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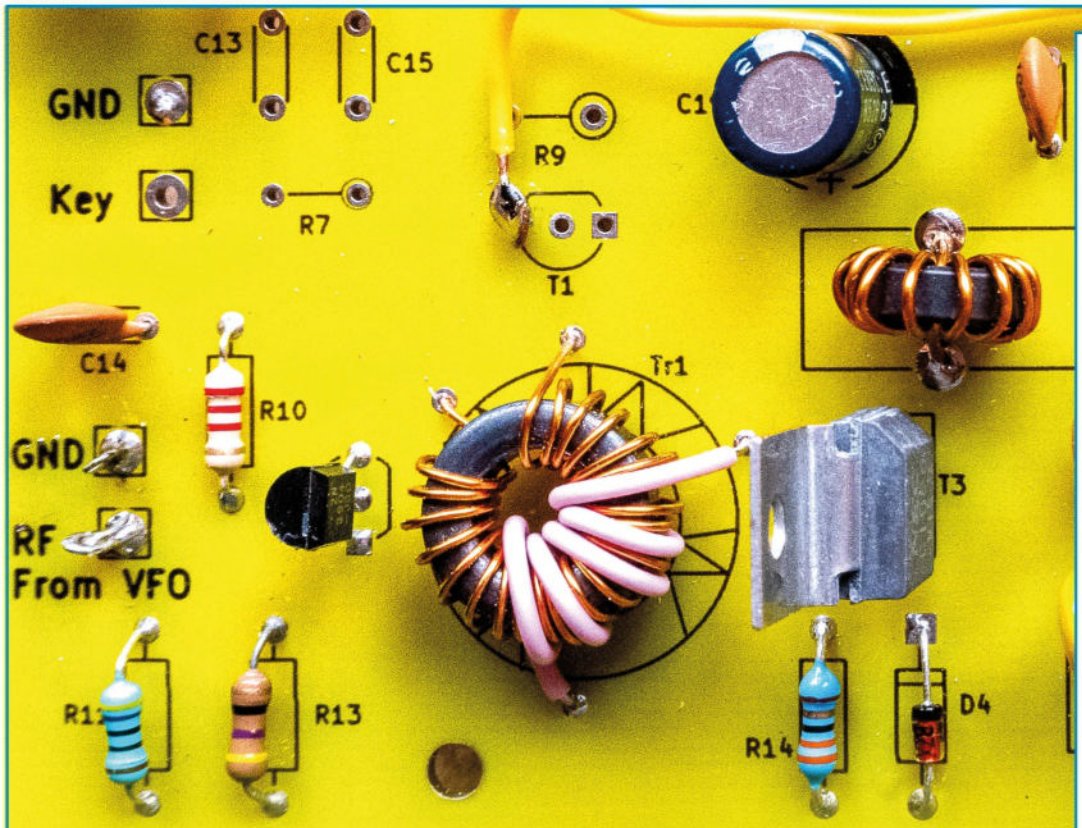

PROJECT QRP

How to complete the build of our SCD QRP transceiver and connect the various modules

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A design for this handy shack test instrument you can make

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TEST Adventures with the Quansheng UV-5K(8)

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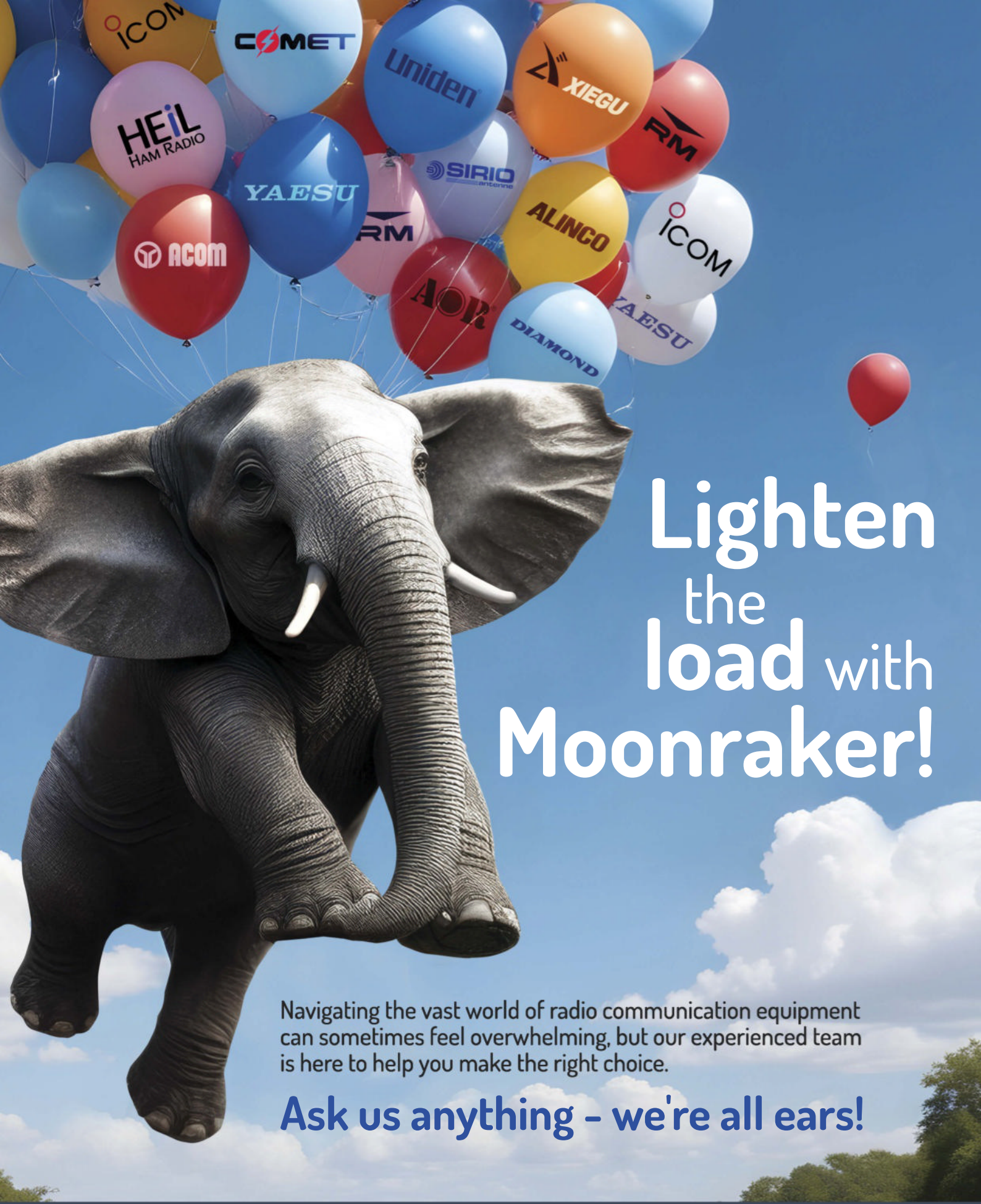

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Keylines

It's nice to have some decent weather at last and it enabled me to get my three-element SteppIR antenna back in the air. Now I just need to get back on the HF bands and make good use of it!

ISWL and NRC profiles

I'm pleased to have two (very different) profiles this month – one of the National Radio Centre, which I was to an extent involved in setting up when I was on the RSGB Board, and one of the International Short Wave League (ISWL), an international (but UK-based) club that has been in existence for a very long time and which is still thriving. I joined the ISWL in my early years in radio, when my main interest was still broadcast band DXing, and even ended up writing a regular column for their magazine Monitor. I eventually let my membership lapse but it's good to see they are still going strong.

Flannans in August

Another item that brought back memories is the news (in *HF Highlights*) that a group of five operators will activate the Flannan Islands in early August. With **Martin G3ZAY**, **Andrew G0HSD** and others I took part in the first activation of the Flannans, back in 1989. We then went on to St Kilda for some additional fun. Activating either island group can be a challenge as the weather off that west coast of Scotland can be pretty extreme!

Moxon antennas

And yet another item to catch my eye was this month's *Amateur Radio on a Budget* in which **Daimon G4USI** describes how to build a Moxon antenna for the 10m band. The late **Les Moxon G6XN** was quite an antenna guru and the so-called Moxon antenna is a two-element beam with the ends folded in to save space but without any significant compromise in performance over a full-size two-element Yagi. I have never used one myself but my friend **Alan G3XAQ** was using one on 10m to good effect when we were in Uganda earlier this year and used a 20m version when we were together in the Gambia a few years ago. I believe he has also used a 40m version at his home QTH. They do seem to be an effective way of saving space.

A Twitter/X type of section in PW?

PW reader **Vince M0KVW** has written with the thought about having a section in *PW* where readers send in short 'snippets' from articles or items they have seen on the internet. He says, *"In this day and age the internet is a wonderful source of information and ideas and, of course, radio communications and technology related topics could be a rich source for a section in* PW. *The advantage of this short-and-sweet (hopefully) approach is that many* PW *readers would feel confident on sending in their 'bite-size' contribution where a full-blown article might be a step too far for them".*

I take Vince's point – some of these items would perhaps be most suitable for our *News* pages, some could be compiled into a section of their own. I'm willing to give it a try. I certainly can't be expected to find all suitable *News* and related items myself and they can be on a much wider range of topics than simply product or club news provided they are radio-related and likely to be of interest to at least a section of our readership. I look forward to receiving some contributions!

This month

My apologies that once again I have had to hold over a couple of the promised articles. They will appear next month. The good news is that I have plenty of material to hand (though don't let that discourage you from sending more in!), partly I suspect because other than *RadCom*, we are the only remaining amateur radio magazine in the UK, a significant drop from the several monthly amateur radio magazines that existed in the past and particularly during the 1980s and 90s. That said, I was sorry to see that *CQ Magazine* in the US, their only remaining independent amateur radio magazine, appears to have ceased publication for good. This is surprising considering the much large population of radio amateurs in the USA and the larger number of potential advertisers. I'm not clear what led to the final nail in the coffin but it does seem a shame that a country like the USA can no longer sustain at least one independent publication.

Don Field G3XTT
Editor, *Practical Wireless* Magazine

Contents

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Newsdesk

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

International Amateur Radio Union Elections

The International Amateur Radio Union (IARU) has re-elected **Timothy Ellam VE6SH/G4HUA** as President and elected **Thomas Wrede DF2OO** as Vice President. Both will serve five-year terms that began 9 May 2024. Ellam begins his fourth term as President. Wrede has been active in IARU matters for several years and has managed the Deutscher Amateur Radio Club (DARC) international affairs team since 2009.

The International Amateur Radio Union (IARU) is the worldwide federation of national amateur radio organisations. The membership of the IARU consists of more than 160 member-societies in as many countries and separate territories.

International Dog Day

PW readers include many who share their lives with pets, many of them with dogs of one sort or another. Many enjoy working special event stations (SES) as well!

International Dog Day is celebrated annually on 26. August. For several years now this special day has been marked by Special Event Station stations on the amateur bands. It began with **Hanz YL3JD** on the air with YL1DOG.

Last year the number taking part had grown. **Chris G5VZ** says, *"Here in UK I put on GB0DOG. After a brief chat about the event **David G4YVM** was given SES GB4DOG. This year – 2024 – is looking to be the biggest year yet. With European stations again taking part and several American operators joining in, too."* **Caryn KD2GUT** is coordinating a US team, activating K2D on both CW and SSB.

GB0DOG will be QRV on HF bands from 29 July through until Dog Day on 26 August. The original YL1DOG is scheduled to operate during all of August and September. Hanz will also be participating in contests using this special call.

International Dog Day is primarily to focus on man's best friend. It is also a reminder that we can all encourage the care and well-being of dogs everywhere and to promote adoption of dogs. Here in UK there are many local dog rescue resources. There are larger national charities as well, such as The Dogs Trust, the RSPCA, and Blue Cross.

A full list of participating stations, and their special calls, can be found on the website: dogdayradio.org

and on the YL1DOG page coordinated by Hanz YL3JD, at:

www.qrz.com/db/YL1DOG

Earlier in the same month, Cat Day is now marked on 8 August. This year there are also some cat SES operations, including YL1CAT operated by **Yevgeniy YL2TD**, GB4CAT operated by **Ed M0MNG**, and GB9CAT by **Simon G0FOZ**.

TX Factor episode 30 – 10th anniversary!

The 30th episode of *TX Factor* is now available, and marks the 10th anniversary of this series of amateur radio videos.

Bob G0FGX demonstrates the Groundstation 2 from DX Patrol in the first of a two-part feature on operating via the QO-100 geostationary satellite. He looks at the hardware and software needed to achieve your first QSO at home or out mobile. The team visit the new QTH of the Sidmouth Amateur Radio Society and meet **Dave Lee G6XUV** who helped SARS to secure a derelict former sports social club from the local town council and renovate it into a community hub and club QTH. Bob reviews the latest mobile transceiver from Yaesu, the FTM-500D, and demonstrates the many advanced features of this versatile FM and digital rig.

As always, there is the *TX Factor* free-to-enter draw with a chance to win three RSGB publications.

www.txfactor.co.uk

Important changes to the GB3OV 70cm Repeater

On 30 June the GB3OV Repeater situated in the Ouse Valley was due to have a system upgrade, which will mean that the usual receive and transmit frequencies will change to match most of the UK repeaters. Details of the changeover frequencies, CTCSS and split are published on the HARS website under the GB3OV Repeater tab. The website can be found by searching Hunts-Hams or: **http://hunts-hams.weebly.com/gb3ov-repeater.html**

The GB3OV Repeater has been running since 24 November 1985 using TAIT 300 Series Base Modules on the same site so now is the time to upgrade with modern equipment, which will see users benefitting from better coverage and. GB3OV is one of the most used repeaters in East Anglia due to its location. HARS would like to thank all the users past, present and in the future for making use of the facility."

Workington & District Amateur Radio Club supports North Fells District Scout Camp

The picturesque Ratlingate campsite near Carlisle buzzed with excitement and curiosity over the weekend of 7 to 9 June, as the North Fells District Scout Camp unfolded. Approximately 70 scouts, along with their leaders and volunteers, gathered for an event filled with adventure and learning. Among the many highlights of this weekend was the presence of members from the Workington & District Amateur Radio Club, who were invited to facilitate a series of communication-based activities for the young attendees.

Hands-On Radio Communication: The club members set up a mast and dipoles for 80m and 40m and had use of an Elecraft K3 and hand-held radios to introduce the scouts to the fascinating world of amateur radio. They provided hands-on experiences that allowed the youngsters to engage directly with radio equipment, fostering both curiosity and basic technical understanding. Scouts learned about the fundamentals of radio waves, how to operate different types of radio equipment, and the importance of communication in emergency situations.

Activities and Demonstrations: Throughout the weekend, the scouts participated in a variety of activities, including:

HF and VHF Communication: Demonstrations on High Frequency (HF) and Very High Frequency (VHF) radios showed the scouts how to communicate over long and short distances. A small number of calls were made using club call MX0WRC.

Morse Code Demonstration: Scouts were thrilled to learn the basics of Morse code, understanding its history and significance, and even trying their hand at sending and receiving messages. Many of the younger attendees were particularly amused with a Morse code game.

Video and QSLCard Exhibition: Several videos were on display to provide a range of topics to demonstrate the diverse and fascinating world of amateur radio and included a recording of astronaut **Jasmin Moghbeli** answering questions put by children of St. Thanet CE School during a pass of the ISS during October of last year. A collection of QSL cards was also available together with leaflets and badges provided by the RSGB.

Engagement and Education: Members of the Workington & District Amateur Radio Club were delighted to be able to share their passion for radio communication and to be able to contribute to the educational activities of the scouts over the weekend. They emphasised the role of amateur radio in fostering international friendship and providing a crucial service during emergencies.

Positive Impact: Leaders and volunteers from the various scout groups within the area praised the initiative, noting how it may have inspired some scouts to consider pursuing amateur radio as a hobby. The practical skills and knowledge gained from these activities not only enriched their camping experience but also helped to equip them with some valuable life skills.

Looking Ahead: The Workington & District Amateur Radio Club looks forward to future opportunities to engage with the community, particularly in educational settings such as the North Fells District Scout Camp. By sparking an interest in radio communications among the youth, the club hopes to nurture the next generation of amateur radio enthusiasts who will continue to explore and innovate in this field.

In summary, the weekend at Ratlingate Scout Campsite was a remarkable blend of fun, learning, and community spirit, showcasing the power of amateur radio to educate and inspire. The Workington & District Amateur Radio Club is proud to have played a role in this successful event and eagerly anticipates future collaborations with local scout groups and others.

Our thanks to **Fiona Woodward**, DC North Fells District Scout Camp, to leaders and volunteers who made us welcome and provided us with refreshments and support during our time at the camp. Thanks to **Stuart M0BCV** and **Peter G8RZ**, who provided equipment and invaluable help at the event. Also, thanks to **Dean M7DSU** and his daughter who provided much appreciated help to print and produce booklets to hand out at very short notice.

The Workington & District Amateur Radio Club meets at 7pm on the first and third Wednesday of each month at Moorclose Community Centre, Workington.

RSGB'S NEW TROPHY MANAGER: The RSGB have announced that **Mike Franklin G3VYI** will be the new RSGB Trophy Manager. He will focus on the Contest Trophy collection and RSGB HQ will now manage the AGM Trophies. **Jacqui Goodey G6XSY**, the retiring RSGB Trophy Manager, will support Mike's transition into this role. She will also take responsibility for the historical aspect of our trophies. You can contact Mike via trophy.manager@rsgb.org.uk, and Jacqui can be reached on trophy.archivist@rsgb.org.uk The RSGB thanks Mike and Jacqui for volunteering for this important work.

80TH ANNIVERSARY OF D-DAY: On 6 June, the 80th anniversary of D-Day, Furness Amateur Radio Society (FARS) using the special event callsign GB0DAY contacted the special event station TM80PB manned by members of the Vintage Military Radio Society (VMARS), located at Pegasus Bridge in Normandy. Pegasus Bridge, over the River Orne was the target for British Airborne troops, whose objective was to hold the bridge intact to facilitate the allied invasion. It is now a war memorial dedicated to those that safeguarded it behind enemy lines.

The location of FARS members was on a WWII tug that is moored in the Duddon Estuary. The tug (TID43) was involved with movements on D-Day so it was a fitting location to operate from and to remember the events of 80 years ago. Equipment is a WWII Command receiver and transmitter, running 20 watts of AM running on a Dyno Motor from the tug's 24V batteries, both were made in 1943, the same year that the tug was built.

Among the 60 plus other radio stations on the air one was located at the now closed RAF Henlow museum. It was good to hear special stations on the air representing all three armed forces. Including the Sunday operation, 400 contacts were made.

FARS members expressed their thanks to **Dave Keenan** for allowing us to use his boat and also to Duddon Inshore Rescue for their assistance with the operation.

CHANGES TO THE FOUR-YEAR PLANNING RULE IN ENGLAND: (from *ICQ Podcast*) The four-year planning rule has offered a degree of protection for antennas and masts that have been erected without planning permission. Under this rule any installations which had been installed and unchanged for four years or more were protected against planning enforcement action. However, as of 25 April 2024, this rule ceased to exist in its current form in England under changes introduced under the Levelling-up and Regeneration Act 2023. The rule has been replaced by a more stringent ten-year period for the exemption from enforcement for residential dwellings. This change does not affect Wales, Scotland and Northern Ireland where the four-year rule will continue to apply. Any installation that was substantially completed prior to the introduction of the Act will still be subject to the four-year rule meaning, for most radio amateurs, the ten-year rule will not apply until 24 April 2028.

For more information on planning matters visit: **www.rsgb.org/planning**

FALKIRK WHEEL SPECIAL EVENT STATION: On the weekend of 25/26 August, as part of the BIWOTA (British Inland Waterways on the Air) event, Livingston and District Amateur Radio Society (LaDARS) will be running an exhibition station at the Falkirk Wheel, hosted by Scottish Canals. The Falkirk Wheel is one of two boat lifts in the UK and the only rotating boat lift in the world. It was built as part of the Millennium project to replace a derelict flight of 11 locks which connected the Union canal with the Forth and Clyde canal. This now enables direct inland waterway access between Scotland's two largest cities, Edinburgh and Glasgow.

LaDARS requested and received the SES call GB0FW for use over the weekend, and we will operate three HF stations (CW, Phone and SSTV) and a VHF station (FM or DMR) from a site overlooking the canal basin. We will also maintain a listening post by the visitor centre at the Wheel and offer visitors the opportunity to talk over the air according to the new licence conditions. We shall be operating while the Wheel is open (9.45am to 6pm). We will welcome any amateurs to come by to chat or even the chance to operate a station with an SES callsign.

For further information on the Falkirk Wheel visit: **https://tinyurl.com/4wa94nr3**

For further information on LaDARS visit: **www.ladars.org.uk**

BRITISH SCIENCE WEEK – CALL FOR AMATEUR RADIO IDEAS: The RSGB is asking radio amateurs to share their ideas on the theme of 'Change and adapt', as part of plans for British Science Week 2025. The event is run by the British Science Association and celebrates science, technology, engineering and maths. The 2025 theme offers a huge range of opportunities for creativity and discovery. Ideas could cover any area from construction to propagation, from making QSOs under supervision, to space and satellites. This is a chance to show young people in schools, or anyone in your local community, just how interesting and enjoyable amateur radio can be. While 2025 might feel a long way off, the Society is collecting ideas now so schools and groups have plenty of time to prepare. Please send ideas to the RSGB British Science Week Coordinator **Ian Neal M0KEO** at bsw@rsgb.org.uk To find out more about previous year's activities, or next year's theme, you can visit: **rsgb.org/bsw**

BOOK REVIEW : War Diaries, Volodymyr Gurtovy US7IGN, 2022 ISBN 9798363068096 (by **Dr Jonathan Hare G1EXG**) This book is an account of living in Kyiv during the first six months or so of the Ukrainian war. **Mr Gurtovy** takes us through the many lows such as the harrowing nighttime bombings, to the little highs such as baking his own bread. He struggles to keep sane while chaos unfolds around him. His family has escaped to Poland and we learn how his skill at electronics and the wonderful hobby of amateur radio that helps keep him going.

This is not a political book, although of course it's impossible not to have opinions and views on the crisis. Rather, this book is more an account of the challenges individuals and families have to face in adversity: to keep going.

Some parts of diaries are not always interesting to read ... not until later on. Toward the end of his life my great uncle **Mark Hayler** read through all his diaries and edited them down into one volume, destroying the rest. He focused on the national events of the day as he thought they would be important and interesting, removing much of the 'day to day' entries. This was a shame, because large events are almost always well written about and it's the 'day to day' things that are so very interesting to read later on. This is because the 'day to day' is real history, actually lived. Because of this, I am sure Mr Gurtovy's diaries will add to the important Ukrainian historical documents of this time.

There is still much magic about sending signals from one country to another using radio, but in this book you also learn how amateur radio and the internet can be a creative way in which humans communicate, support and care for each other in difficult circumstances.

I thoroughly recommend Mr Gurtovy's *War Diaries* and although at times they are obviously painful to read, I look forward to more of his writing.

THE RADIO AMATEUR OLD TIMERS' ASSOCIATION: The Summer 2024 edition of our quarterly magazine (*OTNews*) has been posted to our members and also an audio version to members with limited vision. We intend to have a stand at the Newark Hamfest again this year, where we will be launching our latest *OTNews* archive in USB format instead of CD, alongside all our other publications.

To find out more about our magazine and our organisation, visit: **www.raota.org**

Secrets & Broadcasts

David Harris reviews a book about a pioneer female broadcaster with quite a life story.

David Harris
mydogisfinn@gmail.com

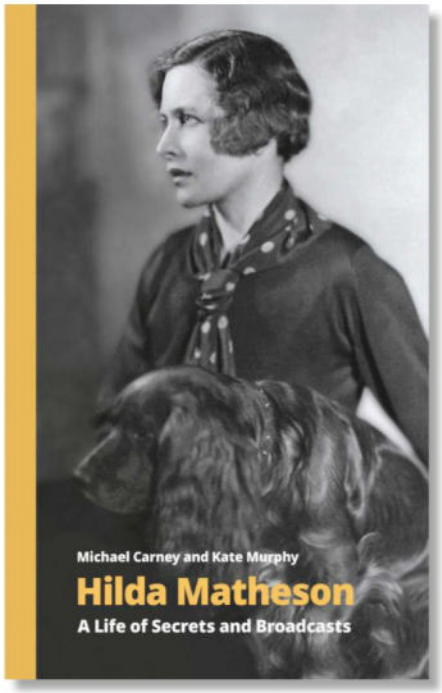
This life of pioneer broadcaster **Hilda Matheson** (1888 – 1940) was first privately published in 1999. It has been reprinted by Handheld Press and includes an additional chapter by **Kate Murphy**. She is a writer, broadcaster and academic who in 2016 published *Behind the Wireless: A History of Early Women at the BBC*. (See my review in *RadioUser* November 2016)

Hilda Matheson worked for the BBC from 1926 -1931 and was responsible for shaping the content of talk programmes on radio, which led to the distinct format of public service broadcasting. Her influence was long lasting and her legacy included radio programmes which she founded and are still broadcast today such as *The Week in Westminster*.

Hilda was born into a comfortable middle-class family. Her father was a Presbyterian minister and she was able to study history at Oxford University. On graduating she worked for the historian **HAL Fisher** and the Ashmolean Museum. During the First World War she was recruited by the Special Intelligence Directorate (now MI5) to work on people suspected of being German spies. As part of her work she is sent to Italy to help set up an MI5 office. After the war she works for **Lady Astor** (1879 -1964) who was the first woman in the UK to take a seat in parliament. She worked closely with her on issues such as Women's Rights, Child health and alcohol abuse.

In 1926 she joins the BBC as its most senior female employee on a salary of £900. She is promoted in 1927 to Director of Talks and established the basis of what was to ultimately become BBC Radio 3 and BBC Radio 4. Her success was attributable to her formidable intellect, tenacity and extensive network of well-connected people. The BBC was founded in 1922 as a completely new business with no traditions and no grand plan, beyond **Reith's** aims to educate, inform and entertain. At the time many types of employment were closed to women or presented barriers but the BBC was able to recruit on merit, although many of its female employees had establishment connections.

Hilda grew her department to include reviews, talks by government departments, official bulletins and news. Up until 1928 the BBC did not report the news but merely read out press agency bulletins This was done initially as a way of protecting newspapers from this new media. By 1930 the BBC began to proactively report news. From 1922 up until 1940, when a Forces Channel (which became the Light Programme, now Radio 2) was established there was only one radio channel in the UK. There was much debate about programme content as to whether highbrow programmes which sought to educate should predominate or give way to populist entertainment content. This debate continues today with recent criticism of BBC Radio 3 for dumbing down and trying to emulate the much more popular commercial station Classic FM. Through her connections Hilda was able to attract many of the leading thinkers of the day such as **George Bernard Shaw** and **H G Wells** to give talks.



Hilda Matheson. A Life of Secrets and Broadcasts by Michael Carney and Kate Murphy. Handheld Press. £13.99. 260 pp. Pbk. 2023.

Even in those early days of broadcasting there were conflicts within the BBC about its direction and political bias. There was debate about whether the BBC should present only a middle way on controversial issues or allow speakers with radically opposing viewpoints to make their case. There was also a great deal of moral censorship. Hilda wanted to give academics the opportunity to broadcast about controversial authors such as **James Joyce** and **DH Lawrence** but this was seen as being too radical for the time. She began to clash with the Director General Lord Reith and in December 1931 she resigns from the BBC.

She finds works writing about broadcasting for *Weekend Review*. Among the topics she covered were audience research, control of the radio spectrum, political broadcasting and the Art Nouveau styling of radio receiver cabinets. In 1933 she publishes *Broadcasting,* which was part of a series of introductory books by the Home University Library. In 1933 she starts work on *An African Survey: A Study of Problems Arising in Africa South of the Sahara by Lord Hailey,* which is a massive study of existing knowledge about Africa and its problems and solutions. The survey was eventually published by Oxford University Press in 1938 as a 2,000-page book. She became the chief of staff for the project overseeing the numerous specialist contributors to this project. She was awarded the OBE in 1939 for her role in the project. The work was republished in a revised form in 1957 and is widely available from second-hand booksellers.

> **"At the time many types of employment were closed to women or presented barriers but the BBC was able to recruit on merit, although many of its female employees had establishment connections."**

In 1939 with war looming Hilda is recruited by MI6 as a propagandist. She becomes Director of the Joint Broadcasting Committee (JBC), which was an arm of the Foreign Office that produced propaganda and publicity about Britain aimed at other countries. The JBC prepared radio scripts and broadcasts that gave a favourable impression of Britain and were aired by foreign radio stations. The JBC had greater freedom than the BBC in choosing content.

Hilda had a complex private life which involved many affairs with women, including the writer, poet and garden designer **Vita Sackville-West** (1892 -1962). Her very full life came to an end in 1940 when she died of Graves' disease, an *immune system disorder that results in the overproduction of thyroid* hormones (hyperthyroidism).

The final chapter of the book by Kate Murphy looks in more depth at her early career working with Lady Astor. It also traces her relationships with the many women in her life. In 1940 a privately produced book of tributes to Hilda was published. Kate Murphy chooses the words of **Marjorie Maxse** who described her as *"The fine spirit, the utter selflessness, eager mind and unfailing humanity of Hilda Matheson."* **PW**

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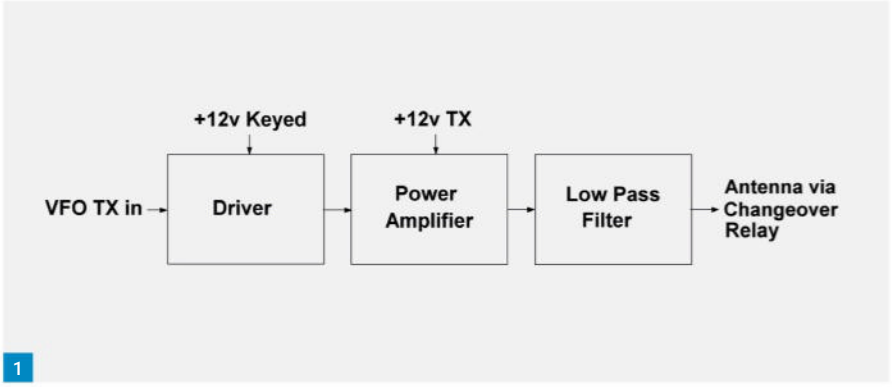

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The G3RJV SCD QRP Transceiver Revisited (Pt V)

Steve Hartley G0FUW completes the build of the SCD QRP transceiver, describing the transmitter module and how the various modules interconnect.

Just as a quick recap, Part 1 of this series provided the basic project overview. Part 2 covered the construction details for the VFO, then Part 3 covered the receiver section. Part 4 was about the changeover, sidetone and RIT sections. This part covers the transmitter section. Combined with the other boards this forms a complete transceiver. There are also some suggestions for boxing it all up to make it look and feel more like a radio, rather than just a collection of PCBs.

Transmitter module circuit description

Fig. 1 shows a block diagram of the transmitter board. The original SCD transmitter, described in the January 1980 edition of *Short Wave Magazine*, had a crystal controlled oscillator, a buffer amplifier, a driver amplifier and a power amplifier (PA).

In June/July 1981 *Short Wave Magazine*, a 'deluxe' version replaced the oscillator and the buffer amp with a VFO and added a PNP keying transistor. This 'revisited' version more closely follows the 1981 line-up but with the keying done on another module (see Part 4) and the driver is coupled to the PA in a slightly different way as this was found to be more reliable.

The coupling transformer is now placed in the driver collector circuit and a small value resistor is connected between the base of the PA transistor and ground. This configuration works very well and can be found in the well-known 'Twofer' circuit and also in the G-QRP Club *Limerick Sudden* transmitter kits; both fully endorsed by **George G3RJV**, the originator of the SCD project.

The output circuit has also been updated. A 33V Zener diode provides some protection against a high SWR. Whether this is needed is debatable, but for the sake of an extra diode, it seems daft not to include it.

***Note**: The commercial PCB has provision for the original PNP transistor keying circuit, should you wish to build the transmitter module for use without the Changeover and Sidetone module. Details of the 'missing' circuit are provided after the main build. Just to be 100% clear, if you are using all of the modules from this* PW *series, T1 and the associated parts are not required.*

Finally, a 60m low pass filter using W3NQN high performance low pass filter values ensures that any harmonics from the Class C power amp are supressed to a very low level. Component values for other bands are available from the G-QRP Club website:

www.gqrp.com/Datasheet_W3NQN.pdf

The prototype produced a good 3 or 4W RF output on 3.5MHz, 5MHz, 7MHz and 10MHz. Tests on 14MHz showed it was running out of steam by that point and the output was down to a couple of watts, which is still capable of making QRP contacts.

Building instructions

Fig. 2 shows the transmitter circuit diagram without keying circuit, while the Parts List appears at **Table 1**.

The PA transistor T3 is far from critical. The original circuit used a BFY51, or a 2N3053, but those have become quite scarce, and a tad expensive when you do find them. In another *Short Wave Magazine* article, in February 1987, G3RJV moved his SCD PA to 'an altogether beefier device, the 2SC1096'. That transistor is still available if you look hard enough, and are willing to pay a few pounds per device. However, the good news is that very similar performance has been had from the readily available BD139, and the house marked '2N3866' transistor that the G-QRP Club supplies for free to its members. The 'beefier' 2SC1096 seems quite happy without a heatsink, but the other options do need something to keep them reasonably cool; take care with the BD139 as the back of the transistor is connected to the collector and is therefore 'live'.

Most parts are available from G-QRP Club Sales. Non-members should be able to purchase from the likes of Rapid Electronics, CPC Farnell, Bowood Electronics, JAB electronics and/or Spectrum Communications.

Let's melt some solder!

As I said in Part 1, I am a great advocate of building a bit and testing it before building some more. That way you can narrow down any issues to the section you built since the last successful test. This board is another good example of using that technique.

In this case, we first build the driver stage, then the power amp and finally the low pass filter.

Work your way through the parts list and tick them off as you go. It is worth pausing after each stage, to compare your board with the relevant photo and correct any misplaced parts before moving on.

I cannot stress enough the need to check, check and check again, that you have the right part in the right place before you solder it; it is so much easier to make changes before soldering!

