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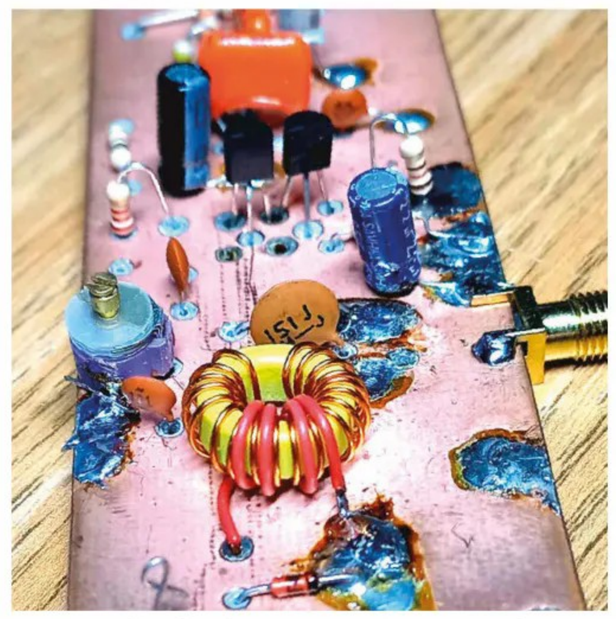

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Keylines

Something a little different this month. I'm writing this while awaiting my flight home from East Africa. This was my first time in this part of the world and it's been fun – the weather is milder than West Africa, which I know well, and it's always interesting to experience propagation from a different part of the world. I started in Uganda with **Alan G3XAQ**. Alan put up a Moxon antenna for 10m, made from wire and fishing poles, which worked well. As a second antenna, I put up an elevated quarter-wave vertical for 12m, with two wires by way of a 'ground plane'. That too worked remarkably well. We operated only on CW but always had big pile-ups whenever the bands were open. Our equipment consisted on Alan's Elecraft K3 and my KPA500 amplifier.

One focus of our trip was the ARRL CW Contest, which Alan took part in as a 10m single-band entry. That was an eye opener insofar as the USA, particularly the West Coast, is a very long way from Uganda and openings on the high bands are short in duration. Alan struggled a bit on Day 1 of the contest – fortunately band conditions picked up on the second day and he was able to end the contest with a respectable QSO total.

But the operation also gave us the opportunity to check out the QTH (a villa by Lake Victoria which Alan had used some years ago) as a possible location for a CQWW CW operation in November. One of the big problems operating from Africa nowadays is noise – so many (usually Chinese-made) devices have found their way into the general infrastructure in recent years that it can make HF reception impossible. We did have problems from one noise source, which we tracked down to solar panels on an adjacent building. But when they weren't operating, the bands were reassuringly quiet. Which leaves us to determine whether the building owners would be willing to turn off the panels for a contest weekend – we shall see.

We then moved on to Kenya where our good friend **Andy 5Z4VJ (G3AB)** has been living for over four years while working for the Foreign Office. He had organised a 'CW Dinner', which was attended by visitors from the UK, Germany, Guernsey and the USA as well as some of Andy's Kenyan friends. **Adrian KO8SCA** kindly gave us presentations of last year's Bouvet Island operation and also the very first public presentation of the Swain's Island W8S operation, both of which Adrian had participated in. We also got chance to do some sightseeing, including a very successful foray into Nairobi National Park, right on the outskirts of the city but with a great selection of wildlife.

All in all, a great trip, once again showing how amateur radio can transcend international boundaries.

The 10m Moxon on a 20ft scaffold pole.

'CW Dinner' in Nairobi.

Licence changes

Most of you are probably aware by now, but the first round of Ofcom licence changes has recently come into effect – changes to RSLs, to power limits, etc. More information on the Ofcom website, of course: **http://tinyurl.com/yak6p3xz**

Don Field G3XTT
Editor, *Practical Wireless* Magazine

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Newsdesk

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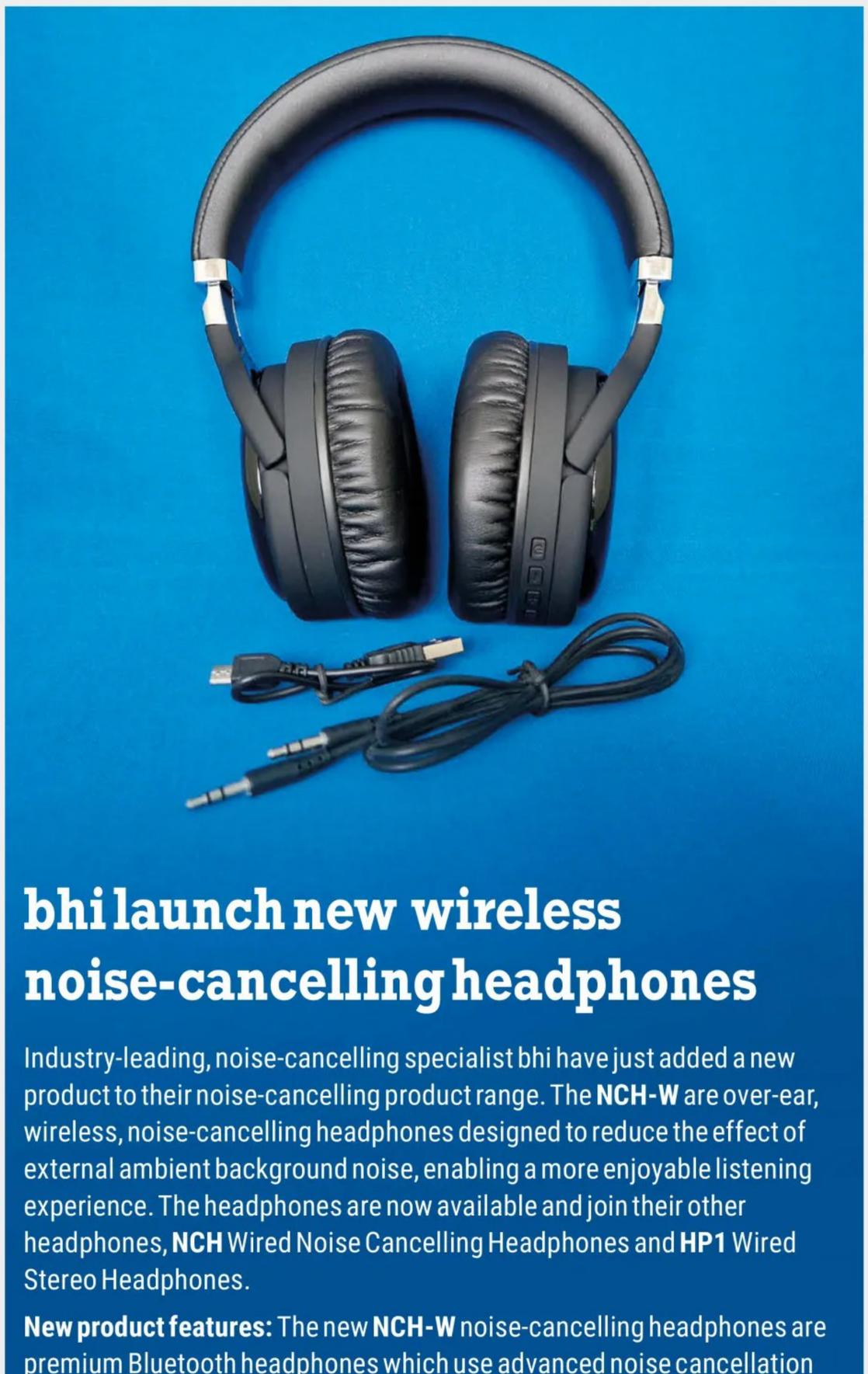


bhi launch new wireless noise-cancelling headphones

Industry-leading, noise-cancelling specialist bhi have just added a new product to their noise-cancelling product range. The **NCH-W** are over-ear, wireless, noise-cancelling headphones designed to reduce the effect of external ambient background noise, enabling a more enjoyable listening experience. The headphones are now available and join their other headphones, **NCH** Wired Noise Cancelling Headphones and **HP1** Wired Stereo Headphones.

New product features: The new **NCH-W** noise-cancelling headphones are premium Bluetooth headphones which use advanced noise cancellation technology to block out up to 25dB of ambient sound, letting you enjoy your audio without distraction - whether you're travelling on a noisy aeroplane, train or trying to focus in the office. The adjustable headband and high-quality ear pads form a perfect seal around your ears, providing all-day comfort while also enhancing noise isolation. Easy-to-reach controls allow you to adjust volume, skip tracks, take calls, and toggle noise cancellation on and off with just a touch. With up to 8 hours of battery life per charge and a 10m wireless range, the **NCH-W** headphones give you the freedom to roam while staying connected to your device.

Specification USB charge: DC 5V • Wireless frequency: 2.401-2.480GHz • Wireless distance: ≤10m • Frequency: 20Hz-20kHz • Output power: 30mW • SNR: ≥75dB • Charging time: <2.5 hours • Active noise reduction – 25dB

Order code: NCH-W £39.95 inc. VAT (£33.29 net) Available direct from bhi Ltd at: **http://tinyurl.com/4bhbb5pw**

FANTASTIC DAY AT THE MILITARY WIRELESS MUSEUM: The Military Wireless Museum, run by *PW* contributor Bernard Nock G4BXD, recently enjoyed a landmark day with the visit of Dr Mark 'Enigma' Baldwin. He is an international expert and professional speaker on the Enigma Machine, the History of Cryptography, and the Special Operations Executive, and has delivered more than 700 talks to over 60,000 people on these topics, all over the world. It was fantastic to get so close with 'hands on' a real machine. The museum thanks Mark for his visit.

www.militarywirelessmuseum.co.uk
https://drenigma.org

DX SOUND CLIPS: The large collection of clips (MP3 format) covers DXpeditions, rare and semi-rare DX. This makes 26 full years of sound clips available. Tom K8CX's DX sound clips for 2023 can be found at:

http://hamgallery.com/dx2023

QSL GALLERY: The large collection of QSL cards on *Les Nouvelles DX's* website has been updated. 17 different galleries include 21,774 cards for the ten Most Wanted DXCC Entities (2014-23), the 62 deleted DXCC Entities, obsolete prefixes, stations from Maghreb from 1945 to 1962, Allied Forces stations in Germany (1945-80), special stations commemorating ITU and IARU, stations using the United Nations prefix (4U), Antarctic bases and TAAF (Terres Australes et Antarctiques Francaises), amateur radio 'globetrotters', the various French DXCC island Entities in the Pacific Ocean, the Indian Ocean and the Americas (1945-1969), pre-1945 countries, French Departments and CONUS, plus a gallery for cards not accepted by DXCC:

www.lesnouvellesdx.fr/galerieqsl.php

HUMBER FORTRESS DX AMATEUR RADIO CLUB: Following on from the recent AGM held on19 January the handover of the chairmanship reins took place and was put into the trusty hands of Andy G7LRR. Many thanks and good wishes were given to the outgoing chairman John G6LNV who has done a sterling job and looked after us all so well. He is not leaving us but taking a well-earned rest.

2 February saw another successful club night at the Millhouse Patrington for the Club. New members Allan M7FFL and Ed 2E0HKZ and prospective member Charles received some expert tuition in operating and voice procedures from Sean M0SLY, which was much appreciated. Dave 2E0TKO and Andy 'Tappy' 2E1TAP were to be found putting the finishing touches to the updated 40m station.

Upstairs in our fully equipped radio workshop Andy G7LRR was casting an expert eye over Oliver's soldering skills, very steady hand indeed. Oliver is not licensed as yet but you never know, he may follow in his father's footsteps, Sean M0SLY. Last but not least after updating the 40m station with, Tappy gave a demonstration of the Yaesu FTdx10's filters to John and Ed.

Finally, it's huge congratulations for Alan on his upgrade from M7 to 2E0IVD.

Future events can be found on:

http://tinyurl.com/mryxf9kk

PARKS ON THE AIR: After a talk on the subject, Maltby and District Amateur Radio Society members decided to go out and activate some locations for the POTA award scheme. Two teams went out, one to the Bassetlaw Showground in north Nottinghamshire and one to Cusworth Hall near Doncaster. They decided it would be easy to activate both locations using 20m FT8 but also, to make their operations more widely accessible, to also feature 2m FM and 40 and 20m SSB. The operations were successful and they hope to repeat them in the future.

JS1YMG: The first amateur radio station on the Moon, JS1YMG, is now transmitting. The Japan Aerospace Exploration Agency (JAXA) successfully landed their Smart Lander for Investigating Moon (SLIM) on 19 January. Just before touchdown, SLIM released two small lunar surface probes, LEV-1 and LEV-2. LEV-2 collects data while moving on the lunar surface, and LEV-1 receives the data.

The JAXA Ham Radio Club (JHRC), JQ1ZVI, secured amateur radio licence JS1YMG for LEV-1, which has been transmitting Morse code on 437.41MHz since 19 January. The probe uses a 1W UHF antenna with circular polarisation and is transmitting 'matters related to amateur business'.

Radio amateurs have been busy analysing JS1YMG's signal, with Daniel Estévez's EA4GPZ

blog introducing the method and extraction results for demodulating Morse code from the signal, as well as extracting the code string.

SLIM was launched with the mission of analysing the composition of rocks to aid research about the origin of the Moon. SLIM's landing made Japan the fifth country to achieve a soft touchdown on the moon. The landing was achieved with exceptional precision, within 180 feet of its targeted touchdown location.

IOTA GROUPS FIVE-YEARLY REVIEW: (Announcement from G3KMA and the IOTA Board) With a review due this year, the IOTA (Islands on the Air) Board has decided not to delay the announcement of Hans Island, located in the high Arctic between Canada and Greenland, as the new IOTA NA-251P. This follows the final stage of ratification last December of an agreement between Canada and Denmark (representing Greenland) to split the island's sovereignty equally between their two countries. IOTA Programme rules specify that split sovereignty island groups can qualify for separate listing (IOTA Programme Structure B.1.7). In fairness to all activators who might consider activating what is a demanding group, the Board has felt it necessary to insert a delay in implementation of the decision, and will only consider operations that take place on or after 1 July 2024.

The Board has also considered the whole review exercise. Aware that due to the pandemic in the last three years there has been a major absence of IOTA operations from the rarer IOTA groups, it has decided on a pause in creating any further groups in the immediate future that might draw attention away from these. The current tragic world political situation is also one factor in this decision. It is not clear how long this pause may last, and it is best not to assume that it will end any time soon and what the decision will be when it does.

AMATEUR RADIO EXAM PRICES TO CHANGE: The RSGB is being affected by higher-than-inflation increases across the exam processes. The Society is not passing this total increase on to candidates, but the RSGB Board has reviewed the amateur radio licence exam fees and has decided that there needs to be an increase from 1 May 2024. Foundation, Intermediate and Full exams will rise by £3 but the Direct to Full exam won't change. The cost of each licence level exam will be:

Foundation – £35.50
Intermediate – £39.00
Full – £45.00
Direct to Full - £95

The fees will come into effect for exams taken from 1 May this year. Remember that if you're a young person under the age of 21, in full-time education, you can apply for funding from the RCF to pay your exam fees. For more information on how to apply, contact

rcfsecretary@commsfoundation.org

RSGB SPECTRUM FORUM UPDATE: A busy year has seen several online Spectrum Forum meetings. Two meetings held in January considered the Ofcom notice period for 'representations' and areas where band plan adjustments would be needed, as well as more regular items such as annual group reports. The RSGB website now has these details online. The Society's reply to Ofcom has been added to the RSGB special focus page on the Ofcom licence review. The RSGB Spectrum Forum pages have also been updated with the January 2024 group reports and meeting notes, which included the discussions on the provisional changes. To read more, visit:

rsgb.org/spectrumforum

AN UPDATE ON THE AMATEUR RADIO LICENCE EXAMS: As previously announced by the RSGB Examinations Standards Committee Chair, Tony Kent G8PBH, the amateur radio licence examinations will need to change to reflect the changes to the licence conditions announced by Ofcom. The scale of the licence changes will have a significant impact on Section 1 of the syllabus (licensing) and a small impact on Section 7 (operating). The new licence will come into effect before work on the syllabus and examination question bank is completed. The RSGB Examinations Standards Committee has gained approval from Ofcom to continue to examine to the current licence conditions for a period of six months following the publication of the new licence. This will allow trainers time to update their courses in line with the new syllabus and allow candidates that have started their training under the current licence conditions to complete their courses and take the exam. It is expected that examinations to the new licence conditions will begin on 1 September 2024. For full details see the exam announcements page on the RSGB website.

Radio in popular culture

David Harris checks out an academic's take on the legacy of radio in popular culture.

David Harris
mydogisfinn@gmail.com

Dr Martin Cooper taught radio theory and practice at the University of Huddersfield and for 20 years was a BBC reporter, presenter and news editor. The purpose of this academic book is to explore the intersection between radio and other cultural forms such as literature, television and films. The book is divided up into ten short chapters, each of which examines how radio was portrayed in other media through the decades since its birth in 1922.

