initially, telephone landlines were not suitable for carrying music programmes to these regional studios. However, the quality eventually improved sufficiently using the GPO trunk network.

The first broadcast was at 6.00pm on Tuesday 14 November 1922, from Marconi's *2LO Station* (on 369 metres) located in the Strand, London. The programme consisted of a news bulletin, read by **Arthur Burrows**, Director of Programmes. The items were supplied by various news agencies and he read the bulletin twice, once at normal speed and then repeated slowly so that listeners had the opportunity to take notes if they wished. The bulletin was followed by a weather forecast, prepared by the *Meteorological Office*.

The first regular 'General News' bulletin from London was broadcast on 23 December 1922, together with the first orchestral concert plus a mixture of programmes featuring speech and dance music. The BBC had been very quick to introduce a broadcast receiving licence, costing 10 shillings (50p in today's money), on 1 November, some two months before the service was officially inaugurated.

Between 1922 and 1929, the BBC opened a number of MW stations to expand their radio service. This process began with two additional stations being brought into service on 15 November 1922: Birmingham (*5IT* from Witton on 420m) and Manchester (*2ZY* on 385m from Trafford Park).

The station at Newcastle-upon-Tyne (*5NO*, 400m) was brought into service on Christmas Eve, 1922. Cardiff (*5WA*, 353m) began on Tuesday 13 February 1923, to be followed by Glasgow (*5SC*,


6

415m) on 6 March. In October 1923, Aberdeen (*2BD*, 360m) and Bournemouth (*6BM* on 410m) were brought into service on Wednesday the 10th and 17th, respectively. The Bournemouth station was originally intended to be located in Plymouth.

In December 1923, the 2LO station changed from broadcasting on 369m to 365m. The other seven stations also changed wavelengths in December.

Due to poor reception on crystal wireless receivers in some areas, eleven medium-wave relay stations were installed, each with an ERP of approximately 200W. Wireless receivers in those days were affectionately known as 'Cat's Whiskers'. This was because a thin copper wire, resembling a cat's whisker, was used to make contact with the device's crystal detector. The crystal was usually made of galena, commonly known as lead sulphide. This type of wireless didn't require any source of power and the sound was monitored using headphones.

The regional MW stations, which were all located in large towns and cities, gave an excellent service up to a range of about 20 miles. The more remote rural districts and a very large number of towns, particularly those on the coast, remained more or less ill-served. The BBC soon realised that apart from wavelength difficulties, expense would prevent the erection of the very large number of MW stations necessary to cover the whole country.

A station working on comparatively high-power, and using a wavelength between 1,000 and 2,000 metres, seemed to offer a solution to the problem, since it was well known that the attenuation on long waves was very much less than on medium waves.

Following many delays for technical reasons, the *Geneva Plan* was eventually introduced on 14 November 1926. This was an attempt to reduce interference among the ever-increasing number of European stations sharing the same frequencies.

Prior to the Geneva Plan, the BBC's original masterplan to avoid interference was to open a high-power transmitter on long-wave. *Station 5XX*, with 15kW aerial power, was duly constructed by the Marconi company in Chelmsford, Essex. *5XX Chelmsford* was brought into service on Monday 21 July 1924, operating on 1600m. Initially, the programming was only experimental but it later became known as the *5XX High-Power Station Programme*, later to be renamed the *High-Power Programme*. Alas, the station in Chelmsford closed. However, the station rose like a phoenix when the BBC constructed their own 5XX transmitter at Daventry in Northamptonshire. The new, and first, long-wave station, known as *5XX Daventry*, was brought into service on Monday 27 July 1925. It broadcast on 1600m with an aerial power of 25kW.

There were already some stations broadcasting in Europe using long waves, notably one at the Eiffel Tower and another in The Netherlands. However, before embarking on the construction of a high-power station to work on a wavelength between 1,000 and 2,000m, the BBC considered it necessary to carry out tests to ascertain what range could be expected and whether any unforeseen difficulties would arise. It was particularly important to be cautious in this respect owing to the fact that a considerable change in design for all broadcast receivers would be required if they were to receive the new station.

Service information: Switzerland, Part X

In 1946, Radio Lausanne's **Roland Nordmann** and **Jack Rollan** broadcast the first *Chaîne du bonheur* ('The Chain of Happiness') on *Radio Sottens*, raising money to help the disadvantaged in Switzerland and abroad. *Radio Beromünster* and *Radio Monte Ceneri* soon followed suit with *Die Glückskette* (which also translates as 'The Chain of Happiness') and *La buona azione* ('The Good Cause') respectively. Over 150 pies and cakes were delivered to hospital patients, all of them made by listeners. 'Die Glückskette' was a huge success and in 1948, the event was broadcast internationally for the first time to help children in need all over Europe, **Fig. 6**. Along with Switzerland, listeners in Germany, Austria, France, Italy, Monaco and the Free Territory of Trieste also took part in the appeal. Listeners in Switzerland alone raised a total of 700,000 Swiss Francs in donations.

In 1946, *Cumünanza Radio Rumantsch* (CRR), based in Chur, and the *Innerschweizerische Rundspruchgesellschaft* (*IRG*, the 'Central Switzerland Broadcast Corporation'), based in Luzern, were both established although neither had its own radio studio.

Listeners were not very impressed in 1947 when the radio licence fee was increased for the first time, from 15 to 24 Swiss Francs. Two thirds of the licence fee revenue went to SRG, with the remainder going to the Swiss Post Office.

By 1949, the number of licence fee-payers exceeded one million for the first time. Effectively, there was a radio in almost every Swiss home.

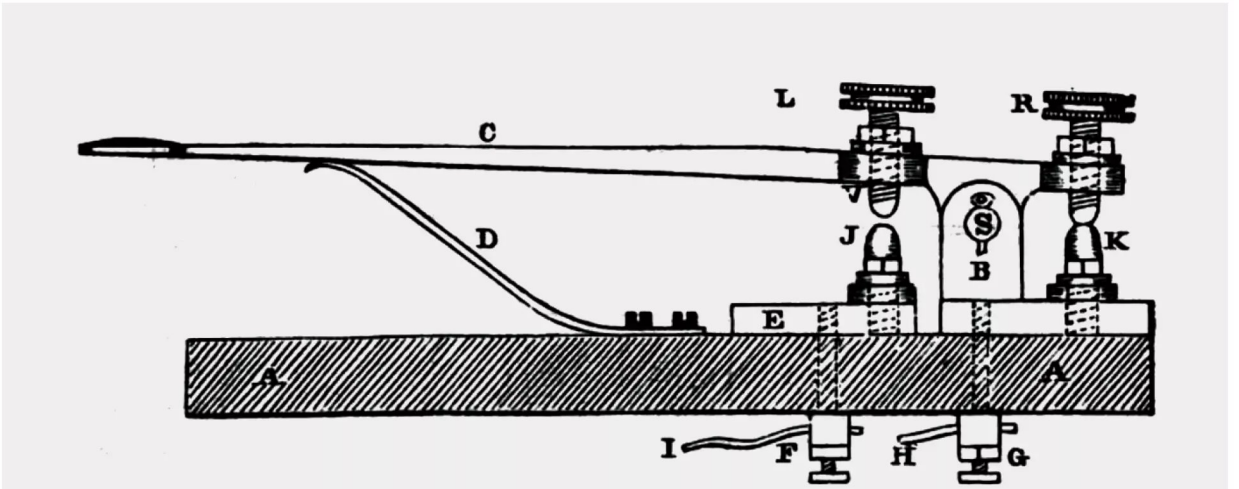
In 1952, SRG took over responsibility for broadcasting via the telephone network from the Post Office. Broadcasting using the telephone network ensured that Swiss listeners could receive SRG's programmes 'loud and clear', as well as some permitted foreign stations.

DX-TV & FM News

The latest DX news, plus details of changes to broadcast television and radio services, is available on-line via the *Radio Enthusiast* website by searching for the *Latest Articles* section.
www.radioenthusiast.co.uk

Stay Tuned!

All photos this month except Figs 4 and 5 (courtesy of Pierre-Yves Pièce in Bex, Switzerland) 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**



1

Morse before radio

In Part 1 of a two-part feature, **Tony Smith G4FAI** describes the early days of Morse sending.

Tony Smith G4FAI
g4fai@btinternet.com

How was Morse sent and received, and what did it sound (or look) like, before wireless was invented? **Samuel F B Morse's** first experimental transmitter of 1832 was called a Correspondent. This sent numbers, derived from a numbered dictionary of words or phrases, which were read at the receiving end by looking them up in a similar book.

He called his receiver a Register. He didn't think in terms of dots and dashes but considered the signals to be made up from dots (short or long) and spaces.

The Register drew a series of Vs with a pencil, on a moving strip of paper from which the numbers could be determined. The numerical code was replaced in 1837 by an alphabetical dot-dash code, also sent and received on the original apparatus.

In 1844, Morse and his technical partner, **Alfred Vail**, demonstrated an improved version of their telegraph to members of the U.S. Congress, using a new more professional register, invented by Vail. This embossed the tape instead of marking it with a pencil.

First key

They initially used a key they called a Correspondent of the type known today as a strap-key. They later changed to a new key, the Lever Correspondent, **Fig. 1**, and another new, alphabetical code, later known as American Morse, from which the international code we know today was eventually developed.

The Lever Correspondent was made to Vail's design by a skilled clock maker in New York, **John Stokell**, and was the forerunner of many thousands of single-current Morse keys designed and produced in the years that followed; all seeking to improve performance and speed in operating.

A professional register

As the Morse telegraph expanded across America, Vail's register came into universal use. The receiving operator, now called a telegrapher, read the incoming messages by looking at the embossed code on the tape as it came off the register and wrote the message down by hand.

During this process, the instrument clicked continuously as the embossing arm moved up and down to mark the tape; and the telegraphers soon realised that they could read the signals by the sound of the clicks without having to look at the tape.

From this discovery evolved the sounder, **Fig. 2**, a purpose-built instrument for aural decoding, a major step in the development of Morse telegraphy. It replicated the movement of the register without the embossing function and, coupled with a Morse key, it represented the simplest possible arrangement for sending and receiving Morse signals. However, the registers, **Fig. 3**, remained in use for many years, eventually inking instead of perforating the tape.

Simplest circuit

In its simplest (single current) form, each of two telegraph stations had a Morse key, a battery, a sounder, and a galvanometer. The two stations, which could be a few or many miles apart, were linked by a single wire strung on telegraph poles. A second wire was connected to ground at each station.

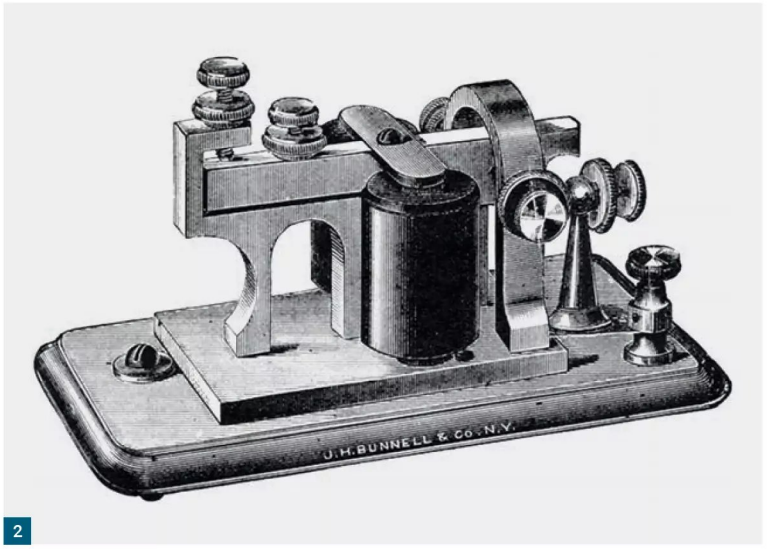
When the key in one station was held down, current passed along the line to activate the magnets in the sounder at the distant station. A hinged bar in the sounder was pulled down towards the magnets, making a loud click as it came to the end of its movement. Releasing the key switched off the magnets and the sounder's bar was pulled up by a spring to make yet another click.

Depressing the key for a brief period (a dot) resulted in two clicks close together. Holding the key down for a longer period (a dash) created two clicks further apart. A telegrapher could distinguish between the dots and dashes sent in this way and thus read the Morse code.

In busy offices with many sounders, they were mounted in resonator boxes to concentrate the sound of the signals at each desk. In the United States, telegraphers often wedged a 1½-ounce Prince Albert tobacco can between the sound bar adjustment screw and the back of the resonator to amplify the sound and soften the tone, making it easier to copy the signals.