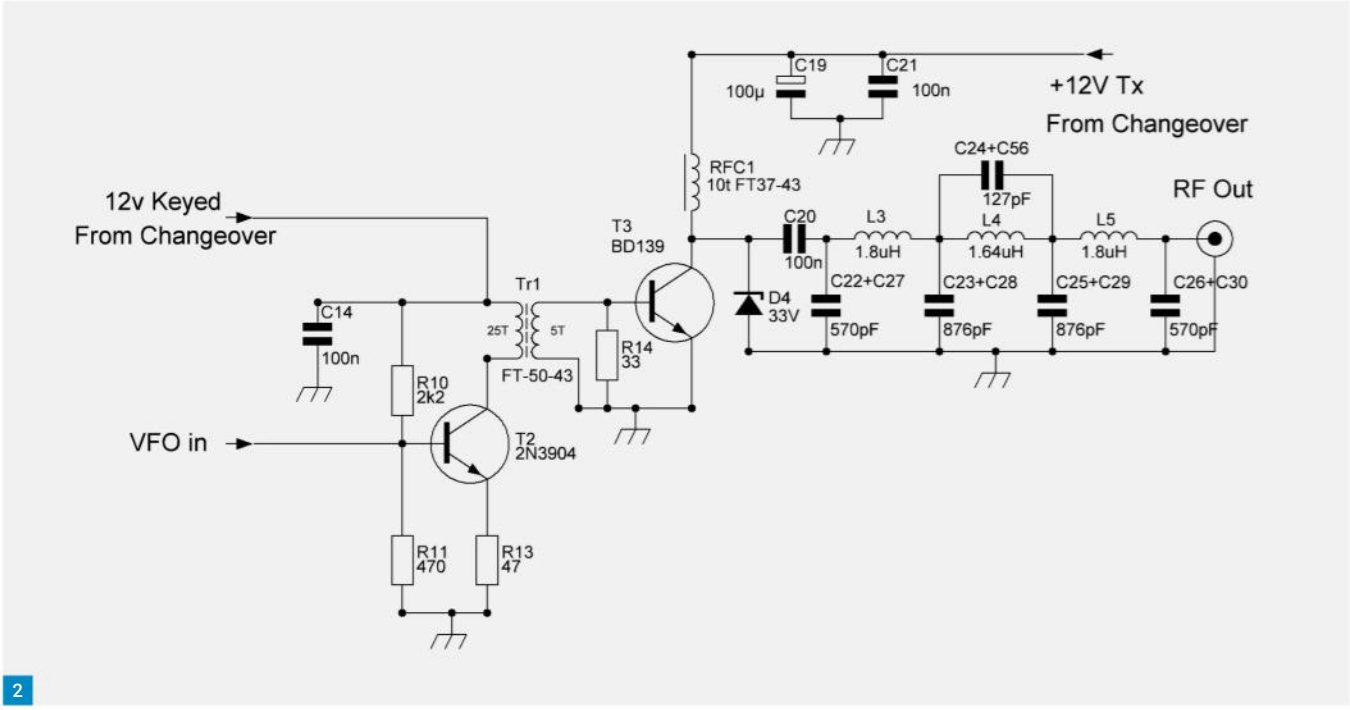
A wee reminder that all parts should sit on, or just above the surface of the printed circuit board.

Driver Stage

A build checklist appears as **Table 2** and a photo of the finished driver board as **Fig. 3**.

If you are using the G-QRP commercial PCB, you will need to make a connection point for the +12V keyed to be applied to the driver. To do this, I used a piece of thin waste resistor lead, folded over to form a loop and inserted into the hole that would have the Collector of T1 in it, had the original on-board keying stage been used. Splaying the ends of the loop on the underside of the board prevents it falling out while you solder it in place. You can see it in place in the photo.

***Note**: the enamelled copper wire on Tr1 is a common cause of poor joints. You may need to*



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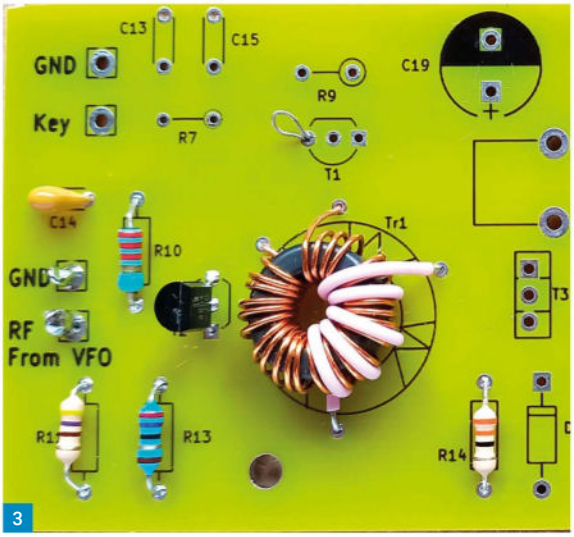

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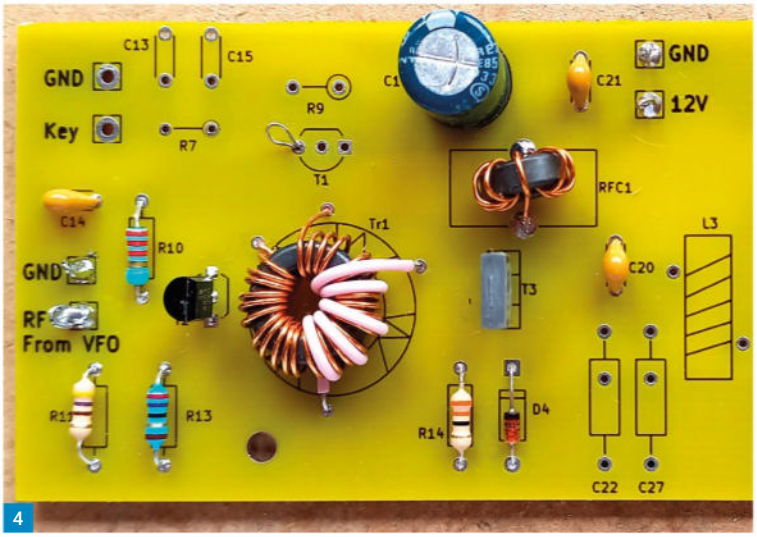

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Fig. 1: Block diagram of the transmitter board. Fig. 2: Transmitter circuit diagram without keying circuit. Fig. 3: A completed Driver stage. Fig. 4: A completed Driver & PA stages (BD139 heatsink not fitted for clarity).

keep the soldering iron in place for a good few seconds to ensure the enamel burns off. Before applying power, it is worth using a continuity setting on your multimeter to check that there is a good connection from the '+12V Keyed' connector to the collector of T2.

At this stage it is worth taking a break and then coming back to cast an eye over the parts to make sure they are in the right places, and to check the soldering for any leads you may have missed, or any unintended solder bridges. If all is well, move on to the testing.

Testing

First of all, connect a temporary lead between the ground of the PCB to the negative terminal of your battery or power supply. A 'clip lead' with a crocodile clip at both ends is useful but you can simply solder a length of spare wire to the board and grip the other end in the power supply terminal if you prefer.

With your multimeter set to read DC Amps (most meters require you to change the red lead over to a separate socket) connect the red lead to the positive terminal of your battery or power supply and the black lead to the +12V Keyed connector on the PCB.

If you get a reading more than 0.1A you probably have a solder bridge or a faulty component. Re-check your soldering before continuing. Assuming your reading is in the mA range, you can drop to a lower range (typically 200mA) and check the exact value, which should be somewhere between 40 and 60mA. You may need to swap your meter leads again.

If all is well, replace the meter with another supply lead and prepare to measure some voltages. To prevent confusion, I would recommend sticking to the 'red is positive, black is negative' convention. Set you meter to read at least 13V DC (typically a 20V max range). Switch on the power supply and connect the black meter lead to ground. Now touch the red meter lead on each of the transistor pins, taking care not to short out two or more. **Table 3** shows the expected test results.

Knowing the voltages are correct is always very reassuring. If the results are very different to those in the table (more than 10%), it is worth

Parts List:	QTY	Part Numbers
Resistors (0.25W)		
33Ω	1	R14
47Ω * band specific	1	R13
470Ω	1	R11
2.2kΩ, sometimes shown as 2k2	1	R10
Capacitors		
100nF	3	C14, C20, C21
100µF 25V electrolytic	1	C19
27pF * band specific	1	C56
56pF * band specific	2	C28, C29
100pF * band specific	3	C24, C27, C30
470pF * band specific	2	C22, C26
820pF * band specific	2	C23, C25
Semiconductors		
33V Zener diode	1	D4
2N3904 NPN	1	T2
BD139, 2N3866, 2SC1096 NPN	1	T3
Miscellaneous		
PCB	1	
Heatsink to suit T3	1	
Toroid FT-50-43	1	Tr1
Toroid FT37-43	1	RFC1
Toroid T-50-2 * band specific	3	L3, L4, L5
Enamelled copper wire 24 or 26SWG	1m	TR1, RFC1, L3, L4, L5
Hook-up wire		
(3 different colours, e.g. red, black, yellow)	20-30cm each	Interconnects
Miniature coax, e.g. RG174	20-30cm	Interconnects
RF socket, e.g. SO239, BNC	1	Antenna socket

Table 1: Parts List

Component	Value	Notes	Done
R10	2.2kΩ		
R11	470Ω		
R13	47Ω	47Ω is good for 80 & 60m	
		Use 27Ω for 40m	
		Use 10Ω for 30m & 20m	
R14	33Ω		
C14	100nF	Maybe marked 0.1 or 104	
Tr1	FT-50-43	Black toroid, 0.5in dia.	
		25 turns, 27swg enamelled copper wire primary,	
		5 turns solid core hook-up wire secondary	
TR2	2N3904	Note orientation	

Table 2: Build checklist for the driver stage.

Operation / Test	Expected Result (Assuming 13.8V DC supply)	Done
T2 collector	13.8V	
T2 base	2.4V	
T2 emitter	1.7V	

Table 3: Expected test results, driver stage.

Component	Value	Notes	Done
C19	100µF	Note orientation – black stripe on negative side	
C21	100nF	Maybe marked 0.1 or 104	
C20	100nF	Maybe marked 0.1 or 104	
RFC1	FT-37-43	Black toroid with 0.37 inch diameter. 10 turns 24 or 26swg	
D4	33V Zener	Marked 33V – note orientation; black band is the cathode	
T3	BD139	or 2SC1096, or free G-QRP Club '2N3866'. Note orientation – check datasheet!	

Table 4: Build checklist for the PA stage.

re-checking all the parts are the correct values and in the right places and that there are no solder bridges or unsoldered joints.

Now connect your VFO board TX output terminals to your transmitter board RF input terminals using miniature coax. Connect your multimeter RF probe across R14. Set your multimeter to expect up to 10V DC (although RF is AC, the RF Probe converts it to DC so the meter can read it). If you don't have an RF probe, see Part 1 of this SCD series. Connect 12V DC to both the VFO and the 12V Keyed connector on the Transmitter board.

The multimeter should now show around 5 to 9V DC, which shows the Driver should provide enough RF input to the PA transistor to make it work.

Assuming the voltages are correct, add the PA stage.

The PA Stage

A build checklist appears as **Table 4** and a photo of the finished driver board as **Fig. 4**.

***Note**: the enamelled copper wire on RFC1 is a common cause of poor joints. You may need to keep the soldering iron in place for a good few seconds to ensure the enamel burns off. Before applying power, it is worth using a continuity setting on your multimeter to check that there is a good connection from the '+12V' point to the collector of T3.*

At this stage it is worth taking a break and then coming back to cast an eye over the parts to make sure they are in the right places, and to check the soldering for any leads you may have missed, or any unintended solder bridges. If all is well, move on to the testing.

Testing

Repeat the testing routine that you did after the Driver stage but with 12V applied to both the '+12V' and '+12V Keyed' connections on the Transmitter board. Do NOT power up the VFO just yet, we want to test the Driver and Power Amp without any RF first.

The current should still be somewhere between 40 and 60mA; the PA is a class C amp so should not draw any current when there is no RF present.

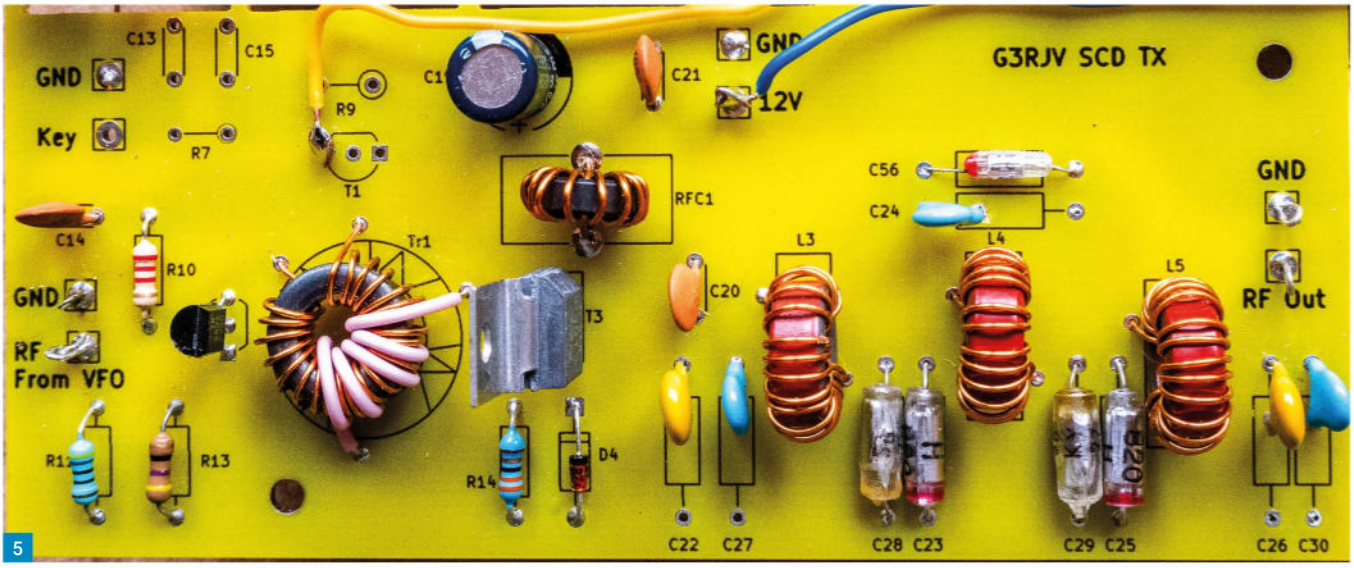
If all is well, replace the meter with another supply lead and prepare to measure some voltages. To prevent confusion, I would recommend sticking to the 'red is positive, black is negative' convention. Set you meter to read at least 13V DC (typically a 20V max range). Switch on the power supply and connect the black meter lead to ground. Now touch the red meter lead on each of the transistor pins, taking care not to short out two or more.

If it is not already connected, connect your VFO board TX output terminals to your transmitter board 'RF From VFO' and 'GND' terminals using miniature coax. Make a temporary connection between the unconnected side of C20 and the Transmitter Board RF output terminal using some hook-up wire.

If you have a dummy load and a power meter, connect the transmitter board 'RF Out' terminal and ground to your antenna socket using miniature coax. Plug in your power meter and dummy load into the antenna socket. If you don't have a power meter or dummy load, that is not a problem, we can make a dummy load and use the RF probe and multimeter to measure voltage and then convert that to a power measurement.

The dummy load is simply two 100Ω 2W resistors wired in parallel across the Transmitter 'RF output' terminals. Connect your multimeter RF probe across the '50Ω' dummy load resistors. Set your multimeter to expect somewhere between 25 and 45V DC.

***Note**: The RF Probe provides a DC reading that is roughly equivalent to the peak-to-peak RF voltage. Power = the peak-to-peak voltage squared and divided by 8 times the load impedance. So:*



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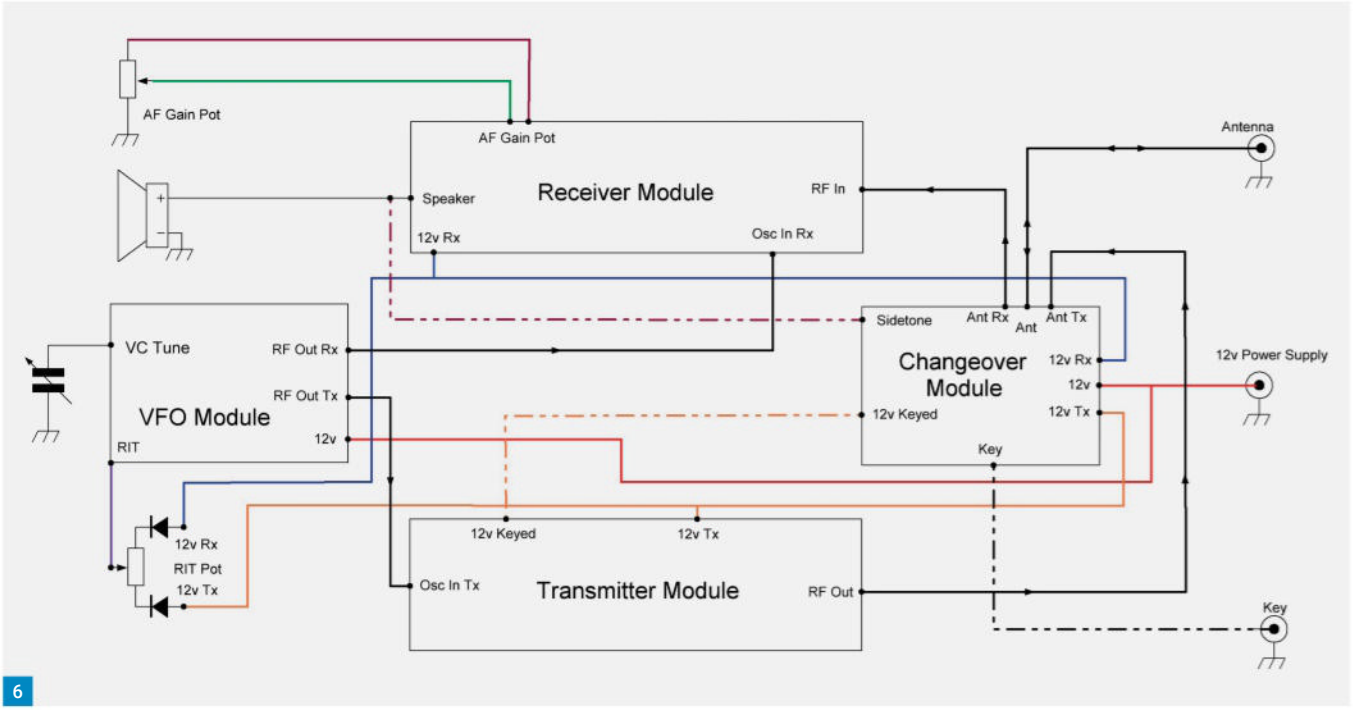

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- *25V = 1.56W*
- *30V = 2.25W*
- *35V = 3W*
- *40V = 4W*
- *45V = 5W*

Connect 12V DC to both the VFO and the '+12V Tx' and '+12V Keyed' connections on the Transmitter board.

If using a power meter/dummy load you should see something between 1.5 and 5 watts.

If using an RF Probe across a dummy load, the multimeter should show something between 25 and 45V DC.

***Note**: If the output is at the lower end of the range, you might need to reduce the value of R13 (see parts list). Tagging another 470Ω resistor in parallel with R13, giving 235Ω, is a reasonable way to go, and easier than desoldering R13! Do not go less than 10Ω or you risk killing the Driver transistor!*

Assuming the voltages are correct, turn off the power, remove the temporary wire between C20 and the RF output terminal and add the Low Pass Filter stage.

Low Pass Filter

***A wee word of warning!** If you are using the G-QRP Club PCB; there are three holes for each of the capacitors in the Low Pass Filter to allow different sizes of capacitors to be fitted. If you are using capacitors with 5mm spaced leads, use the two holes that are closest together (guess who learned that the hard way!). See photo of completed transmitter, **Fig. 5**, for examples of both size options in use. Definitely check, and double check before soldering them in place.*

Fig. 5: A completed 5MHz Transmitter board (with 2SC1096 for T3).
Fig. 6: SCD project wiring diagram.

A build checklist for the Low Pass Filter appears at **Table 6**.

At this stage it is worth taking a break and then coming back to cast an eye over the parts to make sure they are in the right places, and to check the soldering for any leads you may have missed, or any unintended solder bridges. If all is well, move on to the testing.

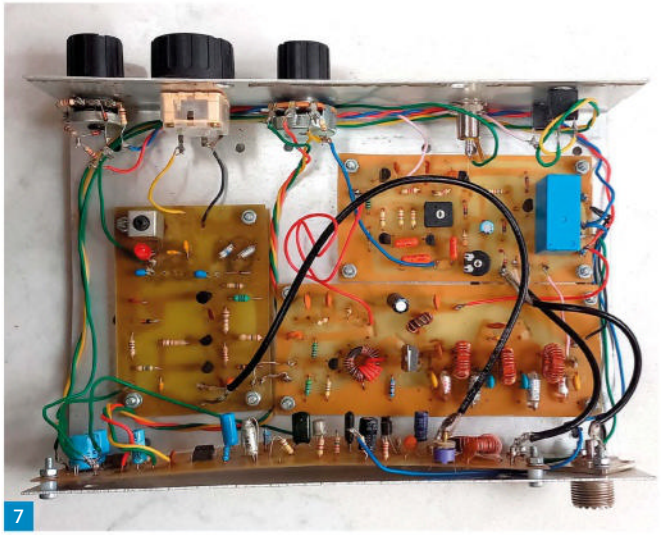

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Fig. 7: The completed 80m prototype.
Fig. 8: The completed SCD Front Panel.

Operation/Test	Expected Result (Assuming 13.8V DC supply)	Done
T3 collector	13.7V	
T3 base	0V	
T3 emitter	0V	

Table 5: Expected test results, PA stage.

Component	Value	Notes	Done
C22 + C27	570pF	470 + 100pF in parallel	
C23 + C28	876pF	820 + 56pF in parallel	
C25 + C29	876pF	820 + 56pF in parallel	
C26 + C30	570pF	470 + 100pF in parallel	
C24 + C56	127pF	100 + 27pF in parallel	
L3 T-50-2	1.8µH	Red toroid with 19 turns 24 or 26swg enamelled copper wire	
L4 T-50-2	1.64µH	Red toroid with 18 turns 24 or 26swg enamelled copper wire	
L5 T-50-2	1.8µH	Red toroid with 19 turns 24 or 26swg enamelled copper wire	

Note: All of the component values shown are for the 5MHz band. If you are building your SCD for a different band, refer to the W3NQN document referenced above.

Table 6: Build checklist for the Low Pass Filter.

Component	Value	Notes	Done
R7	1kΩ		
R9	47kΩ		
C13	100nF	Maybe marked 0.1 or 104	
C15	100nF	Maybe marked 0.1 or 104	
T1	2N3906 PNP	Note orientation – check datasheet!	

Table 7: Build checklist for on-board keying modification.

Testing

Repeat the tests you did before fitting the Low Pass Filter. The only difference you are likely to see is a slightly reduced RF output. This is due to the Low Pass Filter attenuating the harmonic content of the output. A reduction of 10 to 20% is nothing to be concerned about. If you find it has dropped by more than that, you may have made an error in the Low Pass Filter so it is worth re-checking all the parts are the correct values and in the right places and that there are no solder bridges or unsoldered joints.

Assuming the voltages and power output are correct, turn off the power, and prepare to wire up and box your SCD project.

Bringing it all together

If you have followed this series through you should now have four working modules that can be connected up to form a fully-fledged transceiver. The diagram, **Fig. 6**, isn't a new map of the London Underground, it shows the various interconnections between the PCBs and off-board parts/sockets.

Boxing it up is very much up to the builder. If this is your first project, I would caution against using a very small enclosure; leaving some space around the boards allows for easy access when it comes to making modifications or repairs.

If you have built the modules on the G-QRP commercial PCB panel, you can build the completed panel into a suitable enclosure. If you have made the modules on individual PCBs, you can be a little more 'creative' in how you box them up.

Some constructors like to use ready-made aluminium project cases. Others prefer to fabricate their own, using either aluminium sheet, or copper-clad PCB sheets. We don't have room here to go into metal bashing, but here are two suggestions and there are some useful references at the end of this article.

The first option is what I used for the first prototype. I bent a sheet of aluminium into a U shape using a wide vice and two pieces of steel angle. The VFO, Transmitter and Changeover PCBs were mounted on the base and the Receiver board on the back panel. I used 3mm nuts and bolts with spacers to keep the underside of the PCBs from shorting to the aluminium. The controls and sockets were mounted on the front and back panels. It is a bit crude but it works. Given more time and thought, you could make sure you have room to arrange the sockets and controls to suit your liking. The photo, **Fig. 7**, is of my 80m prototype.

The second version, **Fig. 8**, has the completed commercial panel mounted on a piece of timber with front and back panels made from blank PCB material. A top cover

Testing Times

Throughout this project series I have provided a fairly standard test procedure using current and voltage measurement to give an indication that all is well. In Part 4, June 2024, we popped the current testing procedure in a sidebar, to make the best of the space available. At each appropriate stage, the reader is referred back to the sidebar.

A reader wrote to point out that the instruction to switch on the power supply is absent from that sidebar, and other current tests. That is true, but thus far, no one has reported getting zero current readings. However, for the avoidance of doubt, at any point in the project, when carrying out current, or voltage, measurements, the power supply most be switched on. It is also advisable to switch it off after each test is completed.

could be fashioned from aluminium, bent into a U shape.

The front panel, **Fig. 9**, was designed in the appropriately named 'Front Panel' free software, printed on card and stuck on the front with double sided sticky tape.

RIT setup and operating

Once the radio is all boxed up, you can calibrate the VFO to get the frequency coverage you want; remember to only use plastic adjustment tools for the VFO inductor!

Some trial and error will be required to find the spot on the RIT control that ensures the receiver and transmitter are on the same frequency. A second receiver is used to listen to the VFO in RX and TX mode. Once you know where they 'net' make a note of the RIT control position and use that for tuning around.

When you find a station you want to call, tune with the main control to 'zero beat'; the point where the signal disappears, but reappears if you tune either way. Then use the RIT control to set the Morse to your preferred audio frequency; you can rotate the RIT either way to avoid any QRM. When you transmit, the RIT will automatically send on the 'zero beat' frequency and you will be spot on with the other station.

When you finish the QSO, always return the RIT to the 'net' position and away you go for the next QSO.

On-board keying modification

If you want to build the SCD transmitter with its own keying stage, like the 1981 'deluxe' version, there is provision on the PCB to include a keying transistor, T1. The parts needed are shown in **Table 7**.

What next?

First and foremost, get your SCD on the air, work some stations and have some QRP fun!

There is a mod you can do if you want/need louder sidetone. Another that adds a built in SWR indicator, and an audio 'S-meter'. You could add a frequency counter display. Lots of 'bells and whistles' as George used to say.

We had in mind to offer a modern upgrade by replacing the VFO with a Digital VFO and G-QRP Club member **Kevin M0KHZ** developed one for us. It included a keyer and worked really well. Unfortunately, shortly after we built a number of prototypes, the Teensy microprocessor Kevin had used became unobtainable. Work is in hand to find a replacement and I hope to bring you that in a future article.

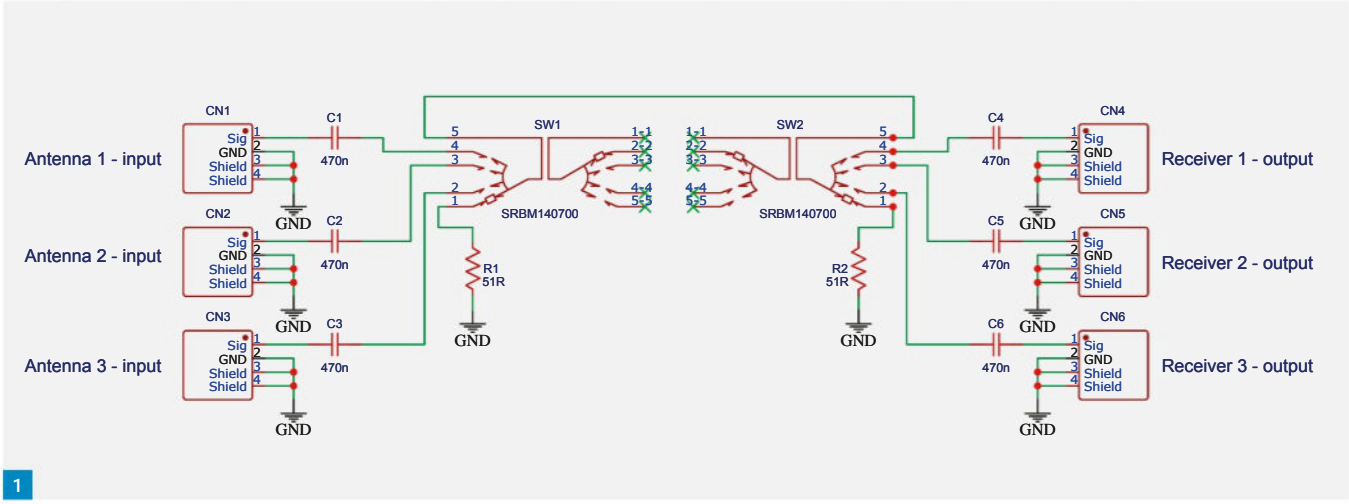
In the meantime, please let the Editor know how you got on with building the SCD; I know a number of Clubs have been using it as a Club project and I am sure **Don** would welcome feedback.

We would love to see a 'fleet' of SCDs at the G-QRP Convention, which takes place in parallel with the Telford Hamfest over the weekend of 31 August and 1 September this year and marks the 50th anniversary of the G-QRP Club. See the G-QRP Club website for further details:

www.gqrp.com

Some useful sources for metal working

- Kitchen Table Technology, Part 4: Boxing it Up, G3RJV, Short Wave Magazine, Feb 1984
- Chapter 25, RSGB Handbook of Radio Communication, edited by G8GLM/DD5LP
- Radio Projects for the Amateur Volume 2, VK3XU, G-QRP Club Sales **PW**



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Dr Samuel Ritchie EI9FZB
practicalwireless@warnersgroup.co.uk

Got a lot of antennas and receivers?

Dr Samuel Ritchie EI9FZB tackles the age-old problem of connecting multiple receivers to multiple antennas.

I recently watched a YouTube video in which a radio amateur had so many antennas to choose from, and so many receivers to pick from, that he had installed a patch panel in a large rack. Each antenna was terminated at this panel to a BNC connector, and similarly the input to each receiver was terminated at this panel in the same manner. A number of short BNC-to-BNC cables were used to patch the selected antenna to the chosen receiver.

One day I may get to such a situation but until then here is one way of getting antennas and receivers connected.

Connectors

In my shack I have standardised on using BNC connectors for almost everything. The coax of every antenna is terminated in a BNC connector and every receiver and piece of test equipment (other than the VNA) either has a BNC connector on its input(s), output(s), or an adaptor is used to convert the connector to BNC. For example, the ICOM R8500 has an SO-239 (UHF jack) for the HF bands and an N-type connector for use above 30MHz. I have added an adaptor to change this to BNC for each connector. This has allowed me to overcome many frustrations and reduce bad measurements since I started doing this 15 years ago.

My experience over the last 30 years is that the quality of adaptors varies greatly, and therefore I exclusively use adaptors manufactured by Radiall and Amphenol, purchasing these from reliable sources.

Switching between antennas and receivers

In order to select between three different antennas and three different receivers I put together the circuit shown in **Fig. 1**.

The switch (SW1) has four positions allowing the connection of one of three antennas, or in the off position connecting to 50Ω (R1). Likewise, SW2 allows whatever is selected with SW1 to be connected to one of three receivers or terminated in R2. Series capacitors (C1 to C6) are used to ensure there is no DC path between antennas, receivers, R1, or R2.

I made a printed circuit board for this circuit which is shown in **Fig. 2**. As you can see, there is not a lot on the PCB but it is a lot neater than a rat's nest of short lengths of coax from the switches to the connectors.

The BNC coax connectors are good quality Molex connectors, available from Mouser under part number 538-73138-5033, and cost €2.65 if you buy more than ten at a time. The PCB mounted connectors are made to be fitted to a panel and are specified up to 2GHz. The switches are manufactured by Alps Alpine, costing €11 each. These switches are two-pole switches, but I only use one pole in this application.

There are a variety of switches available that would allow the number of receivers and/or antennas to be reduced or expanded. I was limited by my enclosure to having six connectors and I went for three antennas and three receivers, as this suits my current needs. If you only have one receiver and many antennas, or one antenna and a few receivers, you could do away with one switch.

An enclosure

A front and rear view of the final enclosure is shown in **Fig. 3**. Here I used a Hammond enclosure (model 1455T1201). This enclosure is made to mount the PCB horizontally by sliding it into internal slots that are extruded into the enclosure. In addition, the 1.5mm thick front and back panels are easy to machine with hand tools. You do not need to use the four screws on each panel as the nuts on the switches and connectors pull the panel into a tight fit.

I designed and had the decal manufactured, as described in the July 2022 edition of *PW*.

Testing

I carried out two sets of tests on this unit using a vector network analyser (VNA). All unused inputs and outputs were terminated with 50Ω for these tests. **Fig. 4** shows the transmission coefficient, S21, which is the ratio of the output at Port 2 to the drive signal into Port 1. Or. as I like to remember it, *"knowing the signal I have on the input, what is coming out of the output?"* This tells me how much signal I lose (attenuation) as the signal passes through the device and how this loss varies as the frequency changes.

Note that the VNA was set to measure 1dB per division – not 10 dB as one often sees in these plots. The reason is that, being a mechanical switch, there is not a lot of attenuation to measure. This device is useful all the way up to 70cm and very acceptable for HF and the air bands if those are your interests.

Another important parameter is the isolation between receive-ports. The primary reason for checking this in our scenario is that every

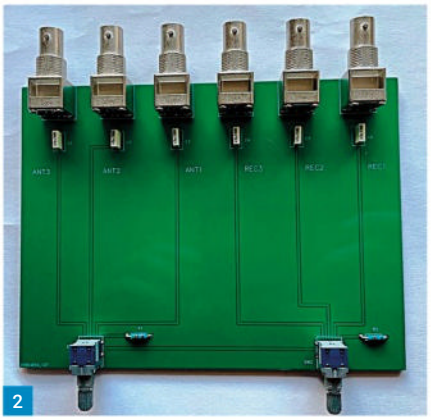


Fig. 1: Schematic diagram.
Fig. 2: Top view of PCB.
Fig. 3: Front and back view of the enclosure.
Fig. 4: Transmission coefficient - S21.
Fig. 5: Coming out of the antenna port.
Fig. 6: Isolation between receivers.
Fig. 7: Using a passive combiner.

receiver is also a transmitter. How did the TV licence inspectors in the days of PAL television know which house had a TV, but also how many TVs were on the property and what channels they were watching? The TV radiates, via the receive antenna port, the internal local oscillator signal which is what the TV inspector detected. Why are military radios so well shielded, with great attention paid to ensure excellent isolation between stages? It is because a sophisticated enemy can detect the signal of the receiver's local oscillator being radiated by the antenna – they do not have to wait for a transmission. I demonstrate this in **Fig. 5**, where I have a spectrum analyser connected to the HF antenna port of my ICOM R8500 receiver, tuned in this instance to 20MHz.