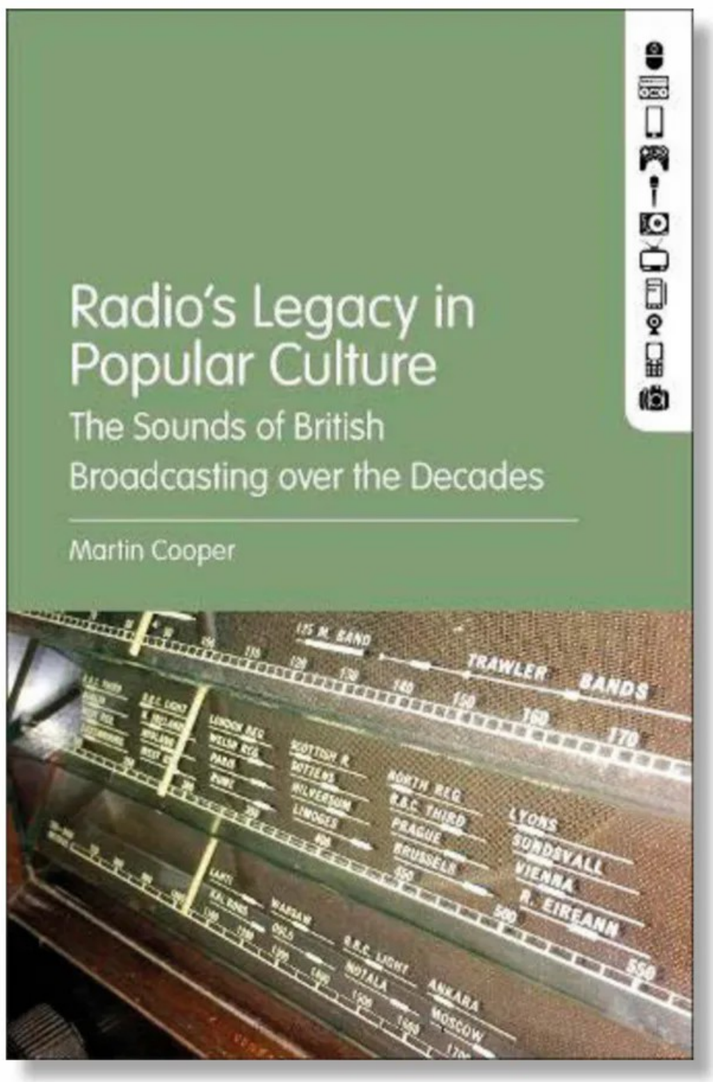
Radio broadcasting was a completely new cultural form, which brought both speech and music into the home. The early broadcasts by the BBC were very successful and radio took off in Britain with over one million radio licences being issued by 1924.

Radio ownership climbed to three million by 1930 and just before the Second Word War in 1938 had reached almost nine million. It was not long before books and films would start to feature people listening to the radio as it quickly became part of people's day-to-day life. The author gives examples of films such as *Out of the Blue* (1931), *Head over Heels (*1937*)* and *Death at Broadcasting House (*1934*)* all of which introduced radio into their story lines.

As radio developed so did the different ways in which people listened to radio and how these ways were reflected in other cultural forms. Cooper examines different scenarios such as: listening alone, talking to other people about radio, radio ownership and communal listening. Books and films of the time now began to reflect these different radio related situations. The writer **George Orwell** sees radio as part of the consumer society, which the central character **Gordon Comstock** rejects in *Keep the Aspidistra Flying* (1936). In his study of poverty in Britain, *The Road to Wigan Pier (*1937*)* Orwell cites radio, along with cheap chocolate and tinned salmon as factors that have kept the working classes from revolution.

The Second World War opened up radio listening with the BBC starting the Forces Programme (which became the Light Programme) in 1940. People then had a choice of listening, which was augmented in 1946 by the launch of the Third Programme (now Radio 3). Some radio programmes became so popular that they spawned film versions, including ITMA, Hi Gang and Hippodrome.

The BBC had launched a television service in the London area from 1936 - 1939. It closed down during the war and was slowly rolled out over the rest of the UK during the 1950s.



Radio's Legacy in Popular Culture. The Sounds of British Broadcasting over the Decades
by Martin Cooper. Bloomsbury Academic. 2023. 247 pp. Pbk. £28.99. ISBN 9781501388231
www.bloomsbury.com

Perhaps the most memorable depiction of radio on television was *'The Radio Ham'* (1961), an episode of the sitcom *Hancock* starring **Tony Hancock**.

The BBC website gives this description of the programme: *Tony Hancock has a go at amateur radio and ends up responding to a mayday call. Dealing with the emergency does not go as planned and his attempts to help are thwarted at every step*. The TV programme no longer seems to be available on the BBC website but I found it at:
https://vimeo.com/133262448

This show was also released as an LP record and there are numerous audio versions on the internet.

Moving into the 1960s we come to the golden age of pirate radio (1964 -1967) when up to a dozen offshore stations broadcast pop music to the UK. The author makes the point that the 1961 **Cliff Richard** film, *The Young Ones*, depicted a land-based pirate radio station. In 1967 rock band The Who released *The Who Sell Out*, an album that featured Radio London jingles and adverts between

"Moving into the 1960s we come to the golden age of pirate radio (1964 -1967) when up to a dozen offshore stations broadcast pop music to the UK"

tracks. Playing the album was meant to replicate the experience of listening to a pirate radio station.

As we move into the 1970s there are plenty of songs being recorded that celebrate radio. When I was a presenter at a community radio station I liked to have a theme running through each show and one theme that was very popular were songs about radio. Here is my own list. **Martin Cooper** also includes references to most of these songs in his book.

- *Radio Free Europe* – REM
- *FM* – Steely Dan
- *London Calling* – The Clash
- *You turn me on I'm a radio* – Joni Mitchell
- *The Nightfly* – Donald Fagen
- *Song on the Radio* – Al Stewart
- *Roadrunner* – Jonathan Richman and the Modern Lovers
- *Do you remember Rock 'n' Roll Radio?* – The Ramones
- *W.O.L.D* – Harry Chapin
- *Radio Gaga* – Queen.

Films of the 1970s also celebrated radio, including *American Graffiti* (1973), which featured a soundtrack of classic US songs from 1953 -1964.

By the 1980s there begins to be a degree of cynicism creeping into the way in which songs featured radio. Radio presenters were seen as being out of touch with the concerns of young people. The Smiths song *Panic* (1986), which has the line Hang the DJ, is perhaps an extreme example. The fictional, but stereotypical radio presenters Smashie and Nicey were parodied by television comedian **Harry Enfield** in his TV comedy series. This may well have led to the infamous culling of many older BBC Radio 1 presenters by **Matthew Bannister** in 1993 and the repositioning of Radio 1 as a youth station. The very successful US television comedy *Frasier* (1993 -2004) featured a radio

Babel by Cildo Meireles (pic by David Harris)

psychiatrist who hosted a phone in show.

In the C21 the film *The Boat that Rocked* (2009) took us back to the glory days of offshore radio in the 1960s. Cooper has illustrated his book with one of the few examples of art that features radio in the form of Babel by Brazilian artist **Cildo Meireless**. He constructed an installation that consisted of a tower of old radios accompanied by a soundtrack of different radio broadcasts. This has been on display at Tate Modern since 2008.

Radio's Legacy in Popular Culture is a very readable, original and well researched book, which will be widely used by Media Studies students and hopefully appreciated by many outside of academia.

Addendum

The following heading should have preceded the last paragraph in last month's Book Reviews: *Global Radio Guide* by **Gayle van Horn**. Teak (USA) £8 (E-book only).

And below the cover of the Klingenfuss *2024 Shortwave Frequency Guide*, the text should have read:

2024 Shortwave Frequency Guide (28th edition) Klingenfuss Publications, Tuebingen, Germany. 2023. 336 pp, pbk, £54.95. ISBN 9783941040748

www.klingenfuss.org

Rallies & Events

All information published here reflects the situation up to and including **22nd February 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**

17 March

CALLINGTON RADIO AND ELECTRONICS RALLY: The Callington Radio and Electronics Rally will be held in the Town Hall, New Road, Callington, Cornwall, PL17 7BD on Sunday 17 March 2024. Doors open from 10am. Entry is £2 each with no charge for those under the age of 16. A comprehensive selection of traders, clubs and societies from the Southwest will be present along with a bring-and-buy stall and the usual excellent catering service. The venue has excellent disabled access and toilets and there is ample car parking in a nearby public car park. Some Trader tables are still available at £5 for the large size and £3 for the smaller one. Booking is essential, so please contact Alastair, MOKRR via alastair.kerrl@btinternet.com or by phone on 01503 262755 with your requirements. (CR, CS, D, SIG, TS)

www.callingtonradiosociety.org.uk

14 April

SHANNON BASIN RADIO CLUB RALLY: Shannon Basin Radio Club Rally in conjunction with the 2024 IRTS AGM Weekend, Shearwater Hotel, Ballinasloe, Co. Galway, Ireland. Food and drink, bring & buy, largest show in Ireland and monster raffle sponsored by WiMo, Icom UK, Martin Lynch & Sons, DX Engineering, MFJ Engineering, Yaesu UK, Radionics Ireland, Messi & Paoloni, Long Communications, Wescom, and more. Doors open 10:00am, €5 admission. (BB, CR, CS, D, FP, L, LB, RF, MS, TS, Wi-Fi)

admin@sbrc.ie
www.sbrc.ie/agmweekend

20 April

2024 YEOVIL ARC THIRTY-EIGHTH QRP CONVENTION: The Digby Hall, Sherborne, Dorset, DT9 3AA, 9.30am to 1.30pm. Admission £3. Talks, Traders, Bring and Buy, club stalls, cafe, parking. Supported by RSGB, G-QRP & Rafars. (BB, CR, CS, FP, RSGB)

http: //Yeovil-arc.com or contact M0WOB
Email: derekbowen1949@talktalk.net

21 April

NARSA RALLY (NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION): Norbreck Castle Hotel Blackpool FY2 9AA, 1030am.

Contact Heather Stanley M6HNS, info@m0juw.co.uk

5 May

LOUGH ERNE AMATEUR RADIO CLUB 40TH ANNUAL RADIO RALLY: Share Discovery Village, 221 Lisnaskea Rd, Lisnaskea, Enniskillen BT92 0JZ. Usual facilities - Food and Drink, Bring & Buy. Doors Open 11:00 (Traders to arrive around 9:00). £/Euro 5 Admission to include Draw Ticket, Usual Draw. RSGB Books/ QSL Bureau, IRTS, All our usual variety of traders . Contact Alan at argault91@gmail.com to arrange a table. (BB, CR, CS, RF, RSGB, TS)

19 May

DARTMOOR SPRING RADIO RALLY: Yelverton War memorial Hall, Meavy Lane, Yelverton, Devon, PL20 6AL. Doors open 10am, Admission £2.50, Free Parking. Contact Roger:

Tel: 07854 088882
Email: 2e0rph@gmail.com

9 June

MENDIPS RALLY: Farrington Gurney Memorial Hall, Church Lane, Farrington Gurney, BS39 6UA, 9am - 1pm, Admission £2, Free car parking, Hot & Cold refreshments, Inside tables £8 each, Field Pitches £5, Traders from 7.30am. (CBS, CR, FP, TS)

Contact: Luke 2E0VHV, 07870168197
or email mendipsrally@hotmail.com

9 June

JUNCTION 28 RADIO RALLY: Alfreton Sports Centre DE55 7BD, 1 mile from M1 J28. Open 10.15am. Bookings now open for Tables at £12 in advance. Visitor Admission on the day £4. Cash Only. Everything is indoors with bar/refreshments. Large and small suppliers, including Canny Components, providing new and used equipment. www.snadarc.com for map/routes and trader booking form. (BB, CR, LB, RSGB, SIG)

j28rally@snadarc.com.
www.snadarc.com

15 June

ROCHDALE & DISTRICT AMATEUR RADIO SUMMER RALLY: St Vincent de Paul's Hall, Norden, Rochdale, OL12 7QR. Doors open at 10am with entry still at only £3. Usual Traders and caterers. Plenty of free parking. Contact Dave, G3RIK – details below. Please note that all proceeds from this rally will be given to a local charity. Last year we were able to donate £4000 from Rally sales and Silent Key donations to the Rochdale Springhill Hospice. (CR FP TS)

Email: dave@cardens.me.uk
Tel: 01706 633400, Mbl: 0781 367 1296

23 June

NEWBURY RADIO RALLY: Newbury Showground, next to junction 13 of M4 motorway in Berkshire, RG18 9QZ. This is the 35th year of The Newbury Radio Rally and is the ideal event for anyone interested in radio communications, computing and electronics. There will be a display area with an amateur radio station, exhibits, special interest groups, clubs and societies. Open to sellers at 08.00hr and visitors at 09.00hr. Massive Free parking. On-site catering. Disabled facilities. Entry is £3 visitor, £15 sellers pitch. (CR, CS, D, FP, SIG, TS). Advance bookings (with discount) can be made via:

www.nadars.org.uk/rally.asp
Email: NewburyRally@nadars.org.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). Berkshire Lowland Search and Rescue will be providing a First Response service. No Dogs other than Assistance Dogs are allowed on the events field. **EMAIL:** General Enquiries: rally@radarc.org, Traders: traders@radarc.org, Telephone: Colin Ashley 07706 512505

https://mcmichaelrally.org.uk/
https://www.facebook.com/McMichaelRadioRally/
Insta: @mcmichael_radio_rally/ Twitter: @McMichaelRally

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

Backpacking with the ID-50E

Richard Constantine G3UGF takes a long walk with the ID-50E.

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The launch of Icom's ID-50E, FM and D-STAR hand-portable came as something of a surprise to quite a few, including me. It seemed like only yesterday that I was raving about their ID-52E, its colour screen, waterfall display and pre-programmed repeater list as standard. I checked back only to find my review appeared way back in the May 2022 issue of *PW*.

Early dealer photographs indicated that the new ID-50E outwardly looked the same but with a price tag some 18-20% lower. That being the case I wondered why would a quality manufacturer like Icom wish to do this. That's why I was pleased when Icom offered me the chance to take a closer look at the new model on behalf of *PW* readers. Here I could envisage a dilemma as I already have my very own ID-52E.

The comparison was going to be unavoidable as they looked to be so similar. Could I keep an open mind? It was going to be a case of focusing on what the ID-50E offers and not what possible extras you get with an ID-52E, apart from the bill.

Looks the same but…

My first thought when it arrived was, 'it looks the same, only different'. Same appearance but slightly shorter. Identical antenna and GPS feature. Same rugged, professional and solid feel in the hand. According to the kitchen scales it's 43 grams lighter than the press release specification. Being 10mm narrower than the ID-52E it felt even easier in the hand and a bit more convenient in the jacket pocket. It was great to see the same BP-272 1880mAh battery pack as used on many Icom radios, including the now ubiquitous IC-705, but where was the charger? Perhaps Icom thought I didn't need another for the review. There was a short USB-C lead that I first assumed must be for software upgrades only – wrong!

Flipping through the handbook it became clear that as Lithium-Ion and USB-C charging is now so common and the *de facto* world standard, the assumption is that a charger's no longer essential. You can easily charge the rig from the nearest laptop or use a powerbank. The rapid stand charger is an optional accessory, costing £44.95.

I can see the logic as a contribution to saving the planet. I have a cupboard full of chargers that I no longer know what they were used for; have you? I've learned the hard way to label them as soon as I get them to aid my failing memory. No charger helps to reduce the end-user price, but I would still have liked to see something in the box.

On the left-hand side from top to bottom, it has a nice chunky PTT lever that you can easily press even with gloves on. There's a small squelch release button, separate on/off button in grey, plus a microSD slot for memory file storage and data recording behind a flush fitting neoprene type weather cover.

There's a GPS engine built in at the top of the radio with its internal antenna located between the whip and the dual rotary volume/channel change control. The GPS stores data to the SD card while travelling. Details include location, altitude and time information plus it supports the D-STAR function. … and before I forget, the microSD also allows you to record a QSO and to pre-record messages like CQ etc.

To the right-hand side there's similar covered access for an optional speaker mic and external DC input. The lower USB socket provides PC connectivity and battery charging, as mentioned.

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Photo 1: Air band & Simplex display.
Photo 2: Size comparison between the ID50E and ID-52E. Photo 3a: In Icom backpack.
Photo 4: Screen layout with icons, from the handbook.

Annoyingly, the top mounted dual rotary control is not the first I've encountered with its function to my mind the wrong way around. The inner/smaller knob changes the channel and the outer/larger one is volume adjust. – It's too easy to knock the radio off-channel and not realise until it's too late. Thank heavens for a dial lock function.

The ID-50E has voice activation VOX but doesn't have a Bluetooth facility, something I like to use when I'm mobile. Operating a concealed radio via Bluetooth is much less conspicuous when walking. People assume you're on the phone these days.

The front panel layout controls, legends and speaker are identical to the ID-52E and that's what puzzled me when I first saw photographs. In reality, the monochrome display area of the screen is 10mm smaller diagonally and 6mm less wide than its bigger brother. Unlike radios from some other manufacturers, the highly polished screen is flush faced with the body and not recessed. To avoid scratches and mishaps I think a screen protector wouldn't go amiss. Being menu driven rather than touchscreen there are potential benefits to using a protector. The optional carrying case is a worthwhile investment for outdoors.

Display resolution seems a little lower than the ID-52E but is much superior to most Chinese offerings I've seen and definitely a better refresh rate.

Speaking of other oriental models, unlike many the ID-50E has six different, stepped power levels starting at 5 watts and going down to what's called super low at 0.1 watt. Pretty handy if you're intending to connect locally to a hotspot, PC or use it as a signal source.