A demonstration of the sounder can be found at:
https://youtu.be/Lki3jxNLVCI

In the double-current system, a double-current key reversed the current when the key was released. The sounder or relay in this type of circuit responded to the reversal of current without need of a spring, resulting in more reliable operation over long lines. The key



2

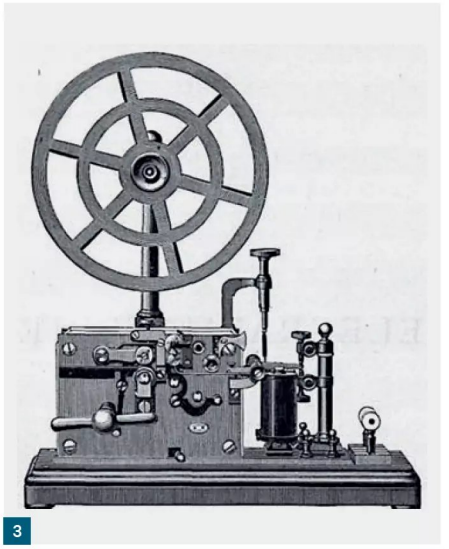
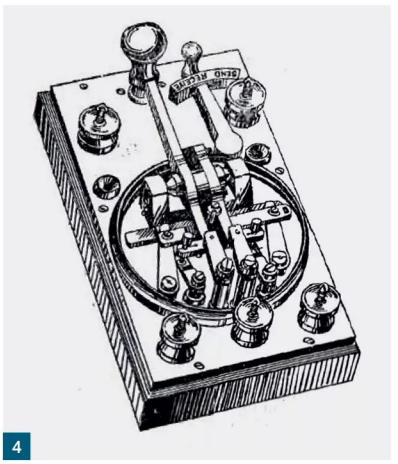
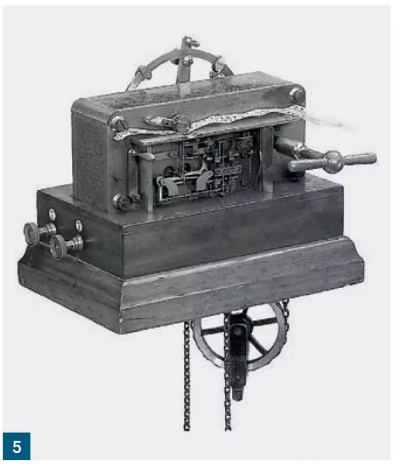

3

Fig. 1: Vail's Lever Correspondent. (Contemporary illustration.) Fig. 2: American sounder. Fig. 3: Ericsson Inking register 1889. (Public domain.) Fig. 4: Double current key. (Public domain.} Fig. 5: Wheatstone high speed transmitter. (Photo: Doug Palmer K4KEY)


4


5

illustrated, **Fig. 4**, is a Post Office Mk1 model from 1885 and would normally have a round glazed cover.

Newspapers

For press work, on the 'news wires', the need to transmit large amounts of copy was met by Wheatstone's automatic high-speed telegraph, **Fig. 5**. This perforated a tape, which was fed through a high-speed transmitter connected by landline to a distant printing receiver.

On the original version, a three-finger instrument was used, with the right-hand finger representing a dot, the left a dash, and the centre key the spacing between letters. Holes were punched in the tape by steel pins activated by the fingers, and a mechanical movement automatically carried the tape forward to receive the next symbol.

Later, the keys became buttons hit by vigorously manipulated 'stick punches', iron sticks with a rubber tip held in the fists of each hand. This, in turn, was finally replaced by keyboard activated perforators outside the period covered by this article.

Expert operators using the stick perforators could reach 25-35 words a minute while preparing the tape. By 1873, the automatic transmission speed of the transmitter had reached 80-200 wpm and, by 1890, 250 wpm. In press offices, the tapes were prepared by more than one operator, depending on the amount of copy to be sent, before feeding them consecutively into the transmitter.

At the receiving end, of the circuit, when working at such high speed, so much material could come through that up to six or eight transcribers would be needed to cope with the output of just one machine. The tape received could be used on other transmitter circuits, to send the same material on to other destinations, without further preparation. Until the turn of the century, both transmitters and receivers were weight driven. The tape was known as 'Wheatstone slip', **Fig. 6**, on which dots were indicated above a central line and dashes below it.

Improvements

In the 1870s, the invention of the typewriter dramatically increased the ability of telegraphers to take down copy. Improved designs of hand keys and the use of code words for common phrases also improved speed and capacity.

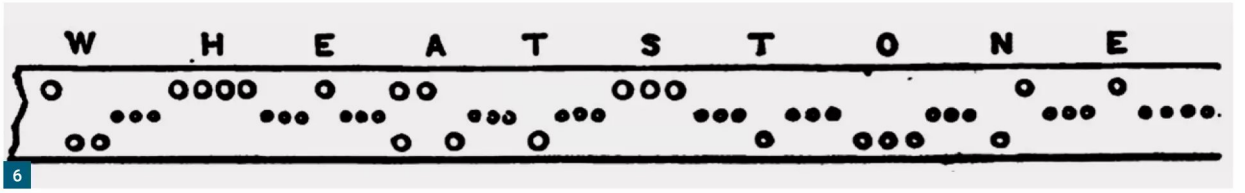
In 1871, **J B Stearns**, in the United States, invented the 'duplex' system, which enabled a single wire to carry two messages in one direction and another two in the opposite direction, thereby creating extra 'lines', which did not have to be physically built at a high capital cost.

In 1876 **Thomas Edison** invented the 'quadruplex' system with a single wire carrying four messages in one direction and four in the opposite direction, with even greater savings and an even more effective use of existing lines.

Needle telegraphs

In Britain the Morse telegraph evolved differently from its evolution in America. In 1837, **Cooke** and **Wheatstone** patented a five-needle electric telegraph on which individual letters were indicated by the deflection of any two of the five needles pointing to one of ten possible letters above, or ten below, their axis. This system did not use the Morse code.

Its successor, the single-needle telegraph was patented in 1845. It initially used a complicated code of multiple needle deflections for each



6

Fig. 6: Wheatstone slip. Fig. 7: Single needle with sounding plates. (Source unknown.)
Fig. 8: Bright's Bells. (Public domain)
Fig. 9: Double plate sounder. A modification of Bright's Bells. (Public domain.)
Fig. 10: Railway tapper key. (Photo: W. Davies.)

letter. This was replaced in 1853 by the European version of the Morse code (later known as International Morse) when undersea cables linked the UK's public telegraph lines with European networks using that code.

Letters and numerals were now signalled by the movement of a drop-handle on the sending instrument. A needle moved to the left on the receiving instrument indicated a dot, and when moved to the right indicated a dash. When a reply was necessary, the receiving instrument became the transmitter and vice versa.

Later, a simple modification of the single-needle greatly improved the efficiency of the system. Small metal striking plates were fixed on each side of the needle, **Fig. 7**, and emitted different tones when struck by the needle. The Morse signals could thus be received by a single person, listening to the tones and writing down the message at the same time.

Railway telegraphs

While Morse's electromagnetic telegraph reigned supreme in America, the single-needle became the principal Morse system in the UK, used by most public telegraph companies and the railways until 1870.

That year, the public telegraph companies were nationalised and taken over by the Post Office which, in time, standardised on the sounder. The railways, which had been served by the public companies, then set up their own telegraph departments outside the nationalised system.

Most continued to use the single-needle and other systems derived from it, while some kept the sounder in use. They maintained links with the PO system and where post offices were not available it was still possible for the public to send telegrams from the nearest railway station.

In 1887, the *London Electrical Review* noted *"the universal agreement... amongst all railway telegraph engineers" on the value of the single-needle. Long... recognised as being, far and away, the best instrument for railway work, on account of its durability and simplicity".*


7

Hand-maid of steam

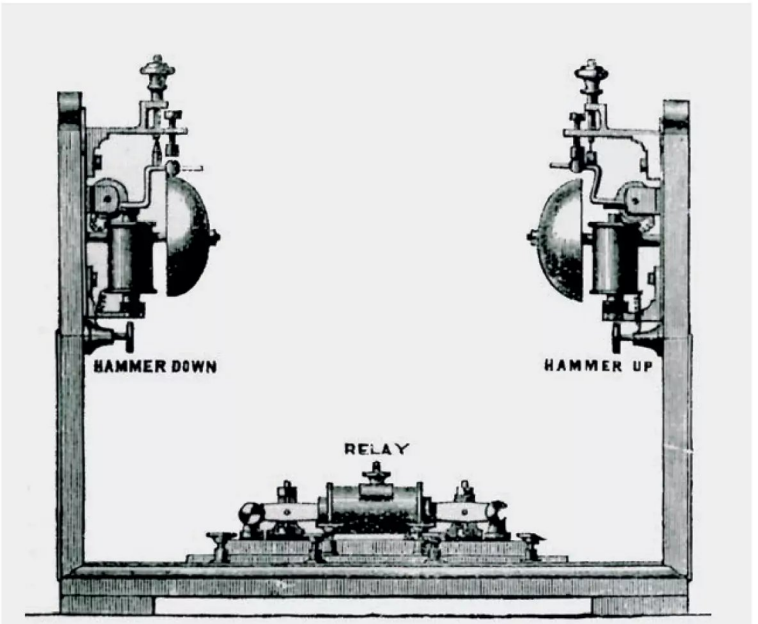
Commenting on the modification to the needles to make their signals audible, the *Review* described this as providing the dual character of 'sound and sight' reading. *"Such has been the success attained that an efficient railway clerk can now take 'G' from it quite as smartly as his postal confrère can from the more aristocratic Morse sounder".*

"G" was the railway code signal for *"Go on"*. Receiving telegraphists sent *"T"*, meaning *"Understand"* or *"E"*, *"Not Understand"*, after each word. If *"E"* was sent, the word was sent again. Expert telegraphists could send a *"G"* to the transmitting station, indicating that they could take messages without having to use a *"T"* or an *"E"* after each word.

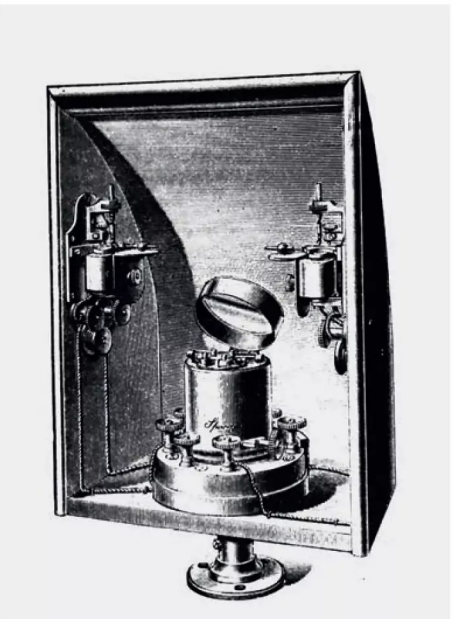
In 1889, **Sir George Findlay**, General Manager of the London and North Western Railway (L&NWR), described the Morse telegraph as *"the hand-maid of steam"*, playing an important part in almost every railway operation, starting trains from stations, conducting them safely through every part of their journey, marshalling goods wagons, monitoring the status of signals, passing messages accurately, and controlling 'railway time' nationwide. It was indispensable, he said, *"in ensuring the safe and efficient performance of the entire railway system".*

Bright's Bells

In 1855, **Charles** and **Edward Bright** patented a railway receiving instrument known as 'Bright's Bells', **Fig. 8**. This used two bells with different tones, one representing a dot, the other a dash, which responded to signals activated by a conventional single-needle instrument's drop handle.



8



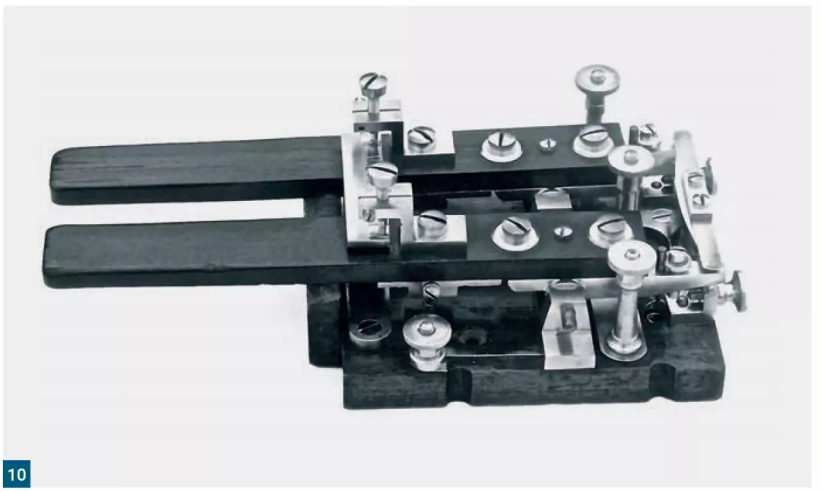
9

The double-plate sounder was a successor to Bright's Bells. Messages were again sent using a drop handle but were received on an instrument with two striking plates, each with a different sound, made by small hammers. A high pitch was a dash, and a low pitch was a dot, an effect similar to that of the modified single-needle, but with a built-in relay, making it more sensitive in receiving signals sent over long distances.