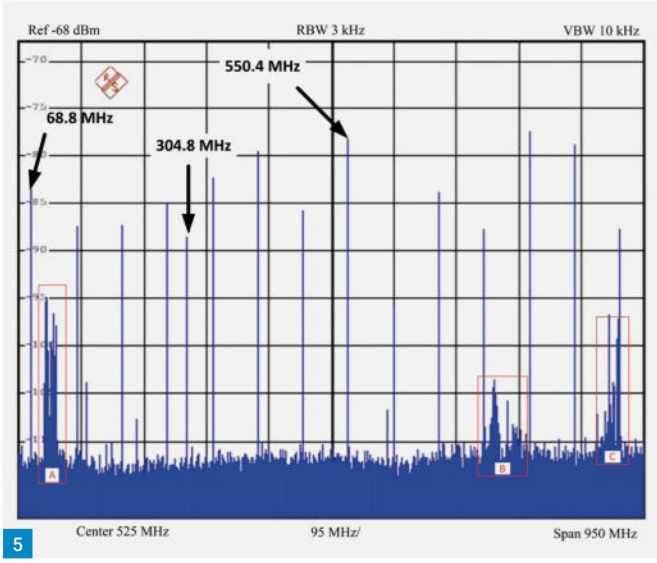
The spectrum plot covers 50MHz to 1GHz. The multiple signals in area A are from the FM band being picked up, and areas B and C are my local mobile phone base station signals – until I get my study in an anechoic chamber I just have to live with them. All the other narrowband signals are generated in the receiver and are present at the HF antenna port. I have identified a few as follows: 68.8MHz is the first local oscillator frequency when the receiver is tuned to 20MHz (LO = IF + receive frequency, so then 48.8MHz + 20MHz = 68.8MHz), 304.8MHz is the fixed frequency, second local oscillator signal, and 550.4MHz is the frequency of the VCO which is divided by 8 to get 68.8MHz. These signals are in the -85 dBm region, which is around an S7 signal strength – any directly coupled receivers are going to pick these signals up if isolation between receiver ports is lacking.

In my design there are no active circuits, so isolation relies on good PCB design and physical spacing. The weak spots are the switches in which physical separation is lacking. However, the isolation between receivers is not bad and is shown in **Fig. 6**. For this measurement I input a known signal into one receiver port and measure what is coming out of the adjacent receiver port. At 1MHz the isolation is 83dB at 60MHz, 44dB and even at 435MHz it is generally acceptable at 32dB.

An example of what this means: If you have receiver A, connected to one receiver port, emitting a signal at 68.8MHz into that port with a power of -85dBm, then receiver B connected to an adjacent antenna port on the device will hear the signal reduced by a further 44dB. This is a reduction of the unwanted signal from -85dBm to -129dBm, which is around S1, and most likely lost in the noise floor of receiver B.

Combining antennas into one receiver

There are wideband receivers that only have one input to receive from DC to daylight. Many SDRs are configured like this, resulting in the user having to change the antenna (physically or using a switch) when moving, for example, from HF to the airbands and then to UHF. This applies to the ICOM R8500 where there is one antenna port (if you ignore the RCA connector for 500Ω antennas) for signals up to 30MHz, and another for signals from 30MHz to 2GHz. Of course, using the switch arrangement described above configured as a many-antenna to one receiver would work, but many is the time I have forgotten to change the antenna and wondered why I cannot hear the planes I



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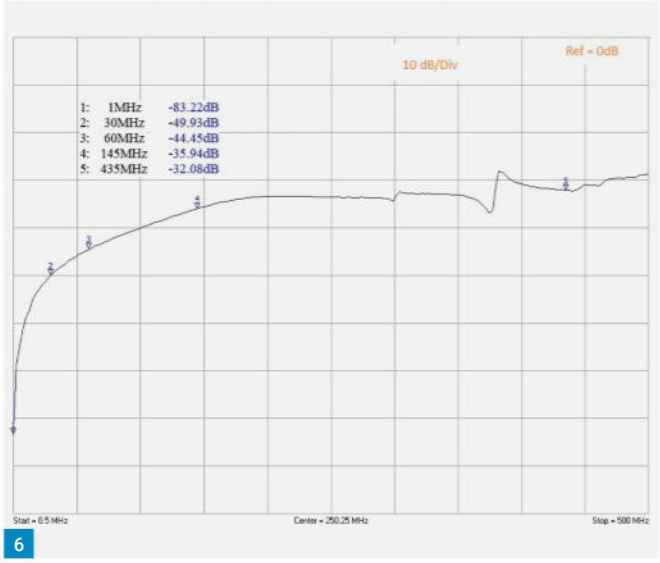

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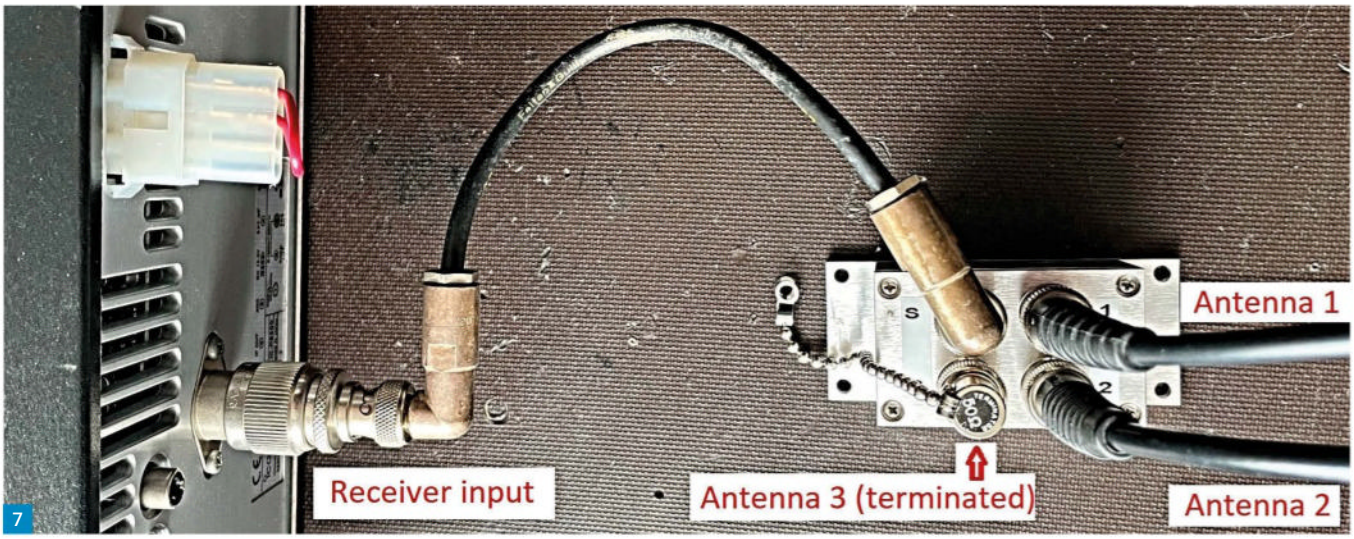

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can see flying overhead, only to discover my VLF loop is connected.

The solution I have used is to combine two or three antennas so that they all simultaneously connect to the wideband receiver but do not adversely affect each other by disturbing the impedance matching. I use a splitter/combiner specifically made to maintain a 50Ω impedance while, in this case, combining multiple antenna signals.

The idea of passively connecting a number of antennas to one receiver input is shown in **Fig. 7**. I use combiners made by Mini-Circuits® who have a large range covering many options.

My preference for HF is the model ZFSC-2-6+ which combines two signals into one, covers 2Hz to 60MHz and has options for BNC, SMA, or N-type connectors, and the addition of a bracket which greatly helps to mount these devices. They do cost about €84, and before Brexit were available in the UK for Ireland, but now ship from the Netherlands. For combining up to 1GHz I like the ZFSC-3-4+ which combines three signals into one, covers 1 – 1000GHz and again has options for different connectors. These sell for €100, but these and many other Mini-Circuit devices often appear on eBay for far less than the new price. Between ports these devices typically have isolation values of 20 – 35dB, depending on the frequency, the higher isolation occurring at the lowest frequency of use.

However, as passive devices, we must accept that there will be losses. If you split a signal into two equal parts, then you have divided the signal by half – that is a 3dB loss. Split the signal into three and that is a 4.8dB loss. As these are not ideal devices there is an additional loss of 0.5 – 1.5dB, again depending on frequency and the device.

To prevent destructive interference this technique is not suitable for antennas that overlap in frequency coverage, but works very well and is convenient for connecting for example, an HF loop and a VHF/UHF discone antenna to an SDR, or an airband Yagi, a low UHF discone and a high UHF log-spiral to the R8500.

Endnote

You can purchase switches with more positions and increase either the number of antennas and/or the number of receivers you can connect. However, you may need to consider alternative enclosures as the one I used is maxed out with six connectors on the back panel.

Have a look at my website (URL below) where there is a link to access the schematic and PCB design on EasyEda if you want to modify what I have done, just have some identical boards made, or use it as a starting point for your ideas. **www.samuelritchie.com**

There is also the Visio® file if you want to copy or modify the decal I used – perhaps marking the switches and connectors in a more generic manner or matching the equipment you are currently using.

As usual there are higher resolution pictures and details on some of the components. I have no financial interest in Radiall, Amphenol, Hammond, Molex, Mouser, EasyEDA, or Mini-Circuits. **PW**

Steve Telenius-Lowe G4JVG
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1

LoTW, SuperFox and More

Steve Telenius-Lowe G4JVG has another full column of HF news, despite us heading into the summer propagation 'doldrums'.

ARRL staff and directors, **Fig. 1**, had a bit of a nightmare few weeks in May-June. In mid-May many radio amateurs around the world noticed that the ARRL's 'Logbook of The World' (LoTW) was no longer working. (LoTW is the massive database of amateurs' logs that can be used to verify contacts for awards such as DXCC.) This turned out to be one of the first indications for amateurs that ARRL had been the victim of a major cyber attack.

ARRL announced that *"On or around May 12, 2024, ARRL was the victim of a sophisticated network attack by a malicious international cyber group. We immediately involved the FBI and engaged with third party experts to investigate."* ARRL added that *"Many of our services and programs have been impacted by this attack... [and] while the Logbook of The World® server and related user data were unaffected, we have taken the precautionary measure of keeping the service offline until we can ensure the security and integrity of our networks. Similarly, access to Online DXCC is unavailable, although individual award data remains secure."* As of the deadline date of this column, 11 June, LoTW was still down. Updates are being posted at:

arrl.org/news/arrl-systems-service-disruption

New 'SuperFox' mode

Love it or loathe it, it cannot be denied that FT8 has revolutionised HF operating and especially DXing, allowing those with limited antenna possibilities or those running very low power to make genuine DX contacts that would have been virtually impossible on SSB or even CW. FT8 is part of the WSJT suite of datamode programs and first hit the airwaves in 2017. It was further developed a year later when the so-called 'Fox and Hound' (F/H) mode was introduced. Those who use FT8 will be familiar with F/H but, for those who don't, in brief it allows the DX station (the 'Fox') to respond to several callers ('Hounds') simultaneously, thus increasing the 'rate' of contacts being made, allowing DXpeditions to make more QSOs and, incidentally, making it easier still for those with limited stations to make DX contacts.

However, the big *disadvantage* of F/H mode is that each additional 'stream', where more than one station is being responded to at the same time, causes the Fox's signal to become weaker. There comes a point where the Fox's signal becomes so weak that it can no longer be decoded by Hounds, so contacts are no longer being completed and the rate of contacts *decreases* rather than increases.

In order to overcome this issue, in May the WSJT Development Team announced a new enhancement to FT8: 'SuperFox' mode. The press release stated: *"Hounds chasing the SuperFox DX station will transmit normal FT8 signals, as in the already familiar Fox/Hound mode. But rather than sending concurrent streams of up to five FT8 signals, the SuperFox station will transmit a single constant envelope, using a 1.5kHz-wide waveform, that conveys signal reports or 'RR73' acknowledgements to as many as nine different Hounds simultaneously. Most importantly, there will be no signal-strength penalty for simultaneously transmitting to all those Hounds."* In fact, there will be about a 10dB *gain* with a SuperFox station transmitting nine messages simultaneously, when compared with just five streams from a regular Fox and Hound station, thanks to the 1.5kHz-wide signal. Furthermore, Hound stations will be able to call SuperFox stations *below* 1000Hz, whereas in standard F/H mode Hounds must call higher than 1000Hz above the nominal dial operating frequency.

The WSJT Development Team added: *"Another very significant improvement will be a digital signature contained in the SuperFox message that will allow the receiving software to verify the legitimate origin of the signal from a validated DXpedition."*

At the time of writing, the 'SuperFox' mode is being beta tested and the intention is for it to make its first appearance during this month's N5J Jarvis Island DXpedition (see below). As SuperFox transmissions will consist of a new 1.5kHz-wide waveform it will be necessary for 'Hounds' to download a new version of the WSJT-X software (and it seems likely that JTDX and MSHV will follow suit and also introduce new versions that include SuperFox mode). **Uwe DG2YCB**, a member of the development team, quoted by **Mike M0AGP** on the CDXC members' reflector, stated that new software versions with SuperFox will continue to include the normal Fox and Hound mode.

More activity from Turkmenistan soon?

David EZ/DL7ZM, who made a small number of CW QSOs from Turkmenistan last year, was back on the air from Ashgabat for a few days from 10 June. Posting on the DX-World.net website, **Vlad OK2WX** said that David is hoping to be able to set up a club station at the university in Ashgabat, Turkmenistan, next year. He said David *"is asking all hams to refrain from any attempt to get a license there now. He works there at the university and to educate local students and hope they will activate this rare country soon."*

Turkmenistan is in the top 25 Most-Wanted DXCC entities as there have been no amateur radio licences issued for many years, other than that granted for brief demonstrations by DL7ZM.

dx-world.net/ez-dl7zm-turkmenistan

The month on the air

Marek FH4VVK started operations as FT4GL from the seventh rarest DXCC entity, the Glorioso Islands, on 24 May. Marek is working on the main island, Grande Glorieuse shown in **Fig. 2**, and operating on FT8 and SSB (though not CW) in his spare time.

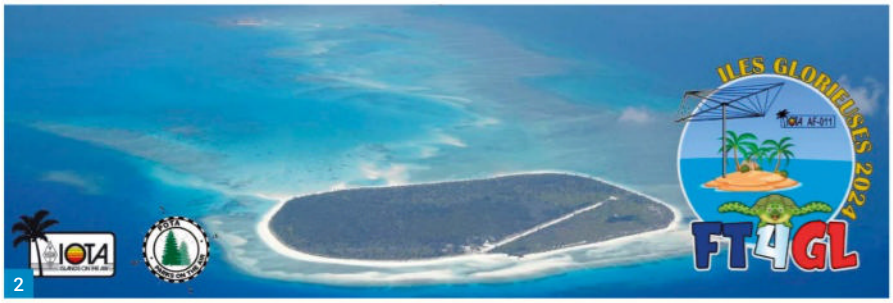

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Fig. 1: L to r: ARRL Director of Marketing and Innovation Bob Inderbitzen NQ1R, CEO David Minster NA2AA, and President Rick Roderick K5UR. Fig. 2: Grande Glorieuse island, from where Marek FT4GL was operating in May-June. Fig. 3: Well-known DXer and contester Martti Laine OH2BH, seen here at a recent Friedrichshafen show. Fig. 4: N5J Jarvis Island DXpedition logo. Fig. 5: QSL from the last operation from Jarvis Island, AH3C/KH5J, in 1990. Fig. 6: Eilean a' Ghobha and Roareim in the Flannan Isles (photo credit: Marc Calhoun, via Wikipedia Creative Commons licence).

The CQ WPX CW contest took place over the weekend of 26/27 May. Numerous special callsigns and DXpeditions were active for the contest. One such was SX5R, operated by well-known Finnish operators **Martti OH2BH** (**Fig. 3**), **Juha OH8NC**, **Niko OH2GEK** and **Leena OH2BE**, who joined **Bill SV5AZP**, **Vangelis SV5FRV** and **Denis SV5FRD** from the SZ5RDS club.

Well-known traveller **Elvira IV3FSG** was active as 5U5K from Niger from 7 June. She was expected to stay until the 20th and be active on all bands on FT8/FT4, SSB, CW and RTTY.

What to look for in August

The 'big one' is news of an operation from Jarvis Island in the central Pacific. This is scheduled to be a 13-day operation using the callsign N5J (**Fig. 4**) and due to start on or around the 1st of the month. Jarvis is not in itself a DXCC entity, being part of the Palmyra Atoll entity, but Palmyra is only rarely activated and Jarvis Island (which *does* count as a separate IOTA, OC-081) was last on the air 34 years ago, by AH3C/KH5J (**Fig. 5**). This will be another 'RIB' (Radio In a Box) operation, with the stations and antennas physically located on the island but operated by the team on a boat anchored a short way offshore, supplemented by others around the world operating remotely over the internet. Jarvis Island is administered by the US Fish and Wildlife Service, which has forbidden overnight stays on the island, making it necessary for any operation from there to use RIBs.

jarvisisland2024.com

Nobby G0VJG, **John G4IRN**, **Paul G4PVM**, **Mike GM5AUG** and **Jamie M0SDV** plan to operate from the Flannan Islands (**Fig. 6**) as MM0UKI starting on 1 or 2 August for about four days (depending on the weather). The Flannans form a rare IOTA, EU-118, in the Atlantic, off the west coast of the Outer Hebrides.

An operation from St Paul Island (part of Canada, but a separate entity for DXCC) as CY9C is scheduled for 26 August to 5 September. The island is administered by the Canadian Department of Fisheries and Oceans, which has issued a permit for the DXpedition to go ahead.

t-rexsoftware.com/cy9c

Readers' news

Tim Kirby GW4VXE, usually operating as **GW4MM** on CW, found conditions were definitely much changed from the spring conditions. Tim writes, *"High absorption seemed to put paid to 20m and quite often 17m, during the day. Even 40m was completely quiet on some days, following solar flares. During the evenings, 18MHz perked up nicely with the band often open to North or South America. An enjoyable QSO was had on 17m one evening with UR7FM/MM off the West African coast, with Genn running low power from a Xiegu transceiver to a long wire on the ship. 15m has been less reliable to the USA in the evenings, but there have been surprises, like finding the band open into Japan at around 2230UTC – of course there's much more traffic on FT8 than on CW. Short skip took place on the Sunday of the RSGB's National Field Day, providing some fun to work portable stations on some of the higher bands."*

Owen Williams G0PHY wrote that *"The aurora on 10/11 May coincided with the start of the DXpedition to Bolivia by a group of LU hams as CP7DX. Although Bolivia is a lowly 186 on the Club Log Most Wanted list it would have been a new one for me. I had three very early morning sessions on 14MHz trying to get them but with no joy. He was often a genuine 59 with me but there was no split operating and it would appear that he was hearing signals from North America better than those from Europe. I was somewhat surprised by the unruly behaviour of some of the Ws and VEs calling him as I thought this was a mainly European phenomenon. I*

Fig. 7: OS8D/P activating another Belgian castle on 30 May. Fig. 8: Carl Gorse 2E0HPI, operating /P from near Hartlepool. Fig. 9: Certificate awarded to Carl 2E0HPI for activating 100 Parks on the Air references.

had better luck with the recent 4X2DS operation from the Dead Sea, getting them on three bands.

"I heard FT4GL from Glorioso when he started on 14MHz. There was the usual deliberate QRM, as with W8S Swains Island; re-broadcasting Italian language conversations etc... There may be a chance to get him as I understand that he will have two days for 'little pistols' to get an All Time New One."

Unfortunately, **Carl Mason GW0VSW** has been a bit under the weather recently but he says *"I did manage to operate in the CQ WPX contest and picked up a bit of DX."* He used a Xiegu G90 transceiver at 5 watts to an inverted G5RV antenna and his best DX was Australia: *"A VK1 was calling CQ on the Sunday morning with what seemed no replies. I bagged him first call so was very pleased with that. The lower bands were hard work at times but a few calls entered the log."*

Etienne Vrebos OS8D wrote: *"Business as usual: nearly 2000 QSOs this month, 1180 as OS8D/P* (**Fig. 7**) *and only 750 QSOs from home. Conditions (space weather) weren't good and most /P QSOs were difficult, but it's still fun. I have already purchased a spare microphone for the Yaesu FT-710 as it seems it is more tired than I am, but I completely understand the weakness of man-made tools after more than 30,000 QSOs as OS8D/P."*

It was good to hear from **Carl Gorse 2E0HPI** (**Fig. 8**) again, after a short break. He wrote: *"It's been a while since I last sent in some reports for* HF Highlights. *I've been out portable a few times but have been mainly working Europe and very little DX. I did do an early morning session on the headland at Hartlepool with the Yaesu FT-891 at 100W and the Slidewinder vertical antenna."* Carl also operated from his *"favourite location on Hartlepool South Pier on 20m SSB from 2100 to 2300UTC... We are looking forward to a holiday on the Isle of Mull in August and to doing some operating from the Scottish islands. I also managed to activate 100 unique references for the Parks on the Air programme"* (**Fig. 9**). Carl added that he also had a holiday on the Isle of Portland but sadly the solar flares got the better of his QRP set-up!

28MHz beacons

Neil Clarke G0CAS reports on the 28MHz beacons logged during the month of May. Sporadic E took place most days of the month but the summer season really got going from the 12th. From Italy, IQ8BB 28260 was heard on 20 days and IW3FZQ 282227 on 16 days. Looking south to Spain ED4YBA 28263 and ED4YAK 28250 were logged on 16 and 10 days respectively. Two Polish beacons, SQ4HWI 28193 and SR55TDM 28216, were heard towards the end of the month. Also, YO2X 28240 was logged on the 24th; these beacons are not logged very often. LA5TEN 28237 in Scandinavia was heard on 11 days. During the magnetic storm of the 11th OH2B 28200, OH5TEN and OH9TEN 28267 were heard, with OH9TEN sounding auroral and not the usual T9 note. Beacons from South America including LU2DT 28193 were logged on 28 days. It would appear that PY4MAB 28270 was off the air for a couple of weeks around mid month. From the world-wide beacon network on 28200, 4X6TU was logged on 26 days, LU4AA 27 days and ZS6DN on 20days. Paths to North America were, as expected, very poor: the W4 and W5 call areas were heard only on four and two days respectively, while W8 and W0 were both heard on the 8th.

Band highlights

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

Tim GW4MM (HS): 7MHz CW: VK2GR. **10MHz CW:** VK3NX. **14MHz CW:** JA5AK, VK2GR, VK6T, ZM1A. **18MHz CW:** CX5UA, JJ0PKS, PP5WX, VE7FE. **21MHz CW:** D4Z, SV5/OH2BH, XR7D, ZB2FK.

Owen G0PHY (HS): 14MHz SSB: 4X76TT, JY5FA. **18MHz SSB:** 4X2DS. **21MHz SSB:** A65HS.

Carl GW0VSW (QS): 1.8MHz CW: DR5X, OP5T. **3.5MHz CW:** C7A, CN3A, CQ9A. **7MHz CW:** 4X6FR, CN3A, CR3DX, D4Z, NJ4U. **14MHz CW:** CN3A, CR3DX, K3LR, VK1A. **21MHz CW:** P3AA, 8P5A, CN3A, CR3DX, EF8BBM, RA9P, ZA/OG1N. **28MHz CW:** 4Z5PN, CR3DX, D4Z, PS2E.

Etienne OS8D (HB): 14MHz SSB: 4L1BB, 7Z1VD/M, HP1XV, KH6ML, UN79P. **18MHz SSB:** 4L6DL. **21MHz SSB:** YB3MVD, YE4IJ. **28MHz SSB:** 9X2AN, 9X2AW, CE5DSQ, CX6DZ, LU1DX, PU5CBA, TO60CSG, YC7ONC, YD1SKA, ZS6BAF.

Carl 2E0HPI/P (MS): 14MHz SSB: K5RX, KB9ZAC, VA3HES, WA4AWD, YB0AR. **18MHz SSB:** 8P5UD, 8P6PE, JF1EHM, YV5HNJ.

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 October issue the deadline is 11 August. Photos of your station, antennas or you in the shack are always welcome. 73, Steve G4JVG. **PW**

Roger J Cooke G3LDI
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NFD

Roger Cooke G3LDI reflects on Field Days past and present.

By the time you read this, NFD (National Field Day) will be over of course, but did you get involved? If not, why not? NFD has been the 'centre' of the yearly contest calendar ever since I was first licensed in 1956. By the centre I mean just about the middle of the year, but also the main event for most clubs.

Times change obviously and this view has changed over the years, but NFD still remains my favourite club contest of the year. Perhaps the long-held dream has faded somewhat, however. If I do a momentary time-shift back to 1956, this is how it went in those days:

Club meeting for NFD. What receiver can we use? It would invariably end up with a BC348 or similar. Three years down the line we would use my AR88D, a very light-weight portable receiver (!). What transmitter is going to be paired up with it?

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

The antenna would be a wire with an ATU, which had to be re-tuned for each band change.

We then had to visit the chosen NFD site, erect the antenna and adjust the transmitter so that it did NOT exceed 10W, preferably 9.9W, as Ted was a very pedantic chap and rules is rules, unlike today I am sad to admit. This all had to be done on site in what we used to call a dummy run. Nobody was allowed more than 10W.

We were not allowed to erect anything prior to the Saturday so that day was a hectic one! Not everybody owned a car and transport was whatever we could scrounge for the tents, poles and so on.

Logging was usually a huge piece of paper, several A4s stuck together, and this was our dupe sheet. We logged those using the suffix of a call. Logging was a very important and very boring job. Loggers usually dropped off their perch around 2.30am.

Keying was achieved by either a straight key or a bug. Electronic keyers were still a few NFDs away. When I first built a CMOS memory keyer I was accused of cheating!

The most interesting thing was the list of UK portable stations available, several dozen, which had to be ticked off. Fish and chip supper was mandatory on Saturday evening for those awaiting their shift. We did keep some for those already operating though!

The postmortem afterwards was conducted at the QTH of one of the participants, poring over the complex calculations and graphs made by **Pat G3IOR**.

Some of you, not many now, will remember those halcyon days with affection. I still enjoy NFD and if you have never taken part, you don't realise what you are missing. It is all rather commercialised these days, however, and I think that is why it is now regarded as 'just another contest'.

This year at G2N/P the weather was inclement and on the Saturday there was a NW gale blowing and it was cold, so much so that the tent was full flaps down and an electric fire burning to keep us toasty warm. I also had my parka high-vis jacket on. Sunday was the opposite, no wind, sunshine and fairly warm.

Figs 1 through **3** are a few pictures taken at G2N/P, the NFD station of the Norfolk ARC, at Gt. Ellingham in Norfolk.

ChatGPT

I have been using ChatGPT for generating my CW groups and so on for use with my GB2CW Morse class here in Norfolk. It is a tedious matter making up groupings of letters, producing callsigns, simple or complex text so I thought I would try ChatGPT. Wonderful! Providing it is given precise instructions, the actual item is ready within a second or two. For example:

"Please create random character groups of five characters per group, limited to h, 5, b, and 6. Separate each group by a space. Generate 100 character groups.

Result....

6b5bh h5bh5 h56bh 5h6b5 bh5h6 bh56b 6bh5h h56bh h6h5b 56bh5 h56bh 5bh6h 56h5b h5bh6 5bh5h 6bh6b bh5bh 6bh56 5h56h bh5bh 6bh56 h6h5b

and so on for as long as you wish!

My students love these groups, not! However, I save them as a string of five groups at a time and randomly select a group. It is interesting to see the text files constructed this way, simple text or complex text, all great for practice.

From N9EEE

This is from **Dick N9EEE**:

An alternative to lcwo.net is another tool the CW Academy uses, CW Academy Morse Code Trainer from **Stephen Phillips** (aka MCT, Morse Code Trainer). There is an ICR section that can be easily configured to do exactly what you've asked ChatGPT to do but without the need to copy and paste. In ICR, you can configure the number of characters to create 'word' length, select the characters you wish to work on, and it will randomly create 'words' and send them to you in an endless stream. Or, you could use the Word List Trainer section to upload the ChatGPT-generated words and use all the nifty

Fig. 1: Jon G4IVV on Saturday evening in Arctic conditions! Fig. 2: Malcolm G3PDH on Sunday afternoon, the complete opposite! Fig. 3: Jim G3YLA dreaming of a pile-up. Fig. 4: Andy G0IBN.

features of WLT, including randomizing those words. Have fun! The trainer is available on the MorseCode.World website: **https://tinyurl.com/5emcfup3**

Two of my students are keen enough to attend my lesson, join another local tutor and they have also signed up for the CWops Academy. Now that IS dedication!

And from M0KFH

I received an email from **Ian M0KFH** regarding the CWops Academy:

Hi Roger, thanks for getting back to me.

I have indeed enrolled on the CWops academy, and started my course last week. I absolutely love it! Your book is excellent, and certainly set me up for the course, so it's very much appreciated.

I wish you well, and thanks for your reply.

Kind regards and 73, Ian M0KFH

It's always very satisfying to hear of the progress of CW students. Ian obviously was able to obtain a copy of my book before it was taken out of print.

Essex CW Club

The Essex CW Club holds regular meetings, skeds and tutoring sessions, as well as a very successful Bootcamp. News from down south indicates that **Andy G0IBN** has had the honour of having been invited to become Honorary President.

I am sure you will join me in sending congratulations to Andy!

Honorary President of Essex CW ARC

*Hello. My name is **Keith G3WGE** and I am the current chairman of the Essex CW Amateur Radio Club.*

Essex CW is an established amateur radio club. Andy G0IBN is of course a Founder Member who has been at the forefront of supporting our members for over 15 years. Since the club was founded, Andy has led by example and has pro-

actively helped to raise the profile of our club, both nationally and internationally. Andy has ensured that our club encourages, maintains and promotes the use of Morse code on the amateur radio bands. Andy has also personally encouraged a good many of the Essex CW members to 'practice, practice, practice' and 'get on the air'.

Andy has championed the teaching and practice of CW and is a recognised RSGB CW instructor. In a professional role Andy was a Telegrapher in the Royal Navy. As an amateur radio operator, he is a member of the Chelmsford Amateur Radio Society (CARS), Royal Navy Amateur Radio Society (RNARS), CW FISTS Club, the First Class CW Operators' Club (FOC), the High Speed Club (HSC) and the Straight Key Century Club (SKCC).

To recognise the above-mentioned facts the committee of Essex CW ARC has cordially invite G0IBN Andy Kersey to be our very first Honorary President.

The appointment of a club 'Honorary President' recognises a highly committed individual who has supported and made an exceptional and significant contribution to the club. That is certainly very true of Andy.

The committee has agreed that this should be a five-year term of office. This office is not intended to place any extra burden on Andy, but we do wish to recognise an outstanding individual in our midst.

We sincerely hope that Andy will remain as an active member of committee and continue in his roles of teaching, mentoring and leadership. While Andy remains an elected committee member, he will retain voting rights.

I am very pleased to announce that Andy has accepted our invitation and is therefore now the Honorary President of the Essex CW Amateur Radio Club.

Many congratulations Andy. **Fig. 4**

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

Keith Rawlings G4MIU
keith.g4miu@gmail.com

1

Time to try an OCFD

Keith Rawlings G4MIU tries out an alternative HF antenna that he hopes will solve some of the challenges he faces.

I have mentioned in previous columns that my antennas had been taken down for tree work and that while reinstating them I have been bearing in mind I didn't want anything too permanent as we intend to 'move on' in, hopefully, the not-too-distant future.

The last HF wire antenna I had been using before it was taken down was a 66ft (20.11m) long doublet. This ran from points A to B in **Fig. 1** (I had an attachment point in a tree at location B) and was fed with a run of 450Ω ladder line. Position C is where my 33ft LMA mast is located

Like many readers I have experimented with various types of wire antennas over the years but the good old Doublet is one of those designs that just seems to work in almost any environment. I have found that one may be bent around the garden, have its ends dropped, configured as an inverted-V, but whatever way it is mounted, it seems to take things in its stride. Clearly, how it radiates will depend on its environment and configuration and this will also vary from band to band but overall it is a good 'jack of all trades' antenna.

I had always been happy with this antenna and over time I fed it with 300Ω ladder line, open-wire feeder and then finally, as mentioned, 450Ω ladder line. In all cases the feeder ran down from the antenna at right angles for about 20ft and then curved back towards the shack. For a long while the feeder was connected directly to the balanced terminals on my KW107 AMU. However, this unit is quite large and in a bid to make more space (and make the shack look a bit tidier) I changed over to using the smaller Yaesu FC707 AMU, which only has an unbalanced input, so I used a simple 1:1 balun that was designed to be screwed directly onto the SO239 input of the FC707.

This proved to be a bit cumbersome so I eventually settled for running a short length, about 3.5m, of RG58 from the FC707 to the outside and connected the ladder line directly to this coax. I included four turns of RG58 to form a choke balun at the point where the ladder line connected to the coax. Experience from past years told me that I would likely get RF on the coax outer if I did not take some precaution here.

While technically this doublet would be good for 7MHz and all bands above due to it being a λ/4 on 40m, I found it useable on 80m too, but it was never a 'DX' antenna on that band.

Areplacement

When considering putting a wire antenna back up for HF, in the case of the doublet, I was mindful of the positioning of the ladder line with respect to the EMF regulations when people were in the garden. It would be hanging just above head height so I felt that I needed to try something else.

I also decided that in my bid for a tidier shack it would be good if I could find an antenna that would not necessarily need an AMU or, if it did, could at least be handled by the internal matching unit on my FT-990.

I still have an 80/40/20/15/10m Diamond CP6 vertical that could be re-mounted in a more EMF friendly position than where it used to be, but, there were two issues using this antenna. Firstly, it would require a long run of feeder and, secondly, one of the reasons I stopped using it was that it picked up a large amount of local QRM compared to the doublet. This was a pity because it was quite good for the longer distance contacts. So, I wondered what other simple wire antenna I could use.

The obvious choice was an end-fed but this would require the use of the KW107 if I ran the wire directly into the 'shack'. To avoid this I could use a matching transformer and then run the coax back to the radio. I already have a 49:1 balun, which is based on the commonly used ARRL end fed design.

www.arrl.org/end-fed-half-wave-antenna-kit
https://tinyurl.com/3spuvk9r

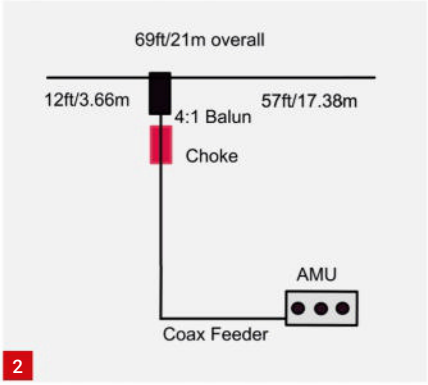
This would be simple to implement, a single wire is light to support at the far end and would fit into the space available, while the matching unit could be mounted under the house soffit. By adding a coil I might even be able to persuade a 66ft one to work on 80m. So that was a possibility but thinking back, in the June 2021 *RadioUser*, I reviewed a Vine AS-OCF-404-HP Off Centre Fed Dipole (OFCD).

This amateur bands antenna covered the 40, 20, 15,10, 6 and 4m bands without an ATU and the 30, 17 and 12m bands with one. It used a matching transformer/balun that matched not only the main element but also incorporated a 75Ω port to match a 4m element. It was 69ft/21.03m long.

The review period was during the January and the poor weather at the time prevented me from installing it as I would have liked but it did work quite well and, importantly, being off-centre fed the feeder could be brought closer to the house and further away from anyone in the garden.