Frequency deviation levels can be set at either 5kHz or 2.5kHz in the UK and any spurious emissions are rated as –60dBc (decibels related to carrier) – again, excellent compared to many oriental radios.

Receiver design

As for the receiver, no it's not another SDR! It's a conventional double-superhet with slightly different first IF frequencies at 50MHz for bands A and B but using a common second IF frequency at 450kHz. It incorporates both the FM broadcast and Airband (AM) on the A band display. The ID-50E doesn't have a UHF Airband receive facility but it makes a great little scanner using memories on VHF. It has wideband receive capability from 137MHz to 449MHz in nine bands spread over both upper and lower displays.

The 2m receiver is super sensitive at 0.18µV and the 70cm receiver is as expected a creditable 0.32µV or less, both for 12dbB SINAD. Selectivity on FM is at least 55dB and very marginally lower in digital mode.

When it comes to memories there are some differences to big brother. It has two call channels each in two bands, 500 FM memory channels, not 1,000 as before, but how many do you actually need?

Much of the rest of its specification and features are similar in both radios and mostly taken as read. However, when it comes to the way in which the radio interface and presentation to the user works, we're back to

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the idea of 'same only different.'

If you're coming to this cold and not as I did with previous experience, it's not a problem. I'm afraid I struggled a bit at first to find what I was looking for. It's really all perfectly logical and if all else fails, you read the handbook. With regard to the handbook, it's comprehensive at 72 pages but it is worthwhile as always, downloading the advanced manual from the Icom Japan website for those difficult to understand bits either now or in the future.

The first thing to get your head around is that this radio comes, and to use a favourite phrase of a certain **Mr B Johnson**, 'oven ready'. By that I meant that it has all the FM and D-STAR digital repeaters for both VHF and UHF pre-programmed into the radio. There's simply no messing around connecting to a laptop and

laboriously entering many digits by hand. It's ready to monitor and display two frequencies and modes simultaneously on-screen using the dual-watch function. This dual display comes into its own when you use D-STAR to link one repeater's input to another's output via the internet.

At the very top of the display there are a possible 12 icons that can be shown as required to give the user lots of information of the current radio settings everything from battery state, time, VOX active, recording active or paused.

Lower down and as you might expect the radio shows the current mode, power and signal levels, simplex repeat, dual monitor, memory or VFO operation and packet message monitoring, break in, loss and auto reply when using digital DV function. All in all, it's pretty comprehensive but not cluttered.

The transmit audio is clear and punchy and there's 0.75W of receive audio that I had no trouble hearing from the passenger seat of my car, while driving. Being menu driven there's no physical or on-screen keypad for direct frequency entry as it's not really needed. With the repeaters already to hand the simplex channels are easy to find simply by rotating the top-mounted control knob. If bigger frequency shifts are required, there's a 1MHz shift facility activated by pressing the V/MHz step button. (top right). It's something that may be more useful on UHF or when monitoring outside the amateur bands.

There's an attenuator for use on strong local signals, a speech/announcement facility and two programmable 'Home channels' that can be either simplex or favourite repeaters.

D-STAR

Icom's world-wide digital system is an integral part of what the high-end ID-50E has in its armoury and what separates it by miles from the many low-cost alternatives. For those unfamiliar with the system what it is, how it works and how to get involved takes up 24 pages of the handbook. Not that it's complicated. It's just detailed and set out in an easy to follow way.

The guide shows you how to first store your callsign in the radio and how to register your details with the system as the 4.8kbps data stream needs to recognise you. Registration advice is in the manual but perhaps easier to contact your local repeater keeper or better still take a look at the many websites and videos online. One of the simplest ways is via the Icom UK website, especially if you don't have an active D-STAR repeater or gateway locally and want to go travelling.

The ID-50E comes ready with not only all the active FM repeaters but also the D-STAR network. Push the DR button on the central panel and it takes you to a short menu that reveals not only the entire repeater and gateway listings but as if by magic the GPS shows you the list of repeaters near to your current location plus their bearing and distance as a guide to accessibility.

Dual-watch allows you to set up a call 'To and From'. That is, from your system access point to a huge selection of other locations. It's great to surprise your local friends by calling in from distant parts!

Speaking of friends, not only can you call through a local or distant repeater but you can also direct your call to an individual callsign on the network. Just a thought … Imagine linking direct to a DX station in order to set up an HF contact.

If you're called and not able to respond immediately, such as yomping up a hill and out of breath (like me), D-STAR can Auto-Position reply for you. A very significant safety feature when travelling alone.

It gets better. Specific repeaters using D-Plus software give access to a reflector system that can relay your call worldwide. During the recent festive season I had the ID-50E with me on a visit to deepest Wiltshire. Monitoring the 'D-STAR QSO party' was fascinating. The nearest repeater was alive with international calls almost 24 hours a day.

The fun and functionality of the ID-50E doesn't stop there as it can also transmit very acceptable file-transfer pictures from the memory when connected to an Android phone or PC using the either ST-ID50A or ST-ID50W utilities (sorry IOS Mac users – come on Icom!).

A neat feature of D-STAR repeaters is 'Echo Test'. There's nothing more frustrating that not knowing if you're being heard when no one replies. Echo-Test allows you to send a short message and hear it echo it back to you.

Another significant feature of the radio and the system is Terminal Mode. No repeater, no local gateway? Download RS-MS3 for Windows or MS-3A for Android from Icom's website or Google Play to your laptop or phone and you can get into the system using your ID-50E on its lower power setting. The battery will last for ages!

What do I think?

For the cost conscious the new Dual-Band, FM/D-STAR ID-50E offers all the benefits and functionality you're ever likely to need in a compact and very handy package. For me it's 4.5 stars.

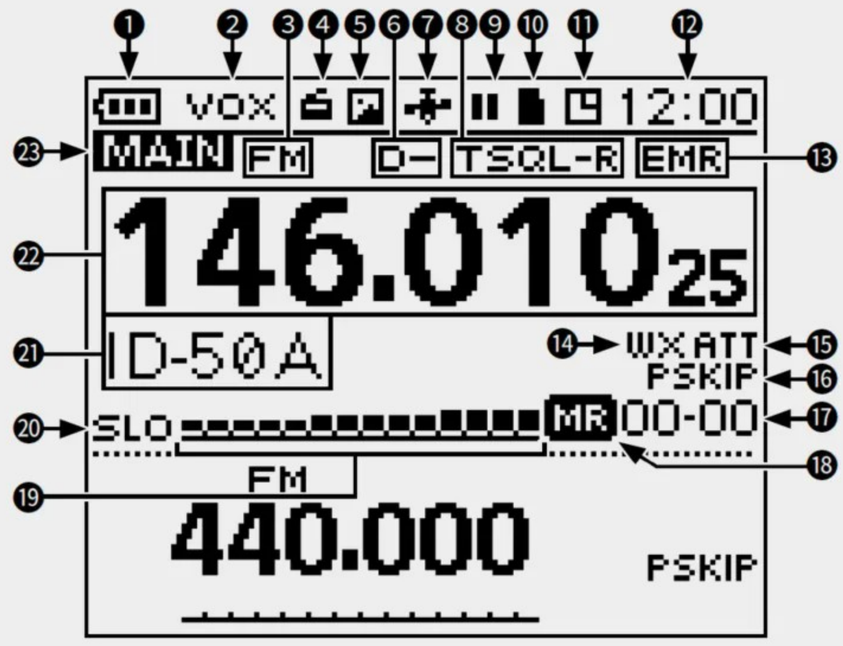
Stand-alone it's ideal and practical for walkers and travellers. As demonstrated, there's much more that you can do with it if you're a Windows or Android user, both out and about and around the shack. It has great potential or should I say 'play value'.

Performance and specification wise I can't fault it and it lives up to Icom's high standards. If I didn't already have the ID-52E I would be very tempted, especially if it was my first foray into D-STAR.

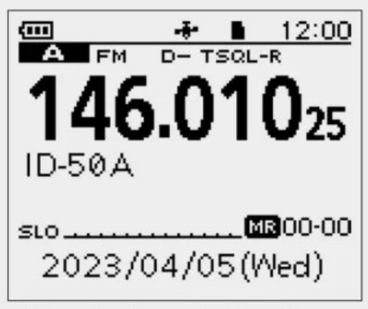
It may not concern others but I miss the Bluetooth and to some extent the colour screen, that would have clinched that extra half a star. As a first-time buyer, none of these extras would be a deal breaker for me. I can easily live with the lack of a mains charger as I frequently use a powerbank or my car to charge when off-grid.

My thanks to Icom for the time and opportunity to really get to know this radio. The ID-50E is currently £449.95 at time of press from its authorised UK dealers. **PW**

■ Function display



Dual band display



Single band display

FM RADIO window (Tuning mode)

❶ BATTERY ICON
Displays the current capacity of the attached battery pack. (p. 6)
ⓘ "[redacted]" is displayed when the optional battery case is attached.

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ICOM

VHF/UHF DUAL-BAND DIGITAL TRANSCEIVER

ID-50E

Your Perfect Travelling Companion!

DIGITAL

GPS

SPEAKER OUTPUT 750mW

IPX7

VHF AIRBAND

USB (Type-C)

MicroSD

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Using those fixed power supplies (Pt II)

Dr Samuel Ritchie EI9FZB continues his three-part series looking at reusing various types of fixed power supply.

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In my first article I looked at an amateur power supply as well as presenting a circuit to test and gain confidence in using a multimeter. In this article I am going to look at a semi-professional fixed power supply and at a circuit to increase the utility of these supplies by adding one or more fixed output voltage options.

The semi-professional power supply

This power supply, a Maplin model XM21X, is substantially heavier than the amateur power supply I wrote about last month, weighing in at more than 4kg. The specifications are a fixed output voltage of 13.8V DC with a maximum continuous current supply of 5A, a 50% duty cycle current of 7A and a surge current capacity of 9A. These units are found in many radio shacks, powering audio setups, DJ desks, feeding battery chargers, charging uninterruptable power supplies and I have seen them running telescope rotators.

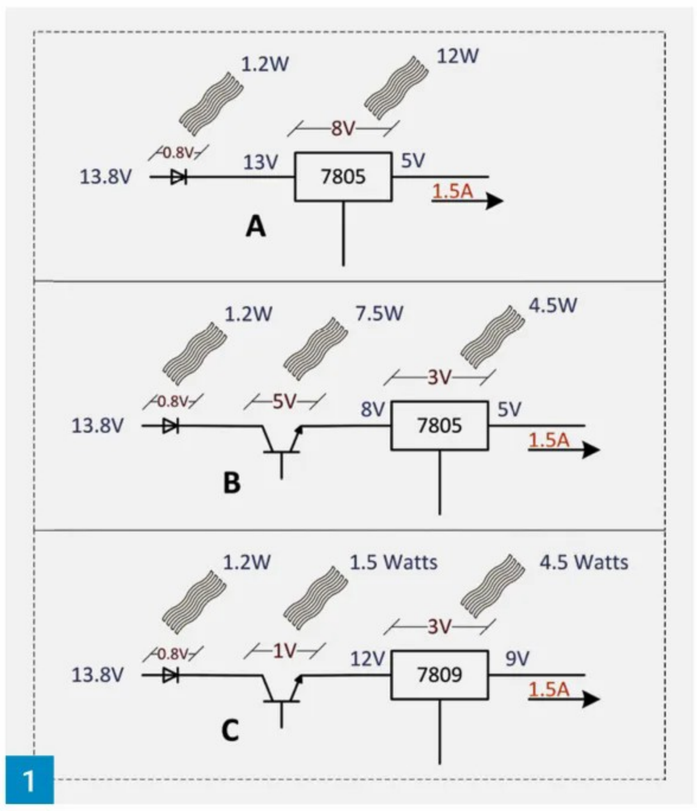
They are fairly rugged with decent quality components, large electrolytic capacitors, large bridge rectifiers and the use of bigger heatsinks. A Zener diode voltage reference is typical and a single IC, consisting of four op-amps is used to provide the voltage regulation and rudimentary current overload protection. The one example I tested allows the output voltage to be set from 9.9V to 16.6V and maintains this voltage accurately when continuously loaded at 5A. At around 9A load the power supply drops the output voltage and reduces the current to 1.8A until the connected load has been completely removed, before restoring full operation.

Measuring the ripple and noise when loaded at 5A showed the 50Hz ripple was below 2mV and while I could see higher frequency spikes these were below 8mV. At these low voltages I could not get my oscilloscope to trigger reliably. There is still not enough heatsink on these units for my liking and after 30 minutes of operation at 5A output the heatsink temperature stabilises around 73°C and the transformer temperature stabilises at 50°C.

Generating other values of fixed voltage

All of these fixed power supplies are set to 13.8V but it may be useful if we were able to generate a range of other fixed voltages. Then we could use these power supplies to perhaps operate some 5V CMOS or TTL circuitry, or run an audio amplifier kit that requires + and – 9V power supplies or even run some equipment that requires an 18V input.

My first thought was to just use a three-terminal voltage regulator from the 78XX family of linear voltage regulators. These devices are available in a large range of output options and a quick look at the Mouser online catalogue showed at least twelve options ranging from 5V to 24V. I then remembered from bitter experience that one of the hurdles faced is dissipating all the heat generated, which becomes a bigger problem the lower the chosen output voltage is relative to the input voltage.



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Let me explain using **Fig. 1A**. Here we have a 7805 regulator supplying 1.5A to a load. The voltage drop across the diode is 0.8V so the power that needs to be dissipated in the diode is then P = I × V = 1.5 × 0.8 = 1.2 watts. The voltage drop across the regulator will be 13V – 5 = 8V so the power that needs to be dissipated in the regulator is then P= I × V = 8 × 1.5 = 12 watts. That is a lot of heat that we will be generating and need to dissipate, but that is one of the disadvantages of linear power supplies.

One important factor before we go further is that we need to know what the dropout voltage is of these 78XX regulators. The specification sheet only gives the dropout voltage as 2V at 1A. As we want to go as high as 1.5A output current I will always ensure that the input to the regulator is 3V higher than the output of the regulator.

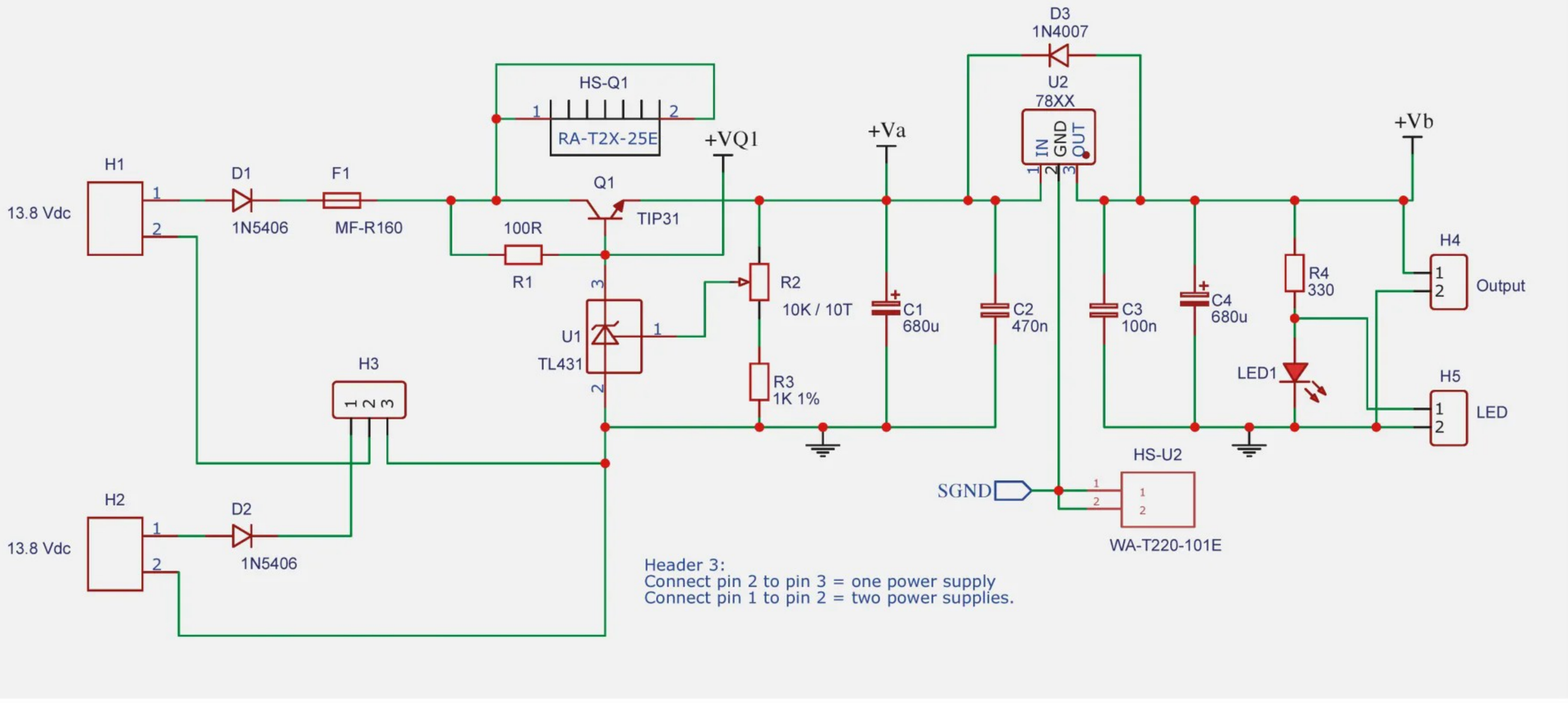
One solution to our heat problem is to share all the heat that needs to be dissipated between the voltage regulator and a pre-regulator and this is shown in **Fig. 1B**. Now we will only need to drop 3V across the regulator and this limits the heat generated in the regulator to 4.5 watts. The remaining 5V is dropped across the pre-regulator generating 7.5 watts. It is easier to deal with two lower power heaters than one large heater.