Messages could also be sent on a tapper key, **Fig. 10**, comprising two parallel wooden pedals in a polished wooden box. Depression of the left pedal sent the signal for a dot and depression of the right one a dash. The signals were again received on the double-plate sounder, although they could also be received on a single-needle instrument.

An important advantage was shared by the single-needle, Bright's Bells, the double-plate sounder and the submarine cable siphon recorder. In these systems, dots and dashes were sent in identical periods of time, compared with the sounder, which had short and long periods for the same signals.

A short demonstration of the action of the double-plate sounder, **Fig. 9**, can be found at: **https://tinyurl.com/yc72wmym**



10

Batteries

The telegraphs were powered by banks of batteries (cells). Central Telegraph Offices (CTOs), with lines connected to exchanges across the country, had large numbers in situ. Local offices had smaller numbers to power their lines to nearby destinations.

In 1874, the Post Office's newly opened CTO in London had 25,000 cells on 2½ miles (4km) of shelves in its basement. The railways also had large numbers. In 1899, the LNWR, with 19,508 miles of telegraph wires, had 19,508 cells spread across its network, from main line termini to virtually every railway station.

A number of different batteries were used. The gravity cell, for example, was used extensively on the American as well as the British railways. Banks of two or three cells were used for local lines, and 20 to 100 for long distance routes. The instruments themselves required only a low voltage to operate them.

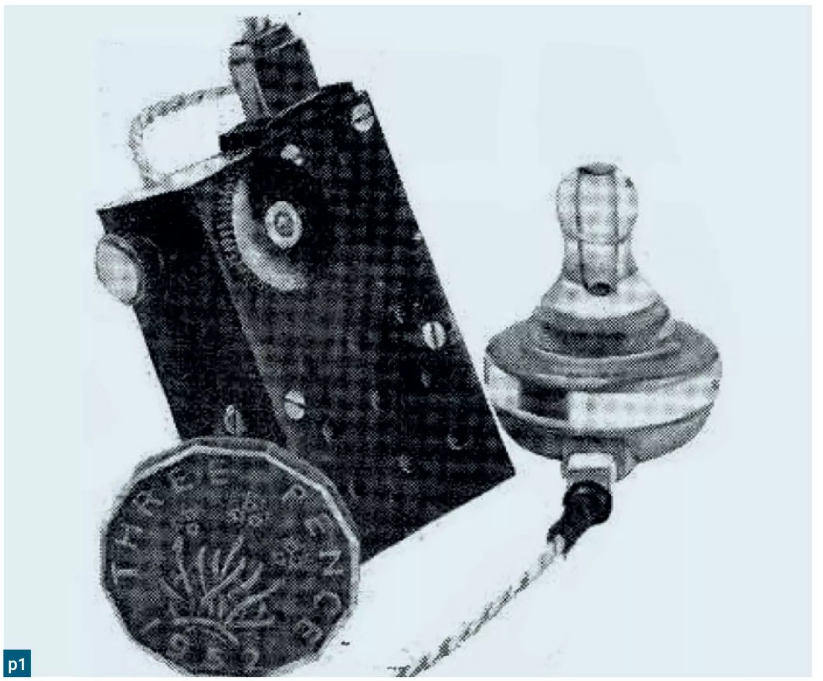
Other batteries used were the Daniell cell, Tyer's mercurial battery, Fuller's bichromate battery, the wet Leclanché battery, Grove's battery and Smee's battery, with the cell power varying from one to two volts according to type.

When fully charged, a gravity cell produced approximately one volt and was expected to last for five to eight weeks in a local circuit, or two months on a long-distance circuit.

With so many in use, recharging was a major task. It was an unpleasant job, undertaken by linemen or designated battery men, which involved cleaning the components and refreshing the water and chemicals in each cell at regular intervals.

Part 2 will cover the Atlantic cable, Morse in the Armed Forces, including Tone signalling; Heliostat and Heliograph; Navy landlines; Signal lamps; Flags; Shutters; Collapsing Drums; and the impact of wireless. **PW**

Don Field G3XTT
practicalwireless@warnersgroup.co.uk


p1

The Micro-Midget

"Probably the smallest receiver in the world, this amazing 3 transistor pocket receiver is capable of operating a loudspeaker."

This really midget receiver. measuring only 1 3/8in x 7/8in x ¼in, or rather less than half the size of a matchbox. has been made possible by the production of really midget components.

In this Lilliputian space is accommodated the 3-transistor, 4-stage. T.R.F. circuit using resistance capacity coupling. The power supply is one of the comparatively new mercury cells only 7/16in. in diameter and 3/16in. high. It should run the set for about 2½ months if used for an hour each day.

The set makes use of permeability tuning and. although designed for use with a deaf-aid earpiece, we found under lest that it worked a small speaker at a comfortable volume. It can be built for about £4. It incorporates the sub-miniature transistors now readily available at a reasonable price and which operate well at low voltages and throw very little load on to the resistances and condensers.

Last and least in size comes the minute switch and aerial socket made by Fortiphone. These components, so often the stumbling blocks when building micro-receivers, have been reduced to microscopic dimensions without any loss of efficiency or robustness.

Before going any further it must be pointed out that this is not a suitable project for the average beginner. although those who have built small receivers before should have no trouble so long as they follow the instructions carefully.

The Circuit

The circuit diagram is shown in **Fig. 1**. As is apparent it consists of three transistors and remarkably few auxiliary components. The set was designed using a minimum, and at first sight there seem to be several important ones missing. This, however, is due to the so-called invisible components.

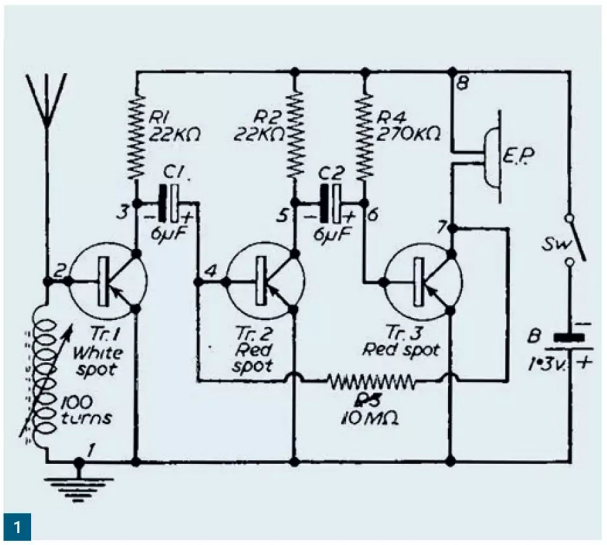
The signal, picked up by the short aerial, is tuned by the variable inductance L. This coil is designed to have sufficient self-capacity to make a tuning condenser unnecessary. The signal is fed from the coil directly into the first transistor, thus saving the space taken up by the usual coupling components. This transistor serves two purposes, first it demodulates the R.F. signal and then amplifies the resultant A.F. The amplified signal is then passed. via C1 to Tr2 for further A.F. amplification. This transistor receives its base bias via R3 which, being taken from the collector of Tr3, applies positive feedback. This considerably increases the gain, and saves using a fourth transistor. The bias for this transistor is also partly supplied by its own collector leakage. The A.F. is now resistance-capacity coupled into the output transistor Tr3 which is biased by R3. The output from Tr3 is directly coupled into a high impedance hearing-aid type earpiece, thereby avoiding the space taken and the power losses of an output transformer. This earpiece is also of interest as it is very much smaller even than the usual hearing-aid type, and thus fits in well with the small scale of the rest of the receiver. If desired the usual size may be used or even 1 kilohm headphones in which case slightly more volume will be obtained but there is plenty to spare anyway.

Construction

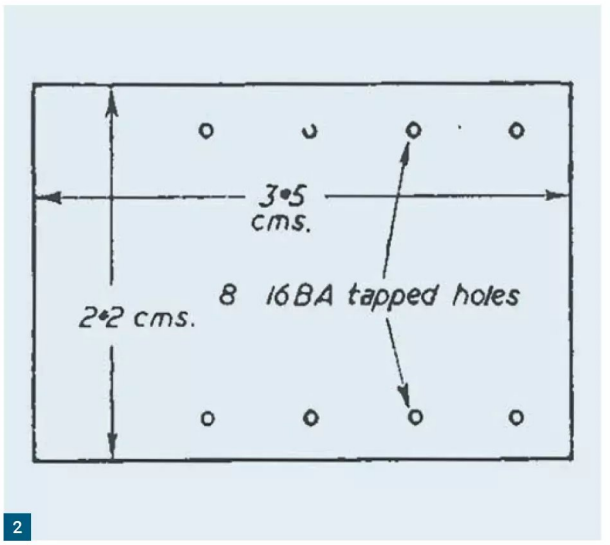
To make the constructional directions simple to follow, each connection point in the receiver has been given a number which is printed in both the circuit and wiring diagrams. It is a simple matter to refer from one to the other, and to check the wiring when it is completed.

The set is built upon a small piece of plywood which also serves as the base of the case. The finest grade available should be used and should have a thickness of a sixteenth of an inch or less. The dimensions of this chassis am 3.5 x 2.2 cm. Using a 16 B.A. tapping bit, drill four holes on opposite rims as shown in **Fig. 2**. Now screw in the eight 16 B.A. ¼in screws with a fine watchmaker's screwdriver. If the screws are held lightly with a pair of tweezers, this job is nothing like so hard as it may sound. To clarify the instructions, the wiring diagram has been split up into several stages, each stage showing how to wire in a different set of components, starting with the condensers. Do not deviate from this plan, as you will find trouble in placing all the components: further, more instability could result.

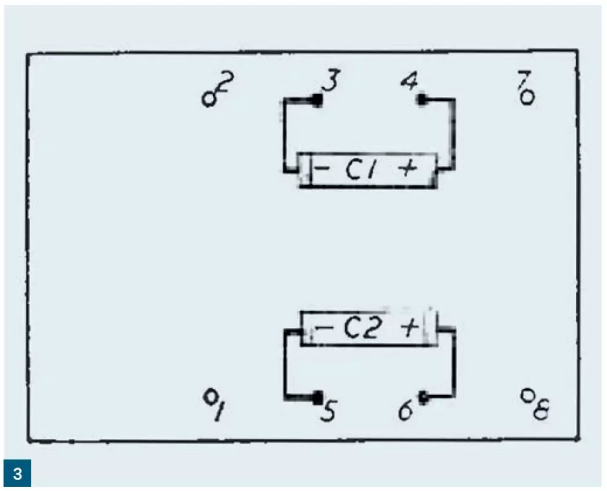
We dip once more into the PW archives, this time to bring you a constructional article by the late Clive Sinclair that featured in the November 1958 issue of PW.



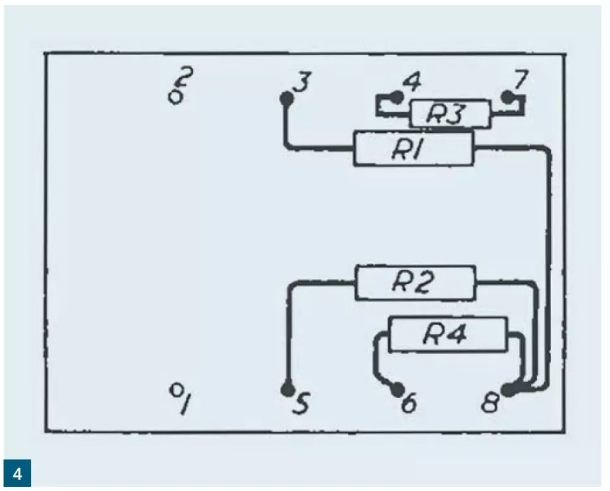
1



2



3



4

The wiring of the electrolytics is shown in **Fig. 3**. They must be connected round the correct way for the set to operate, the black tip indicates the negative end. Before proceeding any further, cover the condensers and their wires with a single layer of Sellotape. This will prevent short circuits when the other components are added and makes it unnecessary to use insulating sleeving.