OCFD explained

The OCFD is sometimes referred to as a 'Windom' antenna. It is argued that this is incorrect as a true Windom is a single-wire-fed antenna, which is worked against ground. The OCFD is a dipole antenna fed with a twin-conductor feeder. This is usually a coaxial line but open wire conductors may be used. Clearly a so-called 'OCF Windom' is



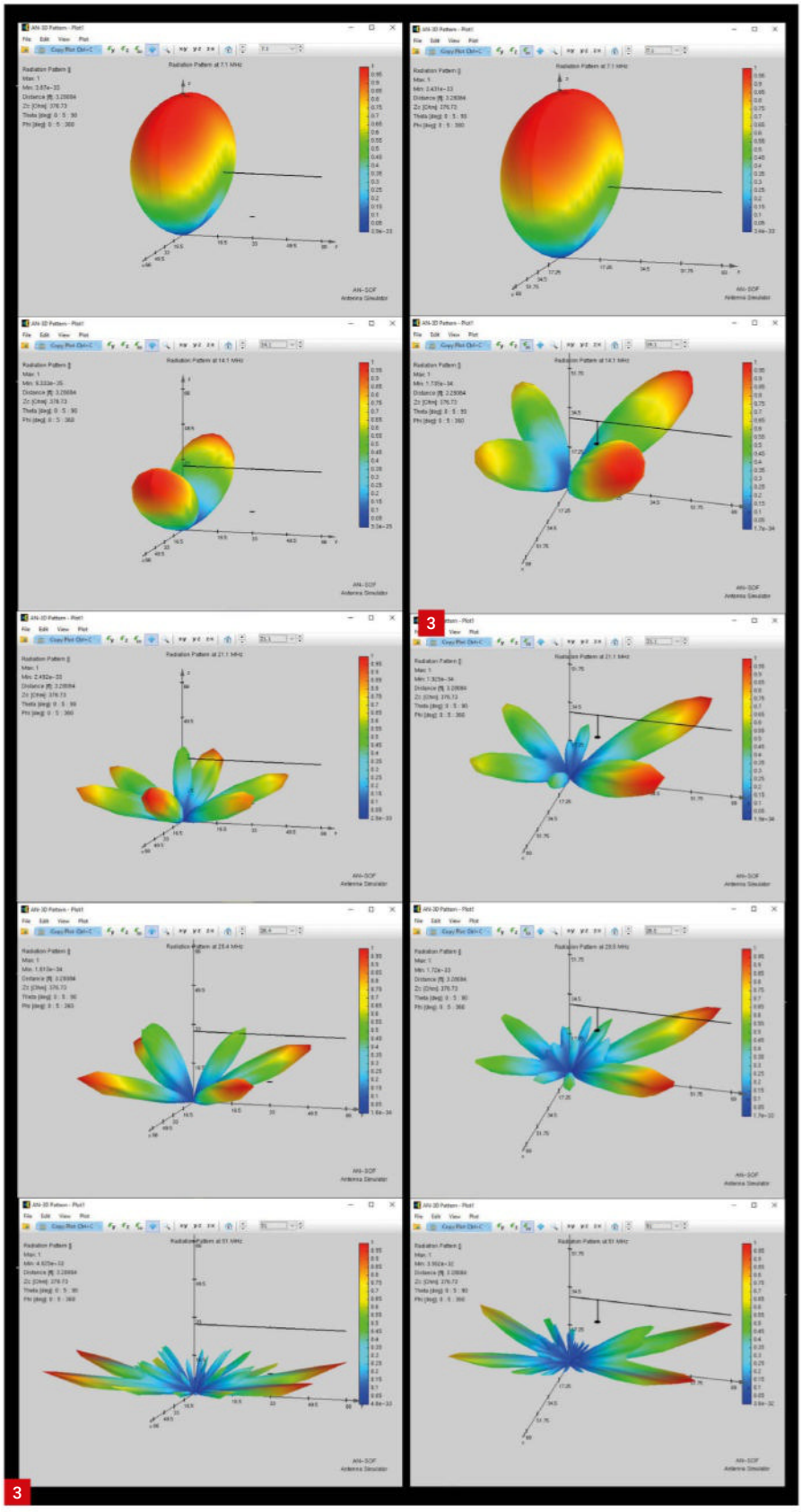


Fig. 1: A layout of my QTH with locations A-B-C being in the back garden.
Fig. 2: The K1POO OCFD. A Common Mode Choke is recommended, depicted in red. Fig. 3: Side by side 3D plots of 40, 20, 25, 10, 6m bands with the doublet, left, and OCFD to the right.

also incorrect for the same reasons.

A conventional dipole is fed at the centre, and when using coaxial cable, it is essentially a single band antenna, although it can present a good match on its third harmonic. A 1:1 balun is generally used at the feedpoint to prevent radiation off of coax cable if this is used as a feeder.

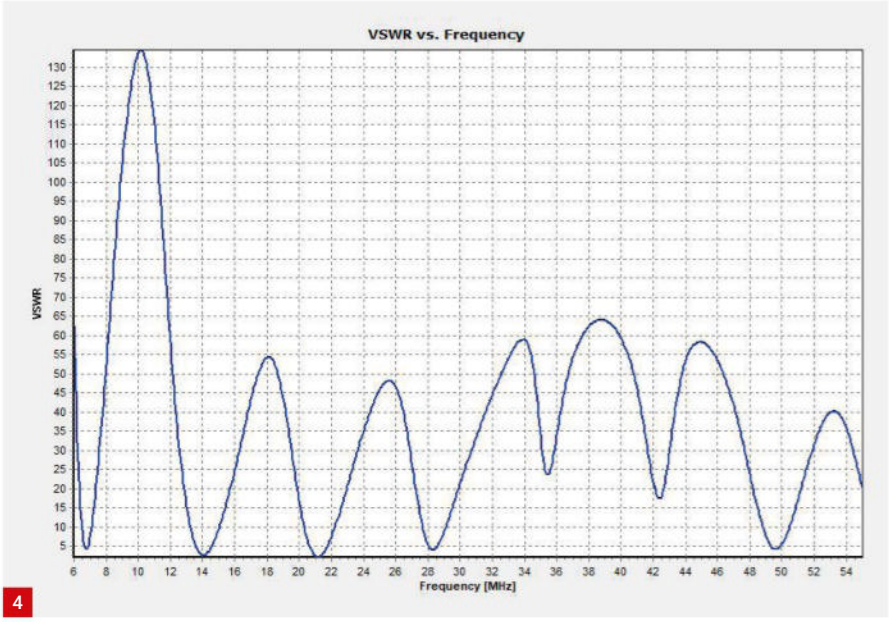
It is accepted that the OCFD works by taking a half wavelength of wire and moving the feedpoint away from the centre to a position where the impedance is equal or nearly equal on a multiple of harmonics of the fundamental frequency. This point is generally found at one third of the length of the wire (as we will see there are variations to the design) but if we make an OCFD for the 40m band using 66ft of wire and put the feedpoint at 33% (25ft) from one end, then we will get harmonic points on the 20, 15, 10 and 6m amateur bands.

The impedance at this 1/3 point will be around 200/300Ω and rather than bringing open-wire feeder back to a balanced AMU, a 4:1 balun/transformer is used to give a match to 50Ω coaxial cable.

A length of coax is connected to the transformer (often quoted figure is 10ft/3m long) with the other end connected to a Common Mode Choke. This length of cable hangs vertically and provides some useful vertical radiation, the common mode choke essentially isolates this section from the rest of the feeder and I found the use of one on the Vine antenna mandatory to prevent RF from travelling along the feeder and back into the shack.

This arrangement, referred to as the Carolina Windom, was developed by three radio amateurs, **Wilkie WY4R**, **Lambert WA4LVB** and **Wright W4UEB**. Their design improved on the original single feed line Windom, bringing the feed arrangements up to modern thinking and to provide an antenna that worked well for local and long-distance contacts.

Over the years amateurs have used variations of the design and one that caught my attention was that of **Richard Formato K1POO*** for a 40/20/15/10m OCFD design. This design has its dipole legs split approximately 17%/83%



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6

5

Fig. 4: Predicted VSWR plot of the OCFD.
Fig. 5: 4:1 Balun transformer.
Fig. 6: The assembled OCFD.

using elements of 12 and 57ft (3.65 & 17.37m) and uses a 4:1 matching transformer. See **Fig. 2**.

https://tinyurl.com/3ynkcwc5

This split would bring the feeder closer to the house and away from the part of the garden where people may be active thus keeping them away from current flowing on the feeder. One downside would be that I would lose the 'all band' capability of the Doublet but I felt that the convenience of the OCFD outweighed the disadvantages of this and who knows, perhaps the FT990's inbuilt AMU would cope on the bands not covered and give me at least some capacity on those bands too. The other downside was that this OCFD would be heavier than a doublet.

The above document states in Note 1 that the design benefits from having a Common Mode Choke immediately after the 4:1 transformer. Experience of the Vine antenna tells me this will be essential to prevent RF getting back into the shack and, unfortunately, it adds more weight to the dipole. It will also mean no vertical radiation from the feeder as per the Carolina Windom.

Model antenna

To see how the antenna was likely to perform I ran an AN-SOF model. Although I may have to drop the far end of the antenna to fit the available space, the simulations were run with the full 69ft top with the antenna at just 20ft/6m above ground (as this will be, for the time being, as high as I can go) over moderate ground. **Fig. 3** denotes the predicted 3D radiation pattern.

For interest I have compared the 3D radiation pattern of the K1POO OCFD, on the right, with that of a Doublet on the left. The image starts with the 40m band at the top and then 20m, 15m, 10m, and I also chanced a look at 6m too. It can be seen that there is a marked difference between the radiation patterns of the two antennas.

As I may have to drop about 1m of the longer wire vertically to fit in the available space I also modelled this configuration too and found next to no difference between the two models. AN-SOF also predicts that the OCFD will present an acceptable match on the intended bands, **Fig. 4**.

As the design looked to be good I got on to building the antenna. For the transformer I had in my junk box some waterproof boxes with the external dimensions of 65 x 60 x 40mm and also a hoard of FT140-43 ferrite rings that would be a manageable fit inside the box.

I have used FT140-43 ferrites before and they seem capable of handling 100W of SSB on the HF bands. If I were to use data I think they would be capable of 50W, however, time will tell if I am correct on this!

I started off by drilling a box to take two M5 stainless steel bolts and solder tags for attaching the transformer and a BNC socket to connect the feeder. Next was the transformer. On opening the drawer that held the 43 cores I was surprised to find that I had already wound a 4:1 transformer on a FT140-3 core. Well, that's what the label I had tied to it said and I can't believe I had forgotten all about it (It must be an age thing!). Anyway, on inspection I found it had seven turns of 18 SWG enameled copper wire, **Fig. 5**.

Before I put it into the box I connected 200Ω of resistance across the transformer's terminals and checked it on an analyser, just in case. The said analyser told me the transformer looked OK over most of the HF bands but the VSWR rose to about 1.7:1 on 10m, something I was happy to live with.

Once the transformer was soldered into the box I added the two wires for the elements using 1.5mm PVC coated cable, **Fig. 6**.

We will see how I got on with the OCFD next month!

*Note: The document I used to base my version of this antenna states that the call has now been reissued to someone else. **PW**

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The PSK Reporter website, compiled by **Philip Gladstone N1DQ** provides a fascinating insight into data modes activity. The map page offers the most popular view, and the facility to filter by band, callsign, etc., is extremely useful and can help ensure you operate using the best band and mode for your current radio interest.

In addition to the map, PSK Reporter hosts a fascinating statistics page (URL below) that contains a wealth of information about the contributing stations. I often use this to monitor the adoption of newly introduced modes. Since the introduction of VarAC, it has been interesting to see it slowly climb the rankings, see **Table 1**. It is important to note that this table is only a snapshot showing modes heard in the past two hours. Nevertheless, it is still a valuable indicator of mode activity. As you can see, FT8 still dominates, but VarAC is steadily climbing the chart and is currently at number 6.

https://pskreporter.info/cgi-bin/pskstats.pl

Another fascinating table sits under the General heading. When operators set their data modes software to report activity to PSK Reporter, the report includes brief details of the software used by the reporting station. The table in this section shows the number of operators using each software entry. I've summarised and ranked the software in **Table 2**.

Whereas the mode data uses a two-hour slot, the software table records activity over the past seven days, providing a more realistic view of utilisation. Unsurprisingly, you can see that WSJT-X leads the pack, but JTDX remains a popular second choice. If you break it down to percentages of WSJT mode software, WSJT-X has 65.5%, while JTDX has 29.5% and MSHV 5%.

When looking at this table on the PSK Reporter site, you will notice that each software entry has a clickable link. When clicked, the table expands to show the software versions and the number of operators for each version. It even lists the operator callsigns for each group! I've further analysed this data in **Table 3**, where you can see that around 60% of operators use the current general release, v2.6.1, while a further 15% use the development release, v2.7.x. However, the table also shows that just under a quarter of the operators are using older versions of WSJT-X! If you're one of these operators, you may be missing contacts and essential features of the software, so I encourage you to update WSJT-X to at least v2.6.1. From my performance tests a few months ago, I know that the later versions of WSJT-X have greatly improved sensitivity, so the upgrade will be worth the effort.

1

Nice new goodies

Mike Richards G4WNC has some interesting new goodies to tempt the wallet, including the official Raspberry Pi M.2 HAT+ and two new SDR receivers. He starts with an examination of data modes software utilisation.

Pi M.2 HAT+

This month, the official M2 HAT+ for the Raspberry Pi, **Fig. 1**, was released, priced £11.50. This much awaited add-on lets us use M.2 peripherals with the Pi 5's PCIe (Peripheral Component Interconnect Express) connector. The PCIe interface is important because it enables reliable high-speed communications between the Raspberry Pi and the attached peripheral device. While this interface is commonly used to connect NVMe solid-state drives, it can potentially connect other PCIe M.2 devices. The new Pi M.2 HAT+ translates from the Pi 5 PCI connector to a single M.2 edge connector that can take the smaller 2230 and 2242 form factor devices. The form factor is simply a measurement of the width and length of the attached device. Thus, a 2230 device is 22mm wide and 30mm long. While many popular NVMe solid-state drives come in 2280 format, you will increasingly find drives in the smaller 2230 and 2242 formats. The cheapest 'known' brand I could find was the Integral 256GB M.2 NVMe in 2242 format at just £27.26 inclusive of VAT and postage from CPC-Farnell. There's no need to pay extra for superfast drives because the PCIe interface on the Pi 5 runs a single data lane with a top rate of around 500MB/s. For my initial shack setup, I used a Western Digital 512GB M.2 2230 device that I had to hand. **NB:** Watch out for mSATA devices that look similar to NVMe drives; these use different connectors and are

Fig. 1: Official Raspberry Pi M.2 HAT+. Fig. 2: Pi M.2 HAT+ mounted on Pi 5 with Active Cooler. Fig. 3: Screenshot showing the Pi firmware check.

incompatible. If you want to be sure of getting a compatible drive, most Pi retailers are offering a NVMe bundle that includes a drive.

Installing the HAT

The new NVMe board arrived with all the required hardware. This included the PCIe link cable, PCB spacers, mounting screws, M.2 retaining screw and a GPIO header extender. I was pleased that the new NVMe board fits above the Official Raspberry Pi cooler, as the Pi 5 needs plenty of cooling when working hard, **Fig. 2**. The supplied GPIO header extension is fitted over the Pi 5 GPIO pins to facilitate this mounting. I wasn't particularly impressed by the screws and spacers, which appear to use a soft nylon. I found it tricky to start the threads without cross-threading. I also had a problem with the NVMe retention screw, as the PCB bush thread was incomplete. I'm sure this was a glitch, as the Pi team usually supply high-quality hardware.

One of the benefits of this board over the Pimoroni NVMe HAT is the position of the NVMe drive on top of the board. This makes it easy to swap NVMe drives. Given the relatively low cost of the NVMe drives, swapping drives to load different operating configurations becomes an attractive option.

Before using the Pi M.2 HAT+, you must ensure your Pi 5 has the latest firmware installed. This is easy to do using the following two commands:

sudo apt update && sudo apt upgrade
sudo rpi-eeprom-update

Upon completing the second command, you will see the current and latest releases listed, **Fig. 3**. If they are the same, then you are bang up to date. If you need to update the firmware, follow these steps:

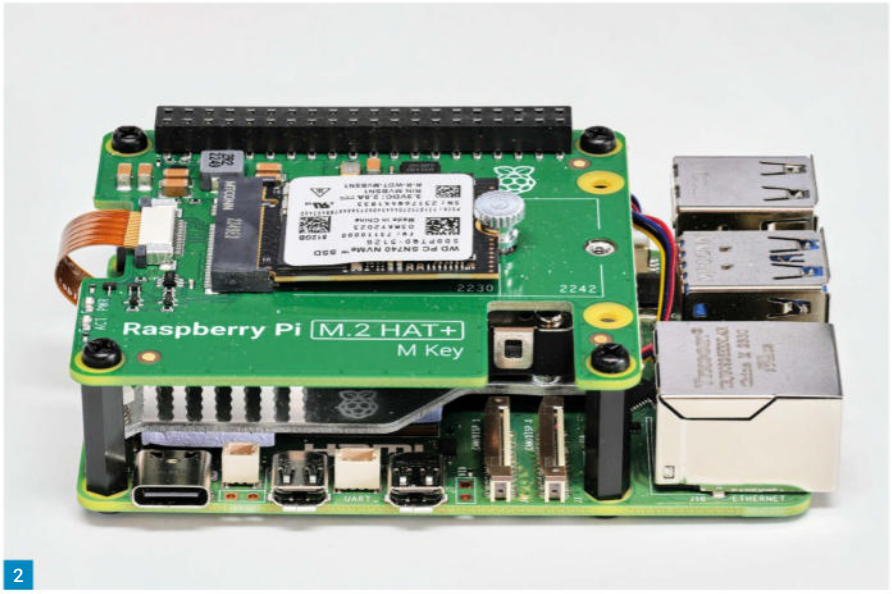
Open a terminal session and enter: **sudo raspi-config**

Go to Advanced – Bootloader and choose Latest then exit raspi-config.

To complete the update, open a terminal session and enter:

sudo rpi-eeprom-update -a

There are couple of ways to get the Pi operating system on the NVMe drive. For my setup I used an NVMe-to-USB drive adapter to connect the bare NVMe to my main PC where I could use the Raspberry Pi Imager software to burn the Pi operating system to the new drive. If you use this system, be careful to select the correct drive, or you could easily wipe the wrong one! The alternative technique is to use Pi Imager to burn a microSD card and



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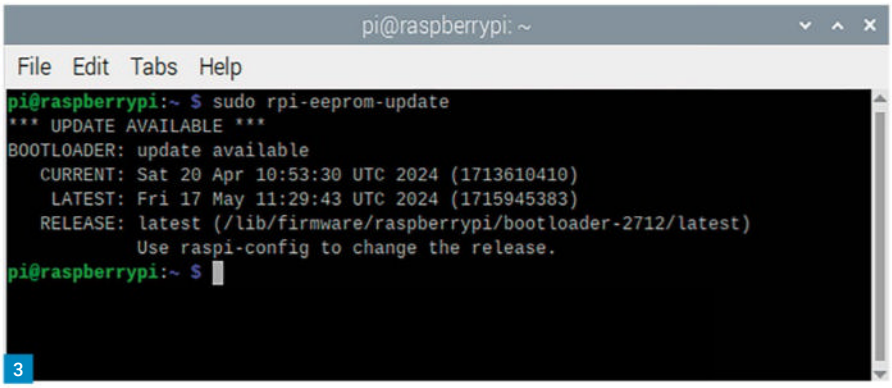


3

insert that in the Pi with the bare NVMe drive attached. Once the Pi has finished booting from the MicroSD card go to the Accessories menu and select SD Card Copier. You can copy the OS from the microSD card to your new NVMe drive. Once the copy is complete, remove the microSD card and reboot the Pi; it will automatically boot from the NVMe drive. You can also change the boot order so that the Pi uses the NVMe drive as the first choice for its operating system. To change the order, open raspi-config again, select Advanced – Boot order and choose boot from NVMe first. Reboot the Pi, and you should enjoy a fast boot time and quick program loads. If you want to check the transfer speeds of your new drive, you can install the Gnome Disks Utility. This handy disk utility is available from the Pi repository and installed with the following command:

sudo apt install gnome-disk-utility

Once installed, the utility is available via the Accessories menu. To conduct a speed test, follow these steps:

In the left-hand panel, select the desired drive

In the right-hand panel, select the large partition, **Fig. 4**

Click the gears icon, select Benchmark partition and click Start Benchmark

Accept the default options on the next page and click Start Benchmarking

Enter your Pi password, and the test will begin

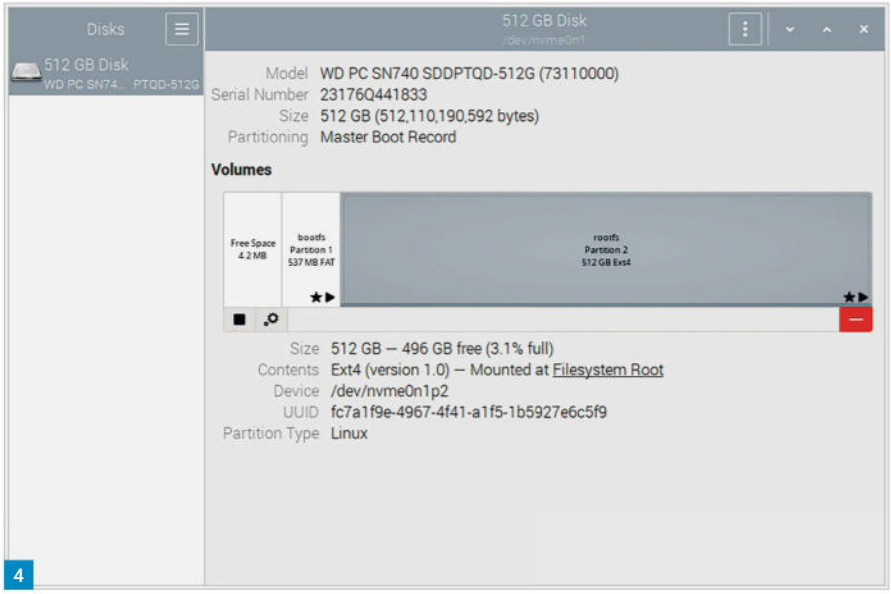
On completion, you will see the speed graph populated, **Fig. 5**

Using an NVMe drive, you should see a read speed of close to 500MB/s with seek times displayed on the right-hand axis. It's only possible to run the read speed tests because you must unmount the drive for write testing, which would disconnect the operating system! When you have completed the installation, you should see a boot time of around 20 seconds.

If you want to consider alternative NVMe adapters, Pimoroni has their NVMe BASE, which I believe was the first on the market. Waveshare also has a PCIe to M.2 adapter at just £8.50. I have one on order, so I'll report on that next time.

Airspy Ranger

The team at Airspy have recently given a sneak preview of their latest hardware, the Airspy Ranger. As with previous Airspy products, the development team are masters at utilising the latest SDR technology to



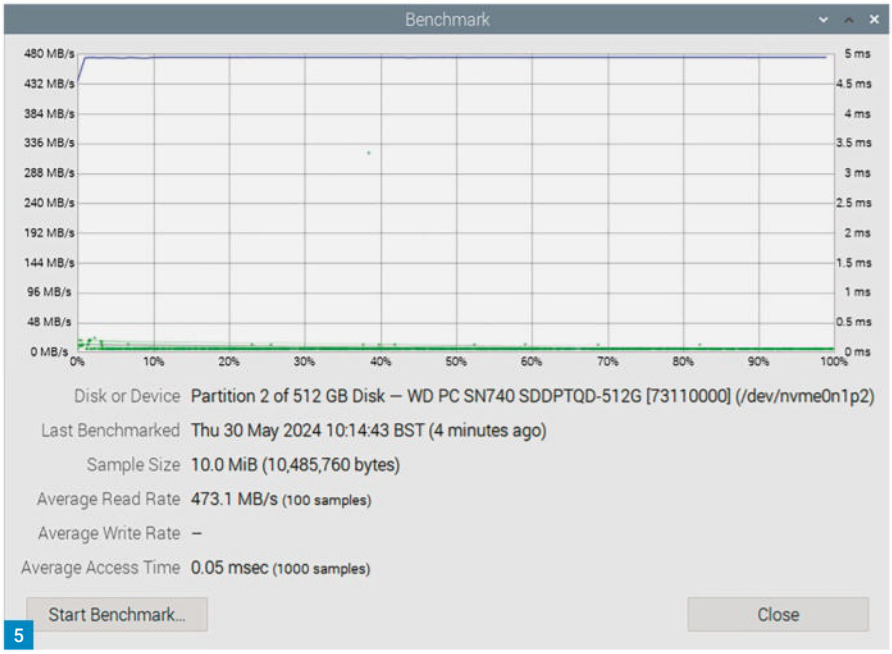


Fig. 4: Selecting the correct partition in the Disks utility. Fig. 5: Completed disk benchmark graph.

Rank	Mode	Count
1	FT8	2350651
2	WSPR	28998
3	FT4	11235
4	CW	8711
5	JS8	4601
6	VARAC	2346
7	MSK144	188
8	FST4W	154
9	JT65	84
10	Q65	53

Table 1: PSK Reporter Mode Count (previous 2 hours only)

Rank	Software	Count
1	WSJT-X	24886
2	JTDX	11201
3	MSHV	1876
4	JS8Call	1396
5	VarAC V	1075
6	OpenWebRX	688
7	KiwiSDR	433
8	ROS	171
9	SDR-Control	151
10	SDR Control for Icom	150

Table 2: PSK Reporter Software Used Ranking (previous 7 days)

WSJT-X Version	Count	Percent
2.7	4150	16.7%
2.6	15209	61.1%
2.5	3721	15.0%
2.4	431	1.7%
2.3	404	1.6%
2.2	439	1.8%
2.1	409	1.6%
2.0	123	0.5%

Table 3 – WSJT-X Software Versions (Previous 7 days)

produce very high-performance receivers. The new Ranger builds on the excellent Airspy HF+ Discovery, extending the coverage from 0.5kHz to 1.75GHz. The low-noise front-end is improved, and the Ranger features extended gain control, more accurate AGC, and state-of-the-art DSP (Digital Signal Processing). The redesigned central clocking system utilises a new low-phase noise VC-TCXO and a dedicated calibration DAC (Digital to Analogue Converter). There are many more improvements that I'll cover in more detail once I get my hands on one. You can also view more information on the Ranger page on the Airspy site here:

https://airspy.com/airspy-ranger

The launch date and prices for the Airspy Ranger are currently unavailable due to delays at the production facility, but I'm sure that will be resolved soon. I should also be receiving a prototype shortly and will be able to report further then.

FobosSDR

Ukrainian manufacturers RigExpert have recently released their new Fobos wide-range SDR receiver. The coverage is an impressive 100kHz to 6GHz with 14-bit sampling and a receive bandwidth of 4-50MHz. Particularly interesting is the dual HF inputs that feature digital direct sampling from 100kHz to 25MHz. These two HF channels provide coherent direct sampling, which opens up the potential for various specialist applications such as beam forming and noise cancellation.

As with all SDR hardware, the software is crucial, and RigExpert has done well here. USB drivers for Windows and Linux are already available, as are open-source API libraries and application examples. There is also an SDR Sharp plugin, an ExtIO plugin, and SoapySDR to use with other SDR applications and GNUradio. The µSDR software also includes native support for Fobos SDR. You may also find that SDR-Console will include Fobos support once the receiver becomes generally available. The UK supplier is Moonraker, and the current price is £329.95, though it was out of stock the last time I looked. **PW**

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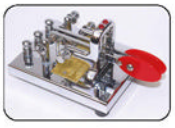

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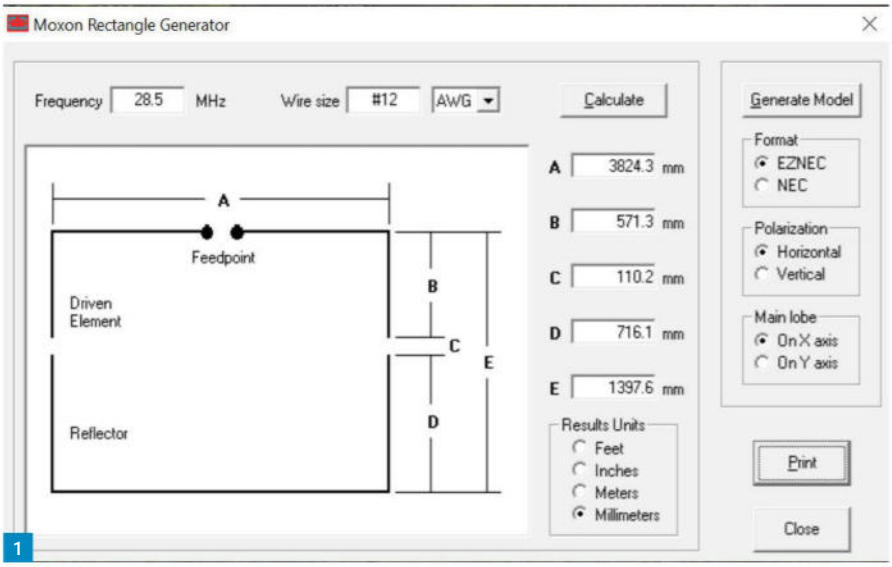


A 10m Moxon beam

Daimon Tilley G4USI describes how to build a 10m Moxon beam antenna for pennies.

With the peak of the Sunspot Cycle getting ever closer, and some good DX opportunities on 10m, why not take advantage of it and give your chances a boost with this simple directional beam, which is cheap, compact and easy to build?

I am fortunate to have four elements on 10m courtesy of my Spiderbeam Yagi, and boy do they make a difference compared to a dipole or vertical! But not everyone has the space or money for such an antenna, so this month I wanted to create a project within the reach of everyone, using just a few hand tools, that would be cheap and effective on this wonderful HF band.

So, I set out to build a 10m Moxon beam that anyone could copy. It took me, quite honestly, about two hours from start to finish, and it cost me absolutely nothing – yes, that is right, not a bean! I already had everything I needed lying around the place, but if you had to start from scratch, then it is easily buildable for less than a tenner.

The Moxon beam is named after antenna guru **Les Moxon G6XN** (SK) and is rectangular in shape. In reality, it is nothing more than a two-element Yagi antenna where the back element (the reflector) and the front element (the driven) are folded in towards each other. This allows the antenna to be more compact, and provides some forward gain as well as a good front-to-back ratio. The rectangular shape and design, as well as the size at 10 metres, lends itself to being built of lightweight spreaders and using wire for the elements. It can be built very light, making it a good portable antenna, as well as effective at home.

Fig. 1 shows the results of the use of a computerised Moxon calculator. There are lots of online versions, but I downloaded one directly to my computer, for use offline, at:

https://moxgen.software.informer.com/1.0

Merely input the frequency and wire size and press 'calculate' for a complete set of metric and imperial measurements. I will use metric here.

In Fig. 1, you can see the shape and dimensions required for 28.5MHz. Unless made from self-supporting material, like aluminium tube, then it is common for the wire elements to be supported by a set of four 'spreaders' in the shape of an X, with one end of each spreader in the centre of the rectangle and one in the corner of the wire rectangle. This provides support for the wire in the shape and size required.

Materials Required

Here is a list of materials required to build the antenna:

- About 11m of wire, I used 12AWG as you can see from Fig. 1. The calculator shows a surprising difference in dimensions for different thicknesses of wire actually, so make sure you choose correctly.
- A piece of plywood, or other stiff material, 6mm thick or thicker, and 274 x 100mm (see note)
- A hand drill and some bits
- Four 2.5m garden canes
- A variety of plastic cable ties
- Two 50mm exhaust clamps (for an aluminium scaffold pole) or to suit your mast size
- Some insulating tape or masking tape to mark positions

Construction

The first step was to calculate the length of spreaders (canes) required, as well as the mounting angle in relation to the baseplate. My schoolboy maths came to the rescue, but to save you the trouble, here is how to get this important part right!

First cut your piece of plywood to the 274 x 100mm dimensions given. Then mark the piece from corner to corner. This gives both the centre point for our mast as well as the required cane angles.

Next, cut your central hole for the mast where the lines cross. I was using 48mm aluminium scaffold pole, so I wanted a hole 50mm in diameter. I did not have a suitable hole saw in that size, so I marked a 50mm circle, drilled a 10mm hole just inside the circle and used my jigsaw to carefully cut the circle. Taking my time gave me quite a neat result.

Next, I offered up one of the thick ends of a cane onto the centre plate, along the 'X' lines I had marked, to gauge its width, then I marked four holes, two either side, on the baseplate, and drilled holes that would allow my cable ties to pass through. I repeated this for all four spreaders, to end up with the result shown in **Fig. 2**.

Then, I affixed each cane to the baseplate using two cable ties, cinching them tight. Note that it is not unusual for canes to have a 'flat' portion, and this is ideal to present to the baseplate. The result is shown in **Fig. 3**. **Note:** This seemed quite sturdy and adequate for /P use, but if I was making it for longer-term / permanent use, I would double the size of the baseplate to 548 x 200mm – thereby allowing a greater distance between the two cable ties on each pole and greater physical support for the canes. I might also cut two plates and place one on top of the other with the canes sandwiched in the middle. It is up to you how to proceed and you might choose entirely different, non-conductive materials. Perhaps a thick plastic chopping board for the baseplate and fibreglass tent poles for the spreaders?

By reference to the Moxon Calculator picture, I marked each corner of the wire rectangle on the canes using insulation tape, **Fig. 4**. Be sure to remember which *side* of the tape marks your point! Then I cut my reflector and director to length, allowing a little extra to fold back and secure with a further cable tie around the spacers both at the feedpoint and where the folded director and reflector elements meet. The wire was then secured at the appropriate length along both the wire and the spreaders using cable ties,

Fig. 5. Depending on your eyesight and the size of the pictures in this article, you may spot that these and subsequent pictures show my initial string mock-up, as the blue string showed up better against the grass than the green wire! Despite this, I did replace the string with wire and make the actual antenna once I was satisfied about dimensions and rigidity etc.

For the separating insulators I used more cable ties, **Fig. 6**, but this time looped, so that when folded the dimension was as given in the calculator. You can see in Fig. 6 where I just tied the end of the strings, but in the final wire version, I secured the ends with cable ties as described. **Fig. 7** shows the entire beam.

I wish I had weighed the antenna but I was really pleasantly surprised at both its weight and rigidity, the wire elements adding to this by keeping the canes under slight tension.

Finally, I secured an exhaust clamp towards the top of my aluminium pole, dropped the antenna on top, securing it with a further clamp. **Figs 8, 9** and **10** show this. Satisfied, it was a few (rainy!) days later before I was able to replace the string with wire, being extra careful with dimensions and allowing for the folding back of the wire at the insulation points.