This is the worst-case scenario because as we use higher output voltage regulators the amount of heat produced decreases as demonstrated in **Fig. 1C**. Here we use a 7809 and the regulator still has a 3V drop and generates 4.5 watts. However, the voltage drop across the pre-regulator is only 1V generating 1.5 watts of heat.

Two tricks you can use. First, if you want to use a 7812 regulator, you will see that you cannot achieve the required 3V of dropout voltage required with an input of only 13.8V. As I mentioned above the semi-professional power supply allows the output to be adjusted as high as 16.6V so setting it to 15V and bypassing the pre-regulator will give enough to head room to drive a 7812. I will explain later about how to use voltage regulators above 12V without changing your power supply setting. Secondly, and in a similar vein the semi-professional power supply could be adjusted to as low as 9.9V, which will allow the heat in the pre-regulator to be reduced. The main problem is that you have to be willing to open and adjust your fixed power supply and the primary reason for using these circuits is so that you do not have to go anywhere near mains voltages.

The generic circuit I have come up with for a pre-regulator, voltage regulator, heatsinks and supporting circuitry is shown in **Fig. 2**.

To start with do not install H2 or D2 and connect a jumper between H3 pin 2 and pin 3. D1 protects the circuit if you get your positive and negative input connections wrong. F1 is a PTC resettable fuse that will hold at 1.6A. This fuse is only here if something catastrophic happens as 13.8V fixed power supplies are usually protected by a traditional fuse. In addition, the 7805 regulators I use, which are manufactured by STMicroelectronics start current foldback at 1.6A and by 1.9A go into complete current limiting mode. Q1 is our pre-regulator and is a TIP31 NPN power transistor. The voltage on the emitter of Q1 is set by R2/R3, which controls a TL431 (U1) adjustable voltage reference. Q1 is attached to a heatsink that has a surface area of 8 900mm^2 and a thermal resistance of 4.8°C/W. This is followed by U2 the 78XX device we want to use to establish the fixed voltage output. U2



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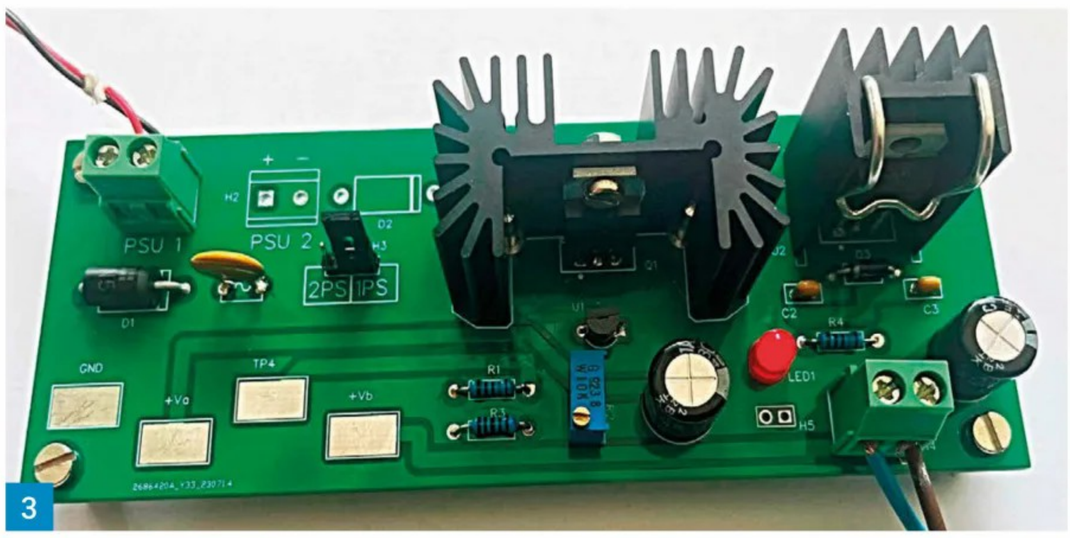

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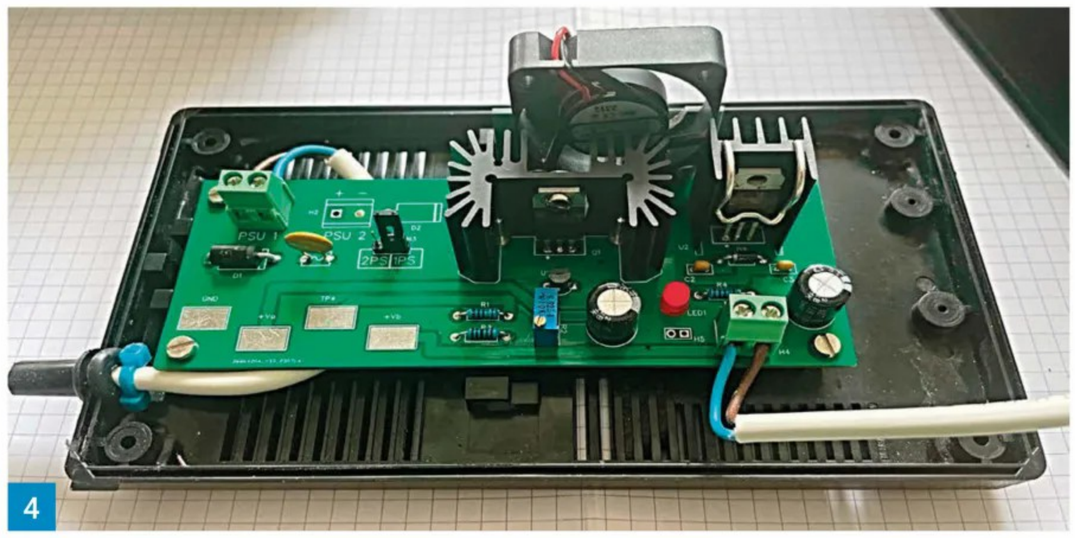

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Fig. 1: Voltage drops and watts.
Fig. 2: Generic circuit to generate fixed voltages.
Fig. 3: Fully assembled PCB to supply 5V DC at 1.5A. Fig. 4: PCB and fan mounted in enclosure.
Fig. 5: Close up of mounting the fan.
Fig. 6: 5V fixed power supply connected to the Maplin fixed power supply.

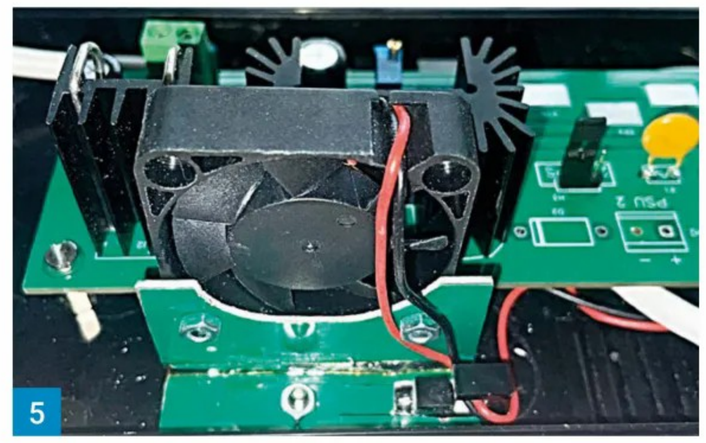
is attached to a heatsink that has a surface area of 6.5in^2 and a thermal resistance of 12°C/W. An LED (LED1) is used to show that the power supply is on and could be taken to the front panel, left on the PCB or left out.

The fully assembled PCB build to supply a fixed 5V is shown in **Fig. 3**. The PCB has been made to fit the two heatsinks that are both manufactured by OHMITE and these can be found at Mouser and at Radionics. The heatsink for Q1 needs an M3 machine screw, a spring clip is used to attach U2 to the heatsink and I also used some heatsink paste on Q1. The PCB has been designed with tracks that are 2mm wide with a 1mm clearance between tracks and ground planes on both sides of the PCB. You may notice that in the schematic, U2 does not appear to be connected to the main ground but instead to SGND. This is a schematic trick and in laying out the PCB, SGND is connected to the circuit ground.

As I did not overly constrain the size of the PCB I provide four large pads at which to make measurements at various points as indicated in the schematic. After connecting my 13.8V DC fixed power supply to H1 I measured 13.8V from ground to the positive terminal of H1. Having loaded the PSU output at H4 to draw a current of 1.5A I used trimpot R2 to set the voltage measured at +Va to 8V. I noted that test point +VQ1 (TP4) was at 8.8V reflecting the Q1 base-to-emitter voltage drop and that finally +Vb (the ouput voltage) is 5V.

Now remember that going from 13.8V to 5V is the toughest test as we need to dissipate the most heat compared to say going from 13.8V to 9V. When drawing 0.5A both heatsinks stabilise at 47°C, when drawing 1A U2 runs at 65°C and Q1 at 62°C and when drawing 1.5A the situation worsens with U2 around 78°C and Q1 is around 81°C.

Even at 50°C, this is a little too hot for my liking and I implemented a small fan to solve the problem. A quick read of the textbooks (e.g. *Power Supplies Explained* by **Paul Lee G3ZKO**, which was reviewed by the Editor in the January 2019 edition of *PW*) reveals that just a little bit of moving air provides a lot of cooling – one of the reasons many of the power supply designs have heatsinks on the outside of their enclosures.



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We also know this principle from our laptops and personal computers, which have their microprocessor under a small fan to keep the temperature down. Gamers who need a lot of performance from their PCs make their

microprocessors work very hard and can have multiple fans and even water cooling systems to keep the temperature of their microprocessors to a reasonable level. I use a small fan, model CFM-4010C-165-251 made by CUI devices and available from Mouser. This fan, connected between ground and the anode of D1 runs quietly at 6500 RPM and within two minutes of operation at 1.5A reduces both heatsinks to less than 45°C. At this temperature you can rest your hand on the heatsinks without discomfort.

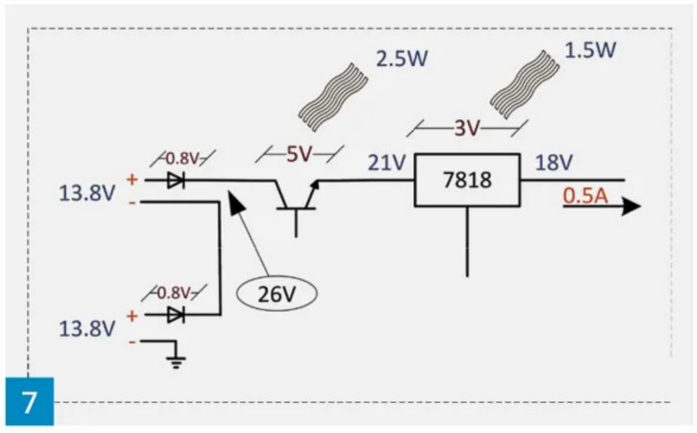
Fig. 4 shows the PCB and the fan mounted in the enclosure. This enclosure is model Z40W made by Kradex, costs €3.90, has a lot of space for the PCB and fan and is well vented on the top and the bottom. **Fig. 5** shows the other side of the enclosure and how I mounted the fan using a few pieces of PCB as a bracket and **Fig. 6** is the fixed 5V power supply running off the Maplin power supply I mentioned at the start of this article. I did not bring the LED out to the front panel of the enclosure as the LED can easily be seen through the vents of the enclosure and the 13.8V fixed power supply has itself an illuminated switch indicating that the power is on.

Getting higher values of fixed voltage

We are going to turn our attention to building an 18V DC fixed power supply to demonstrate how to get higher values of fixed voltage. In order to generate 18V using a 7818 voltage regulator we know that we need ideally 21V DC on the input to the regulator. To achieve this I connected two 13.8V DC fixed power supplies in series to the input of the PCB. With reference to Fig. 2, this is achieved by connecting the second PSU to H2, inserting D2 and on H3 connecting pin 1 and pin 2 together and leaving pin 3 open. We have D2 that prevents the second power supply from causing damage if it is connected with the wrong polarity. We now have 27.6V on the input and our new voltage drop vs. watts diagram, based on a current draw of 0.5A is given in **Fig. 7**.

A close up the PCB assembled and connected for a 7818 is shown in **Fig. 8** and the two power 13.8 V power supplies and the PCB connected are shown in **Fig. 9**. I have limited this supply design to 0.5A but it could easily go to 1.5A if the fan arrangement, demonstrated earlier, is used.

One important note is that the voltage rating of C1 must exceed that of the voltage on the input and the voltage rating of C4 must exceed the output voltage of U2. When first connecting two 13.8V power supplies in series my 16V electrolytic capacitor at C1 drew 0.7A for 10 seconds before dissolving in a puff of white smoke. I replaced C1 and C4 with capacitors rated at 35V having learned that lesson - again.



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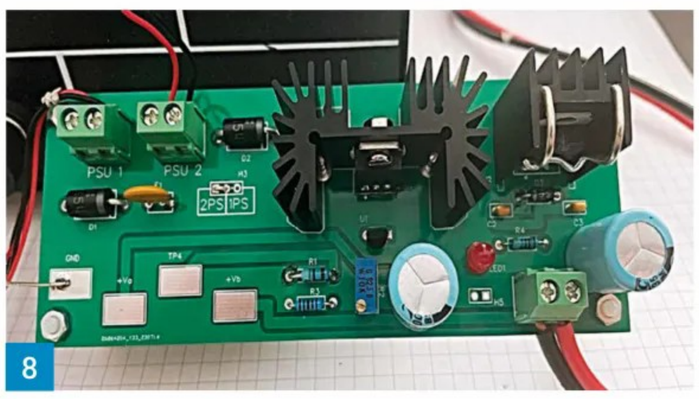

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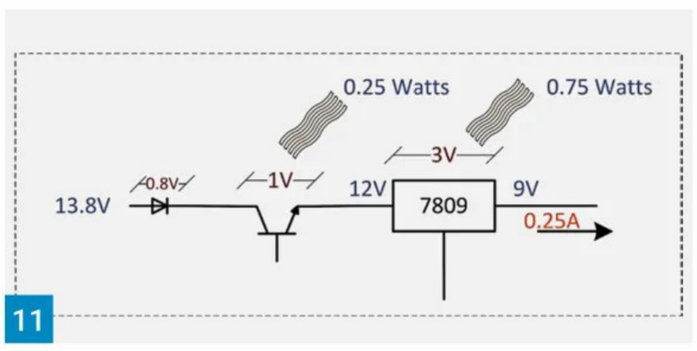

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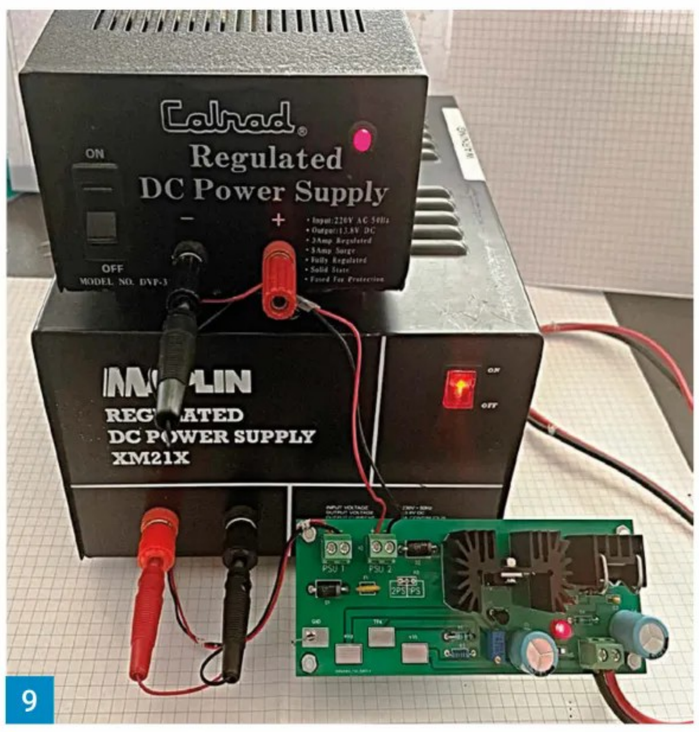

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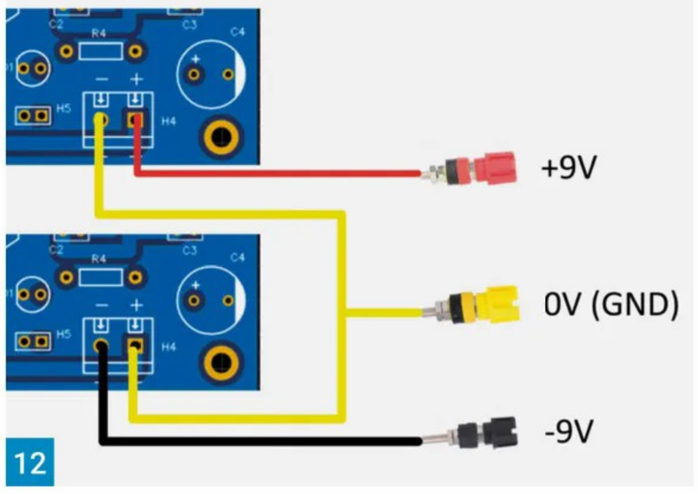

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Fig. 7: Voltage and watts budget for an 18V (0.5A) fixed PSU. Fig. 8: Fully assembled PCB to supply 18V DC at 0.5A. Fig. 9: Using two fixed power supplies in series. Fig. 10: Inside the dual power supply enclosure. Fig. 11: Voltage and watts budget for each 9V (0.25mA) fixed PSU. Fig. 12: Connecting the output of two PCBs for a dual 9V supply

What about a split power supply?