On top of this layer of Sellotape lay the resistances, winding the thin connecting wires tightly round the screws and trimming off the surplus with a pair of scissors or fine wire clippers. Ensure that the wires are wound tightly round the screws so that when the solder is added a good contact is made. The ideal tool for this is a pair of tweezers, preferably the type with long, thin tips. This last stage is shown in **Fig. 4**.

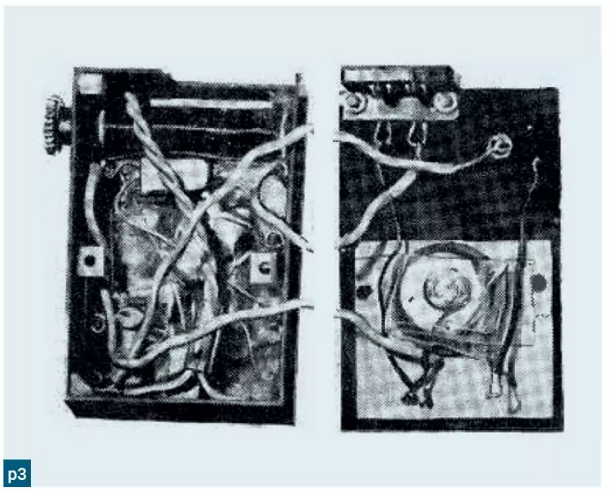
Another layer of Sellotape must now be added before the transistors are connected as in **Fig. 5**. Do not bend the leads from the transistors less than 2 mm. away from the transistor case as this can cause internal damage. A final layer of Sellotape should then be laid.

When the transistors are in place, the coil may be constructed and added. You will need a thin piece of ferrite rod or iron dust core approximately 9/10in. long. I used the core from a scrapped coil. Around this wind a couple of turns of paper and glue the ends together so that the rod will just slide in and out without slipping. Now wind on about 100 turns of wire side by side and cover with a layer of Sellotape or glue to keep the turns in place. If, having done this, the rod appears too loose, stick a piece of thin Sellotape on to it. To the end of the piece of ferrite is glued a wrist watch winding knob, this is the knob that is used for tuning the receiver. As is mentioned above. no tuning condenser is used as the coil has sufficient self capacity to tune itself.

The coil is now ready to be glued into its place beside the transistors as in Fig. 5. A good make of glue should be used as the coil may have to take a little strain.


p2

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


p3

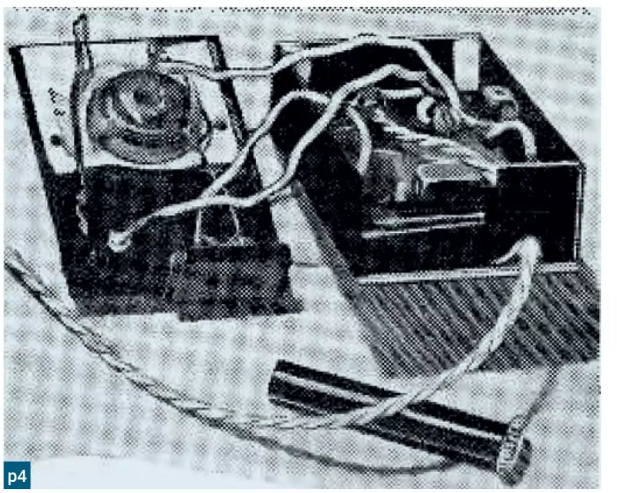
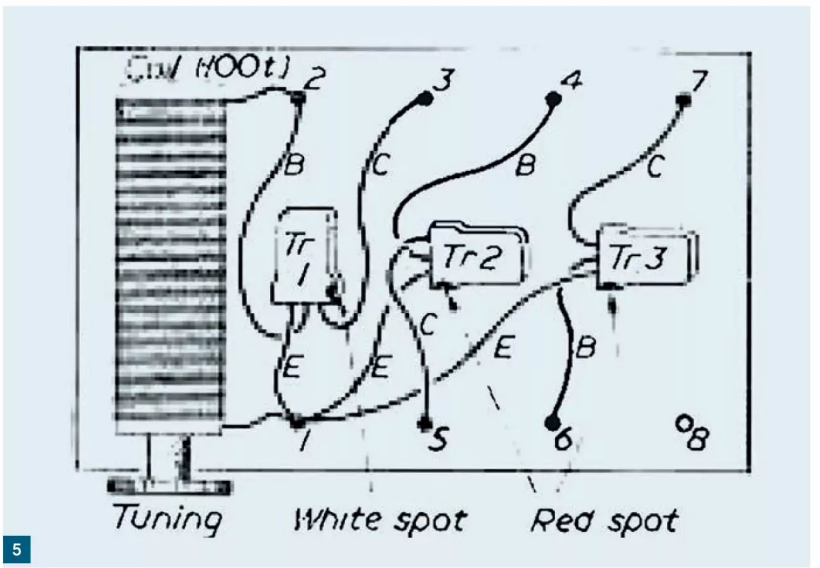
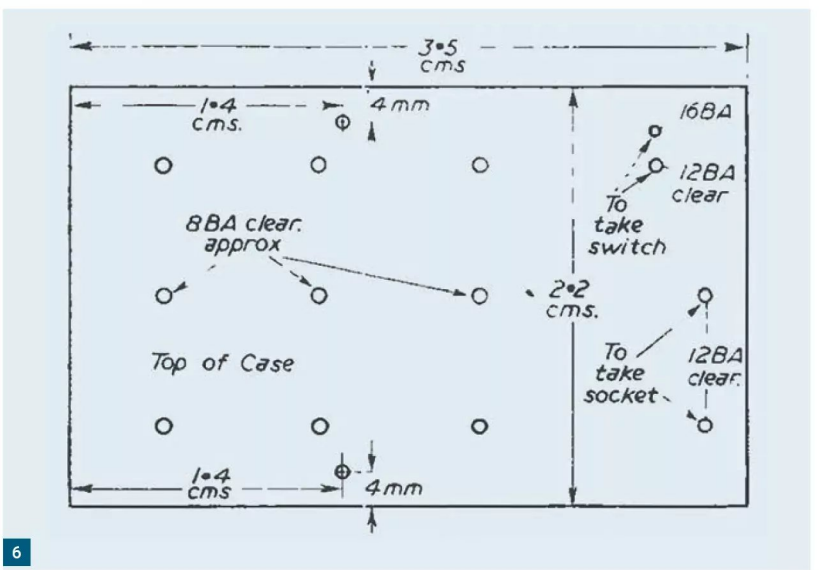

p4

Photo 1:The completed project.
Photo 2: A young Clive Sinclair.
Photo 3: Internal layout.
Photo 4: End view of receiver, showing the tuning rod removed from the coil.



5

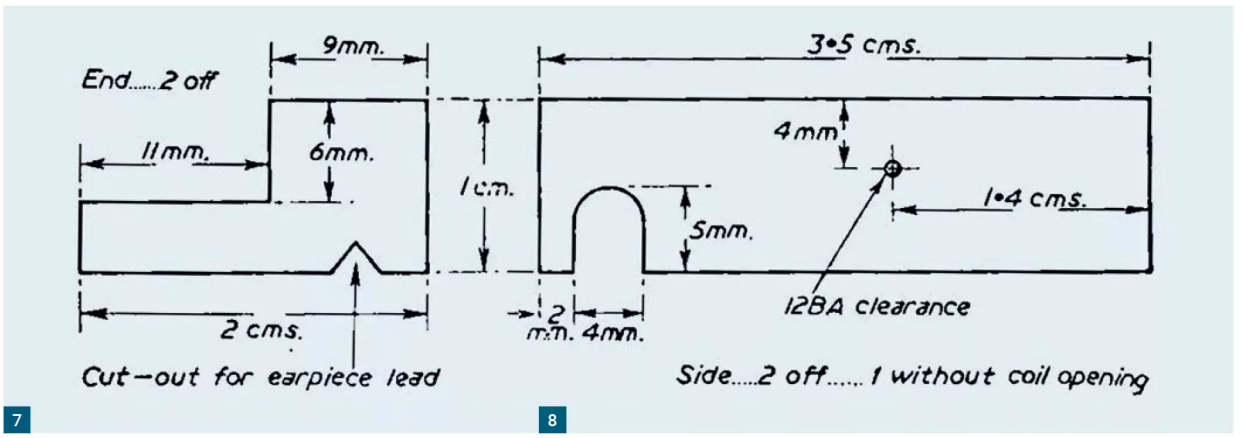


6

Fig. 1: Circuit diagram.
Fig. 2: Base drilling details.
Fig. 3: The condensers.
Fig. 4: Resistance mountings.
Fig. 5: The transistors and coil.
Fig. 6: The top drilling details.
Figs. 7 & 8: The end and sides of the case.
Fig. 9: Wiring connections between top and base.

The connections can now be soldered. Because of the mode of construction, this can all be done in one operation. A soldering iron with a very fine bit is required and several very good makes are now on the market. For the prototype one of the Litesold range was used. Wait until the iron has reached its maximum heat and make the joints as quickly as possible, covering each screw with a thin layer of solder. Do not let the tip of the soldering iron too near the transistors themselves as this may result in permanent damage.

Your set is now ready for testing. Connect an aerial to pin 2 and an earth to pin 1 and your headphones or earpiece to pins 7 and 8. An ordinary 1.5v. battery should be connected to pins 1 and 8, with the positive side to pin 1. Do not solder the battery as this will make it difficult to remove when the permanent battery is fixed in. With everything connected, move the rod slowly in and out of the coil until a signal is heard; if you hear nothing either one of the components is faulty, or there is an error in the wiring. With a reasonable aerial you can expect a really strong signal from this set, despite its small size. In fact. when tested in the PRACTICAL WIRELESS office, it was found possible to drive an 8in. loudspeaker to a very good volume.

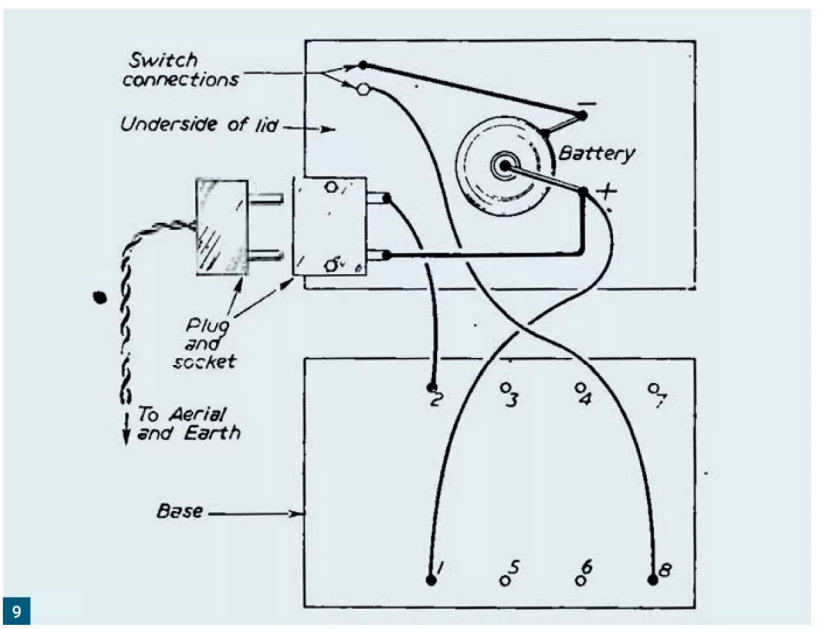


7 8

Components List

C1 – 6µF 6 v.w.
C2 – 6µF 6 v.w.
R1 22 kilohm
R2 – 22 kilohm
R3 – 10 megohm
R4 – 270k or 220k
L – see text
Tr1 – White spot
Tr2 – Red spot
Tr3 – Red spot

- Earpiece and cord – Either type T – 600 ohms with Ph.14 plug and cord – Fortiphone (subminiature) or Henry's Radio standard 1,000 ohm impedance with cord.
- Switch: two way subminiature – Fortiphone.
- Battery: Mallory cell No. RM400 from P.C.Worth's, 1 Binny Street, Oxford Street, W.1.
- The specified components must be used.