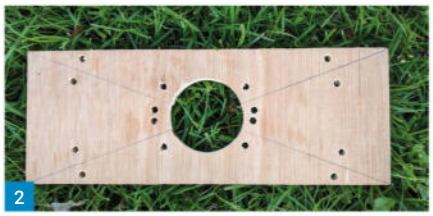
As this was to be a portable antenna, to be carried on my roof rack, I attached a short length of lightweight RG174 to the feedpoint, taking it back to the baseplate where it joined 10m of good quality RG58, with three small turns of coax just under the base to act as a choke. The RG174 caused negligible droop at the feedpoint. An improvement, and necessity for heavier coax, would be a fifth, shorter cane from the feedpoint back to the baseplate at 90°. This would support the weight of coax and prevent the front element from drooping. In this case, a double-sized baseplate would be essential to provide the space to support that cane with cable ties.

In use

Lofting the antenna once more at home, some 6m above ground, and connecting to the NanoVNA rewarded me with instant gratification of an SWR of 1.5:1. I could have trimmed this a little by adjusting the driven element length, but I felt it unnecessary. Connecting up my IC-705 soon brought a couple of CW and SSB contacts and I was pleased that the directionality of the beam and my 'Armstrong Rotator' were in evidence.

So, there you have it – a useful and easy to build antenna for the 10m band (or any band of your choice) for next to nothing. I am certain that my version here would last a few summers, but it would be easy to beef it up a bit, as described, for year-round permanent use. With a bit more ingenuity, you could make the design collapsible to be easier to transport, or if you want to experiment further, consider nesting another element for a higher frequency band inside the first, 6m for example. In this case the feedpoint of the 6m driven element would be at the same position as the 10m element, but then would come back inwards towards the turn points on the spreaders given by the calculator.

Good luck and good DX. **PW**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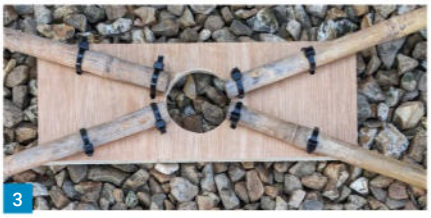
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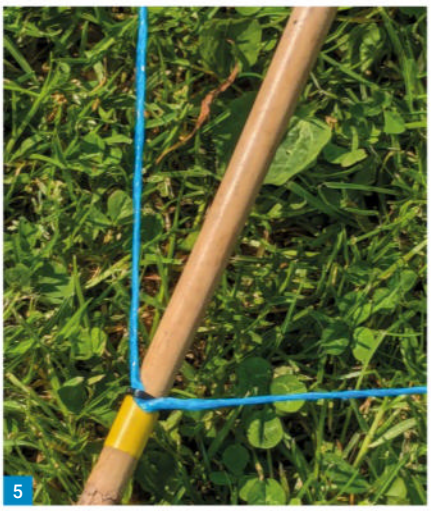
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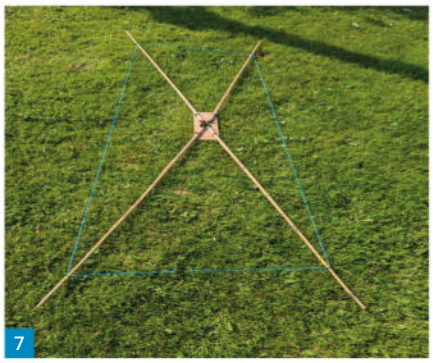
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Fig. 1: Moxon calculator results for 10m.
Fig. 2: The drilled mounting plate.
Fig. 3: The canes fixed in place.
Fig. 4: Marking the measured points with tape.
Fig. 5: Fixing the corners (testing using string to start with). Fig. 6: Method of creating the feedpoint and gaps. Fig. 7: All wired up.
Fig. 8: Exhaust clamps for above and below the centre plate. Fig. 9: Test fit on the pole.
Fig. 10: And finally set up and ready for use.


10

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1

A field strength meter

Alpar Cseley HA8KT has a design for a handy shack test instrument.

The home-brewer amateur sooner or later will need a simple, but sensitive instrument with wide bandwidth, that can be used for checking the tuning of oscillators, power amplifiers, tuning an antenna for maximum radiation, investigating its radiation pattern or detecting noise sources (such as computers, power supplies, LED lights, etc.).

One of those instruments is the field strength indicator, providing relative RF field strength readings in scale units (or in %) of the built-in meter, being not calibrated in μV/m (or μV/ft). They are called *FS indicators (FSI* in short*)*, but in lack of calibration they are not *FS meters*. According to their circuitry, they are either passive, amplified or selective ones, or a combination.

While flipping through numerous books and publications, a long list consisting of 40 items was jotted down with the features of a perfect, ideal instrument. However, with regard to its planned use (and users…), after some considerations a wishlist containing only the really necessary features was drafted. Based on the list, a simple, minimalist, modest FSI was constructed from few components, still suitable for the intended application. The ***FSI-2*** described here, **Fig. 1**, differs somewhat from the known (published) similar ones, and has the following features:

- Built-in fully collapsible telescopic antenna
- BNC for rubber duckies
- Wideband front end
- Sensitive biased diode detector and transistor amplifier
- No sensitivity control potentiometer (knob)
- The meter's pointer is protected from 'pegging'
- Buzzer and LED for additional signal indication
- Metal housing (shielding)
- Could be hand carried (fits in the palm)
- Low power consumption (using 9V PP battery)

The ***FSI-2*** is, as the name suggests, the second unit built with the same electronics but in different form. As small size (45x45mm type) moving coil (VU) meter would be ideal, they are rare, hard to find in these days (or at rip-off prices), the available meter with larger form-factor dictated the geometry of the instrument case. The available 60x45mm one sets the width of the case. Further geometry factor in the design was the collapsed length of the antenna, that should completely be inside the case, when depressed. It gave the height of the case. With a smaller meter, the entire case would be narrower and look prettier (perhaps).

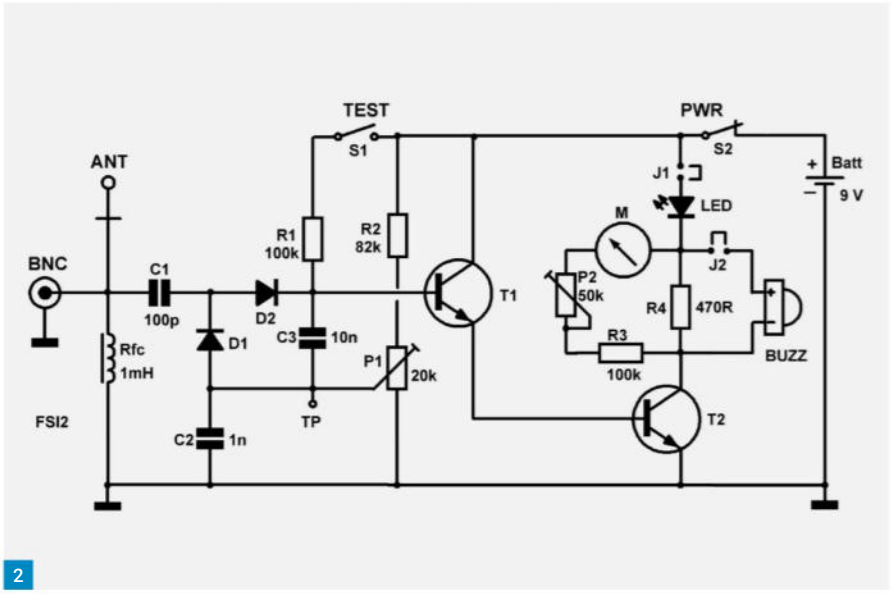
A considerable amount of time was spent with the mechanical design of the case. Due to the bulk of the meter's rear part protruding in the case, the space remaining available for the other parts (switches, battery, antenna, PCB) is limited. The 3-dimensional arrangement of the components was modelled with pieces of cardboard, checking visually how the components fit together.

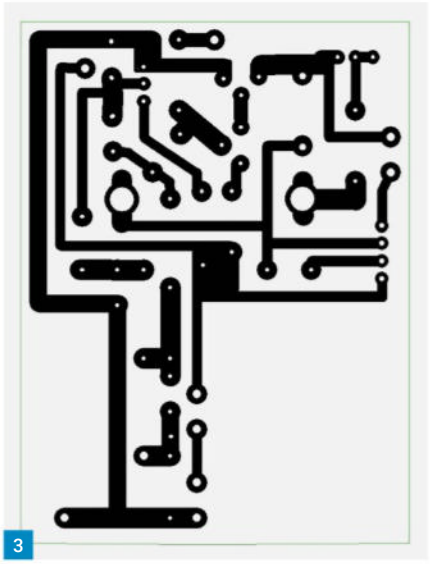
Circuit description

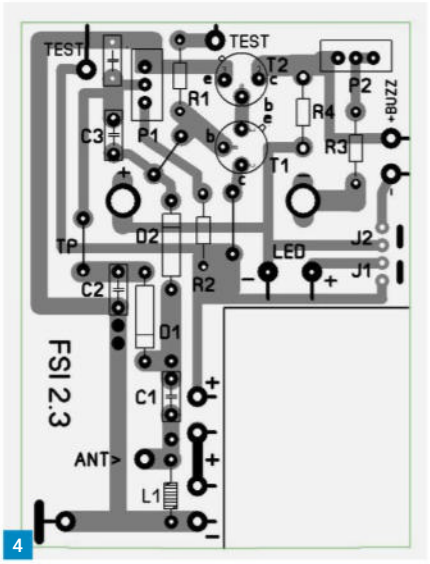
The circuit of the ***FSI-2*** is the result of experimentation, rather than of meticulous design, **Fig. 2**. It works satisfactorily although further improvements may be possible.

The HF signal is picked up by a telescopic antenna (salvaged from an old portable radio), that could be extended to 17 inches (while 4 inches still remain within the instrument case). The sensitivity of the instrument could be adjusted by the extension, the length of the antenna (tuned to the resonant frequency of the RF source). This method is quite effective, particularly at higher frequencies (e.g. when checking a PMR radio). Consequently, no sensitivity control (varipot) is needed (nor provided), that is one of the basic features of this new ***FSI-2***. Moreover, a BNC (or TNC) socket for a resonant rubber duckie could also be installed on the top of the instrument case, if use on VHF or UHF is intended. Rubber antennas are tuned for given frequencies (frequency ranges) and are consequently more appropriate for certain applications. While

Fig. 1: The completed field strength indicator.
Fig. 2: Circuit diagram.
Fig. 3: The PCB.
Fig. 4: PCB with silk-screened component placement.







sensitivity control, adjustment is not possible in this case, the meter is still protected from overload by the circuitry itself. Plugging a short piece of wire (counterpoise) or earthing into the socket on the front of the case increases sensitivity.

The RF signal from the antenna is coupled to a voltage doubling rectifier circuit formed by two germanium PIN diodes, connected to the base of the T1 NPN transistor. The active system consists of an emitter-follower circuit formed by transistors T1 and T2 (**Fig. 2**). The choke Rfc was not installed into the recent unit's circuit, although a place on the PCB was provided. One of the FSI-related articles suggested its use when disturbing low frequency QRM is present. At my location and during field testing such QRM was not experienced.

The T1 and T2 silicon NPN transistors are from my junk-box (BFY333 and BF333) with h_{FE} 293 and 174 respectively. Other NPN transistors with high h_{FE} could serve the purpose, too.

For increasing the indicator's sensitivity, both the diodes and the T1 are forward biased, set initially with the P1 trimpot (see the adjustment process later).

The Ge diodes are selected from the OA-xxx series with matching forward resistance. High-speed Si switching diodes (1N914, 1N4148) could also be used, their higher forward bias must be set to a minimal collector current of T2 accordingly, as described later.

The built-in LED (white or any other colour) is useful if the ***FSI-2*** is placed at a distance from the antenna, workbench, etc., and the deflection of the meter's pointer is not clearly visible. If the bias of transistor T1 was correctly set, the LED without RF is only dimly lit, indicating the 'on' status of the instrument. According to the specifications of the LED (TLRH 190P) in the recent ***FSI-2***, the recommended forward current is 1-20 mA, the 470Ω resistor in the collector circuit of T2 drops the LED current (approximately to 19.1mA at 9V battery voltage). For less brilliance, or a different LED needing less current, 750Ω should be the choice for 12mA.

A rotating coil (Deprez) instrument measures the voltage drop on this resistor – that is proportional to the sensed field strength. The maximal deflection of the pointer could be set by the 100kΩ resistor (R3) and the 50kΩ multi-turn trimpot (P2) during the initial adjustment (given below), afterwards the meter is protected from overload ('pegging').

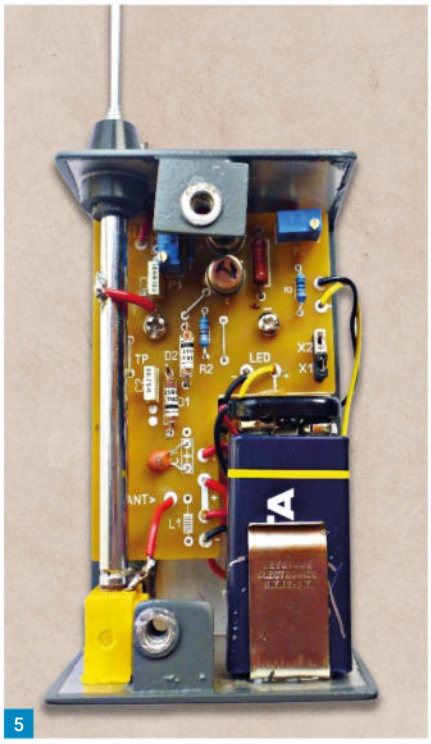
In the earlier versions of the FSI, small VU meters from old tape recorders were built in – their benefits are the satisfactory sensitivity, small form factor and flatness (enabling to craft smaller instrument case). I did not have any, thus a 500µA rotating coil (Deprez) meter with front size 60 x 46 mm (width x height) serves as indicator.

The piezo-sounder with varying pitch and volume gives further indication of the presence and strength of the RF field. It is activated by the voltage drop on the 470Ω (and the meter's circuit). The sounder's volume is not adjustable, but in practice it is not disturbingly loud. If you don't like it, just remove the J2 jumper. The round 'buzzer' is placed and fixed to the instrument panel with Silicon adhesive, right below the PCB, close to its connection points marked as 'BUZZ'.

The unit is powered by an internal 9V block battery. The circuit of the ***FSI-2*** without RF signal consumes only a little (0.3 – 0.4 mA), the power could be switched on/off by the S2 rocker switch (marked as PWR on Fig. 2). This switch type is less prone to inadvertent flipping.

The TEST button (S1) functions for checking the ready status of the ***FSI-2*** and the battery power. By depressing the button forward bias is applied through R1 to the T1 base, driving both T1 and T2 into saturation (fully open), the meter shows full scale deflection (set with P2), the LED shines brilliantly and the sounder buzzes. The deflection of the pointer – without RF from the antenna – depends on the battery voltage. Perfectionists could mark the instrument dial accordingly (9V:480µA; 7V:350; 5V:220).

The components are soldered onto a 56x75 mm (2.20x2.95in) single-layer PCB, **Fig. 3**, with position markings silkscreened on the



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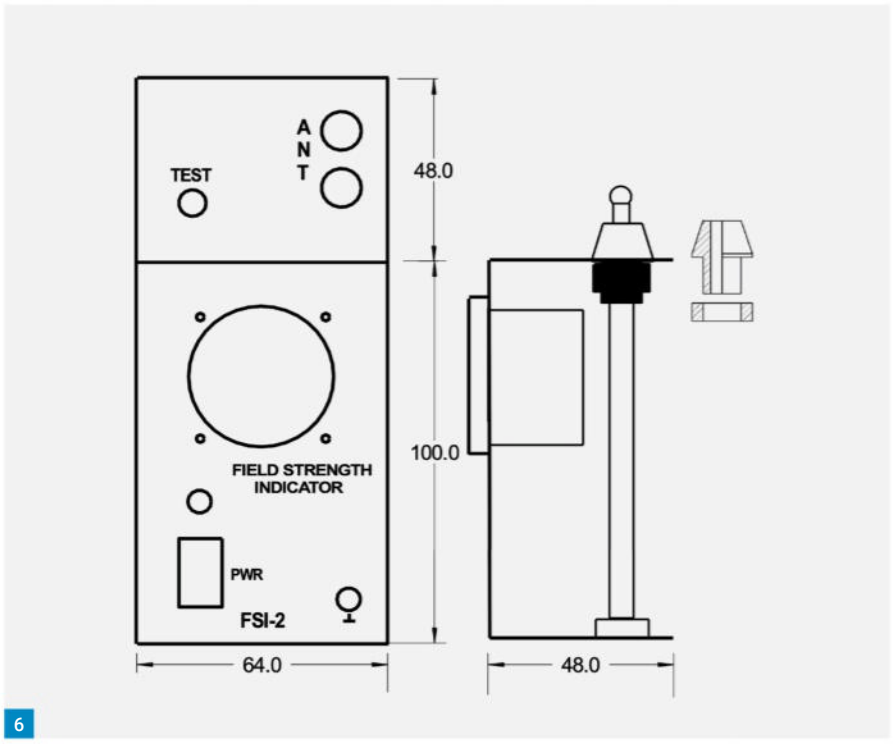

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component side (FSI2.3 on **Fig. 4**). The picture of the inside (**Fig. 5**) with the populated PCB shows an earlier version of the PCB. The FSI2.3 is a modified board, with better component placement and appearance, produced after the recent unit was built. The battery is connected at the + and – signs at the bottom right side of the PCB, above them are the connections for the SW1 switch. The polarities of LED connections are marked. The J1 and J2 jumpers are on the right side up, with the buzzer's connections above. The wire connections for the TEST button are on the top. The meter's screws hold the panel (large circles on the middle of the component side). Watch the meter's polarity! A piece of wire connects the telescopic antenna's end lug to the panel. The BNC is connected to the antenna tube by soldering a wire to it.

A rectangular piece of the PCB has had to be cut out for giving space for the battery (see bottom right in Fig. 5).

Fig. 5: Internal view. Fig. 6: Front panel and top. Fig. 7: Top view. Fig. 8: Back cover.

Mechanical construction

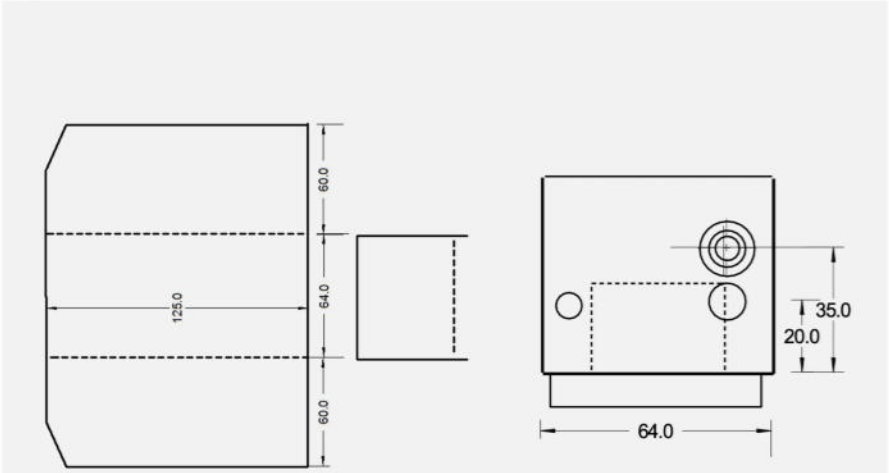
These days sketching up a circuit, crafting the PCB, and the mechanical design of a radio (instrument) case takes more time spent at the computer than the actual assembly requires. True, designing the PCB and case of the ***FSI-2*** lasted longer than their fabrication itself. Here I wish to share my experiences – some might benefit from it.

With no suitable instrument case available on the market, I had to construct it from 1.5mm thick aluminium sheet. It is a rectangular prism, stable enough while standing with an extended antenna, and fits into the user's palm. It consists of two U-shaped parts: one (the 'front') carries all the electronic components (**Figs 6** and **7**), the other is the back cover, the jacket (**Fig. 8**). The parts (antenna, PCB, meter, switch and pushbutton) all had to be placed ('crammed') into the case – designing their 3-dimensional positions took some time and experimentation.

The sequence I follow starts (quite obviously) with the circuit design, experimenting on breadbord (plugboard), and drafting the circuit with the ***sPlan70*** program, plus listing/sorting getting the necessary components. Digging through my junk boxes, the parts were collected and the dimensions of the mechanical ones were measured. Next, with the ***Sprint Layout*** program the artwork was developed (Figs 3 and 4). Up to now all was routine.

Then came the harder task: figuring out the necessary size of the front panel (part), and the entire geometry and dimensions of the case. When the approximate layout of the front was ready, I made a cardboard model, cutting out the holes for the connectors, switches, meters, etc. This process takes time but pays back at the faultless metal work when cutting the aluminium sheets, drilling/cutting the openings on it. When the parts layout on the front is found to be correct, a scale drawing (using the ***AUTOSKETCH*** program) is created, printed and glued to a proper size Al sheet. Dotting the important corner points and locations of holes, centres of circular cutouts according to the drawing through the paper results in precise transfer of the mechanical layout onto the flat metal sheet. After removing the paper, lines and circles are drawn onto the Al sheet (using sharp metal marker pens) and the openings are drilled, cut and filed. The line of bending should be marked on the back side of the front panel!

Cutting to size and bending to U-form the rear (the jacket) of the case comes next. While cutting and bending the front and jacket sheets always use a rectangular ruler for aligning the sheet in the cutter, and in the bending press. The internal size across the bottom of the U jacket (at the bends) (**Fig. 8**) gives the width of the front part. This size depends on the thickness of the sheet and the bending machine (radius) as well. Knowing the rear side (the jacket) internal width, the front part width could be cut/filed exactly to measure for fitting into the jacket U before bending it, too. The front panel must be protected from scratches by adhesive tape while bending.



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Meter setting	10µA in standby (with P1)	
	480µA TEST depressed (with P2)	
At J1 in standby	0.22mA TEST depressed 13.9 mA	
Pointer deflection at TEST	480µA	@ 9V
	350µA	@ 7V
	220µA	@ 5V
Power consumption:	Stand-by 0.25mA	
TEST	45.0mA with buzzer, 42.7mA w/o buzzer	

(These values depend on the diodes, transistors and resistors used, the setting of the circuit, thus they could be different with other components)

Table 1: Measured Results

After bending was finished, and the two U-s fitted together, the ***FSI-2*** case was powder-coated to two different shades of grey. Note, common masking tape is suitable to cover parts where coating is not required. Next comes the lettering: transferring characters, text to the front panel.

One of the local shops offers laser engraving, their machines are controlled with ***CorelDraw*** data files. Therefore, I gave them a scaled ***CorelDraw*** drawing of the front (and its top) with the correct position, font type and size of the letters to be written onto the panel.

Laser engraving writes the letters and text on the front U-part by burning off the plastic layer of the powder coat, then the letters appear white, silver-like – the colour of the aluminium sheet.

After engraving, the front U-section was ready for assembling the meter, PCB, battery, and so on. With all those in place and wired, adjustment of the amplifier circuit commences.

Adjustment

Adjustment commences when the PCB is populated and in place, attached to the meter and the pushbutton, LED, battery, power switch are all connected. It should be done either with a fresh block battery, or (better) using a bench power supply set to 9V.

Before applying power ensure, the P1 is 'wiper low', i.e. the wiper is turned to the ground side of the trimpot. Further, P2 should be set to 50kΩ. The correct setting of the bias voltage causes slight deflection of the meter's pointer, and the diodes work on the linear section of their characteristics. The forward bias of the diodes and the T1 transistor should be set with the P1 multiturn trimpot first. Press the TEST button, and gradually increase the bias voltage until 0.5V is measured at the TP test point: the LED should barely light, indicating the 'on' working status of the FSI2. Now, turn P2 trimpot and adjust the pointer to 80% of full scale. Release the TEST button.

Return to P1 and set the meter to ±10µA reading, the pointer just off zero, that indicates the instrument is active, and in standby.

Press the TEST again, and by P2 set the max. scale reading on the 500µA meter to 480µA. This setting gives a little margin against 'pegging' the pointer. When the max. deflection is set, release TEST button, and note the standby reading.

Re-set P1 (without the TEST) if necessary, and/or P2 (with TEST depressed) until both the 10µA and 480µA are correct.

The drive current of the LED is controlled by the R4 series resistor. In general, 20mA gives quite good brilliance, thus the resistor for 9V nominal supply should be 9/0.020 = 450Ω. Instead, a standard 470Ω one, plus the internal resistances of the LED and T2 at full 'open' while pressing the TEST button resulted in 17mA. If the LED is too luminuous, this current should be reduced by using another R4 resistor. LED type as personal preference dictates.

The currrent through the LED and meter+sounder circuit can be measured by removing the J1 jumper. Measured in the ***FSI-2***, it is 0.22mA in standby, 13.9mA with TEST depressed.

The volume of the piezo sounder (buzzer) is not adjustable. However, it could be silenced, disconnected by removing the J2 jumper. The difference in the reading of the meter while the sounder is on or off is minimal, thus no re-adjustment is necessary.

The values in **Table 1** were measured at 9V (except where otherwsie stated) after adjusting the ***FSI-2*** as described above:

Endnote

The field strength indicator described here serves well for all those experimenting with RF circuits, power amplifiers, antennae, and so on. While it is far from perfect, its amplifier circuit is unique in the sense of protecting the built-in instrument from overloading without the need for twisting sensitivity (reducing) control. There is still room for improvements: VCO with changing pitch instead of the simple buzzer, small amplified loudspeaker for aural indication, selective front end and so forth. Nevertheless, the FSI-2 in its recent form could be a valuable little tool in the ham's toolbox. **PW**

Parts list

ANT	telescopic rod antenna 6mm diam., 48cm total / 38 cm sticks out
BNC	connector for rubber antenna
F	connection for counterpoise (earth)
C1	100pF ceramic capacitor
C2	100nF
C3	10nF
R1	100kΩ 0.25 W
R2	82kΩ 0.25 W
R3	100kΩ 0.25 W
R4	470Ω 0.50 W
P1	20kΩ multi-turn trimpot
P2	50kΩ multi-turn trimpot
D1, D2	OA1180 or similar Ge-diode
T1	Si-NPN transistor, BFY333 (h_{FE}=182)
T2	Si-NPN transistor, BF333 (h_{FE}=294)
Rfc	1mH inductor (optional)
LED	red or white LED, could be high luminous intensity one
M	500µA moving-coil instrument
Z	piezo-buzzer
S1	SP pushbutton
S2	SPST rocker switch

1

Demonstrating amateur radio communications – the 2024 way

We visit the RSGB's National Radio Centre at Bletchley Park and meet some of the large team of volunteers explaining the mysteries of radio.

Roger Dowling G3NKH
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Earlier this year, in our regular series *The Face behind the Call*, we visited the shack of Stony Stratford-based radio amateur **Martyn Baker G0GMB, Fig. 1**. In addition to his home radio activities, Martyn is also Coordinator at the RSGB's National Radio Centre at Bletchley Park, a role which recently earned him the RSGB Founders' Cup in recognition of his dedicated work at the NRC over many years. There, he has built up an over 50-strong team of volunteers who last year spent 9,000 hours over 351 days explaining and demonstrating all aspects of amateur radio to nearly 80,000 visitors. I was delighted when Martyn extended an invitation for me to visit the NRC, **Fig. 2**, and meet some of his colleagues.

My chosen date turned out to be particularly fortuitous – the NRC organises many special events each year and on this particular day visitors were being given a live demonstration of satellite communications in action through the RSGB's links with the ARISS (Amateur Radio on the International Space Station) program.

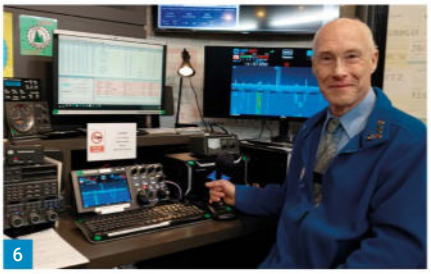
At precisely 1044UTC the International Space Station was due to overfly the UK and youngsters from a school in Lyme Regis were able to put searching questions about space travel to astronaut **Matthew Dominick KC0TOR**. The large audience at the NRC watched with fascination as Martyn explained the technicalities through the NRC's own satellite links with both the school and the ISS itself.

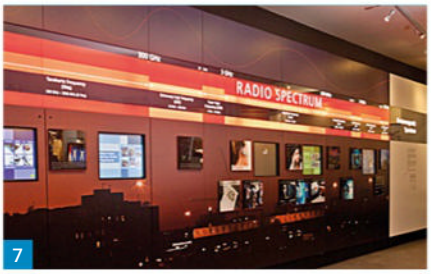
The essentially technical nature of our hobby has always intrigued the great British public, curious as to how it works and how radio amateurs are able to make contacts with other stations around the world. Recognising this interest, the Science Museum in London set up its demonstration station GB2SM in November 1955, an event duly reported in our forerunner *Short Wave Magazine* the following month. The station was under the direction of **G R M Garratt G5CS**, Deputy Keeper of the Science Museum assisted by **G C Voller G3JUL**.

It was a modest start. The technical facilities comprised an enormous a rack-mounted Labgear 150 watt transmitter and its table-top LG-300 variant; and GEC BRT-400E and Eddystone 680X receivers, **Fig. 3**.

GB2SM was modernised over the years, **Fig. 4**, even acquiring an overhead projector (remember those?) and it remained a popular Science Museum attraction until it suddenly closed, to great surprise, in 1994. The reason for the closure – *"…there is no future in radio communications and therefore it is unlikely that the youngsters of tomorrow will be interested in it as a hobby"* – seems risible today, and a more plausible explanation is that the station, in central London, had always been beset by high QRM levels which made amateur radio virtually impossible on many bands.

The closure of GB2SM left a vacuum to be filled and it is to the great credit of the RSGB that a big decision was taken, following the organisation's move from Potters Bar to Bedford in 2008, to invest some £100,000 in setting up its own amateur radio demonstration centre. The chosen site, in the relatively low-noise Bletchley Park





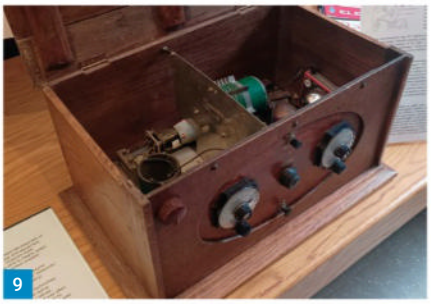


Fig. 1: Martyn Baker G0GMB demonstrates a live link with the International Space Station.
Fig. 2: National Radio Centre exterior.
Fig. 3: Science Museum station GB2SM at its opening in 1955. Fig. 4: GB2SM in 1987 (photo © Costas Krallis). Fig, 5: The radio room of the National Radio Centre when it opened in 2012. (photo © Pete Sipple M0PSX/Essex Ham)
Fig. 6: Volunteer Ed Jones, G3ZLX.
Fig. 7: The Radio Spectrum display with touchscreen panels. Fig. 8: The array of interactive exhibits has been a popular feature since GB3RS opened in 2012.
Fig. 9: A home-built radio dating back to the 1920s. Fig.10: This 1960s KW2000 was once owned by RSGB Secretary John Clarricoats.

in Buckinghamshire was adjacent to a vibrant heritage attraction celebrating the World War II codebreakers. A large team of volunteers and a London-based design consultancy led by **Don Beattie G3BJ** worked tirelessly on the National Radio Centre project with generous support from many organisations, including the major manufacturers and retailers. In addition to demonstration and heritage areas, a radio operations room, **Fig. 5**, was equipped with the latest equipment of the day in the form of Yaesu FTDX9000 and Kenwood TS-2000 transceivers.

The NRC, which acquired its own call GB3RS, was opened by **Ed Vaisey**, then Minister for Culture, Communications and the Creative Industries, on 11 July 2012.

GB3RS today

On my arrival I was welcomed warmly by Martyn Baker and his colleagues. First I met **Ed Jones G3ZLX**, **Fig. 6**, from Milton Keynes who has been a volunteer for four years. At his home station, Ed is mostly active on HF SSB/CW and 2m/70cm FM/SSB, and has recently added a full-wave loop for 6m for FT8. We began the tour in the video presentation area where visitors can watch a short film as an introduction to the basics of radio communications today. An adjacent impressive large wall display with touchscreen panels depicts 'The Radio Spectrum' and how it is used by many different users for different communications purposes, **Fig. 7**.

A former software process control engineer, Ed takes particular pride in keeping all the equipment in good working order. He demonstrated to me the popular self-operated interactive exhibits, **Fig. 8**, that help visitors to understand such concepts as oscillators, bandwidth and modulation.

Ed also finds the historic equipment fascinating. He showed me a home-built radio, **Fig. 9**, that would have been the pride and joy of its constructor in the 1920s. I was also pleased to see that the major contribution of G5KW and

Fig. 11: Volunteer John Moss G0KTW. Fig. 12: Flex-6500 state-of-the-art transceiver.
Fig. 13: Kenwood TS-2000 and Icom IC-9700 transceivers. Fig. 14: Volunteer Robert Tickle M5RTP.

G8KW at KW Electronics in the 1960s is recognised through a KW-2000 transceiver that was presented to long-time RSGB General Secretary **John Clarricoats G6CL** on his retirement in 1963, **Fig. 10**.

Continuing my tour, I then met Manchester-born volunteer **John Moss G0KTW**, **Fig. 11**, who has only returned to the hobby in recent years. John obtained his Class B licence in 1973 but subsequently lost touch with the hobby after working in the Netherlands for some years. He particularly enjoys volunteering at the NRC because of the wide range of visitors it attracts. Some can be quite surprising – like a recent lady visitor in her 80s who surprised John (and indeed her own daughter) by displaying an enviable ability to read CW, which she had learned by serving in the Wrens in World War II. *"We get a lot of younger visitors too"*, said John, *"and I enjoy introducing them to the Morse Code. It's amazing how quickly many of them take to it."*

Now located near Bishop's Stortford, John's main radio is a Yaesu FTdx10, and I thought I detected a note of envy as he demonstrated the NRC's flagship Flex- 6500 SDR-based 100W transceiver covering the range 1.8-54MHz. The radio supports a range of operating modes, including CW, SSB, AM, FM and digital modes, and has an associated 'Maestro' visual display, **Fig. 12**. To its right is a Linear Amp Gemini HF-1K 1kW linear, and on its left a Yaesu FT-5000, regularly used with a wire dipole antenna for the daily NRC NET at 10.30 am on 7.130MHz and for regular monitoring of FT8 on 40m.