Perhaps you want to experiment with some op-amp circuits or audio amplifier circuits that need both a positive and negative power supply. To demonstrate how to do this I have assembled a dual ± 9V power supply using two 9V DC power supplies as shown in **Fig. 10**. Each PCB is attached to the sides of the enclosure and run off a separate 13.8V power supply. I have taken both LEDs to the front panel to show that there is voltage on each output.

Assuming only small amounts of current (less than 250mA) will be required to drive a few op-amps, the voltage vs. watts budget for each PCB is shown in **Fig. 11**. If you limit the use of this circuit to 0.25mA, then you will not need the two heatsinks as the TO-220 packages on Q1 and U2 do not overheat. I have also used for D1 a 1N4007 diode (1A max) instead of a 1N5406 (3A max) and for F1 I am using a 0.9A resettable fuse with the model number MF-R090.

As I had a second 12V fan I did use it and this can be seen in Fig. 10 attached to the top of the enclosure, extracting air out of the top vents and sucking in in through the bottom vents. Even with a 0.8A load the four heatsinks do not reach 40°C. To make it clear, you achieve a split ±9V DC power supply by connecting the output of the two 9V boards as shown in **Fig. 12**.

End note

Using the circuit and techniques explained here you can build add-ons for your fixed power supplies to produce a range of new voltage outputs and even a variety of dual-voltage supplies.

Have a look at my website (URL below) where there is a link to access the schematic and PCB design on EasyEda if just want to have some identical boards made, modify what I have done, or use it as a starting point for your ideas. As usual there are higher resolution graphics and photos and details on many of the components used and where I got them from.

www.samuelritchie.com

I have no financial interest in OHMITE, Mouser, STMicroelectronics, Kradex, EasyEDA, CUI Devices or Radionics. **PW**

1

145 Alive again

Tim Kirby GW4VXE reports on the latest 145 Alive event before taking his usual tour of the bands.

Tim Kirby GW4VXE
gw4vxe@icloud.com

It's great to be able to report that another '145 Alive' event has taken place, encouraging FM activity on the 2m band. This time it was organised by **Mark M0XIC** and **John M0XJA** and took place on 27 January. Mark and John put together a summary for the event, which reads:

- 33 nets operated on the day
- 18 nets were in England, 4 in Scotland, 4 in the Republic of Ireland, 3 in Wales and 4 in Northern Ireland.
- An average number of contacts logged per net was 29.
- The longest distance contact was 352km.
- The total number of contacts recorded was 854.

Carl Gorse 2E0HPI operated from Cringle Moor in the North Yorkshire National Park, **Fig. 1**. Carl used an IC-7100 running 50W to a Slim Jim antenna and made a total of 51 QSOs with contacts as far as Sheffield, Leeds, the Lake District and Northumberland. **Gaz Rowntree M7GAX** enjoyed a QSO with Carl and says that Carl sounded cold but determined! Gaz was operating from Sutton Bank in the North Yorkshire moors, **Fig. 3**. **Dom Wilkinson 2E0WHQ** was the net controller for the Wiltshire area net, operating from Barbary Castle near Swindon. Dom ran 50W from an Icom IC-910H into a Diamond SG-7900 antenna on a 13m mast. He made 51 QSOs and worked 46 unique callsigns. Dom's best distance contact was to G3YPQ/P (IO70) at a distance of 215km.

Ian Miles G0CNN/P writes, *"It was my second go at running a NE/N.Yorks net from 460m ASL in Wensleydale in the Yorkshire Dales National Park. It was blowing an absolute gale, so it was difficult setting up the antenna (a Diamond X-300 collinear). The mast was at its lowest but that was the best I could achieve. Inside the comfort of the car (which was rocking in the side-wind!), the net was made up of 27 stations, ranging from Gateshead and Consett in the north, down into Yorkshire and as far as Nottinghamshire. I had a busy two hours connecting net members across the north and the net closed as planned at 3pm. Conditions seemed down, with some stations based in Teesside, north of the North York Moors, unable to work stations further south in Yorkshire".*

Mark Harper MW1MDH was part of the team from the Wrexham and Marches ARS who ran the net in North East Wales from Chirk, **Fig. 4**. They had 24 stations call into the net and the best DX was to Leicester.

John Yarnall M1AUN said *"what a fantastic event!"* John was part of the net run from Dudley in the West Midlands. John used an FT-897 and a Diamond SG-7900 on a mag mount.

Dave Ackrill G0DJA took part from Axe Edge, just off the A53 between Buxton and Leek and made around 80 contacts – which is great going. Dave sent a map, **Fig. 2**, showing the location of the contacts he made, ranging from Scotland, to Northern Ireland, to Eire, to South Wales, Devon and the south coast of England. Who says you can't work DX on FM?

Melvin M0IID and **Derek M0JUV** chaired the net for the East Anglian region, on behalf of the Bury St Edmunds ARS, **Fig. 5**. They used a mobile tower mast, around 30 feet, and a Comet GP9 antenna. Despite a nasty moment when they found a loose joint, it all worked very well and they made 27 contacts covering Suffolk, Norfolk, Essex and Cambridgeshire.

Ian Bevan G0YAP perhaps wins the prize for the most unusual operating position during the 145 Alive event, sat in the station yard at the Mid Suffolk Light Railway at Mendlesham in Suffolk.

It's really great to see the 145 Alive events going from strength to strength. They have a flavour all of their own. Some people seem to be attracted to them because they are a 'field event' but are not a contest. Some people prefer the accessibility of FM equipment against the perceived higher cost of SSB equipment.

If you want to find out when the next event will be, keep an eye on the 145 Alive group on Facebook. They are often announced at reasonably short notice (at least as regards print deadlines!) so it is hard to include details of upcoming events in *PW*.

New 70MHz net in Derbyshire

Richard Harlow G5RJH wrote on behalf of the South Derbyshire and Ashby Woulds ARG to say that the club has decided to hold a weekly 4m net,

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Fig. 1: A stunning view from Carl 2E0HPI's operating location for the January 145 Alive event. Fig. 4: A map showing the contacts made by Dave G0DJA during 145 Alive. Fig. 2: Gaz M7GAX joined the 145 Alive event from his Mini. Fig. 3: The station of the Wrexham and Marches ARS located in Chirk. Fig. 5: The Bury St Edmunds club operated G2TO during 145 Alive – look at that lovely IC-251!

on Fridays between 7 and 8pm on 70.4125MHz. Richard says that there is a variety of equipment in use on the net: transverters and ex-PMR gear as well as modern 4m-capable radios. Everyone is very welcome to join the net. Listen out for GX0SRC. Richard mentions that the club also runs a 2m SSB net on a Tuesday evening, again between 7 and 8pm on 144.225MHz.

New beacons from Bedfordshire

Dave Thorpe G4FKI (Ampthill) writes to say that a new series of beacons has been licensed and put on air from Bedfordshire.

- GB3BED is on 10.36877GHz and 24.048830GHz from IO92SD. Reports please to G4FKI or via the BeaconSpot website. **John G4BAO** (Waterbeach) reported receiving both beacons by rainscatter with great signals on 6 February.
- GB3IDT is on 1296.840MHz from IO92SA but is currently operating at reduced height.
- GB3MBD is hoped to be on 70.050MHz in February or March from IO92RA.

The first amateur radio station on the Moon!

The Japan Aerospace Exploration Agency landed their Smart Lander for Investigating Moon (SLIM) on 19 January, releasing two small lunar surface probes; LEV-1 and LEV-2. LEV-1 has an amateur radio licence, JS1YMG and transmits Morse code on 437.410MHz. The probe uses 1W to an antenna with circular polarisation. You can read more about the telemetry sent by the probe on **Daniel Estévez EA4GPZ**'s blog – it's fascinating (see link below). It is not expected that the transmissions will continue for long as the probe was not designed for longevity.

http://tinyurl.com/4fhrbjcn

The 8m band

Roger Lapthorn G3XBM (Cambridge) says that the band has been fairly quiet and he hasn't been on. Roger has been weighing up whether or not to renew his Innovations and Trials licence (a £50 annual fee) for another year or whether to try using the 10mW ISM power level, which can be used by anyone without a licence providing they comply with the ISM regulations. Roger and I discussed this. It's clear that experimenting with just 10mW would be genuine experimentation, which won't have been tried before. It could also be quite frustrating! Interestingly, Roger has recently conducted some WSPR tests at that power level on 28MHz and has been heard in the USA, which is quite remarkable when you think about it. It'll be very interesting to see whether, if Roger does try the 10mW experiment, where he can be heard.

The 6m band

Roger G3XBM says he has been active on FT8 using his 2.5W and a V-2000 vertical but has only heard and been heard by, UK stations.

Steve Telenius-Lowe PJ4DX wrote: *"After 2520 6m QSOs between 2014 and 2024, PJ4DX is now QRT (**Eva PJ4EVA** and I are returning to live in the UK). Most of my 6m QSOs were made on FT8 since late 2020, when I first started to use the mode, and almost all of these were made using an HF MW0JZE Hexbeam antenna with two full-size, but bent, elements on 6m. Between 2014 and 2020 I did make a few QSOs on CW and especially SSB on Six, and ended up with a total of 39 DXCC entities worked on both modes. During this time I used a 40m dipole and for a while a home-made 6m ground-plane. But FT8 was the real DX game-changer and my DXCC totals are now 155 worked with 129 confirmed on Logbook of The World (I no longer collect QSL cards). Best DX QSOs have been several long-path openings to Japan and South Korea, Indonesia and Timor-Leste.*

"The month since my last report has been very quiet, though, with only seven QSOs on 6m: on 12 January D4L, EA8/PB0P, EA8/DL9XJ, EA8XNX on FT8 and FY5FE on CW. Three days later I worked ZL1RS, but no-one else, on FT8 and on 6 February EA8/DL9XJ again. And that's it. Thanks for all the QSOs over the last ten years, 73 Steve PJ4DX."

The 2m band

Roger G3XBM was active in the SSB UK Activity Contest and also the FT8 UK Activity Contest. Roger said that he 'saw' 73 different stations in the FT8 Activity session and was spotted near Paris, while running 2.5W and Big-Wheel omni-directional.

Ian Bontoft G4ELW (Bridgwater) says that he was aware of a few small openings on the band over the last few weeks – most of which he managed to miss! On 21 January, Ian worked EA2XR (IN83), F5GHP (IN96) and GU4EON (IN89). On 4 February, he worked F5DYD (JN03), EA2XR (IN83), EA1HRR (IN83), F6GRA (JN04), F6HRE (IN93) and F6IFX (JN08). Ian runs 15W of FT8 to a low 5-element Yagi from his location on the Somerset levels.

Phil Oakley G0BVD (Great Torrington) took part in the 145 Alive event and made four contacts into Cornwall.

Jef VanRaepenbusch ON8NT (Aalter) runs 25W from an IC-9700 to a 5-element LPDA. Jef caught the opening on 12 January and worked EI4ACB (IO62), GI4SNA (IO64), OZ6HQ (JO45), G7RAU (IN79), OZ1HDF (JO55), EI3KD (IO51) and EI8KN (IO62).

Here at **GW4VXE** (Goodwick) I called and worked EI9KP (IO54) on the afternoon of 23 January, only to be called by UT1FG/MM (IN78). which was a nice surprise. F5DYD (JN03) was a huge signal on the evening of 4 February, with one or two other stations from western France seen.

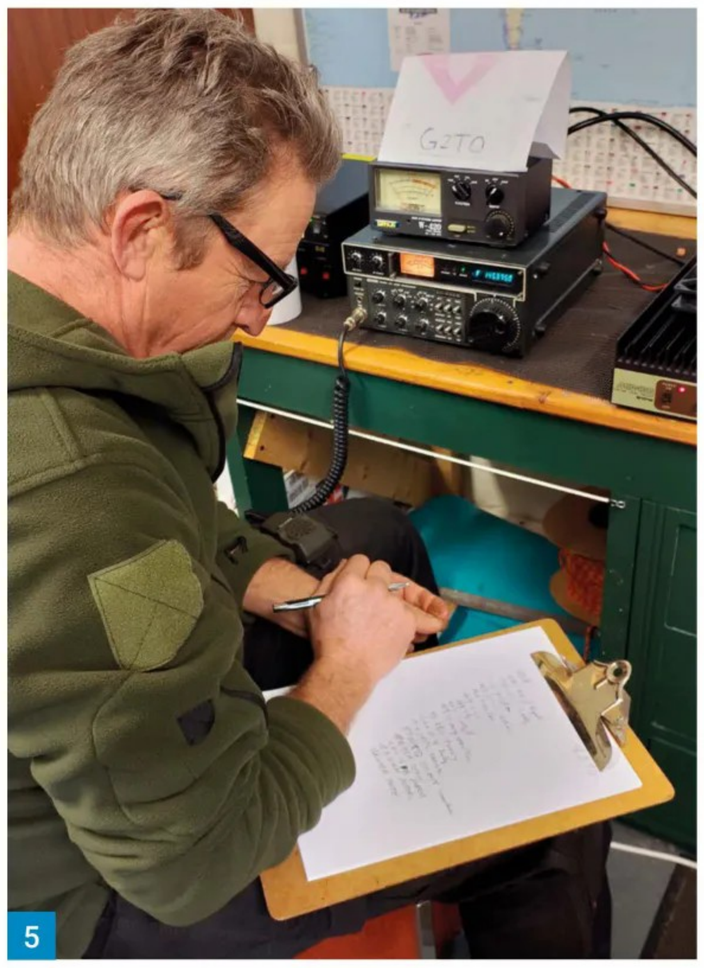
The 70cm band

Roger G3XBM was active with 2.5W SSB to his 144MHz big-wheel during the UK Activity Contest and is always surprised about how much he can hear.

Phil G0BVD worked three stations during the contest on 4 February; 2E0VCC/P (IO70), G4RRA (IO80) and G7RAU (IN79).

Kevin Hewitt ZB2GI worked **Mat EA7KWE** through the repeater situated at the top of the Rock. Mat had called in while walking in the hills at Santa Margarita in Cádiz, using a Baofeng RD5R and a DH-771 antenna.

During the opening on 12 January, Jef ON8NT worked a good number of stations; EI9KP (IO54), GD0TEP (IO74), EI3KD (IO51), GM4FVM (IO85), OZ1JMN (JO46), GI6ATZ (IO74), OZ7KJ (JO46), EI8KN (IO62), OZ1IIL (JO47), GM3SEK (IO74), DJ8MS (JO54), SM6CEN (JO67), OZ1BP (JO55), OZ1KWJ (JO45), LA3QAA (JO59), OZ1SKY



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(JO55), GI4SNA (IO64), OZ8ZS (JO55), OZ2OE (JO45), OZ1KWJ (JO45) and G7RAU (IN79).

The 23cm band

Steve Macdonald G4AQB (Bolton) writes, *"After five years we are celebrating our Wednesday 23cm FM Net in the Manchester area. We started in February 2019 and have only missed two weeks since – once for a bad storm and the other because Christmas Day fell on a Wednesday! All but the first one (which was on SSB) have been on FM. During that time 38 different stations have called in while the regulars G6GVI, G4AQB, G4JLG and G1CXE have clocked up more than 200 appearances each. We've reached as far as St. Annes on the Fylde Coast in the North, Prestatyn in the West, Oswestry in the South and Glossop in the West. During the pandemic, we regularly had up to nine stations in the net at any one time. Everyone is welcome and we are on 1297.500MHz at 8.30pm every Wednesday".*

Satellites

Patrick Stoddard WD9EWK (Phoenix) writes, *"S5Lab, the builders of the GreenCube satellite, had announced in late January that the satellite would be 'passivated' – shut down – at midnight UTC on 5 February. A petition asking for the satellite to remain operational was started, and pleas were made to both S5Lab and the Italian space agency to keep this satellite on the air. As I write this, GreenCube remains operational, without any updates from either S5Lab or the Italian space agency. Satellite operators are hoping this satellite won't be switched off, given its unique 6000km orbit.*

"The recent TX5S expedition to Clipperton Island, a French territory in the eastern Pacific Ocean, was on GreenCube for several days. N6NU was the operator, putting the rarely-heard DXCC (and grid locator DK50) on for satellite operators to work.