9

The Lid

The top of the cabinet and the sides are made from thin celluloid sheet. In the prototype 1/50in. thickness was used and was found quite strong enough. The celluloid may be painted any colour you like. The best finish is given by painting on the inside so that the colour shows through but cannot be scratched off. The dimensions and drilling of the lid are shown in **Fig. 6**. The two holes in the top right-hand corner are to take the switch, which is made by Fortiphone; below these are the holes for the aerial and earth socket, which is also made by Fortiphone under part number 14Bk/X/27C1. This socket is polarised, that is the two pins are of different diameter to prevent the plug from being inserted the wrong way round. In this application, however, the way in which the wires are connected to the socket is unimportant. The nine holes to the left of this are purely for decoration and their positioning is a matter of personal choice. They should be backed by a piece of coloured paper or material to give a professional finish. The switch and socket must now be fixed on to the case: the socket is bolted by means of two 12 B.A. nuts and bolts and the switch is held in place by a single nut screwed into the centre spigot, which is also one of the two connecting points. As may be seen in the photograph showing the interior, the battery is also fixed to the lid. Two small plates should also be made with insulating material on one side; these plates are connected to wires and are held to the opposite sides of the battery by a small clip made from steel wire. The whole assembly is Sellotaped to the lid.

The ends of the case are shown in **Fig. 7**. One end has no controls and is 2 cm. x 1 cm. high. The other end has a cut-out section to accommodate the switch and the dimensions for this are shown in the diagram. **Fig. 8** shows how the sides are made: the rounded-off slot is to take the piece of ferrite and should be on one side only. The 12 B.A. clearance hole is to take a 12 B.A. bracket, which can be seen in the photograph. It may either be ordered from a hardware shop or home-made. The purpose of this bracket is to hold the lid on to the rest of the case.

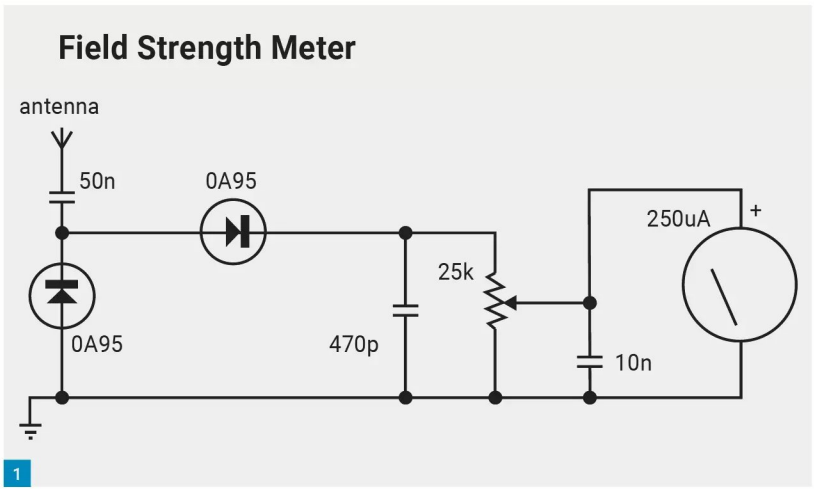
Before the walls of the case are glued into place the connections from the lid to the chassis must be made. These are shown in **Fig. 9** and are self-explanatory. This diagram also shows the aerial and earth plug and socket.

Now, using a strong, fast-drying glue, stick the sides of the case on to the base. The sides are reinforced and held in place by short lengths of matchstick glued into each corner. If the sides are now not level, true them up carefully with a piece of flour grade sandpaper.

Your receiver Is now ready for use. Screw down the lid and test the set as before. If you wish to feed the set into a loudspeaker use a transformer with a primary resistance of 250 ohms and a turns ratio of approximately 9 1. This will correctly match the output from the set to the 3 ohm voice coil of the speaker.

You will find that in most areas the wireless requires no earth and only a few feet of aerial. **PW**

Daimon Tilley G4USI
practicalwireless@warnersgroup.co.uk



1

A few small projects

Daimon Tilley G4USI has some advice on adding useful but cheap accessories to the shack.

In this month's column I am examining three small projects I have recently undertaken in the shack. These are the construction of a small Field Strength Meter, and implementation of two switching solutions, the first for routing my rig's audio output to a Daiwa audio filter and shack speaker, and the second for matching my favourite CW paddle to multiple rigs.

A Field Strength Meter

Let us start with a Field Strength Meter (FSM.) Such a meter can either be a passive or an active device, determined by whether or not you include an amplifier stage that requires a power source. A passive device, however, requires no power source other than the RF field that it is seeking to display on a meter. In my case, I wanted a small pocket-sized meter that I can just pick up and take with me at a moment's notice as part of a HF pedestrian mobile set-up I am working on. Having a battery amplifier both felt unnecessary (due to the proximity of intended use to the antenna) and inconvenient, as I felt sure that, by the Law of Sod, the battery would be flat when the meter was required!

The purpose of an FSM is to provide a visual indication of an RF field and its relative strength. They can be used for checking oscillators, transmitters, adjusting antennas, assessing RF levels in the shack, indeed any task where we want to detect RF energy and do so by converting the RF electrical field into a DC voltage, which a standard analogue meter can detect and display.

I took my design from the web pages of well-known QRP'er **Peter Parker VK3YE** and the circuit is shown in **Fig. 1**, with details of the project available at:

https://vk3ye.com/gateway/noapr97.htm

The component values are not particularly critical, but the diodes must be germanium types, rather than silicon. I used a 47kΩ potentiometer as my sensitivity control as it is what I had available, the 50nF capacitor was replaced with a 47nF, and the meter was one purchased from a rally for 50p – I have no idea of its sensitivity value. Most salvaged meters from old radios etc. will probably work.

Having assembled the components 'ugly' style with no circuit board, **Fig. 2**, a quick test with a handheld confirmed it was working and I proceeded to fit the components into a small project box I had lying around. The meter was mounted on the surface of the box using glue and the meter coil projected through a hole into the box. An SMA connector was fitted and an old Wi-Fi antenna pressed into service. As an FSM responds to any frequency RF (there is no tuned circuit) the antenna can be any length with no need for resonance. A future enhancement may be to fit a 'wander' socket for earth, for better sensitivity when testing oscillators and the like. The photos, **Figs 3** and **4**, show the completed meter, and **Photo 5** shows it displaying the field strength of a Baofeng handheld.

In use, remember that RF energy follows the inverse square law. That is, if you move the meter twice as far from the energy source, then the RF energy at this new point will be four times as small as it was. This useful little project cost me next to nothing to build but I am sure will find many uses – why not build one yourself?

Audio switching

There are quite a lot of rigs in the G4USI shack, and at least half a dozen HF rigs in regular use. Most of these are vintage or homebrew QRP, around my main operating position that I call QRP Corner! Some of these rigs don't have internal speakers, and some have poor or non-existent CW filtering. The net result is a lot of plugging and unplugging of headphones, speakers and filters, which I decided to tidy up.

A recent purchase at the Flight Refuelling Rally was a Daiwa AF-606K all-mode active filter, **Fig. 6**. This after-market audio filter had a great reputation and includes a Phase Locked Loop (PLL) for CW. This facility allows you to tune and 'lock-on' to a CW signal, at which point the Daiwa replicates the signal in real time with no noise or fading – that is the theory anyway! Another recent purchase was a Yamaha mid-range speaker from a surround-sound TV system. A recent magazine article indicated just how good such mid-range speakers are for amateur radio use, particularly SSB. Although I use SSB rarely, I purchased a mid-range Yamaha speaker from a social media site for just £10, and am sure it will serve me well on CW too.

My plan was to use the Daiwa and Yamaha combination with a number of rigs, but to do away with all the wires and unplugging and plugging. Normally I like building my own shack accessories, but a search came across a commercial audio switch that allows switching such that any single input or output can be switched to any of six others. The device allows, for example, one audio device, in my case a rig, to be switched between six speakers, or six rigs to be switched to the Daiwa/Yamaha combination. The device is available here:

https://tinyurl.com/4nsdrnh7

It costs just £22.99 and comes in a solid steel box. It looks very professional and I doubt I could have built it for less, or done as professional a job. A rotary switch is used to select input/outputs and there is a potentiometer to reduce levels (no amplification) and the device is shown in **Fig. 7**.

Inside, the device is well made on a neat PCB and appears very robust with no trace of dry joints etc. and I feel it is great value for money.

In use it works well and the potentiometer allows attenuation of volume from any of the connected devices. It is a simple and neat solution to provide a good external speaker (and the Daiwa filter) to multiple rigs. So far I have not encountered any ground loop issues.

In practice I found best results were obtained by making up my own audio leads with a mono plug at the rig end and a stereo plug at the audio

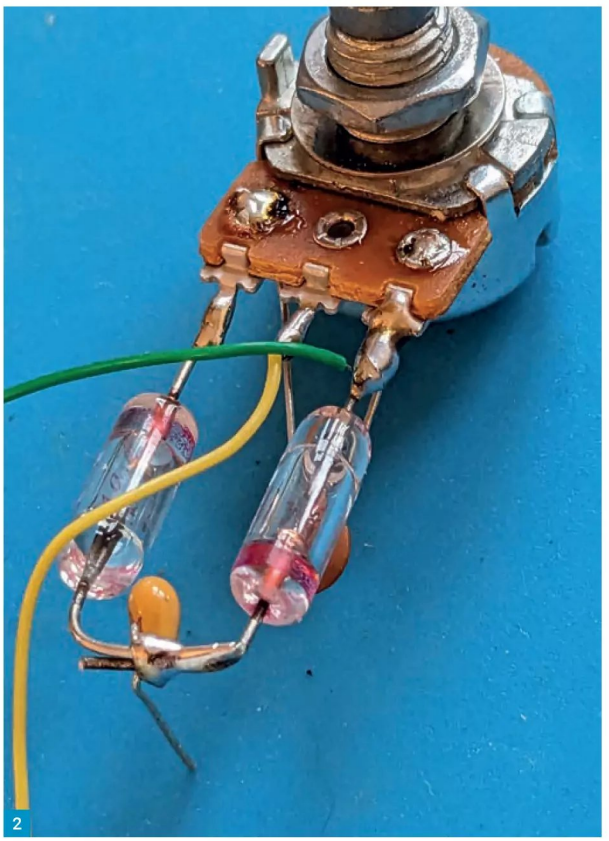


Fig. 1: Circuit diagram of the Field Strength Meter.
Fig. 2: Ugly style construction works fine.
Fig. 3: Inside view of the FSM.
Fig. 4: Fitting a Wi-Fi antenna.
Fig. 5: The FSM in use.
Fig. 6: The Daiwa active filter.
Fig. 7: Audio switch from Amazon.
Fig. 8: Cutting rear traces and adding wiring.
Fig. 9: Cutting the front trace.

switch end. Merely wire the tip of the mono plug to the ring of the stereo plug, leaving the tip of the latter unconnected. Of course, both sleeves are also connected. Failure to do this will mean no audio in most cases!

CW paddle switching

I face a similar issue with connecting my favourite Kent Morse paddles to a multitude of rigs. Up to now I have brought a number of 3.5mm audio cables from the rear of each rig's key socket onto a shelf at the operating position. Each is labelled with the rig name and I manually use a barrel connector to connect the 3.5mm key plug to the plug from the rig I wish to use. This works well but looks a little unsightly. It struck me that a second audio switch would tidy this up enormously. I brought another and connected it up, only to discover that the keyer on the rig selected is permanently keyed, despite the paddle being untouched. Investigation showed that the inclusion of the 'Volume' potentiometer, regardless of its setting, created a circuit between ground and the 'dit' or 'dah' line. Obvious in hindsight.

Out came the PCB from the case to see if I could modify it to take the potentiometer permanently out of circuit. I found that the ring and tip of the various connectors all connect through a twin-gang 5kΩ potentiometer, which allows volume attenuation. The net result is that at whatever level you set that potentiometer, there is a connection between tip, ring and ground at all times. As far as a CW keyer is concerned, when that 3.5mm port is selected, the rig will key regardless of the paddle status.

I soon identified the need to cut some PCB traces and then to hardwire the common port ring and tip connections to the relevant connections on the multi-way selector switch. A total of four traces needed to be cut, one on the top of the board and three underneath, with two hardwired connections then being made to the selector switch, see **Figs 8** and **9**.

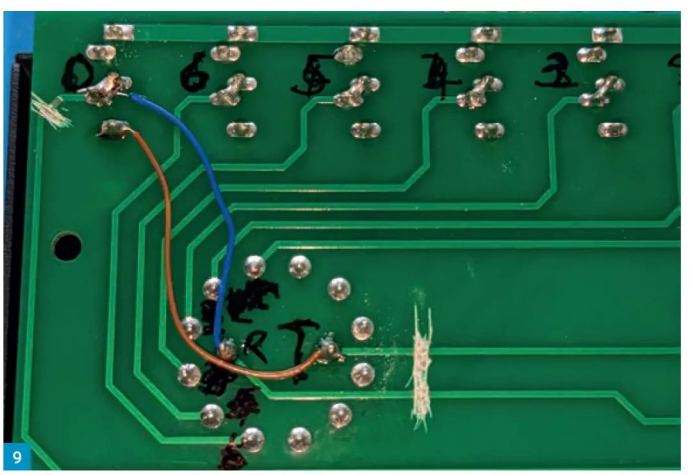
Having completed that and testing it, the unit was put back together and works really well, tidying up my cables nicely, and allowing simple, speedy rig choice right next to my paddle.