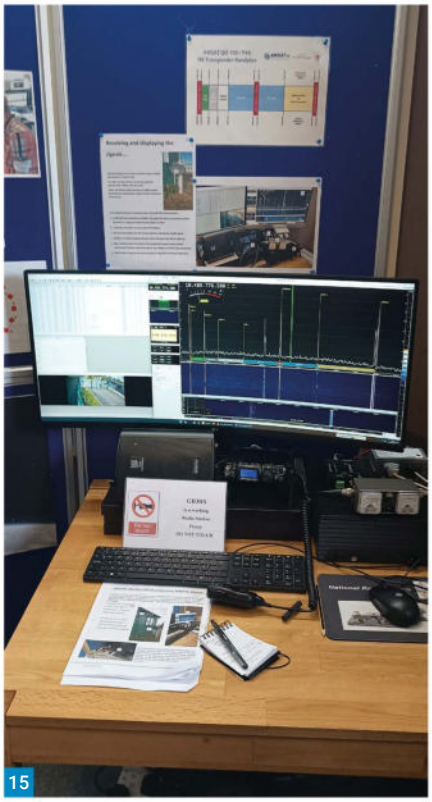
Also in the radio room, to the left, are a Kenwood TS-2000, which is still an excellent transceiver for use with satellites, and an Icom IC-9700 used for digital voice, VHF and UHF communications, **Fig. 13**. I next met **Robert Tickle M5RTP**, **Fig. 14**, who travels to the NRC fortnightly from his home 20 miles away in the village of Harrold on the Bedfordshire border. Originally licensed as G7EPP in 1989, Robert has held his present call since November 2000. *"My QTH is at river level, which is not ideal for amateur radio,"* he told me ruefully, *"and one of the pleasures of volunteering at the NRC is to have access to the latest gear and antenna systems!"* A retired teacher, he greatly enjoys the interaction with the public and in particular with younger people.

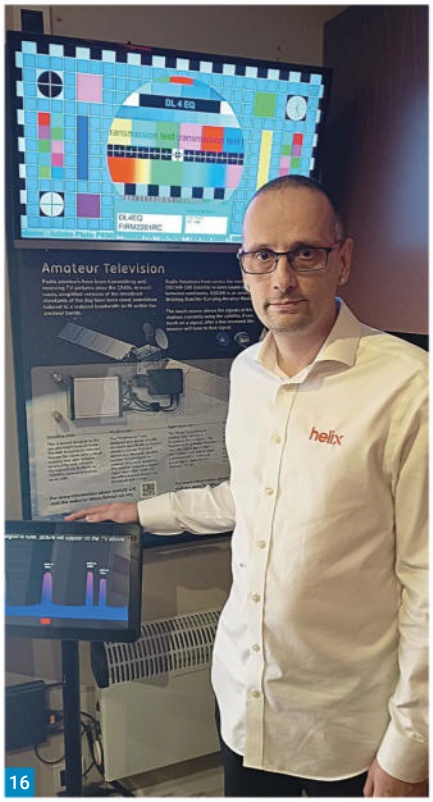
"We have an amazing range of visitors to the NRC," Robert told me. *"People are always fascinated by our live link with the International Space Station. I remember one person even asking me if we ever make contact with aliens."*

He is optimistic about the future of amateur radio. *"We get a lot of visitors who have lapsed licences and want to bring themselves up to date with a view of returning to the hobby. We're also encouraged by the number of younger people expressing an interest in taking out licences and we give them every encouragement to study for their Foundation Licences. I am able to give them the example of my own godson **Barnaby** who is now the proud owner of M7BSN."*

QO-100 satellite demonstrations

The geostationary QO-100 amateur radio satellite (also known as Oscar-100) was launched in November 2018 and has since provided a new dimension for amateur audio and television reception and transmission. The NRC's involvement in satellite radio and television were demonstrated to me by **Las Sanduly M0BOY** from Romania, now living in Milton Keynes. Las has been in this coun-





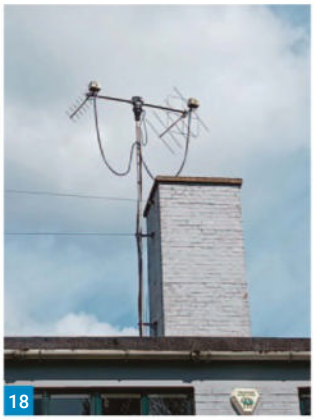


Fig. 15: The QO-100 voice SSB station. Fig. 16: Las Sanduly M0BOY demonstrates interactive digital amateur television reception. Fig. 17: SteppIR antenna. Fig. 18: 2m/70cm steerable dipole. Fig. 19: Satellite dishes for QO-100 reception and voice transmission.

try for ten years and takes a particular interest in satellite radio, with his own Pluto-based SDR duplex QO-100 system at his home QTH.

The NRC has two areas devoted specifically to satellite communications. The first of these, located in the main radio room, demonstrates the use of QO-100 for voice SSB communication, **Fig. 15**. The equipment comprises a Yaesu FT-818 transmitter connected to a Kuhne 2.4GHz upconverter; the transmission dish is equipped with a modified patch antenna. On the receive side, an SDRplay is connected to a PC running SDR Console software.

In a separate area outside the radio room Las demonstrated digital amateur television reception, **Fig. 16**. An interactive display enables visitors to tune into stations by clicking on the spectrum via a small touchscreen. The equipment consists of a Raspberry Pi, a British Amateur Television Club 'Ryde' DATV receiver and a small computer running the interactive processes.

Outside the building, Las walked me around the various antennas currently in use at the NRC. The most immediately obvious is the impressive SteppIR high performance steerable Yagi array, **Fig. 17**, which is operational in the 40m-6m bands. It uses advanced technology to tune itself to the frequency of the station being worked. The NRC is also equipped with a conventional rotatable 2m/70cm beam, **Fig. 18**, and an 80m/40m wire dipole. At the front of the building, three satellite dishes are used for the QO-100 displays, **Fig. 19**.

Looking ahead

I should like to thank Martyn and his team for making me so welcome at the NRC, and for updating me on the latest developments in radio communications technology.

The NRC is an undoubted success, earning a Trip Advisor rating of 4.5 out of 5, and I have no doubt that Martyn's large army of volunteers are central to this. It is a fact of life that amateur radio is a highly technical hobby, and however good the static displays there is no real substitute for practical demonstrations. There are usually three or four volunteers on duty each day, so visitors can always call upon them for helpful verbal explanations as to how the more complex gear actually works.

But what of the future? It is a salutary thought that all the state-of-the-art equipment at the NRC will, in due course, acquire 'heritage' status – and at a speed most of us would prefer to overlook. Already, in the 12 years since it opened, the NRC has been in a state of constant evolution. Fortunately, the amateur radio community is by nature populated by enthusiastic individuals and organisations who are keen to share their knowledge and resources to enhance our hobby. For example, the QO-100 DATV demonstration facility described earlier, which was only installed a year ago, drew heavily on the generous assistance of the British Amateur Television Club and **Justin Crockett G8YTZ**. A few months ago, a multi-layered Geochron display, which illustrates a host of features including time-zones, weather, position of satellites & DX contacts, was very kindly donated by **Patrick Bolan KJ7ZSU** and is now installed in the technology area.

As communications technology develops at an ever-increasing pace, the NRC will require constant updating to reflect the latest techniques, many of which are being developed by the radio community itself. This is the future challenge for the NRC and the RSGB. On the evidence of my visit, I have every belief that it is a challenge that will be met with enthusiasm and success.

Entrance to Bletchley Park and the National Radio Centre is free to members of the RSGB. For non-members, normal Bletchley Park admission prices apply. **PW**

New Syllabus

Colin Redwood G6MXL covers several topics, starting with an overview of changes to the licence exams' syllabus.

Colin Redwood G6MXL
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Welcome to this month's *What Next* column. I am touching on a number of topics, all of which are rather timely, starting with updates to the exam syllabus.

New syllabus

With the announcement and phased implementation of the new licence conditions in the UK, there are changes to the syllabus for each of the three licence exams, **Fig. 1.** These changes apply to exams taken from 1 September 2024. Changes to the syllabus are almost exclusively in the licence conditions part of each syllabus, with a couple of consequential changes elsewhere. The number of questions and pass marks are not changing.
https://tinyurl.com/5n6hf3m7

Licence conditions – Foundation

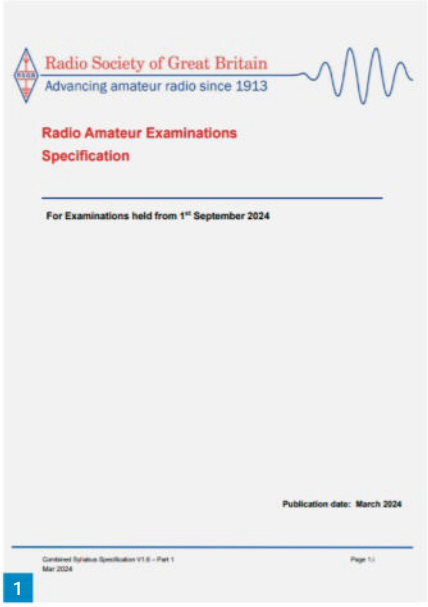
The Foundation exam sees the biggest number of changes from the previous syllabus. There'll still be six questions in the exam. Some examinable items have been re-numbered and/or combined with others, while others have been added to the new syllabus. I spotted a couple of items that have been moved from the Licence conditions part of the old syllabus to the Operating Practices and Procedures part in the new syllabus. Examples of the changes I spotted at Foundation level included the wording around regional secondary locators. Other changes that I spotted include the removal of the section prohibiting the use of home-made transmission equipment. There are also additions to cover restrictions to operating from ships and aircraft and a new item requiring candidates to recall the difference between Primary and Secondary status of bands.

Licence conditions – Intermediate

At Intermediate level, the number of questions remains at six. Some duplication of items already covered at Foundation level under the new syllabus have been removed at Intermediate, e.g. conditions related to Variation and Revocation of amateur licences and operating equipment using another amateur's callsign. Apart from this, there are changes to the wording of the syllabus regarding remote control links to reflect the new licence conditions.

Licence conditions – Full

This section of the syllabus has hardly changed, although several items have been removed as they are already covered at the Intermediate or Foundation level. There'll still be seven questions in the exam on Licence conditions. This will enable candidates to concentrate their learning on those that remain in the syllabus, and where the questions will have to be focussed.


Radio Society of Great Britain
Advancing amateur radio since 1913
Radio Amateur Examinations
Specification
For Examinations held from 1st September 2024
Publication date: March 2024
1

Operating practices and procedures

This is the other area where there are some small changes. At Foundation level, the requirement to know the meaning of the optional suffixes /A, /P, /M and /MM has been moved from the licence conditions part of the old syllabus into this part of the new syllabus. Likewise, the advisability to carry out tests to ensure that the station is not causing undue interference to other radio users has been moved from the licence conditions of the previous syllabus into operating practices and procedures (new syllabus item 7A8). There's no change for Intermediate or Full exams.

Other sections

I understand that there are no changes to other parts of the syllabus, although I have not done a detailed item-by-item comparison. It's likely that training material and mock exam questions for other parts of the syllabus will still be suitable, although a quick review may be prudent.

Suggestions

While the RSGB has produced a document that identifies a number of changes, I've certainly found changes that are not marked. I'd suggest going through the new syllabus (Version 1.6) point-by-point and compare it with the previous version (Version1.5). Only by doing this will you unearth all the changes and satisfy yourself that your training material fully covers the syllabus.

If you are updating training materials, I think you'll need to go through the Licence Conditions part of the syllabus point-by-point to make sure that your material fully covers each aspect of the new syllabus. You'll need to review any example exam questions you might use and any mock papers.

Books

At the time of writing in early June 2024, new versions of the books from the RSGB have yet to be published. While the current and older editions of the books cover most aspects of the syllabus, I'd recommend waiting for the new editions to appear before looking at the licence conditions aspects. Don't forget that candidates will need up-to-date licence schedules provided by the RSGB for their exams.

Sequence

I've been giving a bit of thought to the best sequence to deliver a Foundation course to newcomers to the hobby. I've previously delivered the course in the same sequence as the syllabus, covering Licence conditions in the first session. It occurred to me that this was before covering topics such as power, ERP and frequency bands, that complete newcomers may not be familiar with. I'm wondering whether it would be better to deliver Licence conditions later in the course, once candidates have a grasp of many of the terms used in amateur radio?

Update details

While on the subject of new licence conditions, I'll take this opportunity to remind UK readers to log on to the Ofcom website and check that their details are fully up-to-date for all callsigns that they hold or are responsible for. Ofcom are starting to send out updated licences incorporating the new licence conditions by email. If your email address held by Ofcom for your licence(s) is out of date, then you'll not receive the new licence conditions. If you hold an Intermediate licence, then at some point, Ofcom will be contacting you to offer you the chance to switch from a 2x0xxx callsign to the

Fig. 1: The New Exam Syllabus from 1 September 2024. Fig. 2: Operating near a hill-top car park. Fig. 3: Antenna pole support bracket.

equivalent M8xxx callsign or from a 2x1xxx callsign to the equivalent M9xxx callsign. A further reason is that Ofcom will at some point start cancelling and re-issuing callsigns that have not been verified in five years.

Days in the field

With the advent of better weather conditions, it is a good time to get out of the shack and operate away from home. This can take many forms, including operating from DX locations, or away on holiday or on a day trip. If you like a bit of competition in your amateur radio, then there are contests and numerous awards you can participate in. I've covered many of the popular award schemes such as Summits on the Air (SOTA) and Parks on the Air (POTA) in previous *What Next* columns.

These can all be done individually, as a group of friends or members of your local club, **Fig. 2**. Even if done on a very informal basis with other radio amateurs, it is a great way to see one-another's equipment, interests, operating techniques and logging methods. If you are planning to do this, don't forget to make sure that you charge batteries or obtain fuel for generators beforehand!

Dress rehearsal

It's a good idea to do what in a theatre is called a dress rehearsal, before operating away from home. Try assembling the station in the back garden or a local park and try to make a couple of QSOs. This approach has two main aims. The first is to make sure that all the necessary equipment is present. It is so easy to forget a critical patch lead, RF adapter, data mode interface or lead, or the all-important bracket that attaches an antenna to a mast. The second is to make sure that all the equipment works as intended and that you are familiar with how it works.

Antenna maintenance

The summer months are an ideal time to carry out antenna maintenance. The longer days and usually drier weather with generally less wind make it a lot easier. In addition, the higher temperatures make coaxial feeder easier to work with. It is certainly worth visually checking both coaxial and twin feeders for wear and tear, and looking for any signs of moisture ingress. I'd suggest checking each element of a multi-element antenna such as a Yagi is firmly secured to the boom and that insulators are sound. It's certainly more pleasant to be working outside than in the winter. The warmer summer temperatures make it easier to make good soldered joints, than when the temperature is just above freezing and the wind is blowing! Likewise, if you need to climb ladders or trees to access an antenna.

2

Testing coax

I recently had a need to provide known good 10m run of coax feeder with connectors to replace a faulty feeder for a club activity. As time and reliability were both of the essence, I checked for continuity of inner and outer on the proposed new feeder, and that there was no short between inner and outer conductors. As a final quick test, in my shack I connected it in-line with my main feeder run, and made a few QSOs with no problems. With just a continuity meter or the ohms setting on a multimeter, and a couple of QSOs on different bands, I was able to satisfy myself that the feeder was usable. With more time and better test equipment, no doubt I could have tested for feeder loss etc, but time did not permit this.

Antenna supports

I'd suggest checking things like the brackets for poles that support antennas, **Fig. 3**. When I checked one of mine recently, I was surprised to find one of the nuts had become quite loose. I used the opportunity to check that the rest were fully tightened. I'd also check that wire rope used to raise masts is still in good condition.

Other things to check include rope or string used to hold up wire antennas – these tend not to react well to prolonged exposure to the elements. Also check that any pulleys are free moving and apply grease as necessary. While checking things, I'd also suggest checking that insulators are sound. Don't forget to check

3

rotators, any associated thrust bearings and their electrical connections.

What next?

I'd be pleased to hear from readers with requests for topics that they would like me to cover in future *What Next* columns. There are always newcomers to the hobby with questions on where to start. I'd be happy to look at whatever topic readers would like me to cover. Please drop an email to me via the editor. **PW**

Tim Kirby GW4VXE
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1

Summer on VHF/UHF

Tim Kirby GW4VXE reports a bumper month for VHF/UHF propagation, via a variety of propagation modes.

If, like me, you enjoy seeing how propagation changes from day to day, week to week, month to month and year to year, then I'm sure you will have found this year an interesting one.

Of course, this year we are heading towards Solar Maximum, which brings various factors into play – increased chance of auroras and, seemingly poorer Sporadic E (Es) based propagation, but of course, the chance of F2 as well as F2+Es and F2+TEP type propagation.

Terrestrial weather also forms an input to the Es and tropo propagation that we experience at VHF/UHF and I think it's fair to say that most areas of western Europe, at least, have experienced a very unsettled spring and early summer this year. If you're interested in the effect that weather has on Es, do look out **Jim Bacon G3YLA**'s talks on Sporadic E on YouTube, you'll find several on the RSGB's channel and they are well worth watching.

My observations so far, which are really only anecdotally based on the time I have had available to spend on the radio are that:

The Es season was late in starting, even at low VHF

Once the season started, the higher VHF bands, FM and 2m came into play quite quickly

There have been few extended multi-hop 6m openings in the afternoons and evenings to North America

And, although it's early at the time of writing, the Short-Path Summer Solstice openings to Japan and the west coast of North America have been a little slow to get started, although there have been some good openings a few days ago (early June)

Some exceptional Auroral propagation has been experienced

There have been some excellent single-hop Es openings, already, getting up to 2m

We always used to say that Es would be good in the first week of June. In recent years it seems to have got earlier and earlier, into May and even late April, but this year the 'first week of June' rule seems to have been much closer to the mark!

All of the above gives me the impression that this year is quite different to the Es season, say two years ago. I'll be interested to see if readers agree or have different observations. It's fascinating stuff.

David Johnson G4DHF

I'm very sad to report the untimely death of **David G4DHF.** David was a regular contributor to the *PW* VHF column and a good friend. David died in early June, aged 70, from a stroke. I'd had the pleasure of meeting David back in the 1990s when we operated from Iceland together and we'd kept in touch, off and on, since then. David was a great VHF DX operator and had made many EME contacts, particularly on 2m, with his homebrew array, as well as very many tropo and auroral contacts (I have David's last 2m aurora report to include in this column). David loved designing things – he was a very creative man – and some readers may remember his portable Moxon design published in *PW* a couple of years back, **Fig. 1**. His creative abilities were not confined to amateur radio, but he was an accomplished artist and musician as well. Have a look for 'Urban Faeries' by David Johnson on your favourite music streaming service! Travel well, David, you'll be much missed.

N2MXX Dashboard

Jef Van Raepenbusch ON8NT has been playing around with the N2MXX Dashboard:
https://tinyurl.com/t83v6ypp

It's an HTML page which you can save to your desktop or PC and it contains various items that are possibly of interest to amateur radio operators. Jef customised some of the code for the Denby Dale Amateur Radio Society (DDARS). You can download Jef's version along with instructions on how to customise it at:
https://tinyurl.com/4unzdxyr

Perhaps this makes an interesting alternative to the HamClock software, which I have seen around recently – it's certainly easier to get going!

More on 145 Alive

Many thanks to **Mark Savage M0XIC** who is one of the co-organisers of the 145 Alive 2m activity sessions, along with **John Alexander M0JXA**, for sending a comprehensive writeup on the last event on 11 May. In summary, there were 50 nets running simultaneously and over 1300 QSOs took place during the operating period, **Fig. 2**. Around 300 individual operators took part in the event, with all licence levels represented. Mark says, *"We don't think it's too bold a claim to make that this is one of the most popular and successful community-based participation events outside of Contests or Special Event Stations currently running. It's a 2hr event every 3 to 4 months"*.

Not too bold a claim at all and it's probably fair to say that the 145 Alive event attracts more participation than the majority of events on 2m, contests included.

Early warning that the next 145 Alive event will be held on Sunday 29 September, most likely from 1-4pm local time.

The 8m band

David Thorpe G4FKI (Ampthill) says that he has worked over 20 Spanish stations on the 8m (40MHz) band as well as stations from Portugal, Slovenia and Croatia. Dave has heard PJ4MM but hasn't worked him

Here at **GW4VXE** (Goodwick) I spent a little time monitoring the band and was very interested to see a good number of Spanish stations coming through very well by Es. It was also nice to copy **Robbie EI2IP** via troposcatter.

The 6m band

It was good to hear from **Gus Coleman G3ZEZ**

Fig. 1: David G4DHF with his portable 2m Moxon.
Fig. 2: A map of participation in the recent 145 Alive event.
Fig. 3: Studio X from Italy received by Simon Evans on FM on 4 June.

(Clacton) who says that on 3 June, he was listening on the 6m band using his long wire HF antenna and worked a number of stations, including I, IS0, SP, OK and OE. Around 1155UTC, Gus heard VO1FOG (GN37) calling CQ on SSB (VO1FOG is **Larry Horlick**, who gets a mention in the FM DX section this month). Unfortunately, despite many calls, Gus didn't manage to work Larry. Gus says he's not heard Canada before on 6m and that perhaps the opening was quite localised, because he didn't hear VO1FOG working any UK stations.

Tony Collett G4NBS (Cambridge) started off his season on 28 May around midday, working LA, OH and SM and then the opening moved south east with the highlights being SV0SYH (KN10) and 14 Ukrainian stations. The evening was good too, with five more Ukrainian stations along with SV5DKL (KM64) and 5B4AMX (KM65) – a total of 72 locators and 25 DXCC entities. Next day on 29 May, Tony had an evening opening to the south with 7X2KF (JM06) being the best. There was another opening to the south on 31 May, when Tony worked CN8NY, along with stations in the south of France and the Balearic Islands.

Tony says that the weekend of the 1/2 June was more than a little frustrating, with the UKSMG contest only yielding 27 SSB/CW QSOs though YL2LY (KO07) was a new square. On the Saturday, the Es ended before the contest started and Tony managed to miss most of the Es on the Sunday morning, although he did enjoy a surprise SSB QSO with GM4ODA/P (IO99). As things were quiet on SSB/CW, Tony looked on FT8 to find people working VK8AW (PH57), who was unfortunately not audible owing to Tony's noise level to the North East, but PSK Reporter says that VK8AW heard Tony at -4!

On 8 June, Tony says that the band finally came alive for him. It started off at 1643UTC when Tony worked LX2A (JN29), then turning the beam to work SU1SK (KM05). 7Q6M (KH67) appeared weakly, soon to be joined by 7Q7JN (KH78) – a new DXCC for Tony as well as two new squares. 5H3PV appeared at the same time, but Tony didn't manage to work him. FT4GL from Glorioso Island was also around, but Tony could not see him. The opening closed at 1730UTC. During the evening, Tony says that it started off with him watching others work the Caribbean but he only had fleeting decodes from Ecuadorian stations. Finally, at 2150UTC the band opened and stayed open until Tony went to bed at 0130UTC. Highlights of the opening were FG8OJ (FK96), YV5NEA (FK60), 9Y4D (FK90), J35X (FK92), J88IH (FK93), WA1NLG (FN41), VO1CH (GN37)

and CU3AC (HM68). Tony also saw HK3M and FS/K9EL. Tony worked WP4WW (FK68) on 9 June – the only signal he saw that day.

Jef ON8NT (Aalter) listed stations that he'd worked outside Europe; SO1WS (IL46) on 12 May and PY2XB (GG66) and 7X2KF (JM06) on 19 May.

Don G3XTT (Wells) writes, "*I finally caught CE for a new one in a nice extended opening on 27 May, with seven different CE stations worked over the course of almost an hour. Then 5A1AL was another new one on 2 June. And 53 JA stations worked in the past month, with 39 of them in an extended (at least an hour and a half) opening on 13 June. But I did miss the nice 6m opening to FT4GL in which 20 G stations made it*".

Phil Oakley G0BVD (Great Torrington) has been very active on 6m during the month and has enjoyed the Es. Some of the highlights from Phil's log include CN8NY, 7X2KF, TF3VG and TF2MSN. Phil has been pleased to find some stations on 6m SSB although he says he's had no luck on 6m CW.

Ian Bontoft G4ELW (Bridgwater) caught FG8OJ (FK96) on 1 June. Ian runs 25W of FT8 to an HB9CV.

Roger Lapthorn G3XBM (Cambridge) writes, "*I have not operated on 8m so far this Es season. I decided to carry out my 10mW WSPR tests on 6m instead, as there would be far more monitors. I postulated that if it worked on 6m, it would work on 8m. The 10mW 6m WSPR tests were very successful. It even worked on FT8, much to my surprise. My 10mW 6m FT8 was even copied in Brazil. This looks genuine judging by the other spots. At 2.5W my 6m FT8 reached Argentina! I reckon this is Es linking into TEP. My only 6m antenna is the V2000 vertical omni. My conclusions are that if these results work on 6m, they will definitely work on 8m too, meaning that very many people could WSPR or FT8 beacon on 8m under ISM rules without a licence. I have re-applied for my 8m TX permit and hope to be on 2.5W later in the Es season*".

The 4m band

Don G3XTT decided to get back on 4m and writes, "*I have been running 100W of FT8 to a 4-ele at about 15ft and through an extended length of coax to the bottom of the garden! But 24 countries have been worked during the month despite missing a number of 'obvious' ones, with best DX being OD5KU on 13 June. There does seem to be quite a lot of activity on 4m nowadays when the band is open*".

Dave G4FKI enjoyed the Es opening on 3 June when the best DX was SV9/DK5EW. Dave says he is getting regular reports on his GB3MBD beacon on 70.05 from EI9KP (IO54) over a distance of 600km.

Here at GW4VXE (Goodwick), I've tried 10W of

FT8 to a V-2000 vertical in a couple of Es openings and have been pleased with the results. Highlights have been OH3NE (KP11), OM5KM (JN98) on 4 June and DJ2QV (JN58), HA1YA (JN87), HA7TM (JN97), DL2TOB (JN69), DH8WE (JO50) and OK2WO (JN89) on 13 June.

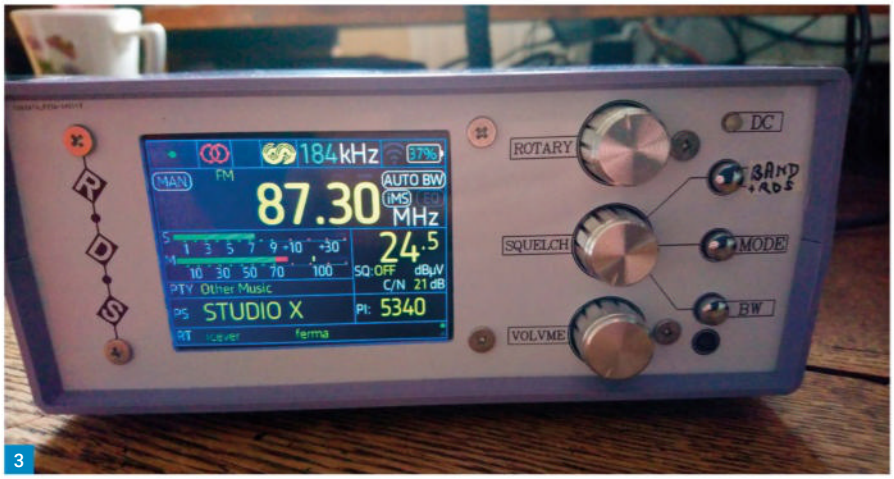
The 2m band

David G4DHF's final report concerned the stations that he had worked on 2m during the big aurora on 11 May. David lists the highlights of the opening, worked, as he puts it, out of the wall of QRM, all on CW; YO5LD (KN05), YO2NAA (KN05), EW6FS (KO35), UT5D (KN18), 9A1CA (JN86), 9A5R (JN95), YU7KB (KN04), S51WX (JN75), S51ZO (JN88), HA1FV (JN87), HA5OO (JN97), HA6NY (JN98), HA1VQ (JN87), HA4ND (JN97), SP7EXY (KO00), I2FAK (JN45), I1DMP (JN34), and OM3WC (JN88). David says that he didn't include all the OK stations he worked or the stations from the south of France and that the heading for the best DX on both 2m and 70cm was around 70°.

Tony G4NBS (Cambridge) starts by noting the passing of David G4DHF, but also of **John Arnold G4NPH** who was a very well-known VHF operator who passed away recently. John was often active in the Activity Contests and had been a member of the Five Bells group in the past. He too, will be much missed.

Tony caught the Es on 2 June, which started slowly, watching others calling Italians that were not reaching him. It was a long opening, lasting over three hours with a Greek station still visible on FT8, some 30 minutes after Tony's last QSO! Highlights of the opening for Tony were IT9QPF (JM67), 9H1PA (JM75), 9H1CG (JM75), 9H1TX (JM75), IU8MHG (JM78), IC8EWW (JN60), F4CQA (JN17), HB9CAT/MM (KM08), SV3BSF (KM08), SV6KRW (KM09), all on FT8, and on SSB six Italian stations in JM89, JN61, JN62, JN70 and JN71. The same evening, Tony caught some tropo to Sweden, working SM6MUY (JO67), SM6TZL (JO67) and SM6MVE (JO67).

Tony says he operated in the *PW* QRP contest as it's always interesting to see how far 5W goes from home but, he writes, "*I'm afraid it has turned me into a Grumpy Old Man this year! Some audio left rather a lot to be desired – when weak almost impossible to understand, this seems to be getting worse or I need hearing aids? Then some operating left a lot to be desired. OK, I accept some are inexperienced operators but others have been around a long time so why the current trend of short CQ and when finishing a QSO not giving a callsign (and often not calling CQ again either)? Add to that, very few actually repeat the information when they give it, not ideal when working with weak signals from home with the usual high noise. Some seem incapable of even giving their callsign more than once when they call me so it's next to impossible to tweak a beam onto them*".



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Jef ON8NT caught the Es opening on 2 June and had a great time, working OZ5QF (JO44), F4CQA (JN17), F1UFX (N19), IU8RIR (JN70), IZ8EDJ (JN70), IZ8YBS (JM89), IW7DWM (N80), IW7DOL (JN90), SV8CS (KM07), IK7UXW (JN80), SV3EXP (KM08), SV6SYG (KM08), OV3T (JO46) and OZ2ND (JO46). I'm guessing Jef's OZ QSOs were either backscatter or tropo.

Roger Daniel G4RUW (Newbury) is always active in the 2m Es openings! He says that for him the season got off to a late start but made up for it. The opening on 2 June was a big one, with the best DX being SV8PEX on Corfu, with IT9HTV (JM76) and IW9BJU (JM77) worked for two new squares. On 13 June, Roger worked SV1NZX (KM17). During the big aurora in May, Roger worked S50C (JN76). After 40 years of running just 10W in Es openings, Roger now allows himself 30W of FT8 or 100W SSB!

Ian G4ELW (Bridgwater) caught two Es openings. The first was on 2 June when he worked IZ6WLW (JN62), IK0FTA (JN61) and IK7UXY (JN90) and the second on 13 June when he worked 9A7JCY (JN74), IZ7UMS (JN81), IZ4AIK (JN63), 9A2WB (JN74) and IW4EGP (JN64). Ian saw several Greek stations but could not complete the QSOs. Ian runs 15W of FT8 to a low 5-element Yagi.

Roger Greengrass EI8KN (Co Waterford) says that the main event for him was the 2m Es on 13 June. Roger managed three new 2m DXCC entities: Z33TI, TA1BM and OH1MA. Roger says he is now up to 46 DXCC entities on 2m terrestrial in seven years. He feels this was possibly the best 2m Es opening that he has known in the seven years he has lived in Ireland.

Just a handful of 2m Es QSOs here at GW4VXE: IK7UXY (JN90) on 2 June and then IK7UXW (JN80) and 9A2WA (JN83) in an early opening on 4 June. I used 50W of FT8 to a V-2000 vertical.

The 70cm band

Keith Watkins G8IXN (Redruth) monitors a number of repeaters for a view of propagation, which can be very interesting as he is surrounded by sea. On 3 June he noticed that all repeaters were about 10dB down from normal – even some of the local ones. It's interesting to note when propagation is worse than usual as well as when it's enhanced! Keith also mentions the new DMR repeater at St Austell, GB7DT.

FM DX

Simon Evans (Twyning) wrote with details of an opening from Spain to Canada on the FM band, experienced by **Mauricio Molano** (Salamanca, Spain). Mauricio wrote, "*I have managed to fulfil another of my DX challenges, to catch an FM station from the other side of the pond! It was this afternoon (27 May), during the Es opening, which had started around 1200UTC and brought me several stations from the Azores Islands with good signals. A couple of hours later, our colleague Larry Horlick (Coley's Point, Newfoundland) began picking up Spanish and Portuguese stations. In the first minutes of the opening was when I caught the CHCM-FM (Marystown) signal on 88.3 with VOCM programming. On 88.5 I have another signal but very weak. I assume it is CBN-1-FM CBC-R1 Saint John's, but it will be difficult for me to identify it 100%*".

Simon says that for him there was no transatlantic propagation, but that he did receive two stations on the Azores on 87.7 and 87.9MHz. See also **Fig. 3**.

Satellites

Patrick Stoddard WD9EWK (Phoenix) says, "*I really don't have much to report this month. GreenCube is still going, the ISS repeater and digipeater have been working, we are still getting use of Tevel satellites, and some nice long-distance contacts on RS-44. It was nice to see the QO-100 activity from St. John's in Newfoundland last month*".

A full column this month, with plenty going on! Hopefully next month will be just the same. Please keep your news and photos coming in! **PW**

Dick King G14167/M5DIK
richardvking@ntlworld.com

The ISWL

ISWL President **Dick King M5DIK** shares some history of the International Short Wave League, starting from its birth in 1946.

I have always been fascinated by the early history of radio and over the years much has been written in *Monitor* (our club's monthly journal) about the early days of the International Shortwave League (ISWL). The starting date of this information would be from around 1952 when the first edition of *Monitor* was published. However, the League was founded in 1946 and during those first few years very little was written or recorded, so I thought it would be interesting to see what I could find out using contemporary publications.

ISWL launched

In October 1946 the editors (**Arthur Gee G2UK** and **Norman Stevens**) of *Short Wave News*, one of the country's leading commercial radio magazines at that time, made the following announcement in its editorial: *The International Shortwave League is launched! For some time, letters have been received expressing the wish that* Short Wave News *should sponsor a society for the shortwave enthusiast. We have carefully weighed up the idea, considering the need for such a society, the snags that are liable to be met, and the facilities that would be required by the members. The conclusions reached are first, that there is room for such a progressive society, and that now with the approach of the DX season, it is the most favourable time to venture on such a project. The objects of the ISWL are simple, but embracing. The ISWL will cater for every class of shortwave enthusiast, be he constructor, listener or transmitter. Entry into the ISWL is not hampered by any unnecessary restrictions, and there will be no varying class of membership. For the present membership fees are purely nominal and are intended simply to cover cost of certificates, postage, address plates and so forth. Membership identification numbers will consist of the letters ISWL followed by the prefix for locality coupled to an individual number e.g. ISWL/VK-234 would indicate a member in Australia. Until such time as the membership justifies the publication of a separate League journal, which would of course entail an increase in subscription, it is proposed to publish news of League activities in the* Short Wave News.

Why the ISWL?