*"During the first weekend of February, **Endaf N6UTC/MW1BQO** and I went to the Utah Digital Communications Conference in Salt Lake City to give a presentation on D-STAR via satellite. This one-day conference, hosted at a community college south of the center of Salt Lake City, had several presentations related to digital communications via amateur radio, and this was the first time we have given a presentation on our topic (I have previously written two articles about D-STAR via satellite for AMSAT-UK). The presentation was received well by the crowd.*

"Along with the presentation, Endaf and I worked the AO-91 and SO-50 satellites that morning. We worked each other on the SO-50 pass – N6UTC using my ID-5100 and Elk log periodic, and I was using my TH-D72 and a long duckie antenna. We worked other stations on SO-50, as well as AO-91, handing out the grid locator DN40. We didn't do any satellite roving while in Utah, but we did drive west of Salt Lake City to see the southern end of the Great Salt Lake.

"The long-rumoured Kenwood TH-D75 handheld radio has finally appeared in ham stores, and in the hands of hams around the world. It started to show up in Canada in late January, and in the USA in early February. A store near me still had one in stock, after fulfilling preorders and back orders, and I picked one up. Some physical differences, when compared to the previous TH-D74, but it will seem very familiar if you have used a TH-D74. It is not capable of cross-band full-duplex operations like the TH-D7 and TH-D72. Unlike the TH-D74, the TH-D75 can function as a packet/APRS digipeater, and can receive two D-STAR transmissions simultaneously. This could make it easier for me to try working D-STAR through a TEVEL satellite, using the two VFOs with both set for D-STAR. The radio has a lot of functionality, with a higher price than the TH-D74 when it hit the market in 2016 (TH-D75s are selling for US$ 749 from most US dealers right now)".

Jef ON8NT monitored the ARISS contact on 31 January.

FM broadcast DX

Simon Evans (Twyning) says that the highlight of the month for him was finding tropo to the north coast of Spain on 27 January, when he heard Pico Llen near Santander on 105MHz. Next day, he heard Goes 87.9MHz using his 2m/70cm collinear. Then on 31 January, there was a good tropo opening unto Luxembourg and Germany.

On DAB, Simon received Amiens (8D) on 27 January. Next day, Simon picked up four groups of channels from the Lille area; Met 1&2 (8B and 8C) and Lille locals on 7D and 8A.

Another varied column this month! Thanks to everyone for their contributions. If you'd like to contribute, please email me at any time during the month. It will be great to hear from you. See you next time. **PW**

Michael Jones GW7BBY/GB2MOP
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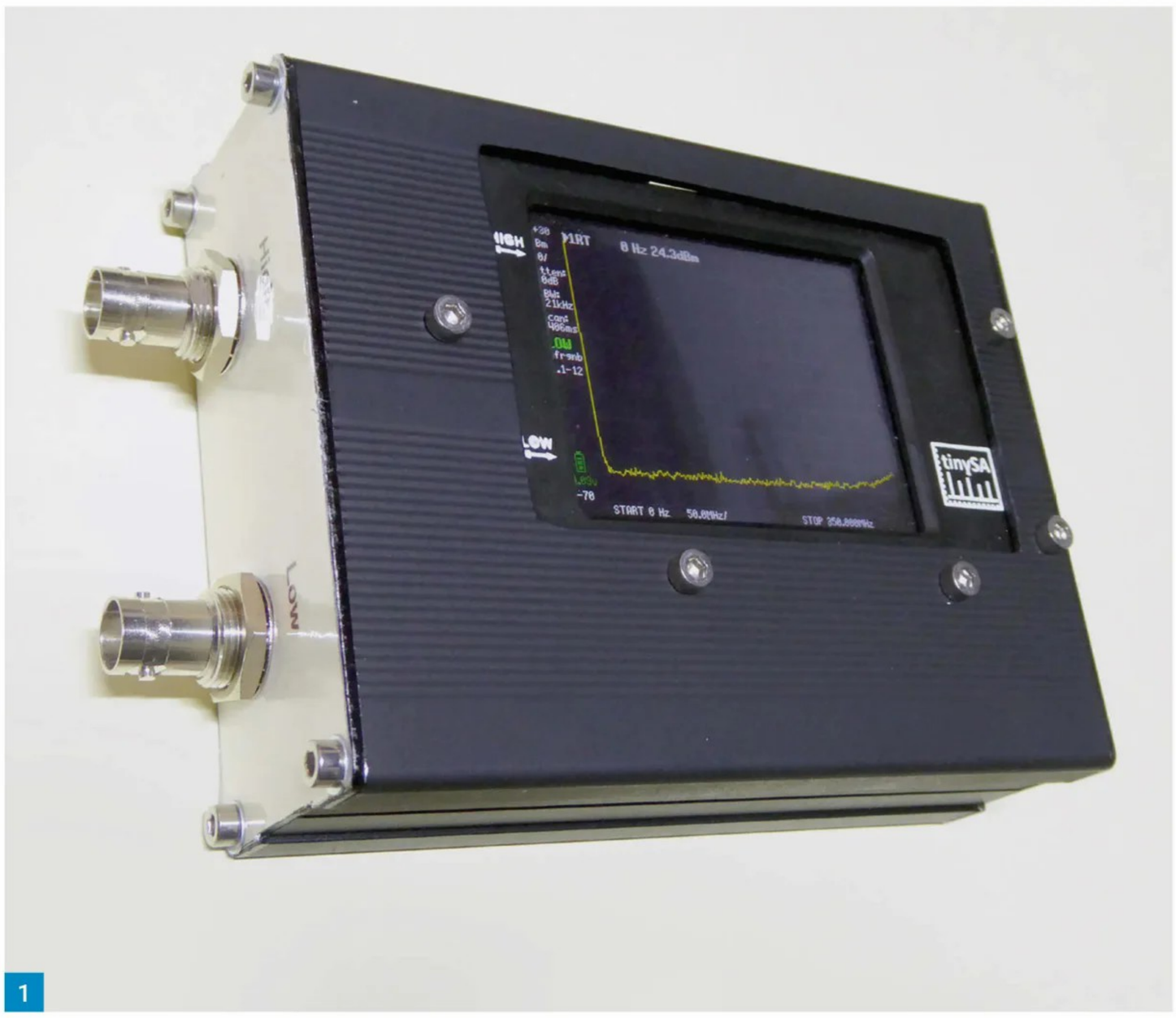

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Enclosures for the NanoVNA and tinySA

Michael Jones GW7BBY/GB2MOP has a solution for improving the use and life of your NanoVNA or similar test equipment.

The tinySA Spectrum Analyser and NanoVNA Vector Network Analyser are so affordable that many of us now own one, or both of these instruments. Brilliant as both these instruments are, they have some physical shortcomings, notably the use of PCB-mounted SMA connectors and the open 'sandwich' construction of my NanoVNA is not the best for outdoor or benchtop use.

SMA vs BNC

It may well seem intuitive having bought a NanoVNA or tinySA to utilise their SMA connectors, but there are good reasons for not doing so:

- The standard connector used on most test equipment, certainly on mine, is the BNC so it makes sense to standardise on these.
- SMAs are only specified for a limited number of connection cycles, about 100 for good SMAs, substantially less for cheap ones.
- Their specifications only hold if the nuts are tightened to a specified torque: 3 – 5 in lbf or 0.3 – 0.6 Nm for brass; 7 – 10 in lbf or 0.8 – 1.1 Nm for stainless steel.
- Attaching heavy adapters, joined to heavy cables – even RG58 coax is heavy compared to an SMA and may put undue stress on the SMA and its attachment to the PCB.
- Using adapters introduces a risk of losses, poor connections and impedance mismatching. They also add weight that will bear on the SMA attachments.
- SMAs are really intended for interconnections between modules within a piece of equipment where they will only be disturbed infrequently.

Enclosures

Handy as these units might be, an enclosure, **Fig. 1**, adds protection and weight.

Weight is important as a lightweight instrument like the tinySA will often not stay put on the bench with a couple of test leads attached while you poke around the innards of a recalcitrant radio. Even a long length of RG58 with an adapter to fit the SMA connector will overpower a tinySA and can drag it off the bench, whereupon striking the floor the SMA's attachment to the PCB can be easily damaged. Bringing the connections from the instrument to the outside world via miniature coax isolates the SMA connectors from physical strain, extends their service life and removes the need for precision torquing.

I chose to use extruded aluminium cases, **Figs 2** & **3**, which come in two halves that slide together and are kept together by the endplates. I used a smaller version to enclose attenuators (*PW* January 2023) **Fig. 4**.

Although I am describing an application for the NanoVNA and tinySA, these cases and the methods described will be applicable to many other devices home built or commercial. They are available on eBay in many different sizes, different colours and have slots for PCBs: all in all, very versatile enclosures.

Metalwork

An aperture (80 x 48mm for NanoVNA, 85 x 55mm for tinySA) needs to be cut for the screen, a slot for access to the controls and a backing plate to hold the device in place against the front panel. Pictures illustrating the process are shown in **Figs 5** to **11**. I'll not go into great detail about actually cutting the apertures as you will adopt your own methods based on the tools and skills available. For the larger holes I favour drilling a large hole in the waste material and then using an Abra-File to actually cut the sides of the aperture out. You might use a hacksaw, junior or full size, or you might drill a series of overlapping holes (trepanning) and then knock the middle out and file to size. Remember to measure and check your measurements before cutting and cut on the small side leaving a small amount to be finished with a fine file to the final dimensions.

Calibration

Changing to BNC connectors means that you will need a BNC calibration set comprising 50Ω, short, open and through pieces for the VNA, **Fig. 12**. They are easy enough to find online. CCS Connectors carry a good range, look for Shorting Cap, Dust Cap (open) and 50Ω terminator from the same manufacturer to try and ensure that the measurement or reference plane is as near the same as possible for all connectors in the set. That is to say that the total distance from the measuring port to the open/short/50Ω plane should be as near as possible the same otherwise phase differences can be introduced. Having said this, do not get hung up about it unless you are working in the high MHz or GHz ranges. The differences will be insignificant at HF/VHF.

Flight cases

For storage and transport I found these small

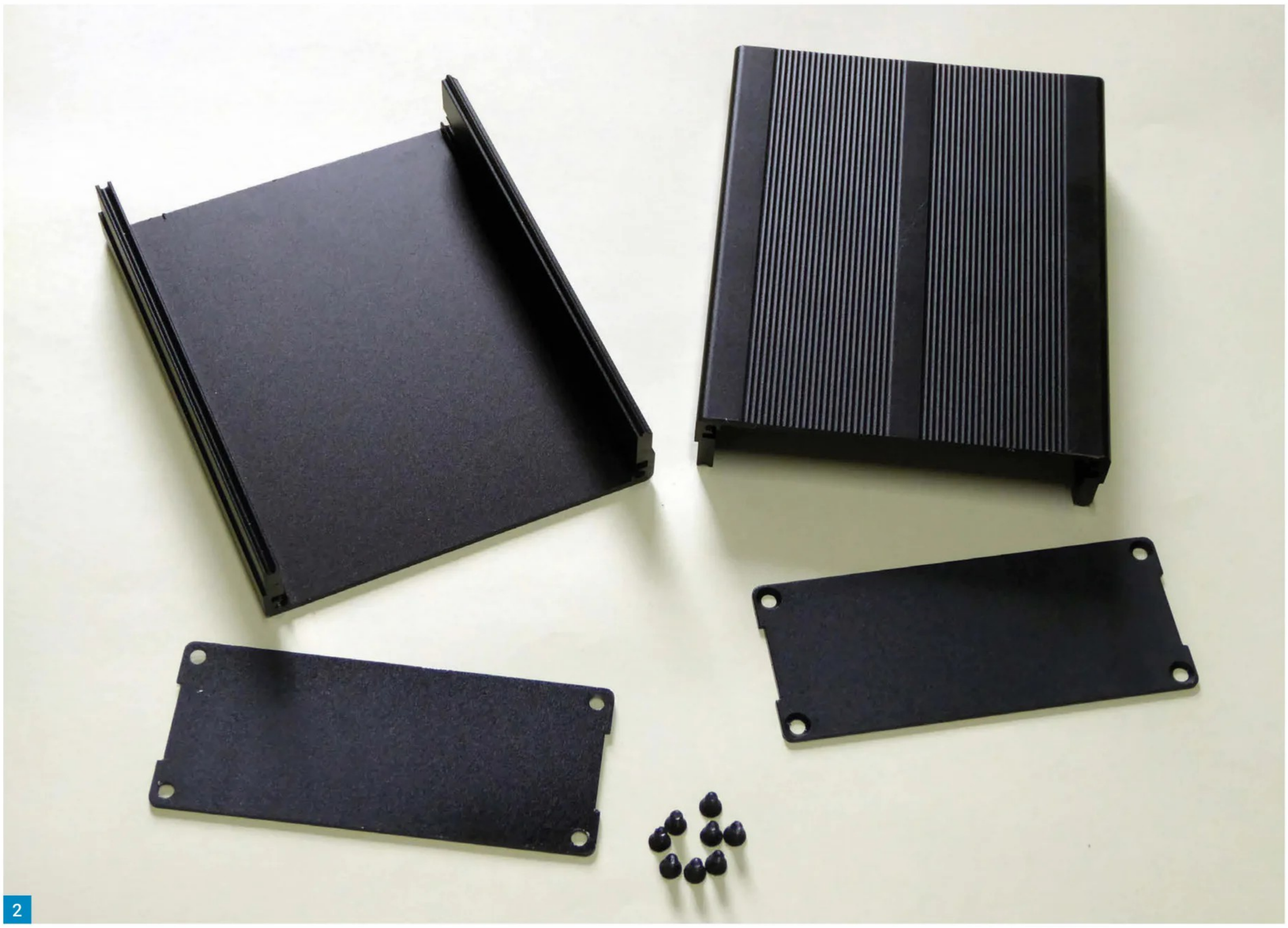

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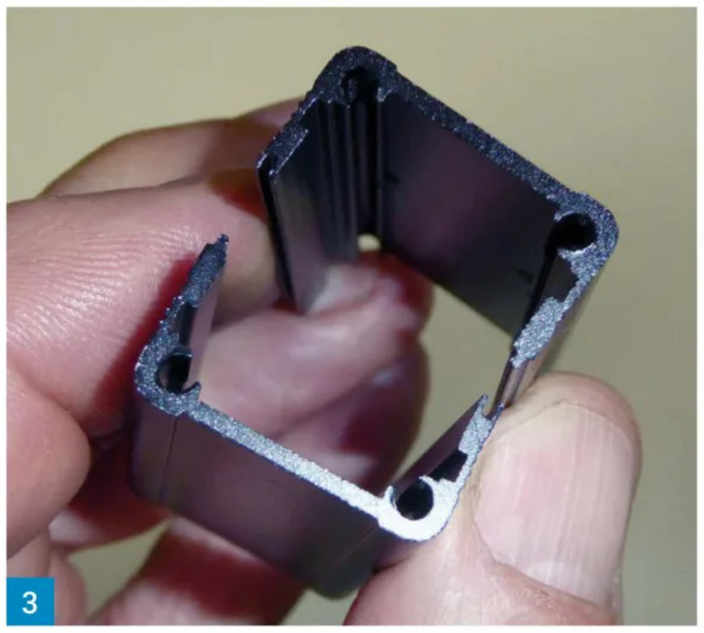
Fig. 1: TinySA in its enclosure.
Fig. 2: Enclosure parts as supplied.
Fig. 3: How the two halves fit together.
Fig. 4: Enclosures for attenuators.
Fig. 5: Using Abra-File to cut out aperture.
Fig. 6: First attempt at retainer for NanoVNA.
Fig. 7: Front with aperture cut out and holes drilled.