Until next time, 73. **PW**

5

6

7



9


8

Specialist Dealers

Electronics

Kit Suppliers

Scotland

Somerset

Classified Adverts

Wanted

VINTAGE FIREWORK COLLECTOR. Do not light the blue touch paper and burn British Heritage, private collector will pay cash and collect from anywhere, licensed explosive storage. **Call Tony on 07956 506300**

Valves

VALVES AND ALLIED COMPONENTS? For free stock list and/or advice, Please contact me: **Geoffdavies337@Gmail.com Telephone 01788 574774**

Repairs

REPAIRS TO RECEIVERS, TRANSMITTERS ETC. New/old, valve/transistor. **Call 07903 023437 for details. www.kent-rigs.co.uk**

BARGAIN BASEMENT ADVERTS COST JUST £5.00 By email Firstly email your advert's wording to kristina.green@warnersgroup.co.uk and then call 01778 392096 to make your payment. By POST Send your advert to: Bargain Basement, Practical Wireless, Warners Group Publications plc, West Street, Bourne, Lincs. PE10 9PH Please write your advert in BLOCK CAPITALS up to 30 words, plus 12 words for your contact details and send it together with your payment of £5 (subscribers can place their advert free of charge as long as they provide their subs number or mailing label). Cheques should be made payable to Warners Group Publications plc, credit card payments also accepted. Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. No responsibility will be taken for errors and no correspondence will be entered into on any decision taken on any of these conditions. The Publishers of Practical Wireless also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

Bargain Basement

Exchange

YAESU FT60 handheld vgc. Original box and accessories. New spare batt. Plus dry cell case and drop in fast charger.
Swap for a decent Kenwood TH-F7 handheld
Tel: Alan 01912 534588.

Wanted

YAESU FT200 POWER SUPPLY. Wanted (FP200) or replacement transformer. **Brian: 07873 740135.**

For Sale

TRIAX FM AERIAL 5 ELEMENT. Never used outside. Like new. £20 Buyer collects.
Tel: 07963 319751. NORTH DORSET

For Sale

HAMMARLUND HQ 140 X Receiver. In excellent condition, recently re aligned and working perfectly. Comes with 110 volt transformer. Prefer buyer to inspect and collect £275 ono. **Bill: 07949 195302.** WOODFORD, ESSEX

YAESU M70 MIC. Boxed good condition £70 + £5 P&P. **Text/call Paul: 07748 948685.** FOREST OF DEAN

Practical Wireless 2023 Index

Rallies & Events

All information published here reflects the situation up to and including **21st October 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**

18 November
ROCHDALE & DISTRICT AMATEUR RADIO WINTER RALLY: St Vincent de Paul's Hall, Norden, Rochdale, OL12 7QR Doors open at 10am with entry still at only £3. Usual Traders and caterers. Plenty of free parking. Contact Dave G3RIK – details below Please note that all proceeds from this rally will be given to a local charity. Last time we were able to give £1000 to the Rochdale Springhill Hospice. Dave Carden G3RIK, Secretary (CR FP TS).
dave@cardens.me.uk
01706 633400 Mobile: 0781 367 1296

25 November
WILTSHIRE WINTER RADIO RALLY: Kington Langley Village Hall and Playing Field, Kington Langley, Wilts. SN15 5NJ. Open 9 am to 3 pm. Traders Welcome. Entry is £3, in-door tables £10. Depending on the weather, there may be a small car boot section. Further information (see also: 30 July). (CS D FP RSGB SIG TS WiFi)
Chairman@Chippenhamradio.club
www.chippenhamradioclub.co.uk

3 December
BVWS SWAPMEET AND AUCTION ROYAL WOOTTON BASSETT (BVWS MEMBERS ONLY): Wootton Bassett Memorial Hall, Royal Wootton Bassett, Swindon, Wiltshire SN4 8EN Swapmeet events: Doors open at 9:30am. Stallholder entry from 9:00am. Auction starts at approx 12:30pm. Auction only events: Doors open for viewing at 9am. Auction starts at 10:30am. Admission £8. Contact Mike Barker From M4 Junction 16, take the Wootton Bassett turning (A3102). Continue to follow the signs for Wootton Bassett. Once in Wootton Bassett (3 miles from J16) you come into main town area where there is a raised town hall (black and white building on stilts). At that point turn left into Station Road, (sign posted for Broad Town / Broad Hinton) and then the hall is 500 yards on your left, on the corner of a crossroads where you need to turn left into Tanners Close to access the car park. For those using public transport, Royal Wootton Bassett is a 15 minute taxi drive from Swindon railway station.

9 December
MID-DEVON AMATEUR RADIO & COMPUTER FAIR: The first Mid-Devon Amateur Radio & Computer Fair will be held on December 9th at * Winkleigh Sports & Recreation Centre, Mid-Devon EX19 8HZ from 09:00 – 14:00. Entrance £3, no charge for partners & under 16s. Easy access from the A3124, ample parking, hot food and refreshments available. A chance to pick up hard-to-find electronic components, two-way radio and computer hardware. Traders £5 per 6 foot frontage + £5 if you require physical table(s), first-come-first-served, pre booking advance recommended. Mains electricity should be available to most traders FOC. Talk-in on S22 and the South West Cluster (DMR TG950 slot 2) repeaters. *What3Words ///focal.fountain.laminated. (CR FP TS).
07990 563147
philbridges@hotmai.com

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).
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 including our now famous bacon butties. Tables £10 each. Contact Steve M5ZZZ for tables and details: At 14.00 after the Rally there will be a Used Equipment Auction items for the auction will be booked in from 13.00. (BB, CR, FP)
m5zzz@outlook.com
07777699069

KEY TO ACRONYMS: 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 **L** Talks, Lectures and Demos **LB** Licensed Bar **MS** Meeting Spaces **RF** Raffle **RSGB** (RSGB) Book Stall **RU/PW** RadioUser/ PW in attendance **SIG** Special-Interest Groups **TI** Talk-In (Channel) **TS** Trade Stalls **Wi-Fi** (Free) Wi-Fi.

Your Letters

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

Rediscovering an old blueprint

Dear Don,

I am now nearly retired after more than 40 years working in the radio communication / long range radar field. I have seen changes from valves to transistor to IC and now SDR. I have worked a lot on ex-RAF/IAL equipment, high power HF Tx, aerial farms, SSAB and RTTY, and later on radars primary and secondary. I have been a radio amateur since 1985, callsign 9H1BP.

My career sparked from my father's *PW* magazine, which dates back to around 1958, all nicely bound in a green hardbound with the year in the front.

The story behind this blueprint is that when I was 12, my father and I started building a top-band transmitter using the OC 71 and OC45, but the range never exceeded half a mile (the circuit was from a Henry catalogue, I still have the copy). Then running through back *PW* magazines I encountered this famous blueprint, which on the back side claimed to give global coverage! No need to say that the plan proved worthless, our receiver was a modified AM receiver but no product detector or BFO. Now 50 years later, the joy of getting the components and bringing it back to life again. The big difference is knowledge and a good amount of test equipment available (besides the ease of getting components).

I still wait each month for magazine, I enjoy every page, I miss those Take 20, the *PW* video writer, Tele Tennis ball, amplifier circuits, superhet receiver and transmitter circuits etc.

Norman Bonello
Malta

The AR88, etc

Dear Don,

It seems I've been completely spoilt for AR88 nostalgia (I mention this because as a 12 year old, it was my first short-wave receiver – found near a refuse bin while my dad was on his milk-round). Not only is there an AR88 featured in a tale about *AM revisited* in the October issue of *RadCom*, in *PW*, on pages 32 to 34, **Philip Moss M0PBM** waxes lyrical all about an AR88 too! And yes, they are the proverbial rats-nest to repair. I've owned two. The second, I bought from a local ham. The first one though, needed a lot more than just TLC. Almost a refurbishment. It was trial and error – more error than trial.

By the way, it appears that **Keith Rawlings G4MIU** (October issue), is a man after my own heart. Fashioning simple antennas. Congratulations.

Although the subject of the demise of ham-radio (November 2023, G0DJA) has been touted about for decades by those who may be disenchanted with it for one reason or another, I think the whole issue has been beaten to death. I'd even go so far as saying that it's now a non-issue, rather than something to keep chewing over.

Dave G0DJO hit the nail on the head. That *"the hobby changes and evolves"*. And no, it *"doesn't end"* and probably won't for the foreseeable future. As technology has progressed in the ham-radio arena bringing forth all manner of modes with which to enjoy, it has by default or maybe by some sort of divine intervention, enabled our hobby to expand into a situation where the odds of securing curious young minds has hopefully exponentially increased?

If it had been the case that amateur radio had remained deep in the rut of yesteryear (where sadly, some of us prefer to remain), with the majority refusing to embrace the race towards the inevitable, the demise of amateur radio would either be horrifyingly numbered or consigned to a footnote in the history of radio communications. Luckily, putting aside the input of commercial interests, that has not happened only because among our fellow hobbyists there are those who spend more time burning the midnight oil inventing and tinkering than most of us care to do. Long may that continue, right?

Having visited a couple of the so-called *Preppers* mentioned by **Joe M1MWD** while in the US long ago, and seen with my own two eyes just what these people have stored in their respective bunkers, just in case of some far-fetched idea that Planet Earth and its population is headed toward Armageddon, like the demise of ham-radio, it is greatly exaggerated. It's not believing is seeing, it's seeing is believing.

Lastly, I don't wish to be an 'alarmist' either. But perhaps Joe would like to know that there is now evidence pointing to the fact that the Sun is not a gaseous object after all. It's a metallic hydrogen sphere. Ditto, other stars. If so, astrophysics will need a radical overhaul.

Finally, with M0WOB's *Baked bean tin radio project* in mind, I thought the readers of *PW* might like to see my efforts using tin cans instead of putting them in the bin. I used 4½ tins to fashion a 2m antenna (see photo). I use it

during the summer where it's strung up on high pole outside my Summerhouse. I tend to change the tin can labels once a month. One month, tomatoes, one month chickpeas and so on. I like to ring the changes.

Ray Howes G4OWY
Weymouth

AC/DC Sets

Dear Don,

I apologise for taking so long to respond to **Godfrey Manning's** and **David Kerr's** letters in the October issue. Godfrey makes some pertinent comments regarding RCDs and isolation transformers. His suggestion of using a 60W tungsten bulb in series with the mains input to any mains set that has not been used for some time is a very valid way to limit inrush current – thank you for reminding me!

I agree with David, the capacitor (C3) shown on the Eddystone circuit should ideally be Y rated as Y rated capacitors fail open rather than short thus preventing accidental exposure to mains voltages. In Eddystone's defence and I 'm happy to be corrected on this, I don 't think Y (and X) rated capacitors were introduced until the mid-1990s so wouldn't have been available when the 840A was made.

On this subject, I have come across a number of Racal RA17s that constantly trip an RCD owing to earth leakage. The problem is two capacitors (red Hunt's if I remember correctly) connected from the mains inlet, Live to chassis and Neutral to Chassis. They tend to go leaky. Snipping them out cures the problem and doesn't result in any noticeable issues. However, they could sensibly be replaced with modern X rated types. These would fail short and take out the fuse thus alerting the operator to the failure. Y rated ones in this application would fail open and thus not advertise their failure.

David 's advice for handling deteriorated dropper resistors is well worth noting.

Michael Jones GW7BBY/GB2MOP
Llangeler

Thoughts on Richard Felton RF breakthrough

Dear Don,

Reading *Your Letters* for November, the problem Richard has with the local MW station breaking through on the Short Wave Bands. This made me think and here's my two pwnn'orth. What sort of radio receiver? Valve? Transistor? SDR Dongle?

1. Is the interference just on one radio? If it is, does that radio have a fault? Or is it a problem for the whole area?

2. What type of radio is it? A valve radio (fault free) would be unlikely to suffer that type of problem.

3. Is the radio an SDR Dongle on a Laptop or a portable All Band Radio with a telescopic pull-out aerial? Indeed, is Richard using an external (to the radio) aerial?

4. Is the fault present without the aerial connected (to find out where the breakthrough is appearing, whether via mains cable or aerial lead)? Can the radio/laptop be powered on an internal battery to check?