I was curious to try and discover why a core of amateurs that were already well established in the commercial aspects of our hobby decided that the ISWL was necessary. Very few comments were made publicly about the reasons but reading between the lines I think many shortwave enthusiasts were unhappy with what was available to them in 1946. Before the war amateur radio was a popular hobby and after the end of the war the hobby expanded rapidly. During WWII thousands of teenagers and young adults had embraced shortwave listening with many having gained experience of radio

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training while serving in the forces. In addition, ex-military communications equipment was becoming readily available making the hobby within reach of everybody. Very little mention was made of the RSGB – it was considered something of a closed shop – one had to be a professional and receive an invitation to join the organisation, which was of no use to the majority of hobbyists. Other local radio clubs and organisations also had curious levels of membership, which I presume were not to the liking of the new breed of shortwave enthusiast. There was a shortwave club called the British Shortwave League (BSWL), which had been in existence since before the war, but it would appear that this club had its problems and many chose not to join. Arthur Gee was a shrewd businessman and I suspect he recognised the huge untapped subscription potential of disgruntled shortwave listeners. By launching a new dynamic ISWL he could perhaps also ensure the commercial viability of *Short Wave News*.

Arthur Gee G2UK / G1

As an aside Doctor Arthur Gee G2UK/G1, our founding President, was a remarkable character packing more into one lifetime than most of us could ever dream of. During the mid-1930s, Arthur was a member of the Royal Naval Wireless Auxiliary Reserve, which led to his life-long interest in amateur radio. He was a member of the London Wireless Club (now the RSGB), BARTG, RAYNET and Co-Director of Data Publications for which he wrote many constructional articles for their publications *Short Wave News* and *Radio Constructor*. As well as a practising doctor he was also a Medical Officer of Health to the Suffolk Counties Hospital Area. As if this was not enough, his interests were far ranging even outside amateur radio. He was a skilled model-maker of sailing ships, a founding member and Commodore of the Lowestoft Cruising Club, Member of the Royal Norfolk and Suffolk Yacht Club, and a member of Waveney and Oulton Broad Yacht Clubs. Arthur was also an amateur astronomer and member of Norwich Astronomical Society and editor of its newsletter. Finally, he was an enthusiastic steamboat owner, one time radio operator and medic on an expedition to Orland Island off the coast of Sweden to record an eclipse of the Sun.

BSWL joins in

Curiously in December 1949 *The Short Wave Listener*, a commercial rival of *Short Wave News*, decided to jump on the bandwagon and made the following announcement in its editorial – *We are happy to announce a new chapter in long history of the British Short Wave League (BSWL). Briefly, the League is in future to operate in association with* The Short Wave Listener *and will, so to say, be under the same management. One of the more important changes brought about by what is a major reorganisation of the BSWL is that all future issues of* The Short Wave Listener *will include the 12-page* BSWL Review *as an additional centre section. For those who may not know, the BSWL was established as long ago as 1935. Though it has suffered many vicissitudes since, it can show a continuous useful existence of nearly 15 years, the war periods included. The new arrangements for carrying on the League ensure that it will at last have the full support of a strong parent organisation. This in turn means that those belonging to the BSWL will enjoy greater benefits of membership that ever before.* I

Photo 1: Short Wave News 1946.
Photo 2: Issue 4 of Monitor, April 1952.
Photo 3: 13-year old Charles Southall.
Photo 4: Countries Heard certificate.

believe the BSWL continued for a few more years with many of its members joining the ISWL before finally closing in the early 1950s.

Off to a flying start

At the launch of the ISWL in October 1946 its objectives were stated in the editorial of *Short Wave News* – they were to bring together shortwave enthusiasts of the world, regardless of race or creed or politics, to their mutual benefit. To foster and promote international good will through the medium of shortwave interest. To provide facilities which will enable enthusiasts to carry out their hobby to the greatest advantage to themselves and their fellow enthusiasts. These ideals obviously struck a chord with our new breed of shortwave enthusiast as within three short months by December the ISWL had signed up over 350 members, including many from overseas in countries such as Czechoslovakia, Sweden, Canada, Australia, USA, Venezuela, New Zealand and Palestine. The members running the League were very progressive in their thinking, they obviously wanted to establish a club that hadn't existed before. They announced that by the end of the year they would be able to supply members with League supplies such as headed notepaper and envelopes, rubber stamps with the League's emblem, log books, badges, SWL cards and stick-on labels. In another departure from the past the ISWL were keen to appoint representatives in all parts of the world and in every part of the UK. Once again, this concept appeared very popular as by December there were 21 county representatives and five foreign country representatives that even included China! The county representatives appeared to be very keen organising meetings and were generally speaking the young breed of members that had joined at the very beginning, for example the Berkshire representative was **R Phillips G74**, in Kent **JP Barnes G96** and in West London **J Wollacott G33**.

ISWL representation

During the early part of 1947 the League continued to grow as well as appointing both County and Town representatives – their objective was to promote the ISWL at a local level and it was hoped that eventually every major town would have an ISWL rep. By the middle of the year more than 30 towns had an active rep with club activities being reported in the ISWL section of *Short Wave News*. For example, we were told that the inaugural meeting of the Middlesex Chapter was held in Uxbridge and that the South East London Chapter was making considerable progress with an average of 15 members attending meetings with four new members welcomed at the last meeting. On

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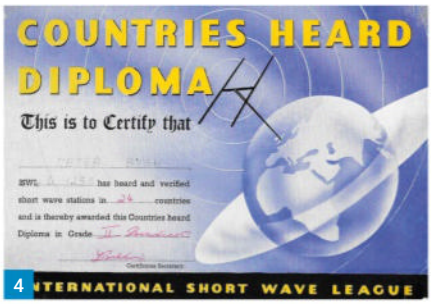
the overseas front representatives had been appointed in Khartoum, Egypt; India, (**D Shahani VU-942**); Kenya (**CF Collins VQ-942**) and State representatives in the USA covering California (**Paul Dilg W-643**), Illinois, Montana, New Jersey, Ohio East and Pennsylvania (**John Young W-821**). Various services had also been added to the offering of the League. These included a free translation service in German, Dutch, Russian, Finnish, Magya, Spanish and French. A QSL Bureau had also been established, a technical query service for home construction under the guidance of **Tom Vallard G6** and a Broadcast station identification service.



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One year on

The editorial in *Short Wave News* October 1947 summed up the first 12 months of the League thus: *the first question that arises is: Was the formation of the ISWL justified? Many people were of the opinion that a new League was not needed since several were already in existence, in varying forms of activity and non activity. These doubts can now be eliminated, for in our first year we have enrolled over 1300 members in 42 countries throughout the world. That, in itself, is surely evidence that a new League of this character was needed? Next comes the query: has satisfactory progress been made? Again, we can come right to the point. During the past 12 months we have formed the following services for the benefit of members: International Correspondence Bureau, Translation Services covering 18 languages, Technical Query Services covering home-built receivers, mechanical construction, valve data and ionospheric problems. A Broadcast Station Query Service unparalleled anywhere for its scope and facilities, a fine two-way QSL Bureau which is the only one in the world to cater for BC station fans, a Ham exchange Holiday Scheme and a QRP Club for transmitting members. With the exception of the QSL Bureau these services are entirely free to members. We challenge anyone to produce facilities even equal to the above. Also on the credit side is the fact that our membership fee will remain at only one shilling a year!*

Dedicatory broadcast

As well as being a success with its members the ISWL was proving to be an influential club with international broadcast stations. There were several reports in the ISWL Monthly Notes that stations were broadcasting dedicatory programmes about the ISWL. We were told that a special ISWL broadcast from Radio WRUL in the USA was very well received in the UK. **Charles Southall W3-990**, a keen American member who was only aged 13, began the programme by outlining the origins of the ISWL and the announcer remarked that a growth of membership to the 2000 mark was pretty good going for 17 months work. The announcer then told a most interesting story of how he first heard of the ISWL. Hailing a taxi in Boston he asked for WRUL studios. The inquisitive taxi driver enquired who he was and on being told, started recounting some of his shortwave listening experiences. During the conversation he said he was a member of the ISWL and gave the announcer full details of the benefits of ISWL membership. A few days later Charles Southall's letter suggesting an ISWL Dedicatory Programme arrived at WRUL and thus the idea of the programme began! Continuing, Charles outlined the purpose of the ISWL and dealt with the services provided for members. Following a musical interlude, details of the origin of WRUL were

given and mention was made of the fact that the objects of WRUL resembled very closely the aims of the ISWL. Charles concluded the programme by giving some particulars of interesting shortwave stations which were putting out good programmes. It was altogether a most interesting programme and in spite of some fairly rapid fading was received 100% in the UK. Other special ISWL dedicatory broadcasts occurred in the coming months, including one from the International Goodwill Station OTC2, Leopoldville in the Belgian Congo on 9767kc/s, which had been arranged by the ISWL's South African Rep **Jean Beaunoir ZS-516**.

Ensuing years

During 1948 and 1949 the League continued on its upward trajectory adding new services and enrolling new members. Every month *Short Wave News* dedicated at least two pages of the magazine to ISWL matters, local chapter news was included along with letters to the editor addressing League issues. At the end of 1948 the flow of new members continued – membership passed 2700 with members located in over 70 countries, including Kenya, Malaysia, Sierra Leone and India. By the end of 1949 this figure exceeded 3500 members. The activities of the chapters were the life blood of the League and in September 1949 a two-page article by **Frank Baldwin G193** gave an account of running the London Chapter. Frank told us that in January 1948 five enthusiasts from the Leytonstone area formed the Chapter and it was decided at the outset that they would dispense with rules and regulations and any payments. By May membership had grown to ten, they were constructing a receiver and had won the first ISWL DX Contest. Other constructional projects that had been completed included a preselector, Clapp oscillator, six-position audio filter, a switchable capacity-coupled antenna control panel complete with coloured indicator lights, an IF regeneration circuit and a noise limiter stage. Other innovations during 1949 included the introduction of the ISWLs first DX Certificate. This was the countries heard diploma, which was an opportunity for DXers to receive official recognition for their abilities as listeners and reporters. In October 1949 it was announced that the ISWL had decided to award two Challenge Cups for future inter-Chapter Contests. The first of these cups would be awarded to the Chapter scoring the highest number of points in the first Broadcast Station Contest to be held in January 1950. The second cup would be awarded for inter Chapter Amateur Bands Contests.

The final years

During the early 1950s the ISWL continued to build on its earlier successes with increasing membership and the expansion of local chapters. By the end of 1950 membership stood at 4200 and new ISWL Chapters (now renamed Groups) were still being formed. We were told that there were plans

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The Cup and its replica, to be awarded to the winning ISWL Chapter in the forthcoming Broadcast Band Contest—*See ISWL Notes*
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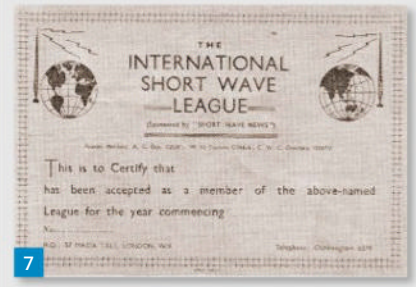

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for Groups to be formed in Bridlington, Coventry, Glasgow, Eccles, Tredegar, Spalding, Folkestone and Yorkshire. On the international front the ISWL had appointed a French Rep in Paris, **Cener Zeljko YU-3866** was representing Yugoslavia and that the North Bay, Ontario Group Chaired by **R Lyttle VE-2578** were the winners of the First ISWL Broadcast contest. By December 1951 membership stood at over 5300 and there were 70 active ISWL Groups. The majority of these groups were naturally scattered around the UK but there were also groups in Shannon, Eire; Malta; Gutersloh, Germany; Sligo, Eire; Luneburg, Germany and North Bay, Canada. Most parts of the world had members, which included countries such as Israel, Kenya, Malaysia, Saudi Arabia, Japan, Nigeria, Brazil, India and Iraq. There were over 60 American members, 12 from Canada, seven from New Zealand, six from Australia and six from South Africa.

Momentous announcement

In December 1951 a momentous announcement was made in the editorial of *Short Wave News*. It said: *it has always been our hope that we would one day be able to launch the ISWL off on its own course, so that it was quite independent of this*

Photo 5: British Short Wave League membership certificate.
Photo 6: ISWL Broadcast Band Contest Cup.
Photo 7: ISWL membership certificate.

journal. It is a bad policy to have any such organisation tied to a commercial project, because the criticisms can very justly be made that the organisation is being run to stimulate interest in the commercial concern's products. In actual fact, this magazine has sponsored the ISWL very heavily during the past few years. Particularly was this so in its early days. As a result of this practical help, the ISWL is now in a very strong position. A few months ago, the ISWL Committee was formed and we now feel that the time is ripe for the ISWL to stand on its feet as an independent organisation, which is not in any way tied to a commercial concern. It can then manage its own affairs and finances and can become a truly independent organisation. As the League is now by far the largest and most active of SWL Societies in the world, the time has at last arrived when such a move to independence is possible. Most members will welcome the event but we would remind all concerned that we all owe a very great deal to Amalgamated Short Wave Press, which not only gave the ISWL birth, but also financially sustained the League for many years and we would like to thank Arthur Gee G2UK, ***Bill Overland G2ATV*** *and* ***J Burrows G393*** *for all the work they have carried out in the interests of the ISWL. As for future arrangements the League is to publish and produce its own monthly magazine aptly named* MONITOR. *This will be in duplicated booklet form and will be published during the first week of the month. Annual subscription will be 8 shillings. All League services will, of course continue to function as will the many groups now in being. In closing we require your interest and support with regards the ISWL magazine and would welcome Group notes, Amateur and Broadcast Band DX notes together with any other items of interest to other League members. Help us to help you – support the ISWL.* And just one short month later members received their very first copy of *Monitor* in January 1952.

Present day

I am pleased to say that nearly 80 years later the ISWL is still alive and well. We certainly don't have the same number of members as in those early heady days but remarkably three of our current members joined the ISWL in 1948 during the *Short Wave News* era. In addition, we have a further four members that joined in 1952, the first year of the publication of *Monitor*. I am sure that there must still be some active previous members of the ISWL that can enlighten us about the early days or perhaps have some interesting memorabilia that we could add to our historical collection. If so, I would love to hear from you and can be contacted via email at the address at the head of this article.
https://www.iswl.org.uk

BBC coronations Pt XVI

Keith Hamer and **Garry Smith** continue the special series looking back at the BBC's coverage of Coronations since 1937. There is also a Coronation vintage television advertisement from the archives featuring two Murphy receivers. A PW reader has requested more information about bygone equipment manufacturers, including Ekco. There are more unique details about Roland Pièce, the pioneer of Swiss radio broadcasts, from family archives supplied by his Grand-Nephew, and PW reader, Pierre-Yves Pièce. The series charting the rise and fall of BBC 198kHz transmissions focuses on the 'Luzern Plan'. Coverage detailing 60 years of BBC-2 looks at some technical aspects involved. We also continue our series about the development of Swiss Radio and Television since 1922, with a last look at the Sottens transmitter before it was demolished!

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

As its own contribution to Coronation Day, *BBC Children's Television* presented a special programme at 5.20pm called *Tattoo* in which children from all over the country took part. Members of the **Royal London Caledonian Schools** performed Scottish dances and pipe music. Teams from the **National Association of Boys' Clubs** gave exhibitions of musical bicycle-riding and Indian club-swinging.

Twelve girls from the **Marden Girl Singers of Caernarvon** sang Welsh airs, and a party of sea cadets and members of the **Girls' Nautical Training Corps** danced hornpipes, climbed scrambling nets, and demonstrated their seamanship (perhaps 'seapersonship' nowadays!), both in the studio and by means of a film shot on the Humber. The London Region of the **Boys' Brigade** combined two of their best drum and pipe bands, and gave a demonstration of marching and counter-marching. There was also a military band of 20 selected professional players.

Vintage coronation television equipment

This month's scour through vintage copies of dishevelled newspapers and magazines has garnered an advertisement by *Murphy* for two Coronation television receivers, **Fig. 1**. The advertisement dates from Friday 27 February 1953. The text has been left in its original format to reflect the spelling, grammar and punctuation of the time.

This is the full description of the *Murphy V200A 12" Table Model* and the *Murphy V202CA 12" Console* receivers.

The *Murphy V200A* was a 405-line, VHF Band I, superheterodyne, 5-channel, A.C. (200-250V), 'low-profile' receiver. It had 17 valves and one selenium rectifier. It was fitted with a 12in *Mazda CRM121* CRT. The chassis was in four separate parts, arranged in a star-like formation around the CRT. Audio was provided via a moving-coil *Permanent Magnet Dynamic* (*PDyn*) loudspeaker.

The *Murphy V202CA* was basically a console version of the V200A, but with 15 valves instead of 17.

More Ekco feedback

In the July column, we featured the reminiscences of **Sid Smith** who worked at the Ekco factory in Southend-on-Sea.

We have also received an email from **Tim G4EOA** asking if we could feature more about Ekco and other vintage radio and television manufacturing companies. Tim writes: *"Hello **Garry** and **Keith**. Just a quick email to say how much I enjoy your monthly column in* PW. *Re the March edition, I found the history of Ekco very interesting and am waiting for the next part. In fact, it drove me to my edition of* 'The Setmakers' (***Gordon Bussey** and **Keith Geddes**, 1991) to refresh my memory.*

"From delving into this book, I wondered if you could incorporate some more historical details of now defunct British radio manufacturers. Just a suggestion, but please do consider it.

"Thank you again for a great column. 73's Tim G4EOA."

Thanks for your encouraging words, Tim. *The Ekco Story*, which began in the March column, will continue as soon as space permits. In the meantime, you may like to delve into some previous *PW* columns where we have featured in-depth accounts of the following equipment manufacturers: September and October 2023: **Murphy**; November: **Marconiphone**; December: **Regentone**; January 2024: **Defiant** and the **Co-op**; February: **Pye**.

We're sure that Tim, and others, will be pleased to know that we are planning more in-depth features about manufacturers from a bygone era.

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better hurry up
If you want a television set in time for the Coronation now's the time to get one. What! In February? Why the hurry? Because more and more people will be buying sets as June 2nd draws near, and there will be neither enough sets to go round nor enough time to install the ones that are available. So if you want to be one of the lucky ones who 'saw the Coronation,' go and see your Murphy Dealer now.*
V200A 12"
Table Model
Price £72. 10. 0 Tax Paid
V202CA 12" Console
Price £96. 0. 0 Tax Paid
*And while you're there ask him to show you the outstanding range of Murphy Radio sets.
Murphy radio & television.

2

Roland Pièce archives: Part X

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.

Following the rapid increase in the number of listeners, the *Société romande de radiophonie* decided to create a *Grand Auditorium* in the city of Lausanne to facilitate the broadcasting of larger orchestral concerts. A location was found in the *Grand-Chêne*, in the former *Théâtre des Marionnettes* of the *Maison Mercier*.

Roland Pièce was in charge of all the technical

Fig. 1: An advertisement dating from Friday 27 February 1953, for the *Murphy V200A 12" Table Model* and the *Murphy V202CA 12" Console* receivers. Fig. 2: The SRG-SSR transmitter at Sottens. The location was personally chosen by Roland Pièce. Fig. 3: The new SSR Studio in Geneva. It was opened in 1982 for the French-language news programme, *Téléjournal*.

aspects of the installation at the auditorium, which became operational on 24 March 1928.

Radio soon became very popular in Switzerland. Unfortunately for Roland Pièce, compulsory military service meant that he couldn't devote as much time to broadcasting. At around the same time, the authorities in Lausanne decided to close the station at *Champs-de-l'Air*. However, despite his military service commitments, Roland Pièce was asked to find a suitable location for a new transmitter.

He surveyed the *Jorat Region* to the north of Lausanne and, after thorough evaluation, he proposed *Sottens* as the ideal site, **Fig. 2**. Unfortunately, he became somewhat disillusioned with his role in Switzerland and didn't have the personal satisfaction of seeing the completion of the project. Instead, he contemplated leaving for Indochina to install a transmitter, and working as a radio-telegraphist for a maritime travel agency in Marseille. The SRG-SSR transmitter at Sottens was decommissioned and dismantled by *Swisscom* engineers on 6 December 2010.

The rise and fall of 198kHz: Part IX

Following the acceptance of the *Luzern Plan* that set out which frequencies broadcasters could use, some stations were forced to share wavelengths. Many broadcasters were very unhappy with this situation and, amid all the squabbling, there were several nations that refused to sign up to the Plan. There were actually 27 countries which signed the agreement and eight nations that abstained from signing.

In order to secure even this measure of agreement, it was necessary, somehow or other, to find channels for more stations. It was very important for European broadcasters to have a cohesive plan, particularly with services operating on neighbouring wavelengths.

The new Luzern Plan provided for 232 stations whereas the previous *Prague Plan* accommodated only 200. The most important difference, however, was in connection with the actual transmitter power permitted for each station. In addition, provision was made for a number of stations that were still under construction.

60 years of BBC-2: Part V

BBC-2 was different in many important technical aspects. Some of the differences were well known: 625 lines, new and still shorter wavelengths (UHF), and adaptability to colour. Other differences also existed which were less evident, but technically profound.

These factors included FM sound, negative instead of positive modulation of the vision carrier and asynchronous operation. The latter basically meant that the frame repetition rate of the television picture would no longer be exactly locked to the 50Hz frequency of the national electricity grid. The reason for this was mainly related to future colour, but the consequences were technically far-reaching and exacting.

The new BBC-2 technical facilities, which went into service in 1964, cost the BBC about £8-million in capital expenditure, and a continuing £1-million extra each year for engineering staff and other running costs with, of course, much more to follow as the new service enlarged and spread. Incidentally, the capital spent on BBC-tv in order to launch the service on 2 November 1936, was under £200,000!

Service information, Switzerland: Part XVIII

From 1982, the French-language news programme, *Téléjournal*, was broadcast from a new studio in Geneva, **Fig. 3**. Previously, a central editorial team in Zürich had produced news programmes for all of Switzerland's linguistic regions.

In 1983, the *Federal Council* relaxed Switzerland's media laws, which enabled private and commercial local radio stations to operate legally for the first time. In an effort to combat the new competition, SRG-SSR introduced their *Third Stations* initiative. This project was specifically tailored for a young audience. *DRS-3* was aimed at German-speaking areas, while *Couleur-3* (which was first broadcast in 1982) catered for listeners in the *Suisse Romande* region. The third station, *Rete-3*, was broadcast mainly for Italian-speaking people in *Cantone Ticino*.

Stay tuned!

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

1

The Eddystone 1990R

Dr Bruce Taylor HB9ANY describes a versatile classic communications receiver covering 25-500MHz.

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After the introduction of the top-of-the-range valved Model EA12, followed by the acquisition of Stratton & Co by the Marconi Company in 1965, no new Eddystone receivers were developed specifically for radio amateurs. But operating as Eddystone Radio Ltd, the Birmingham-based company went on to produce a wide range of high-performance solid-state receivers for professional service. Some of these interesting receivers can now be procured at rallies, swap meets and on eBay at very attractive prices.

The Eddystone 1990R series are general purpose VHF/UHF communication and laboratory receivers that were produced from 1975 to 1984. The 1990R/1 model covers 25-235MHz in five ranges, while the 1990R/2, **Fig. 1**, and the 1990R/3 have seven ranges that extend the coverage to 500MHz to include the 12m, 10m, 6m, 4m, 2m and 70cm UK amateur bands. (The dial calibration extends below 24.8MHz). The suffix 'X' indicates that the receiver has VFO tuning and optional 10-channel crystal control, whereas the 'S' suffix indicates that it is fitted with a Marconi synchroniser unit with a step size of 100Hz. With some minor wiring patches, it is possible to operate the receiver without either a crystal oscillator unit or a synchroniser unit present. The Type and Serial No. of the set are printed on a label on the rear panel, **Fig. 2**. Unlike earlier receivers this doesn't indicate the date of manufacture, but it does specify whether the receiver was equipped with a crystal oscillator or synchroniser at origin. Note that the 1990S receiver (no 'R') is a different model with coverage from 440 to 1000MHz in two ranges and an IF of 36.5MHz instead of 21.4MHz. This model is rare in the UK, as only 50 sets were manufactured and most were exported to North Korea. In 1982, the prices for the various 1990R models ranged from £3600 for the 1990R/1X to £5900 for the 1990R/2S (from £12,300 to £20,100 in today's money). The specification brochure for the 1990R/2X and 1990R/2S is provided here:

https://tinyurl.com/1990Rbrochure

Eddystone produced a range of matching equipment for the 1990R that included the 1535 digital frequency unit, the EP1061B panadapter (£1600 in 1980; £6500 in today's money), and the 1532 noise measurement unit. The 7-digit 1535 has a temperature-controlled crystal reference and can be programmed with the 1990R IF offset to display the received frequency directly. A custom integrator unit was also made that takes the IF output from the receiver and drives a pen or tape recorder. All the equipment can be installed directly in a 19in rack, or if the receiver dust covers are removed it can be housed in a desk cabinet with or without ancillaries as shown here:

https://tinyurl.com/1990Rsystem

As an example of pricing, in 1997 this complete system was offered for only £295.

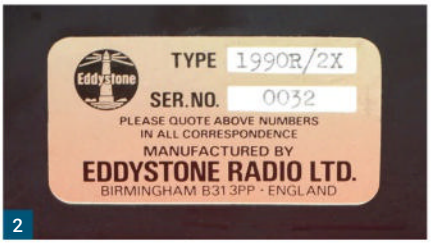
Origins

The 1990R receivers and their 1061B panadapter were designed by **Geoff Woodburn G3AYW**, **Fig. 3**, as successors to the valved 770R (19-165MHz) and 770U (150-500MHz) models that had been introduced in the 1950s. For many years these two sets were the only ones commercially available anywhere in the world covering these frequencies, and in 1956 the USSR purchased 200 770Rs in preparation for the Sputnik launch programme.

Born in 1922, Geoff had joined Stratton as an assembly worker at the age of 16. During WW2 he graduated to Test and Inspection and in the 1960s to the Development Department. At that time more than a dozen radio amateurs worked for the company, including **Arthur Edwards G6XJ**, who became Commercial Director and General Manager, and **Bill Cooke GW0ION**, who became Managing Director of Eddystone in 1976 and Chairman of the company in 1984.

Geoff had an encyclopaedic knowledge of Eddystone products from the earliest days and, before he became a Silent Key in 1993, he recorded many anecdotes about life with the company. He designed the 30-valve 770S double conversion superhet, which uses a special coaxial line first oscillator and cam-driven butterfly tuner to cover 500-1000MHz, and apologised to users for its weight! (a whopping 45kg for the table model). He also designed the Model 960, Eddystone's first solid-state communications receiver, that looked identical to the 13-valve 940 but had transistors mounted over the valve holders. According to former Managing Director **Chris Pettit G0EYO**, Geoff was only given one of each transistor and he was then told in no uncertain manner that if he were to blow one during the design stage, he would be fired! The performance of the 960 was inferior to its valved parent, and it was dropped two years later, but Eddystone soon mastered semiconductor technology and the compact 10-transistor EC10 receiver was a runaway success that remained in production for 14 years.

The 1990R receiver is approved for civil aviation use and conforms to a British Defence Specification that has stringent requirements for ruggedness. In early 1939, Stratton had supplied the British Army with 70 'Reception sets R101'. These were slightly modified versions of the Eddystone L.P.C., itself a variant of the 1938 All World Eight with the push-pull output stage replaced by a single-ended one to free up a valve-holder for a BFO. However, the R101 had to be relegated to fixed station use when it was found that when the receiver was fitted in a tank all the valve filaments blew when the gun was fired. Geoff related that he developed a version of the 1990R fit-



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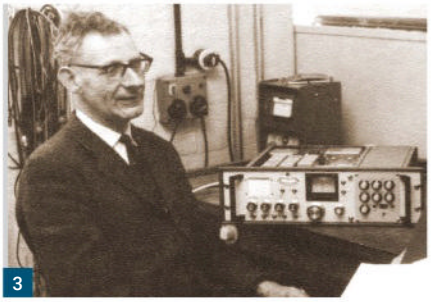
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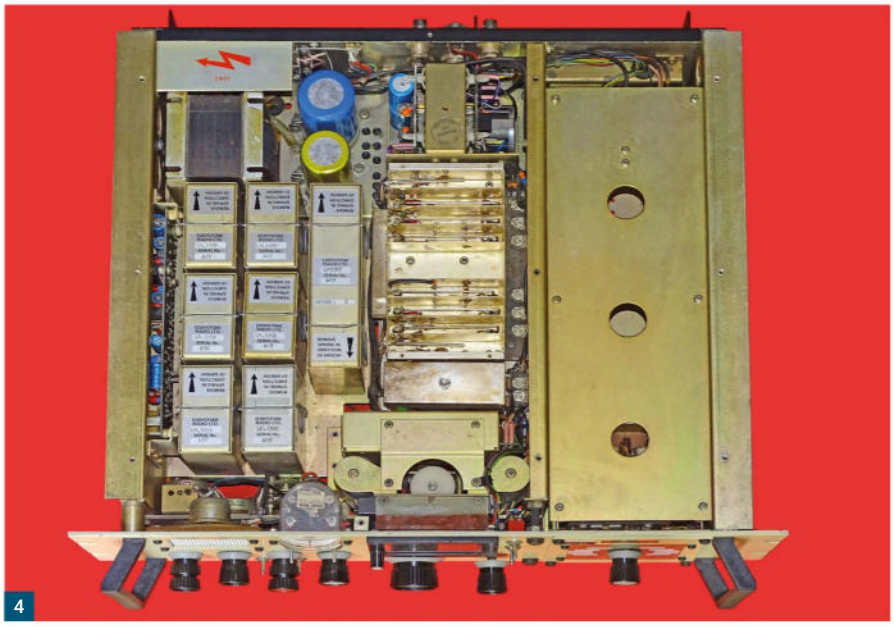
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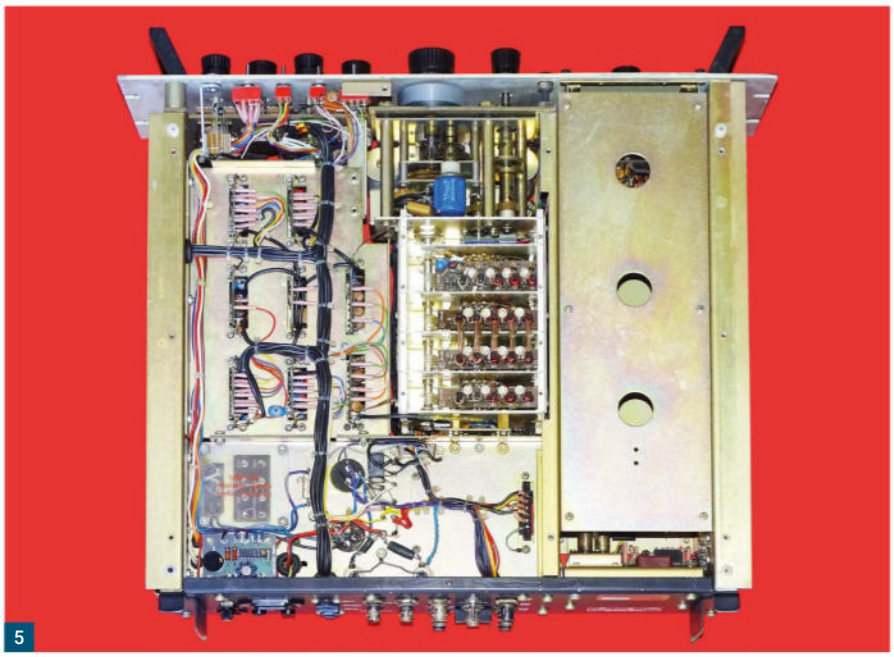
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Fig. 1: The 1990R/2 receiver covers six UK amateur bands in seven frequency ranges. Fig. 2: A label on the rear panel indicates the receiver type and serial No. Fig. 3: Geoff Woodburn pictured with the prototype 1990R receiver in 1973. Fig. 4: Top view of the 1990R shows the modular sub-assemblies. Fig. 5: Under-chassis view of the 1990R. The eight slots on the left are for the connections to the modular sub-assemblies.

ted with a 'special unit' for the Admiralty Surface Weapons Establishment, and after he had signed the Official Secrets Act he took this model on sea trials aboard *HMS Euralyus*. When the ASWE subjected the receiver to repeated 15G shocks while it was tuned to 400MHz, it remained on tune and functioning perfectly, but the trim caps from the control knobs flew out all over the test area!

Documentation

A manual for the 1990R receiver is provided here:
https://tinyurl.com/1990Rmanual
The schematic diagram of the UHF tuner is provided separately here:
https://tinyurl.com/1990Rtuner
while the manual for the synchroniser is here:
https://tinyurl.com/1990Rsynchroniser
The manual for the digital frequency display is provided here:
https://tinyurl.com/1535display
and that for the panadapter is here:
https://tinyurl.com/1061Bpanadapter
The receiver circuitry is divided into 17 subassemblies, **Fig. 4**, the VHF tuner being Ref 2, the dual UHF tuner Ref 17 and the crystal oscillator Ref 3. A little confusingly, the synchroniser is included in Ref 4, which doesn't refer exclusively to a particular subassembly, but to miscellaneous components that are distributed throughout the receiver. For example, the two unmarked preset potentiometers at the rear of the right side panel are RV8 and RV9 of Ref 4, functionally part of the AFC Inverter (Ref 8) that changes the polarity and sense of the VFO frequency control voltage on Range 5. The power supply, Ref 15, isn't a physical subassembly but comprises the mains transformer and under-chassis components, **Fig. 5**, the small regulator board (Ref 1) in the left rear corner, and the main 1B40K05 bridge rectifier and the 2N3055 transistor that is mounted on a heatsink on the outside of the left side panel.

Connections

As the 1990R is a general-purpose receiver, it is equipped with a variety of inputs and outputs. In addition to the three main 50/75Ω antenna inputs, the rear panel, **Fig. 6**, carries BNC sockets for inputs from an external oscillator or synthesiser and a wideband antenna input for use when the receiver is connected to ancillary equipment such as a panadapter. When this input is switched on, the RF amplifier is bypassed and the wideband input is transferred directly to the mixer. Positive and negative 1V pk-pk video outputs are provided, as well as 21.4MHz narrow-band and wideband IF outputs at high and low levels (respectively 50mV and 15μV into 50Ω for 10μV at the antenna input).

A 15-way ancillaries D socket allows the connection of an external 3Ω 1.5W loudspeaker as well as a balanced or unbalanced 600Ω 20mW audio line. A Cat. No. 989 plinth loudspeaker can be fitted if the receiver alone is mounted in a desk cabinet but in spite of its small size the sound quality of the internal speaker is excellent. The external loudspeaker is muted when phones are connected to the front panel jack and a switch is provided to mute the in-

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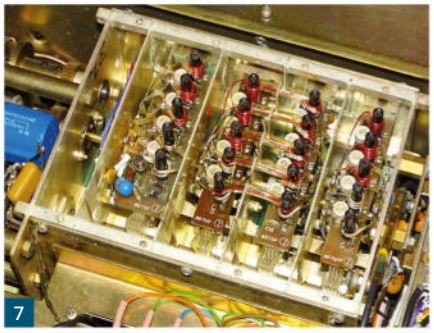
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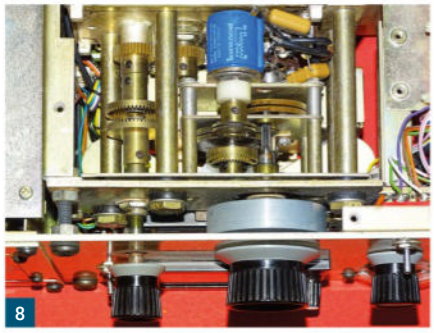
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Fig. 6: The rear panel carries three antenna inputs as well as outputs for several ancillaries. Fig. 7: The VHF tuner incorporates a dual-gate MOSFET RF amplifier and a diode quad balanced mixer. Fig. 8: The tuning gearbox drives a 10-turn potentiometer as well as the 4-gang variable capacitor in the VHF tuner.

ternal loudspeaker when required. This connector also provides a 12V supply to power external equipment and connections to an internal changeover relay for the operation of a muting indicator. In this case muting doesn't refer to silencing the receiver when transmitting, but what is more usually called squelch – muting the audio output in the absence of a signal. Muting can be enabled by a switch on the front panel, and the threshold level can be adjusted down to 3µV by a potentiometer at the rear. Other rear panel potentiometers allow for adjusting the audio line level and setting the zero of the front panel meter that can be switched to indicate RF or audio level, or used for FM tuning.