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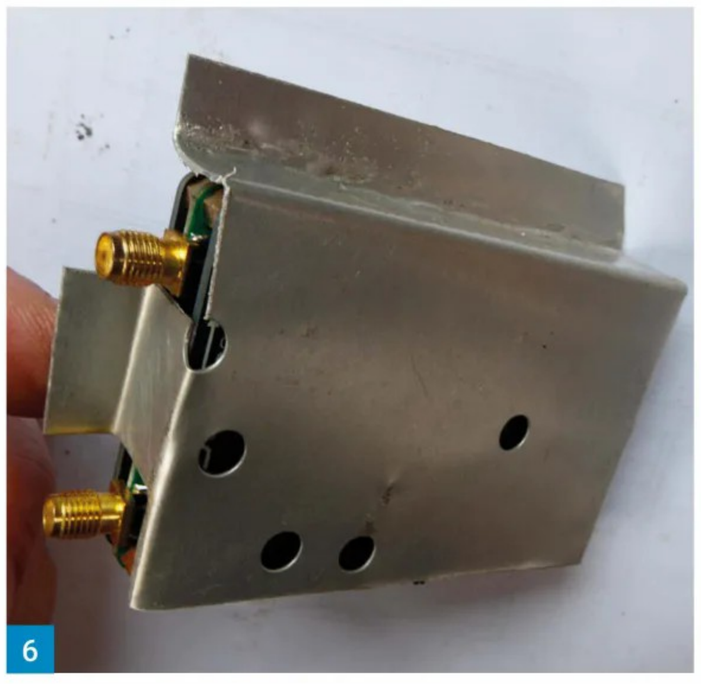

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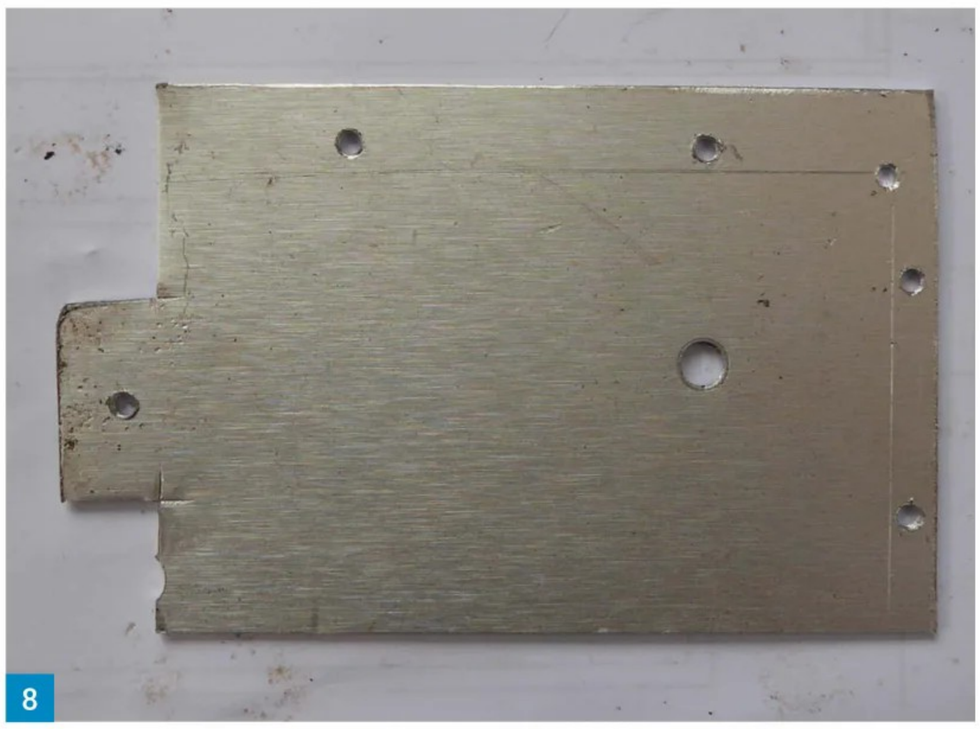

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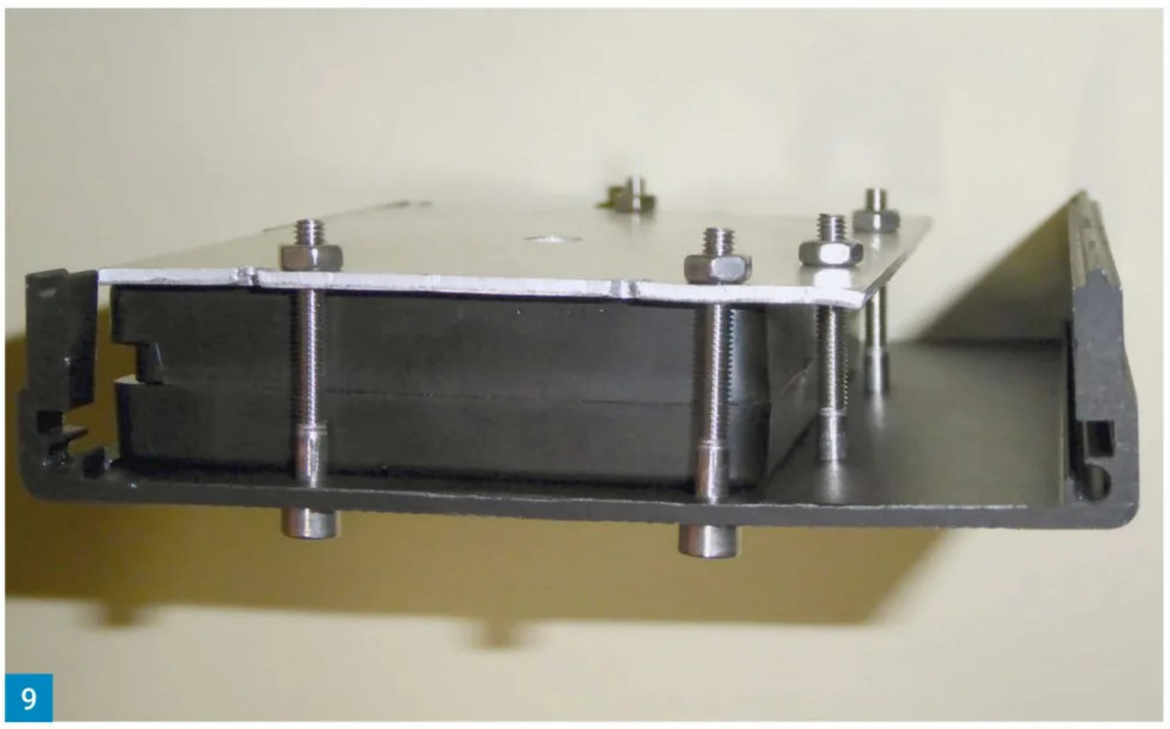

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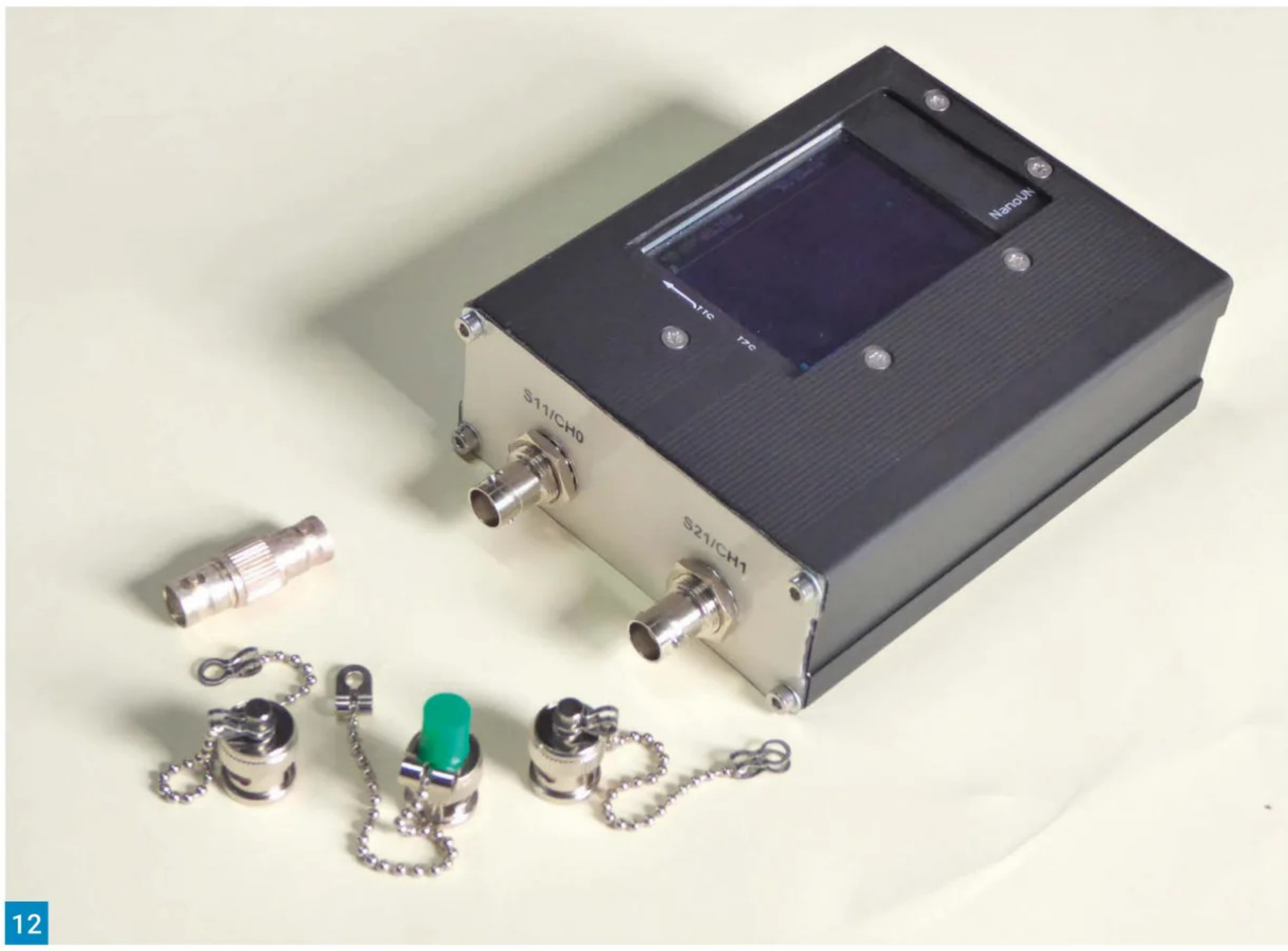
flight cases, **Figs 13** & **14**, three for about £25.00 from eBay. Some come with foam blocks that you have to cut out, for others you may have to source your own foam. These are ideal for my NanoVNA, tinySA and USB Oscilloscope. Another option is to use an 'organiser' box with the segments arranged and/or cut to accommodate the VNA or tinySA. Other segments can be arranged to hold test leads and calibration pieces.

Conclusion

I am very pleased with the results of this project. I feel the equipment is robustly housed and the BNC connectors are much better suited to the test environment. The extruded enclosures are available in many sizes and with the methods described here can be adapted to suit other projects. **PW**

Fig. 8: Final retaining plate. Fig. 9: Retaining plate and VNA assembled to front panel. Fig. 10: Two halves ready to assemble. Fig. 11: Top controls. Fig. 12: NanoVNA with calibration pieces. Fig. 13: VNA in flight case. Fig. 14: Flight cases.



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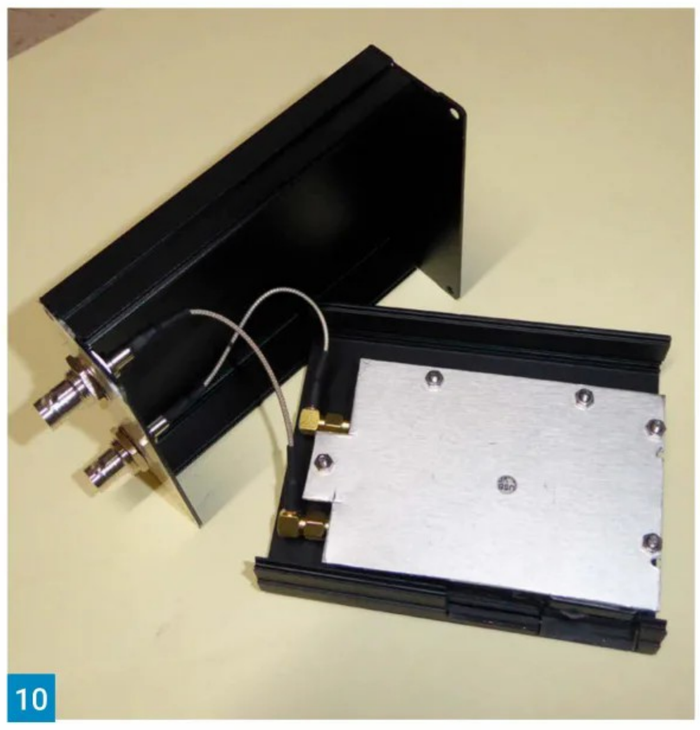

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  12m/10.5 dBi…10m/12.6 dBi
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Keith Rawlings G4MIU
keith.g4miu@gmail.com

Topsy-Turvy

Keith Rawlings G4MIU discusses wall fixings and has more on calculating figures for EMC compliance.

Regular *PW* contributor **Godfrey Manning G4GLM** got in touch with regards to the January 2024 column. Here I went through the procedure I used to put brackets up on the side of my house so that I could mount my LMA-33 mast on them. I used a pair of heavy-duty T-K brackets sourced from Moonraker at the same time as I bought the LMA-33. The only suitable location for this was in the same position that I had my Scam 40 pump-up mast (which has been retired) and this was on the outside wall of the house on a 'return' from the back of the house to the garage wall, **Fig. 1**.

The location is not ideal but I did not want a mast fixed onto the rendered face of the back of the house. Where the mast is now is by the single-storey garage and utility room, which allows me room to lower the mast with antennas on it. This would not be possible with a telescoping mast close to the house.

Godfrey was kind enough to comment: *"The mast brackets are the wrong way up. There's a theoretical school of thought that the K-bracket goes at the bottom to provide a rigid weight-bearing fix. The T-bracket is at the top because it has very slight 'Give' compared to its more rigid companion. The theory is that long-term wind exposure subjects the mast to movements that react at the top bracket as high-cycle very low amplitude forces. To avoid fatigue, the virtually imperceptible elasticity of the less rigid bracket allows these forces to dissipate, whereas there would be a greater tendency to concentrate the force at the U-clamp (stress raiser) if the more rigid bracket were to take the initial load.*

"It looks counterintuitive, not many people know that – but then you might say the same about some of the fatigue principles that I am aware of from my aviation interest (consider stop-drilling, for instance)."

I agree and I probably should have made it clearer in the write up that there was 'method in my madness'. The brackets were mounted that way out of necessity because:

- I wanted reasonable spacing between the two brackets.
- The top one could be no higher than the telescoping sections of the mast, around 6ft.
- The bottom one had to be high enough from the ground to allow clearance for the future installation of a fixed base plate that will allow a non-telescoping mast to be pivoted down on to a trestle.

Another factor was for the bracket to be at least a couple of brick courses away from the damp course.

The K bracket mounted as suggested would a) not give me this clearance from the proposed base unless it was mounted further up the wall reducing the spacing between the two brackets and b) the bolt point of lower part of the K bracket would be far too close to the damp course unless it was raised where it would again reduce the space between the brackets.

Mounting the T-bracket in this position gives me that clearance, retains a reasonable spacing between brackets and is fixed in the fourth row of bricks above the DPC. Both brackets are also in a position where I can easily access the clamps.

The mast presently rests on a couple of blocks on the ground so the brackets take little weight. It is also lowered when not in use and in windy weather. It is more of a mast for experiments than permanent antennas. In fact, I am more concerned about the fixings going into hollow bricks, which presented its own problems, and which will require frequent inspection, as was the case with the previous mounting for the bigger and heavier Scam 40 mast fixed in an identical way, although this existed for 20 years without problem.

Some years ago, when involved in installing radio and telemetry antennas for a utility in the eastern region, on the occasions they were used, we installed TKbrackets in the manner Godfrey suggests. In fact, the mast that I used to have mounted at the opposite end of my house, and which took my VHF antennas, **Fig. 2**, had these same TK brackets mounted in the correct fashion. They too were in position for over 20 years, but had little inspection and were finally removed as they had rusted badly!

As the new brackets are in a position where they can be easily monitored I am not too concerned.

While slightly off the topic of antennas, Godfrey's reference to stop-drilling is of interest. For a crack to work its way along a surface it usually has a sharp edge at its point. If a hole is drilled at the point of the crack, it will remove this sharp point and consequently the crack will, hopefully, stop. Of course, this may not stop another from forming elsewhere and a new one could possibly form from within the drill point but it would require a lot more stress to do so compare to an undrilled crack.

The first time I saw this in practice was when I was in my early teens. A farm near to where my father had his business had some very large metal grain storage bins made from galvanised steel sheets and each had an equally large housing at the base with a big drying fan inside. I assume that the fans must have vibrated because where the housing was bolted to the bins themselves cracks had appeared.

I remember that my father suggested that by drilling holes at the point of the cracks it would stop their advancement, certainly long enough for a more permanent repair to be made at least. I also remember the farmer being quite keen to try this and I watched as a suitable power drill appeared along with a box of drill bits and holes were then drilled into the tin. I assume this operation was successful as the bins stood until a few years ago!

Out of interest I have since found that this process can be used to temporarily arrest cracks on plastic car bumpers that have been damaged. In saying this, should you decide to try the technique, use with discretion and at your own risk, I don't want to hear of any bumpers falling off or farmers whose grain storage bins have fallen down!

TinySA Ultra

Inevitably, perhaps, it seems that the TinySA Ultra Spectrum Analyser has now been cloned and there are 'fakes' on the market. Buyers of these fakes report problems when trying to update to a later firmware version but there may be other issues yet to come to light.

Not being able to upgrade presents the problem that as the firmware is continually enhanced and improved, users will miss out on the many new features being introduced. Presently there does not seem to be a way of identifying a fake visually. The best way to avoid this problem is to purchase from one of the approved suppliers. In the UK this is Mirfield Electronics. The first port of call for any TinySA related information is the Wiki:

https://tinysa.org/wiki

Approved Suppliers:

http://tinyurl.com/5bpnxh2b

EMF compliance and AN-SOF antenna simulator, follow up

As mentioned in the February 2024 issue of *PW* **Tony** at AN-SOF has completed the first part of an article on assessing EMF compliance, titled *A guide to Far Field RF Exposure Assessments: Part One, Evaluating EMF Compliance*.

Although aimed at evaluating compliance using AN-SOF antenna simulator the points covered are valid as a detailed overview for those wishing to understand more about EMF compliance in general.