5. If the fault is clear with the aerial disconnected (works OK with the battery supply), is the interference on the mains wiring?

6. If the fault is present with the radio working on batteries and with the aerial connected, then this suggests the problem is RF down the aerial lead.

What sort of external aerial is it, an inside wire or a longwire outside? How is that aerial con-

★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

The Morse Mode

Dear Don,

I am writing in response to the segment of **Roger G3LDI's** *Morse Mode* column in October's *PW* in which he opines on the matter of CQ callers in contest and DX pileups identifying themselves (or not) after QSOs. Roger argued that a CQ calling station in either of these circumstances should ID – as opposed to just sending an acknowledgement (e.g. 'TU') – after three consecutive contacts, at most. As someone who is not much of a DXer, I will comment with regard to pileups in the world of contesting, only. In a contest environment, I would maintain that the best operating practice relating to the frequency of post-QSO identifying very much depends on the circumstance; hard and fast rules on this matter are simply counterproductive.

Yes, I think that we have all experienced the frustration of joining a pileup, only for the running (i.e. CQ-calling) station to not give its callsign for what seems to be an eternity. On the other hand, there are numerous reasons to delay identifying that can benefit all parties in pileups, be they runners, those in the pileups who know the runners' callsigns, and those looking to join pileups but don't know the runners' calls.

Of course, sending only a 'TU' after each contact would improve the QSO rate of the runner, all things considered. Something not so recognised is that simple acknowledgments will also make life better for those in the pileup who know the runner's call; there could be a great number of these stations if the runner is in, say, a rare DXCC entity. These folks will be attended to more quickly if the runner identifies only seldomly instead of frequently; that will be appreciated, especially in events like the RSGB 80m CCs, where every second counts.

But what about those who have come upon the pile-up's frequency and don't yet know the callsign of the runner? Won't they be the 'losers' if the runner's call is only infrequently transmitted? Not necessarily. In fact, discouragement to the joining of an increasingly unmanageable pileup may be just what the doctor ordered. Effectively being told *"Please try again later"* would be a blessing, if a well disguised one.

There are disadvantages for a runner in not frequently identifying itself, of course. Most obviously, it will risk missing out on working stations that, after being denied the runner's callsign, will simply spin their VFOs. What if those stations could generate multiplier credit for the runner? Ouch. Additionally, less frequent mentioning of their callsigns will mean less likelihood of runners being spotted – either manually or through the RBN – and the less chance that their callsigns will be recorded correctly in contest participants' logs.

With contesting, skilful operators, whether they are the CQ callers or the stations seeking to respond to them, work best when they're allowed to weigh up the pros and cons for – and the risks and opportunities of – various tactics themselves, and not have to follow rigid rules or etiquette. This is especially the case with callsign identification.

Evan Duffield M0TJU
Stockport

*(**Editor's comment**: Thanks Evan. As an active contester myself, both from the UK and abroad, I believe it's a case of horses for courses. Wait too long to CQ and you will definitely irritate potential callers. But if your QSO rate is high, it certainly slows things down for everyone if you identify every QSO. What is particularly irritating to me is those CW contesters who assume everyone is avidly watching the Reverse Beacon Network and therefore knows the callsign – not necessarily so! But for DXpeditions, different rules apply – there is less urgency to make a contact than in contests, so a longer period between IDs can speed up the QSO rate.)*

nected to the radio (eg a direct metal connection to an aerial socket or a few turns of insulated wire around the aerial to form a gimmick capacitor)?

If the radio/SDR only has a Gimmick aerial, the sort you stick on the window, then I would suspect a direct metal connection of an outside longwire would overload the front end of the radio.

I had a problem with an inside aerial (a 20m dipole in the loft and an LED mains light bulb on the landing). The LED light bulb with the power on, no problem, no interference. With the power off the LED bulb would modulate the 1215kHz Virgin MW station with the mains 50Hz pick-up on the power wiring. The harmonics would appear around topband. The cure was to change the LED bulb for a filament one!

One thing I found out, check around your station first.

John Ashmore

Valve testing

Dear Don,

It was interesting to read **David Hodgkinson's** article in the November issue about testing thermionic valves. This sent my memory back to the early 1970s when I used to spend my pocket money on components for my latest projects from magazines such as *PW* from a wonderful shop in Derby, R.F. Potts, which is thankfully still open.

In those days, Potts had a valve tester and on Saturday mornings there'd be a queue of people waiting with bags full of valves from their faulty televisions that they wanted testing. If one proved to be faulty, they'd buy another one from Potts.

In those days as a 14-year-old, I didn't know much about valves, but years later when sharing the memory with a friend it suddenly struck me whether these people knew where the valves went back when they got home.

As I'm sure many readers will know there are various types of valve bases, B9A etc, which will accommodate many different types of valves. So, if you had several valves with the same base and you didn't know where they'd come from, then if the next step was to call in a television engineer, the fault symptoms could be baffling because the valves had been refitted in the wrong position.

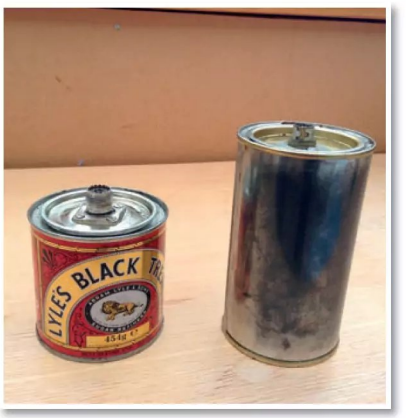
I came across a similar situation a few years later when I started repairing radios where somebody had tried fixing a car radio themselves and had put the AD161 and AD162 transistors, which were usually mounted on the back of the radio, back in the wrong position.

Chris Murphy M0HLS
Derbyshire

Dummyload

Dear Don,

Another excellent read, **Jim Bacon G3YLA** is also a member of the Norfolk Amateur Radio Club and is well known to viewers of Anglia Television and BBC Look East and as a weather presenter he would often include a local town or village for a local forecast and once mentioned the village of Barford near Norwich; it was the club's Barford rally that weekend! He is also a member of the club's licence training team.



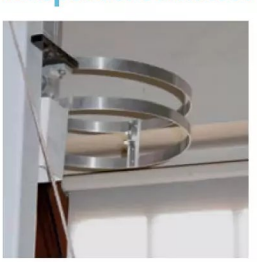
The letter from **Derek Bowden** takes me back. My first radio in the 1960s, a SK KW Atlanta, had TV coax sockets on the SWR meter and ATU and I constructed a 75Ω dummy load in a food tin. I can't remember what as the details have long gone but a more recent one, a 50Ω version with an SO259, does show the tin giving it a bit of humour.

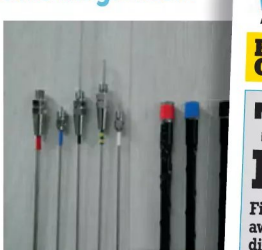
Both are constructed with a number of two-watt resistors in parallel in tins filled with engine oil for cooling and still show 75Ω and 50Ω resistance.

Paul Burgess G3VPT
Norwich

Next Month

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





PW 70MHz CONTEST RESULTS: Colin Redwood G6MXL has the results of the 2023 PW 70MHz Contest.

A REVIEW OF THE AMPRO MOBILE WHIP RANGE: Vince Lear G3TKN takes a look at this popular range of antennas.

ARECIBO & SAM HARRIS W1FJZ: Ray Howes G4OWY/G6AUW explores some history of the classic Arecibo radio telescope.

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

THE SKELETON SLOT ANTENNA HF - 440MHz: Ian Dilworth G3WRT describes modelling and building skeleton slot antennas for HF, 40, 50, 70, 144 and 433MHz, resulting in an exceptionally low profile omni 1dBd vertically polarised antenna.

LAB TUTORIAL: Jeff completes his explanation of capacitors, begun in the December issue.

SEASONAL QUIZ: We have our usual seasonal quiz for Christmas and the New Year.

Specials Throughout December

The new PROSET 7 has two large gel earpieces for a comfortable fit during extended wearing which also ensure a high level of suppression of ambient noise: 26dB attenuation according to manufacturer.

The headset is stereo, so that signals from two receivers (pileup and Dxpedition) can be listened to and leveled out via the integrated balance controller separately.

As with all other larger HEIL headsets there is a switch for one-sided phase reversal to turn the received signal 'in your head', and also to ease symptoms of fatigue during contest.

The PROSET 7 has a detachable connecting cable and is available either with dynamic microphone capsule HC-7 or with an electret capsule for ICOM. The microphones are interchangable so that one headset for both equipment lines can be used.

The Pro Set 7 requires an adapter cable AD-1 at additional cost. (these do not work with most icoms - see the adapter selector).

ML&S are the official UK importer for Heil Sound

The Heil PR 40 microphone boasts the widest frequency range of any dynamic mic in the Heil PR series. The PR 40 incorporates Heil's sage-like understanding of phasing plug placement, along with the use of a very large (1"), low mass diaphragm, and custom magnet metals housed in a specially designed microphone body.

The PR 40 diaphragm is shock mounted such that it is completely de-coupled from the anodized Champagne matte-finished steel body. In addition to dual mesh screens, each made with different diameter screen apertures, there is an internal breath blast filter on the diaphragm element itself, providing superb response for the human voice across the entire vocal range, without "popping" noises. In fact, the PR 40 will provide flawless, smooth, flat response from 28Hz all the way up to the 18kHz, making this a great microphone for everything from vocals, to bass drums and tom drums, to guitar and bass cabinet mic'ing and more.

In short, the PR 40 is known by professionals as the "thoroughbred work-horse" of professional sound recording and reinforcement.

The PR 40 is available in champagne, gold plate, or chrome plate. With all PR 40 models you get an adjustable cast metal microphone holder in a padded leatherette bag with molded foam insert.

We have special offers on THE WHOLE RANGE as Heil are running a promo until the end of this year. See www.HamRadio.co.uk/Heil

Nissei NS-1230D 30Amp PSU With Power Pole Connectors (MFJ-4230DMP)

Latest mini-30AMP 13.8VDC Power supply from Nissei with digital readout.
As featured on MLandS.TV channel, August 2018

New Dual output Power-Pole sockets on rear panel + Heavy Duty Binding posts on front panel.
Mini-Compact size
Short circuit and over-voltage protection
Output power rated at continuous service
Binding post output terminals
Precision regulation of output voltage
Low peak-peak ripple of less than 0.3%
External fuse access
High surge capacity
Heavy duty metal cabinet with power coating
LED Backlight

ML&S Price: £109.99

NISSEI Power Meters

For our NISSEI RANGE See www.HamRadio.co.uk/Nissei

Nissei DG-103 MAX

Digital Display SWR/Power Meter

This digital SWR & Watt meter is highly accurate for measuring Forward Power,Reflected Power, & VSWR.

Large LCD (3.5") display for easy of reading. Forward / Reflected power / VSWR ratio in one push button. Measurement, AM, SSB. LCD backlight display. Convenient control layout for easy operation. Packing gift box and DC 12V wire.

ML&S Price: £149.99

MARTIN LYNCH & SONS LTD
THE WORLD FAMOUS HAM RADIO STORE
Wessex House, Drake Avenue, Staines, Middlesex TW18 2AP
E-mail: sales@hamradio.co.uk
Opening Hours: Mon - Fri: 8.30am to 5pm. Sat: 9am to 4.30pm
Tel: 0345 2300 599
International Tel: +44 1932 567 333
www.HamRadio.co.uk
SAFE ONLINE SHOPPING. E&OE

Have you watched www.MLandS.TV yet?
Every week there's something new.

YouTube

Point your camera to this, the only QR Code for Ham Radio you'll ever need, it takes you directly to our web site!