In November 1976, a Model 1990R/3 was added to the range. This has an FM audio output provided at an additional BNC socket, as well as an output from the RF oscillator suitable for feeding a digital counter. To allow the counter to be programmed with IF offset information, a 5V logic signal that is high when range 5 is selected is provided on pin 13 of the ancillaries socket. In Model 1990R/3S receivers, a 5MHz signal derived directly from the synchroniser frequency standard is made available at another BNC socket. A special model variant introduced in March 1979 made the RF and IF AGC voltages available at the ancillaries socket for measurement by a differential voltmeter. Depending on the options fitted, some unused contacts on the socket are available for custom wiring.

Tuning

The 1990R/2 receiver incorporates a VHF tuner, **Fig. 7**, covering the range 25-235MHz in five switched ranges, and two separate UHF tuners for the ranges 235-365MHz and 360-500MHz. The sensitivity is 2µV with the VHF tuner and 3µV with either UHF tuner for 10dB (S+N)/N. While the tuning scale is quite different from the 'slide rule' type of many classic Eddystone receivers, the split-gear drive features the same precision of design and execution and the flywheel-loaded tuning control has a smooth backlash-free action. There are no cords or wires to break or slip. The gearbox, **Fig. 8**, drives simultaneously the 4-gang 5-37pF variable capacitor of the VHF tuner and a 10-turn 100kΩ linear wirewound potentiometer that tunes all the stages of both UHF tuners by a total of 16 2-17.5pF BB105B varactor diodes connected to resonant lines. These planar silicon variable-capacitance diodes were made for use in TV tuners up to 860MHz. They are very reliable and are still readily available for less than 20p each. They are also used for the AFC of the VFO and for tuning the BFO about its crystal frequency by a switch-selectable range of ±100Hz or ±2kHz.

Each UHF tuner has two stages of RF amplification and a bandpass pair of lines prior to the coupling loop that transfers the output to the double-balanced mixer in the VHF tuner. Tracking is accomplished by a battery of 500kΩ preset potentiometers and 1.2-10pF trimmer capacitors. Although the receiver is a single conversion superhet, the high IF of 21.4MHz results in image rejection exceeding 50dB up to 235MHz and 40dB for 235-500MHz. IF rejection exceeds 60dB.

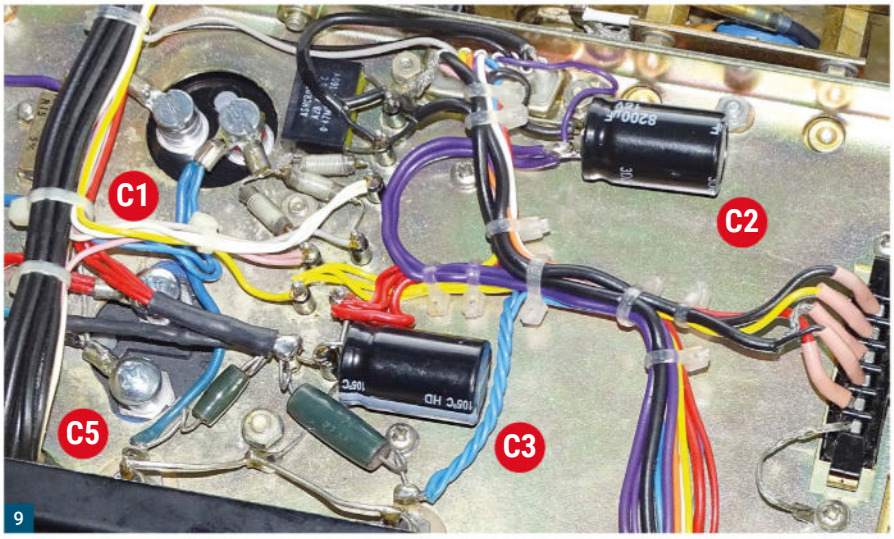
The operating frequency is indicated on a flexible 91.5cm metallic film scale that scrolls between two cylinders as the tuning drive rotates. A modulated crystal calibrator provides 10MHz and 1MHz markers throughout the frequency range of the receiver and a mechanical control allows the cursor to be moved relative to the main scale for calibration purposes. For reasons that I can only guess, the 9-wafer frequency range selector is mechanically decoupled from the switch shaft by a pair of spring-loaded crown gears, so that the control knob must be pressed inwards in order to change the range. Hence there isn't a fixed relationship between the position of the knob and the selected range, so this is indicated by one of seven red LEDs. The scale is illuminated by a pair of 12V 80mA wire-ended filament lamps that can easily be replaced by modern white LEDs.

Note that tuning a receiver with a synchroniser unit is not quite the same as tuning one with a frequency synthesiser. To tune to a specific repeater or beacon, the frequency is set up on the synchroniser dials, and the receiver tuned until the high and low tune lamps flash simultaneously, when the synchroniser can be switched to lock the frequency. Otherwise, the station can be tuned in by the VFO and then locked by the synchroniser after setting it to the same frequency. FM signals are correctly tuned when the panel meter pointer is at the centre of the scale. The AFC capture range is at least 1% of signal frequency.

Power supply

The receivers can be powered from 100/130V or 200/260V 50/60Hz AC mains, or from a 12V negative-earth source, and the front panel power switch allows direct selection of either supply. Be aware that mains voltage is present at the solder lugs of this switch. Mains power input is via a standard IEC C14 socket, while the alternative DC supply is connected by a miniature Eddystone 8855P 3-pin cable socket which is equivalent to the Bulgin PX0631 type that is still readily available. The current consumption at 12V is about 1A for a receiver with a crystal oscillator unit and 2.7A if a synchroniser is fitted. Reverse polarity protection is provided. The 1990R/3B model was modified to include a 78H12 regulator to allow 24V DC operation. Mains voltage adjustment is achieved by soldering wires and jumpers to the appropriate dual primary winding taps underneath the mains transformer, which can be accessed after removing the lower dust cover and a transparent safety cover.

The internal mains power supply generates regulated supply rails at +5V, dual +10V and +12V, while a voltage inverter unit generates -18V and -30V. Checking these voltages should be one of the first priorities when examining an unrestored 1990R. The +12V supply can be adjusted by 15RV1 on the regulator board, except when the receiver is oper-



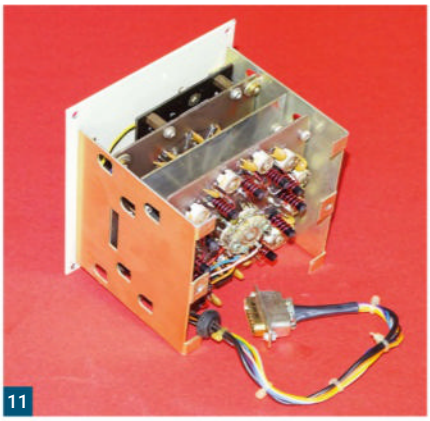


Fig. 9: The original dual electrolytic capacitors can be replaced by the individual components C1, C2, C3 and C5 shown here. Fig. 10: Each of the two UHF tuners has a two-stage RF amplifier and all the resonant lines are tuned by 16 varactor diodes. Fig. 11: The crystal oscillator uses harmonics of 3rd or 5th overtone crystals in the range 40-90MHz.

ated from a battery, and the -18V supply for the synchroniser can be adjusted by 16RV3 on the voltage inverter unit. The -30V supply for the UHF tuner can be adjusted by 16RV4, measuring across pins 115 and 116 on the inverter unit as this supply is floating relative to ground. Dead power rails are commonly caused by short circuits in the small pearl tantalum capacitors that are used for decoupling purposes on several PCBs.

After 40 years or more, the 7,500µF electrolytic smoothing capacitors in the power supply will almost certainly require replacement, especially if corrosion of the top surface of the lower dust panel indicates that there has been leakage. Today it is difficult to source direct replacements for 15C1/15C2, a dual tubular component of diameter 36mm, and 15C3/15C5, which are in one 40mm can. To preserve the appearance of the original, I replaced 15C1 and 15C5 by single tubular electrolytic capacitors of these two diameters and replaced 15C2 and 15C3 by modern 8,200µF radial capacitors, which are small enough (16x25mm) to fit under the chassis, **Fig. 9**. It may be necessary to file slots in the chassis holes for the tubular components if their connections are more widely spaced than the originals.

Maintenance

Depending on the options fitted, 1990R receivers have about 50 discrete transistors, 20 ICs and 70 diodes. There are no custom programmed devices that would be difficult to replace if they failed. The 1990R is easier to service than some earlier Eddystone receivers, which have point-to-point wiring with several layers of components. Projecting ears allow the receiver to be placed vertically on the bench without damaging the components on the rear panel. It has a modular construction, but the modules are not of the plug-in type. The VHF tuner is accessible from below the chassis while the dual UHF RF amplifiers are mounted above it, **Fig. 10**, behind the UHF oscillators. The crystal calibrator is mounted immediately behind the tuning scale and the audio amplifier board can be accessed after removing the cover on the left side plate of the receiver.

The functions of the modules with screening cans secured by spring clips are as follows:

LP3391 Main IF amplifier
LP3392 FM module
LP3393 Product detector and BFO
LP3394 AM detector and IF output
LP3395 Audio-video splitter and video amplifier
LP3396 Muting and IF AGC
LP3397 Double-length IF preamplifier and filter 'Selectivity module'.

The letter label on this module identifies the bandwidth option as follows:

A 250kHz + 30kHz + 15kHz
B 250kHz + 30kHz + 7.5kHz
C 250kHz + 15kHz + 7.5kHz
D 250kHz + 15kHz
E 250kHz + 7.5kHz
(Standard 250kHz + 30kHz)

A special tool, P/N 9284P, was provided to displace the spring clips, but this can also be achieved by pulling the corner loops simultaneously with two small pairs of pliers. The screening can of the LP3398 inverter unit, which is located behind the UHF RF amplifier, is secured by a screw. The PCBs in each module protrude through slots in the chassis, through which the coax cables are passed, while the other wires in the cable harness are connected to the PCBs by individual push-on wire sockets. To extract a module, remove its screening can and disconnect any cables to the interior of the PCB. Then mark carefully the order of the connections before removing the individual wire sockets. Finally, remove the two screws at the ends of the slot that carry chassis solder tags and lift the module out. In the case of module LP3397, the leads that have solder joints should be disconnected where they enter other modules.

The length of the connecting cable attached to the crystal oscillator unit allows it to be operated for test purposes when the module is withdrawn from the receiver front panel, **Fig. 11**. If the synchroniser is to be tested outside the main chassis, an 80cm 8-way extension cable must be fabricated, as well as two BNC cables for the RF input and output connections.

Conclusion

For any radio amateur developing homebrew VHF or UHF kit, an Eddystone 1990R receiver is a very useful and inexpensive addition to the lab or shack. Independently of the main rig and station computer, it can also be left running tuned to a relay channel or beacon for monitoring VHF or UHF activity and propagation conditions.

Because of its wide frequency coverage, the receiver can be used to detect harmonic radiation, track interference sources and check transmitter modulation quality, while providing very good reception of VHF/FM broadcast stations as a bonus. The Eddystone User Group, which currently has over 450 enthusiastic members, hosts an excellent platform for sharing experience, obtaining advice, and getting help with sourcing any spare parts that may be required to maintain the performance of the receiver. **https://groups.io/g/EddystoneUserGroup**

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1

Adventures with the Quansheng UV-5K(8)

Tim Kirby GW4VXE looks at some of the recent developments with respect to the popular Quansheng UV-5K(8) handheld.

If you've been reading *The World of VHF* column over the last few months, you'll have seen the Quansheng UV-5K(8) mentioned a few times. Chatting with **Don G3XTT** recently he mentioned that he'd had an enquiry from a reader about the Quansheng rig and whether we'd covered it or not (we did, in the September 2023 issue). However, this piece is the result of that enquiry as a lot has happened since then in respect of the firmware in particular.

What's all the fuss about?

At first glance, the Quansheng UV-5K(8) is a very cheap 2m/70cm FM handheld transceiver built in China. I bought mine from AliExpress, one was as cheap as £9 (including shipping!). Prices on AliExpress vary and you might pay a little bit more now. If you don't feel like importing one from China, then some of the dealers around the UK stock them, albeit at a somewhat higher price but, of course, the dealers can offer you support on your purchase as well as a slightly quicker shipping time.

As it comes out of the box, the UV-5K(8) is a very serviceable little rig, **Fig. 1**. It covers 2m and 70cm FM, with an output of 5W on both bands. Its construction is quite reasonable – obviously it's not as well built as a more expensive rig, but neither does it feel as if it will fall to pieces after a few weeks of use. It comes with a drop-in charger – some of the chargers I have seen have come with a two-pin plug – so you may need an adapter or you can easily fit a new plug.

The rig is reasonably easy to find your way around and program up memory channels, scan them and so on. It's more intuitive than some more expensive rigs I have seen!

Receive audio is a little 'hissy' but is perfectly understandable. Transmit audio has been reported as good.

The rig has fairly wideband receive covering from 50 to 600MHz, so you can use it to receive 6m and 4m FM if you have nets around you. The publicity with the rig suggests that it has airband receive. Although it covers the civil airband frequencies, AM demodulation is poor and you will struggle to hear very much.

On the basics, little else needs to be said. If you're in the market for a cheap handheld to take out when you're dog walking or out on the hills, the Quansheng offers great value.

But there's more!

Last year, some clever people realised that it would be possible to amend and even rewrite the firmware for the UV-5K(8). One of the first things that was done was to extend the frequency coverage to be from 18 to around 1300MHz and the next thing was to enable transmit coverage everywhere!

This seemed like it might be a cheap way of getting on 4 and 6m FM – until we discovered that although you can transmit on 4 and 6m, you'll find that the second harmonics are much greater than the fundamental, so you should only regard the rig as a receiver outside of the 2m and 70cm bands. Similarly, you will see some people noting that you can get some power out on 27 (and 28) MHz. Again, don't be fooled – it's just a milliwatt or two and the harmonic signals will be much greater. I was intrigued about the coverage at the top end of the coverage. Could the rig receive on 23cm? Maybe, but I haven't yet found a version of the firmware that worked up there.

New versions of 'hacked' firmware were coming out thick and fast. One of the next useful features was an improvement in the AM demodulation. Considering the chip inside the rig doesn't 'do' AM demodulation, the signal quality isn't bad at all. Obviously, it's not as good as a dedicated AM receiver, but it's usable, especially with stronger signals.

Then, someone discovered that you could trick the chip into demodulating SSB! This is surprisingly successful (and no, it doesn't transmit SSB!). To try this out, I got a cheap 27MHz whip (again from Ali Express at around £10 – you'll need one with an SMA-Female connector) and tried listening on 10m CW and SSB – it worked well, **Figs 2** and **3**. I found myself with a very cheap but portable receiver. Funnily enough, tuning up and down with the buttons on the keypad reminded me of my first SSB capable receiver, the Sony ICF-2001!

Other versions of the firmware appeared – so many in fact, it was quite hard to keep track of them. Someone built SSTV transmit into the firmware, someone else built in APRS transmit (albeit with a fixed location) as the UV-5K(8) doesn't have

Fig. 1: The UV-5K(8) is a compact and neat design. Fig. 2: The UV-5K(8) receiving on 10m with a whip antenna. I decoded the FT8 signals with a smartphone decoder, held close to the rig's speaker. Fig. 3: Not bad – a few decodes on the 10m using the UV-5K(8) and whip. I've received A5, FR and numerous others with this simple setup!

a GPS onboard. Someone else built a messaging program into the firmware to exchange text messages over the air and someone else even added a simple game to the firmware.

How do you load the firmware into the UV-5K(8)?

Assuming you want to try out some of the firmware, you'll need:

- A computer (Windows is easiest, but there are solutions for Linux/Mac)
- A programming lead (Wouxun or Baofeng style will work) along with the drivers for your operating system
- A program to load the firmware
- The firmware itself

I started off using the Quansheng firmware loading program, which you can download from:

http://qsfj.com/support/downloads/3268

You need the one labelled Programming Software – Neutral. There's also an independently developed firmware loader called k5prog-win, which you can download from:

https://tinyurl.com/ms58w2be

(section 2.2) or from

https://github.com/OneOfEleven/k5prog-win

(you'll need the EXE file)

K5prog allows you to download and save some configuration and calibration data, which can be a good idea if you are experimenting with different firmware versions. With this stuff, there is always the chance that something could go wrong – so it's good to be able to restore your radio back to a default state.

Finally, you'll need the firmware. You have a lot of choice!

A good collection of firmware can be found at:

https://tinyurl.com/jurm4wpz

A good solid version of firmware to try is from 'Egzumer' Go to **https://tinyurl.com/4yzdam6z** and download the latest .BIN file (at the time of writing it is egzumer_v0.22.packed.bin) to your computer.

Plug your programming cable into your computer and start up the firmware updater program. You'll need to select the COM port (or it may find it automatically). Connect the other end of the programming cable into the side of the UV-5K rig (on some models, it's a very tight fit – so push hard!). Point the firmware updater to the .BIN file that you downloaded just now and then with the PTT held down, switch the radio on. You should now be able to load the firmware into the radio. The light on the top of the radio will flash as the update takes place – generally taking about 20-30 seconds to complete.

2

3

You can use the CHIRP program (URL below) to manage the memories in the rig – again you'll use the same programming lead. When you connect up CHIRP to program the memories, you won't need to hold down the PTT on the radio as you connect it up to the computer – just plug it in and CHIRP should be able to read and write to your radio.

https://chirpmyradio.com/projects/chirp/wiki/Home

The Egzumer version of the firmware works well and you should be able to receive AM, SSB/CW – you can even send CW with the PTT. There are some interface diagrams available if you decide you want to connect up a Morse paddle (I decided that was perhaps a bit over the top!).

Another good version of the firmware is IJV-V3 and you can read about how to install it, as well as the features that it provides at:

https://tinyurl.com/ms58w2be

I like the IJV-V3 firmware as among other features, it allows you an RF gain control, which can be useful at times.

If you are interested in the SSTV and APRS firmware implementations, you can download them here:

https://github.com/phdlee/uvk5cec/releases

(I haven't tried these, but have seen that plenty of people have, so you should have no problems)

There are a number of Facebook pages devoted to the UV-5K(8) – as with Facebook generally, the quality of information can be variable, but sometimes someone posts about a new version and you think, 'I should go and try that', so it can be worth keeping an eye on.

Versions of the radio

Although I have referred to the Quansheng UV-5K(8) through this article, you'll see UV-K6 models advertised too. These look slightly different but internally are almost identical and they will perform in exactly the same way as the UV-5K(8). The only difference I noticed was that on the UV-K6 the programming cable is a VERY snug fit into the socket on the side and I had to push quite hard to get a connection.

Full HF bands receive is possible!

It doesn't stop there! Someone has designed an add-on board, which can be installed in a UV-5K(8) or UV-6 and which will add full HF bands receive. The price of the board is around £7 on AliExpress. I haven't tried one, but there are a number of videos on YouTube showing them in operation. OM0ET has produced a video explaining the add-on board and showing the modification (which looks quite fiddly in places!):

https://www.youtube.com/watch?v=jxwBlp8HfKU

Make your own firmware!

If you have a background in IT and enjoy programming, you might like to try creating your own firmware. The source code for most of the firmware versions is readily available on Github so you can readily download the code and start hacking it around to make changes. See what you can do! Some of the developers involved in creating earlier versions of the firmware have already gone on to jobs involving these skills – so who knows where your work might lead. Surely this is in the best traditions of amateur radio!

Conclusion

For the money, the UV-5K(8) is great value even with the supplied firmware. Because the rig has proved to be so 'hackable', it's even better value. If you enjoy playing around with radio firmware and trying things out, it's probably going to be one of the best £10 or so you have ever spent on a radio. Although you may well have better receivers in the shack, this is very portable and if you lose it or drop it in a puddle, it's cheap to replace!

I thoroughly enjoy playing with my UV-5K(8) and I am sure many of you will, too. **PW**

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Magnetic Loop Antennas

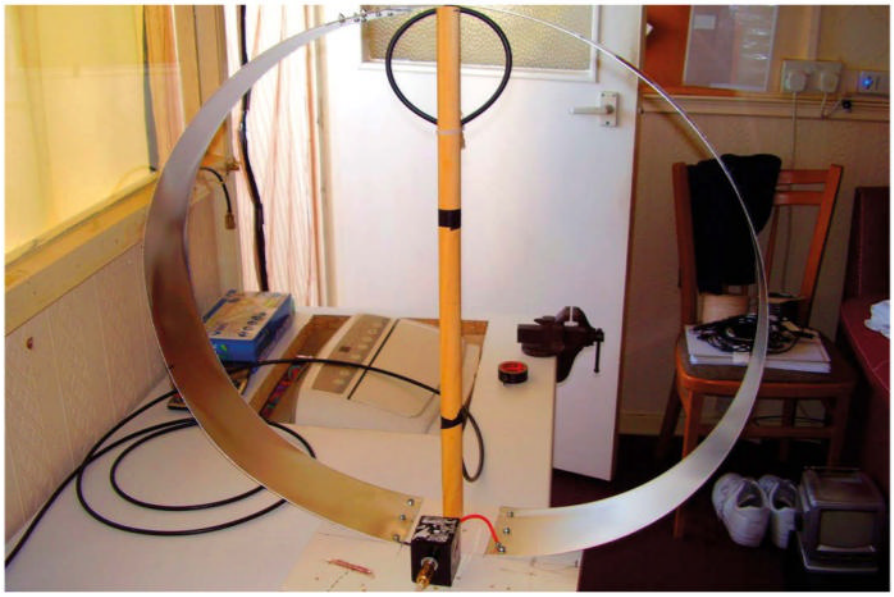
Dear Don,

I enjoyed reading this month's *PW* and I was particularly interested in the articles and points raised about HF Mag Loop antennas. Out of sheer necessity I have been using these antennas since 2016; driven down this route in the old QTH by severe planning restrictions and covenants applying to antennas mounted on the house. They are definitely not the panacea of HF antennas by any means but, and it's a big but, when the choice is no HF antenna at all, and a discrete HF Mag Loop that will conform to insane planning restrictions, then they will get you on the air with HF. And no, they are not dummy loads, neither are they 'wet noodles' as some folk call them. As an example, I managed a good quality 40m SSB voice QSO with the MFJ-1788 (outside) mounted horizontally, at about 10m AGL just below the roof apex. The DX? Kuwait, a distance of 2,889 miles and a solid 59 each way and in March 2018. Bear in mind at this frequency the MFJ-1788 is not efficient, however as I said, it achieved the contact. I appreciate, of course, that propagation conditions really helped this day and some would argue that a 'loaded up baked bean can' would have achieved the contact; but really that's not the point here.

It's very easy to slate these antennas and conclude they are a waste of money, however on our modern, overlooked housing estates with highly restrictive planning controls, the opportunity to put up dipoles or even long wires are I suspect, dwindling rapidly.

Richard White G6NFE
Shrewsbury

(***Editor's comment:*** *Thanks Richard and I see your qrz.com page has a photo of your loop antenna).*



Loop antennas can get you on the air when other options are not possible.

Amateur TV and more on loops

Dear Don,

Maybe a case of the disappointment of a vulture arriving too late at the dead donkey, for some reason I never explored the vista of amateur television. To date, on a similar theme, I've still not arrived at the door of datacoms and its many various incarnations. Probably spent far too much time reading about it rather than doing it. I keep saying that I must jump into the fray of FT8 and so on, but I still resist it.

So, it was especially relevant to read that article (July 2024) which featured **Martin Charman G4FKK** where he understandably waxed lyrical about his passion for amateur television. And I was impressed with his shack - mainly because it was bereft of a surfeit of equipment made in China or Japan. Okay, I did spot some commercially manufactured stuff. But these days, who hasn't got commercial radio gear in their shacks? I have. I do try to keep it at bay, though. Besides, as most of us know, it's ever so easy now to dial a number of this or that ham radio dealer, get the plastic out and the next day some bright spark is on the doorstep with another large cardboard box with Kenwood, Yaesu, Icom or Xiegu scribbled all over it.

I must confess that I've always been fascinated with the transmission of amateur television (ATV & Digital ATV), if only for the sake of actually appearing on it - and of course, the exciting reality of communicating on the ham bands via real-time live video transmissions. ATV, it seems, has always had a minority following in the grand scheme of things of amateur radio. However, as G4FKK might agree, there is probably still scope to enlarge the current knowledge that surrounds TV 'broadcasting technology', even if commercial R&D interests appear to have the upper hand and a lot more cash.

Another thing that I liked was GW0UGQ's piece about those magnetic loop antennas. Again, if only because I've built a couple myself with varying degrees of success. However, they can be difficult beasts to tame, as **Maurice** might attest. Putting aside the complications, and as mentioned in **Don's** editorial, magnetic loops are relatively easy to build design-wise if you understand the rules, which I didn't when I built my first magnetic loop many years ago. Yes, these particular antennas do have their advantages, the bandpass filter effect and far less noise than a dipole etc. And forget about 'gain' factor if using a loop. But there again, a magnetic loop can be unobtrusive - unlike a dipole strung the length of a garden. But in the right hands, it can be a 'plumber's delight' and an answer to restrictive property covenants and so on.

One last thing if I may. I often wonder whether I have enough time to delve into the popular pastime of antenna simulators and their accompanying software. These seemingly clever things are I'm sure very helpful in many circumstances when wanting to know a given antenna's efficiency etc. But are they necessary? Their advocates would probably vote a firm yes, but like some other things we could do without, perhaps just planting an antenna in the ground and finding out how it performs on-air in real-time is a better and less stressful alternative exercise? Just a thought.

Ray Howes G4OWY/G6AUW
Weymouth

Rallies & Events

All information published here reflects the situation up to and including **23rd June 2024**. Readers are advised to always check with the organisers of any rally or event before setting out for a visit. To get your event on this list, email the full details, as early as possible, to: **practicalwireless@warnersgroup.co.uk**

14 July
MCMICHAEL RADIO & ELECTRONICS RALLY AND CAR BOOT SALE: Reading Rugby Club, Holme Park, Sonning Lane, Reading, Berkshire, RG4 6ST. 09:00 entry (08:00 for Trader Set-up).
Entrance Fees: Visitors - £4 per person, Traders - £10 per Table (includes entry for two people). No Dogs other than Assistance Dogs are allowed on the field.
Enquiries: rally@radarc.org,
Traders: traders@radarc.org,
https://mcmichaelrally.org.uk/

14 July
LINCOLN SHORT WAVE CLUB, SUMMER RADIO RALLY: The Festival Hall, Caistor Road, Market Rasen, LN8 3HT. Doors open at 10.00am, Indoor Event Admission £3, Hot refreshments. Ample free car parking, Tables £10.
Steve M5ZZZ, 07777699069
m5zzz@outlook.com

14 July
CAMBRIDGESHIRE REPEATER GROUP RALLY: Unfortunately, the April event had to be cancelled due to the wet weather. It is hoped to hold the rally on 14 July, subject to final confirmation from the venue (Foxton Village Hall). Please check the website for updates:
https://cambridgerepeaters.net

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

4 August
KING'S LYNN ARC 34TH GREAT EASTERN RADIO RALLY: Gaywood Community Centre, Gayton Road, King's Lynn, Norfolk. PE30 4EL. NGR TF638203. Doors open at 9am. Admission £2.50. Traders from 7am, outdoor pitch £8, indoor £10 per table. Free car parking ,trade stands, bring & buy and onsite catering.
email: rally.klarc@gmail.com
www.klarc.org.uk

9 August
29TH ANNUAL MINI-RALLY NIGHT: Community Centre, Main Hall, Port Seton. Bring along your own 'junk' and sell it yourself. Tables on First Come First Served basis. Entrance fee £2 for everyone. Time 18:00 to 21:00

18 August
WEST MANCHESTER RADIO CLUB RED ROSE SUMMER RALLY : St Josephs Hall, Mather Lane, Leigh WN7 2PJ. Doors open 10am.
rally@wmrc.co.uk or

18 August
RUGBY AMATEUR TRANSMITTING SOCIETY ANNUAL RADIO RALLY: Princethorpe College, Princethorpe, Rugby, CV23 9PY. Admission £4 Per Person. Pitches: pre-booked £15, on the day £20. NGR: SP395710, Lat/Long: 52.336N 01.421W, Open 10AM-4PM, 8:00 for sellers
Boot sale, Catering: 07956 855816 & rally@rugbyats.co.uk
www.rugbyats.co.uk

25 August
TORBAY ANNUAL COMMUNICATIONS FAIR: Newton Abbot Racecourse, TQ12 3AF. Doors open at 10am. Indoor event with free parking, bring and buy, RSGB book stall and catering on site.
Email: rally@tars.org.uk

8 September
CAISTER LIFEBOAT RADIO RALLY: Caister Lifeboat station, Caister on Sea, NR30 5DJ. Entrance via carpark on Beach Rd. Raffle, onsite cafe, gift shop, museum. Free entry, open 9am-2pm (8am for sellers). Inside tables £10 each, outside £5 each.
Zane M1BFI: m1bfi@outlook.com Tel 07711 214790

21/22 September
EAST MIDLANDS HAM & ELECTRONICS RALLY: Beckingham Village Hall, Southfield Lane, Doncaster DN10 4FX. We invite traders, special interest group exhibitors and visitors with an interest in any aspect of radio, computers and electronics to attend .We are offering overnight camping on Friday and Saturday and a Saturday evening barbecue. Refreshments are available on both days. Strictly no dogs (except assistance dogs) allowed at this venue. Visitors: Saturday 9.30 am to 4 pm, disabled 9.15am; Sunday 9.30 am to 12 pm (noon) disabled 9.15am. Admission: £3 per person per day.
07767 146574 / 07579 775717
http://www.g0raf.co.uk/rally

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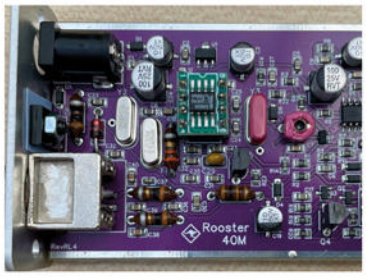

BUILDING KANGA'S 'ROOSTER' TRANSCEIVER: Richard Constantine G3UGF describes a project that is fun to build with a professional and 'Practical' outcome.

REVIEWED, THE ICOM RC-15: Georg Wiessala looks at the new IC-R15 wideband receiver from Icom.

THE 2024 PW 70MHz CONTEST: Colin Redwood G6MXL has the rules and advice on taking part.

VALVE & VINTAGE: Philip Moss M0PBM takes a look at the classic CR100 receiver.

1 +1 +1 = 5, +1 = (ALMOST) 7: Ken Ruiz, ZB2MD says "Get more than you expected from a multiband dipole".

BOOK REVIEWS: The editor catches up on some of the excellent books from the RSGB.

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

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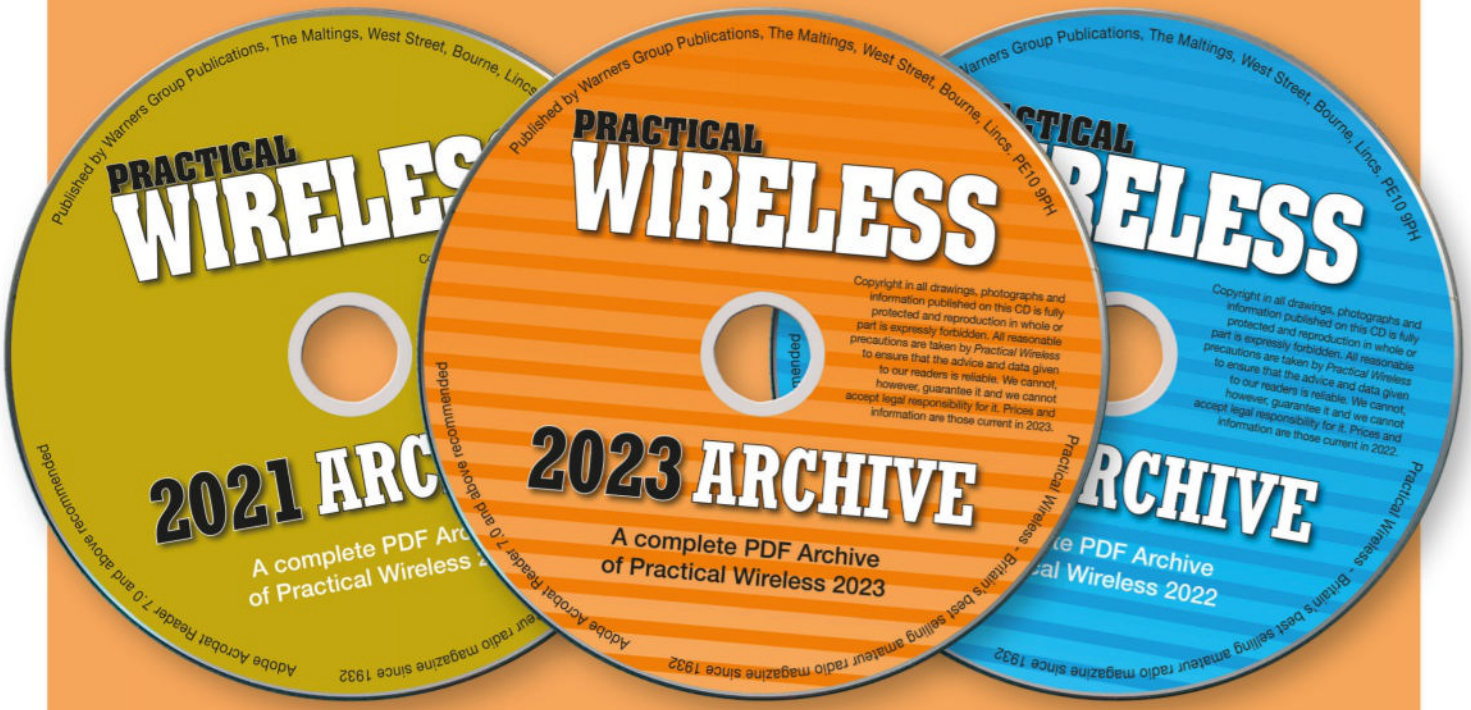

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