- Buy stuff (any stuff) via our website & get **1% CREDIT** back on the money you spent after VAT
- You can use the **CREDIT** the next time you order via our website, or you can save your **CREDIT** for future purchases
- The **CREDIT** won't expire for a whole 12 months so you will have more than enough time to use it
- It's simple and it's **FREE**. You spend money with us via our website and we give you money back to spend on our website on further purchases. **For more information on our FREE MONEY offer see HamRadio.co.uk/CREDIT**

Carries the Yaesu genes for true RF performance

- **SDR circuit emphasizes Receiving Performance**
- **Powerful RF Front-End & Low Noise Oscillator Enable Phenomenal Multi-Signal Receiving Characteristics***
  - RMDR : 113dB+
  - BDR : 127dB+
  - 3rd IMDR : 102dB+
  - TX Phase Noise : −143dBc/Hz
- **Band-Pass-Filters dedicated for the amateur bands to eliminate out-of-band unwanted signals**
- **Built-in High-speed Automatic antenna tuner**
- **Effective QRM rejection by Dual-core DSP**

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

- **AESS** (Acoustic Enhanced Speaker System) with SP-40 speaker to create High-fidelity audio output
- **3DSS**, real-time 3-Dimentional Spectrum Stream presentation
- **High Resolution 4.3-inch TFT Colour Touch Panel Display**
- **VMI** (VFO Mode Indicator) shows the current operating mode
- **"PRESET" Mode functions most suitable for FT8 operation**
- **Equipped with the External Display terminal**

FT-710 AESS

- Includes External Speaker SP-40

FT-710 Field

- Includes Carrying Belt
- To use the AESS function, External Speaker SP-40 (Optional) is required

- 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

YAESU
Radio for Professionals

YAESU UK Ltd
Unit 12 Sun Valley Business Park, Winnall Close
Winchester, Hampshire SO23 0LB

For the latest Yaesu News , visit us on the internet at www.yaesu.co.uk

BATTLE OF BRITAIN

RAF OPERATIONS MANUAL

SAMPLE

JULY TO OCTOBER 1940

HOW SCIENCE, TECHNOLOGY AND DEFENCE SYSTEMS HELPED THE RAF WIN THE BATTLE OF BRITAIN

Warners Group Publications
The Maltings
West Street
Bourne
Lincolnshire
PE10 9PH
Tel: 01778 391000
Fax: 01778 392422
www.warnersgroup.co.uk

Design
Charlotte Bamford

Cover Photo: Hurricane pilots of 32 Squadron relaxing between sorties at RAF Hawkinge during the high summer of 1940.

Opposite: Sgt Pilot John McAdam sits astride the engine cowling of his 41 Squadron Spitfire Mk I. He survived the Battle of Britain only to be shot down and killed over Dover on 20 February 1941.

CONTENTS

INTRODUCTION

'This is the BBC Midnight News read by Alvar Lidell. Up to ten o'clock one hundred and seventy five German aircraft had been destroyed in today's raids over this country. Today was the most costly for the German air force for nearly a month. In daylight raids between three hundred and fifty and four hundred enemy aircraft were launched in two attacks against London and south-east England. About half of them were shot down.'

(BBC Home Service, Sunday 15 September 1940)

ABOVE: Prime Minister Winston Churchill: 'This was their finest hour.'

ABOVE: The Thin Blue Line: Hurricane pilots of 501 Squadron wait for the call to scramble in August 1940.

On 18 June 1940, before a packed House of Commons, Prime Minister Winston Churchill delivered one of his most famous pieces of oratory. He said: 'What General Weygand has called the Battle of France is over . . . the Battle of Britain is about to begin. Upon this battle depends the survival of Christian civilisation. Upon it depends our own British way of life, and the long continuity of our institutions and our Empire.' What he said was perhaps the very first time that the term 'Battle of Britain' was used. Ultimately, it would refer to a battle that stands very much in the British nation's consciousness as an epic and unequal struggle for survival, as well as being a worldwide landmark in the fight against tyranny and oppression.

Following the fall of France and the Low Countries, and the evacuation from Dunkirk, it was inevitable that the Germans would seek to invade and occupy the British Isles from its newly conquered territories. Ultimately, the German forces drew up plans for Operation Seelöwe (Sealion), which would comprise a seaborne and airborne invasion of Britain. It was, necessarily, a hastily put together plan and one that would have carried enormous military risks, particularly in view of the lack of specialised maritime assault and landing craft and the enormous threat posed by the Royal Navy who, as a significant maritime power, were in a position to wreak havoc upon any invasion fleet in the Dover Strait and English Channel. However, the Luftwaffe remained confident that its bomber force (and especially the Junkers 87 Stuka) would be able to deal with the concentration of British naval vessels interfering with the invasion. Indeed, the Stuka in

particular had already shown what it could do against shipping involved in Operation Dynamo, the evacuation from Dunkirk, and more recently in attacks on Channel convoys and shipping. However, the Luftwaffe's confidence perhaps presupposed one thing – that it had already wrested air superiority from the RAF. Thus, as soon as Luftwaffe forces were established and organised at their new bases across northern France, Belgium and in the Netherlands, so the air assault against the British Isles commenced and what Churchill had already referred to as the Battle of Britain got under way.

Officially, the Battle of Britain commenced on 10 July and ceased on 31 October 1940. However, these are entirely artificial dates that were set, post-war, by the British. In reality there was clearly no defined beginning or end to the battle. Initially, and in its 1941 publication on the Battle of Britain, the Air Ministry had stated the commencement date to have been 8 August 1940. Whilst there was some merit to the allocation of this date due to the first massed air assaults against British targets taking place (in this instance, coastal convoys) it was also the case, for example, that huge air attacks had also taken place on 4 July against Portland Royal Navy base and English Channel shipping. It was the former Commander-in-Chief (C-in-C) of RAF Fighter Command, Air Chief Marshal (ACM) Sir Hugh Dowding, who would later, and somewhat hesitantly, set the official and definitive battle dates in his 'Despatch on the Battle of Britain' to the London Gazette on 10 September 1946:

'It is difficult to fix the exact date on which the Battle of Britain can be said to have begun. Operations of various kinds merged into one another almost insensibly, and there are grounds for choosing the date of the 8 August, on which was made the first attack in force against laid objectives in this country, as the beginning of the Battle. On the other hand, the heavy attacks made against our Channel convoys probably constituted, in fact, the beginning of the German offensive; because the weight and scale of the attack indicates that the primary object was rather to bring our fighters to battle than to destroy the hulls and cargoes of the small ships engaged in the coastal trade. While we were fighting in Belgium and France, we suffered the disadvantage that even the temporary stoppage of an engine involved the loss of pilot and aircraft, whereas, in similar circumstances, the German pilot might be fighting again the same day, and his aircraft airborne in a matter of hours. 'In fighting over England these considerations were reversed, and the moral and material disadvantages of fighting over enemy country may well have determined the Germans to open the attack with a phase of fighting in which the advantages were more evenly balanced. I have, therefore, somewhat arbitrarily, chosen the events of 10 July as the opening of the battle. Although many attacks had previously been made on convoys, and even land objectives such as Portland, the 10 July saw the employment by the Germans of the first really big formation (70 aircraft) intended primarily to bring our fighter defence to battle on a large scale.'

However, the relative merits of commencement and end dates to this epic battle are somewhat academic. But, in setting the scene for this book it is important to understand that this was not a battle that began suddenly and came to dramatic halt on the achievement of a clear victory. In that respect, this was a battle perhaps quite unlike any other fought during the Second World War. It was also different, from Britain's perspective, because for the first time in the history of this nation it saw a battle fought out in full view of its population and with significant numbers of that population in the front line. Of course, the history of

that battle, and the Blitz that followed, have been covered in detail in countless works on the subject and it is not the purpose of this book to cover any of that ground. Instead, the aim of this book is to set out the planning, organisational and operational detail of how the RAF, and specifically Fighter Command, fought that battle.

Unlike the evacuation from Dunkirk, which was very much made up and on-the-hoof, RAF Fighter Command already operated within a fully integrated air defence system that had a comprehensive command and control organisation, comprising not only the fighter squadrons themselves but also radar, the Observer Corps, Balloon Command and Anti-Aircraft Command. To a certain extent, defeat in France had been brought about through the lack of any such centralised and coordinated command and control structure in the French air defence system. It would be a different story during the defence of the British Isles during the Battle of Britain, though.

This book, then, looks in detail at how that system worked and how all of the parts of the system meshed together in order to allow RAF Fighter Command, hard-pressed and outnumbered, to fight the Luftwaffe in an organised and effective fashion. Not always, however, did the system work exactly as planned but it has often been said that a battle plan rarely survives first contact with the enemy. Without that 'battle plan', though, the air defence of Britain in 1940 could not have had a successful outcome and this detailed examination also looks at the nuts and bolts and minutiae of the system – the weapons, tactics, operational procedures, equipment, terminology, individual units and organisations, casualties, the commanders and other participants.

BELOW: The aggressors: Reichsmarschal Hermann Göring inspects Luftwaffe bomber crews of Kampfgeschwader 76 at Beauvais in northern France during the Battle of Britian.

THE AIR DEFENCE OF GREAT BRITAIN

PROTECTING BRITAIN'S SKIES

The air defence of Great Britain in the Battle of Britain was based around the 'Dowding System', providing an organised plan of defences in the air and from the ground, and with a centralised command and control structure. This had largely been developed since Fighter Command's creation, with Dowding in charge.

ABOVE: Although pictured here in 1941 when the organisation had become the Royal Observer Corps, this photograph of an Observer Post in the Watford Group is typical of the Battle of Britain period.

In considering the overall picture of the air defence of Great Britain during 1940 and the Battle of Britain, RAF Fighter Command may be regarded to have been at the sharp end of that defence. However, elements other than direct fighter protection were very much part of the integrated air defence system, although overall control of the entire system rested with Fighter Command. In order to better understand how each part of the air defence plan worked, the organisational chart and command structure shown above gives a simplified over-view of the system.

Radar

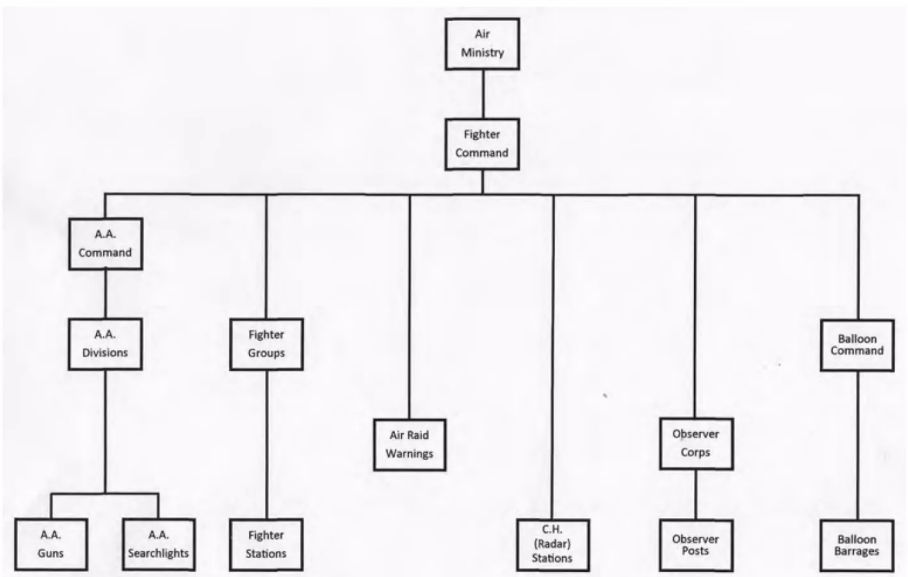
The radar-based system of early warning, interception and control

'All the ascendancy of the Hurricanes and Spitfires would have been fruitless but for this system which had been devised and built before the war. It had been shaped and refined in constant action, and all was now fused together into a most elaborate instrument of war, the like of which existed nowhere in the world.'

(Winston S. Churchill)

Britain's system of early warning, interception and control has widely been called the 'Dowding System' after the C-in-C of RAF Fighter Command who instigated its planning and implementation in the years immediately before the war. This system, the first of its kind in the world, comprised a network that stretched from the northernmost parts of Scotland down to the south coast of England. Although the inner workings of Fighter Command's system of command and control remained a closely guarded secret throughout the war, a surprising public glimpse of the system was given in 1941 when the illustrated HMSO booklet, The Battle of Britain: August–October 1940, was published with its outline of the system. However, the schematic diagram was somewhat economical with its detail and, importantly, it left out one particular element from the explanation of how the organisation worked – radar.

Although the Germans were far from being unaware of radar, and were indeed developing and using systems of their own, their failure to understand its role within the command and control structure of Fighter Command placed them at a most serious disadvantage during the Battle of Britain. However, they were more than aware of the chain of radar stations which had sprung up around Britain's coast during the late 1930s sporting huge arrays of aerials and concrete bunkers, and although they acknowledged these sites to be significant they did not fully appreciate to what extent. For this reason, perhaps, their concentration of attacks on them was somewhat piecemeal and rather lacklustre in effort. That said, the relatively few attacks mounted by the Luftwaffe on these sites did have some



BELOW: Organisational chart showing the air defence of Great Britian in 1940 with RAF Fighter Command at the 'sharp end' (All photographs and illustrations are from the author's collection unless credited otherwise)

AVAILABLE ON READLY NOW!

SEARCH ‘Battle of Britain RAF Operations Manual’ TO CONTINUE READING