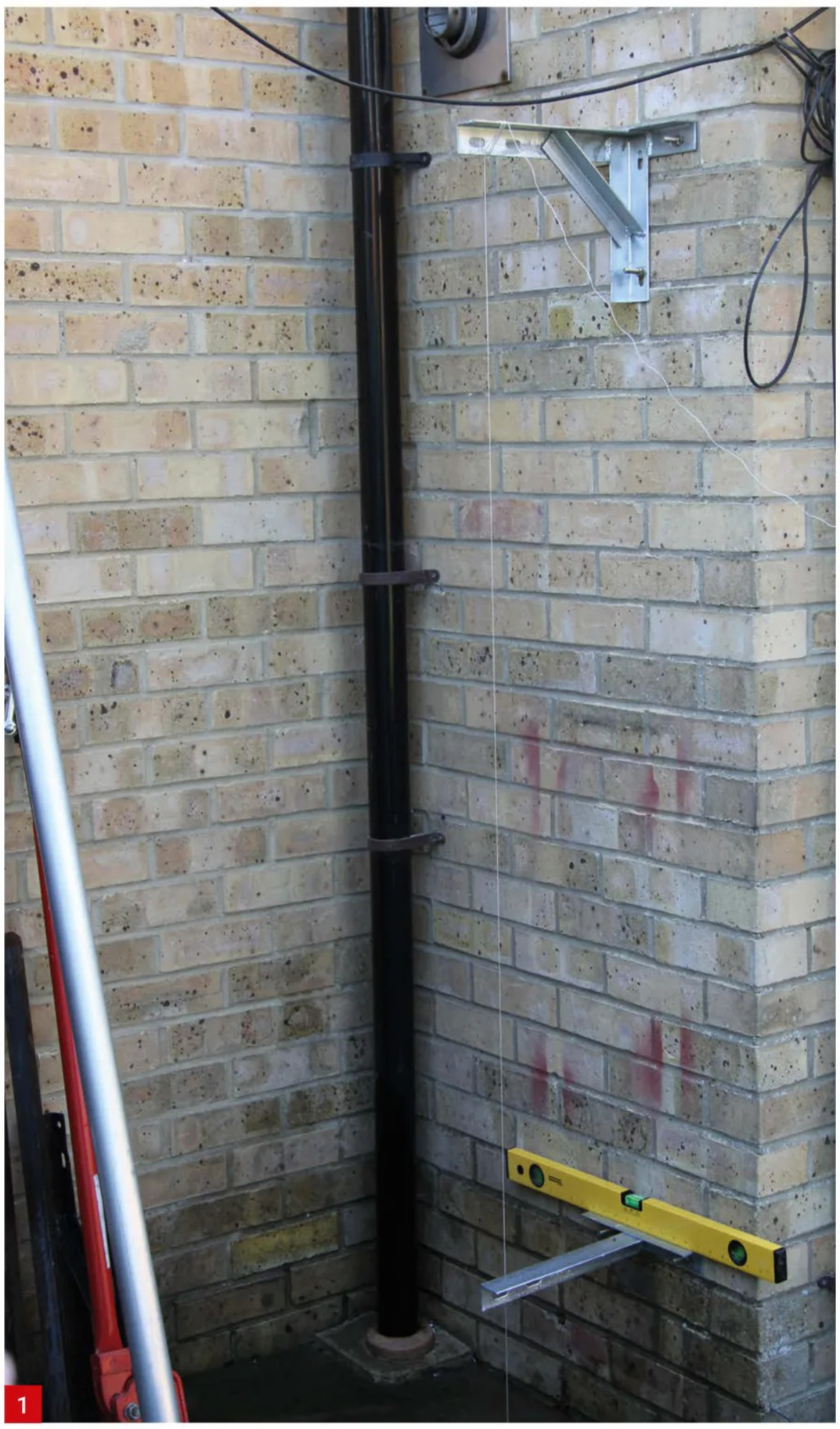

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Fig. 1: Brackets being installed. Note the proximity of the lower bracket to the DPC. Fig. 2: TK Brackets as mounted for my V/UHF antennas just before removal. Fig. 3: Predicted Peak EIRP vs Frequency of the 17m Delta Loop in Free space. Fig. 4: Predicted 3D Plot of 17m Delta Loop in free space. Fig. 5: Predicted Peak EIRP vs Frequency of the 17m Delta Loop above real ground. Fig. 6: Predicted 3D Plot of 17m Delta Loop above real ground.

To quote the paper's introduction: *"The article delves into the concepts of antenna radiation, the near-far field boundary, and* ***Effective Isotropic Radiated Power (EIRP)*** *compliance thresholds. It also provides a practical step-by-step approach to EIRP-based EMF compliance assessment using* ***AN-SOF Antenna Simulation Software****. This approach is demonstrated for antenna configurations with and without ground planes, considering the impact of feed lines on EIRP values.*

Key takeaways from this article include:

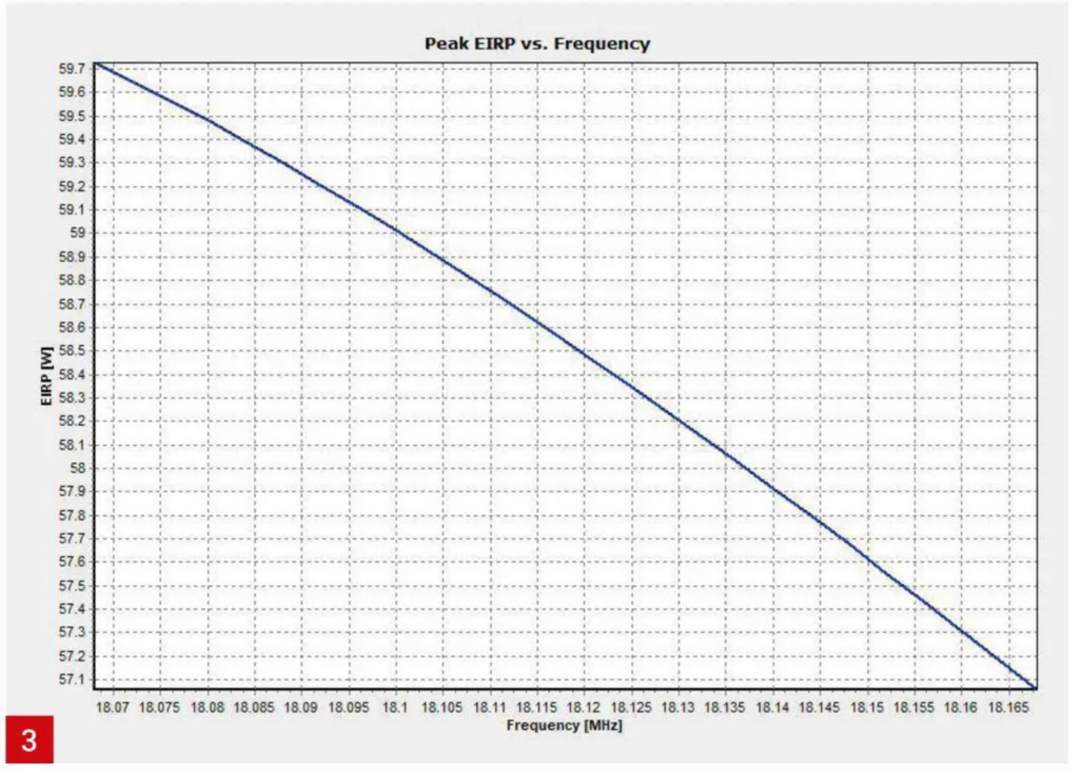
- *EMF compliance assessment is essential for ensuring RF exposure safety.*
- *EIRP is a crucial parameter in EMF compliance assessment.*
- *Antenna configuration and feed lines influence EIRP values.*
- *The near-far field boundary determines the appropriate methodology for EMF compliance calculations.*
- *AN-SOF can be used to model antenna configurations and perform accurate EIRP calculations."*

The article focuses mainly on EMF compliance in the amateur radio bands but, of course, the very same principles can be applied to other parts of the frequency spectrum and to the users of that spectrum.

This is a very useful article for the amateur who wants to understand more about the subject of EMF. Notably because it looks not only at criteria from UK OFCOM but also the American FCC and is a good example of a thorough yet understandable description of the subject. There is a comprehensive description on how to understand the framework of RF Exposure regulations, the concepts of Antenna Radiation and the Near Field Boundary, EIRP Definition Calculation, and Exposure Thresholds. To demonstrate these topics there is a practical example, which assesses a model of an amateur 17m two-element Delta Loop. (A ready built AN-SOF model is available for download.)

Initially the simulation is made in free space without a ground plane where the evaluation of EMF is made under ideal conditions. Subsequently an accurate ground plane is introduced and the antenna is raised to a specific height using a lossy coaxial feeder and the impact on EIRP (Equivalent Isotropic Radiated Power) is reassessed. This demonstrates how ground can affect EIRP levels.

It is of note that when using online calculators, the impact of antenna height over a lossy ground plane on the gain is only considered approximately; as the soil conductivity and



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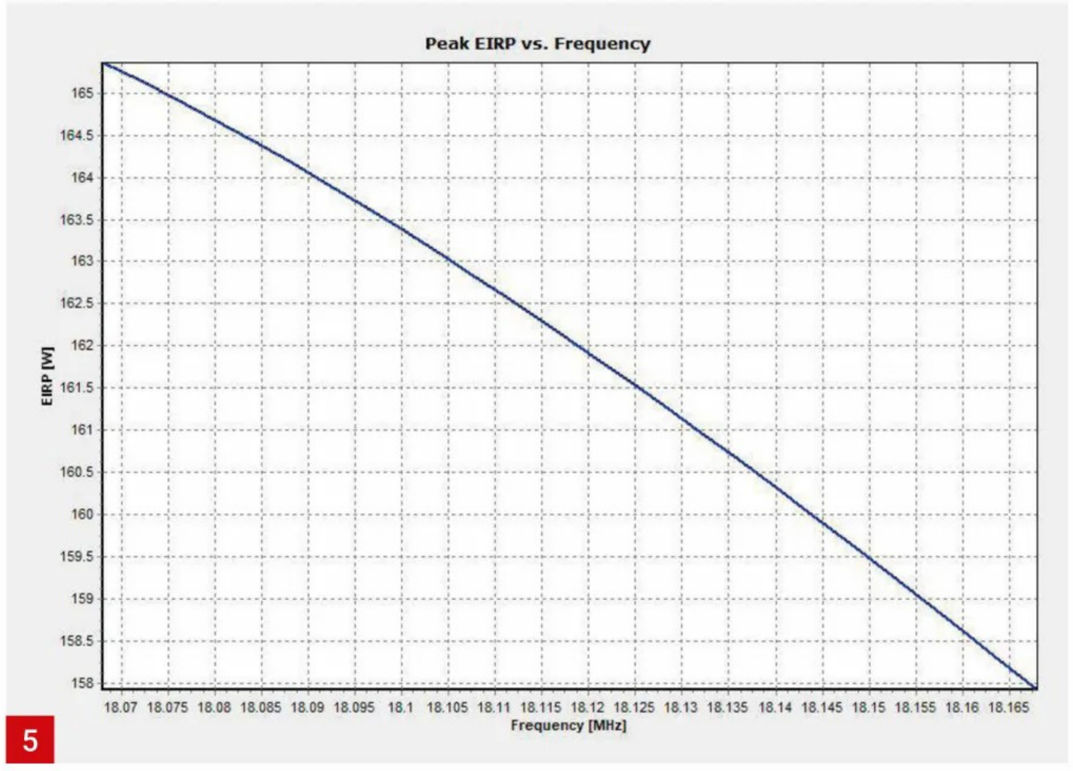

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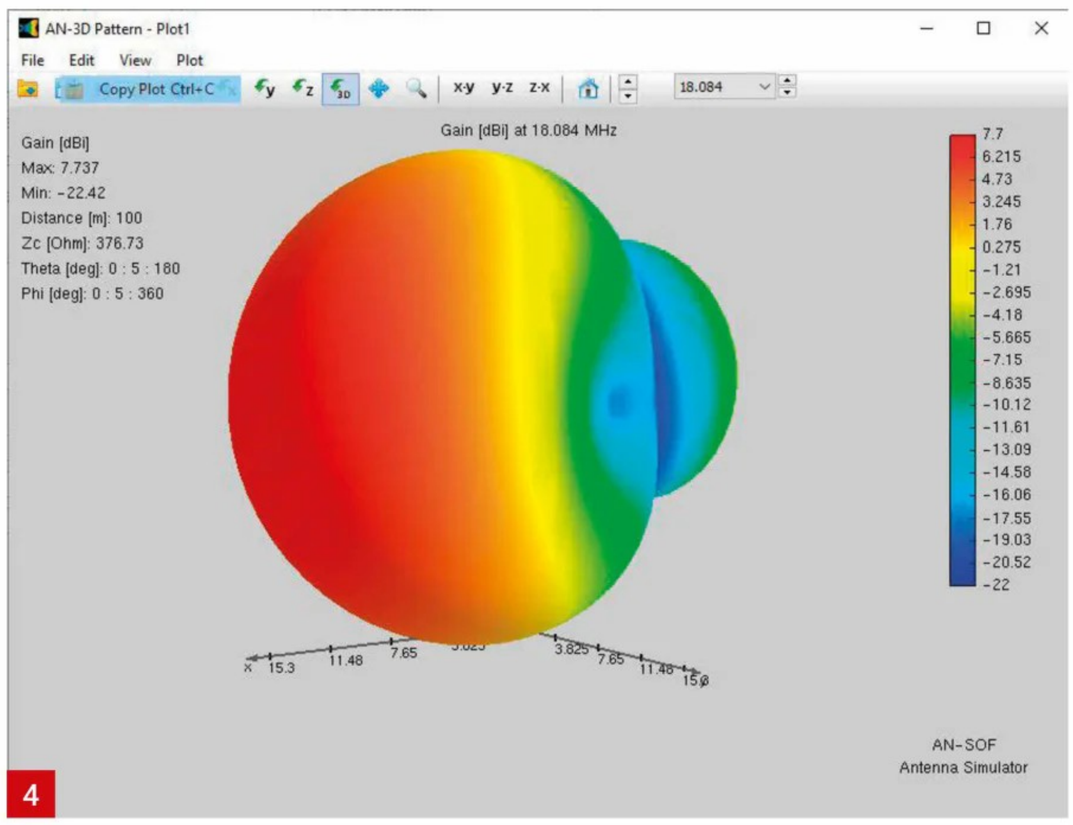

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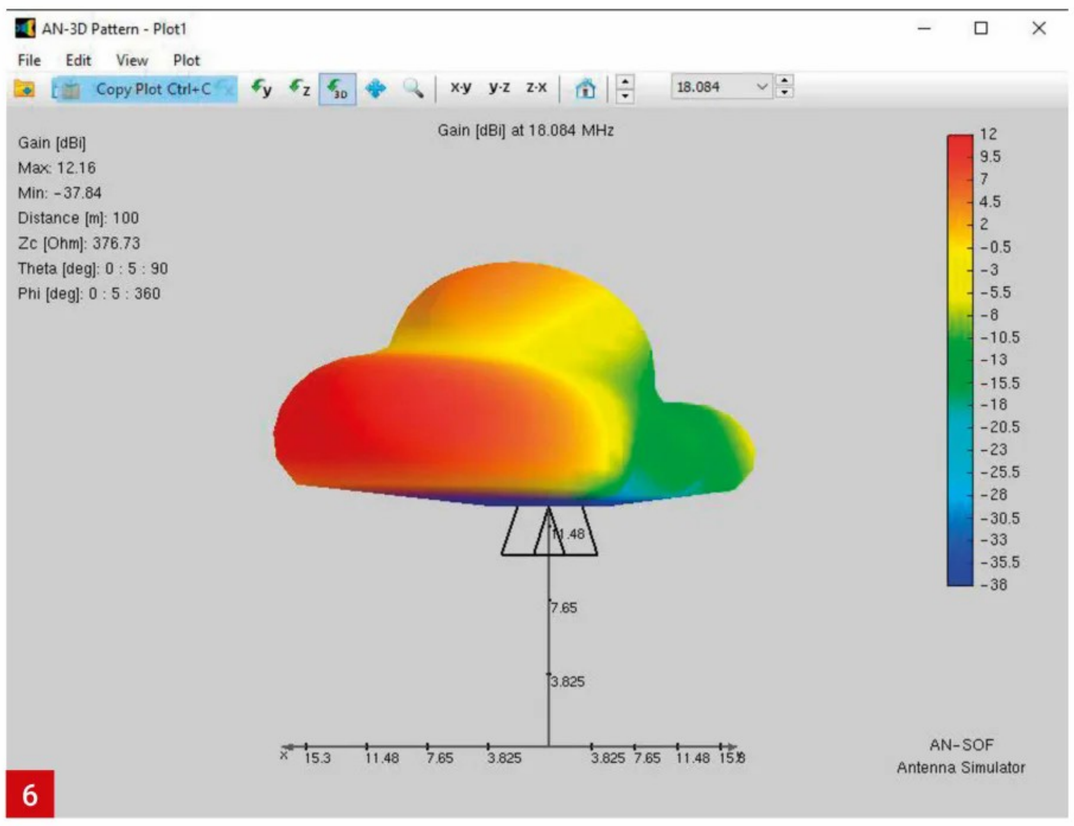

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dielectric constant cannot be entered so an average reflection coefficient is used with these calculators.

In the AN-SOF simulation the Delta Loop model Peak EIRP may be found as a function of frequency by selecting the Power Budget Table with Peak EIRB indicated. With the model fed at 10W the EIRP is 59W. See **Fig. 3**.

By selecting the 3D radiation pattern we find that our model is predicted to have 7.7dBi of gain. See **Fig. 4**.

When introducing real ground with moderate soil and simulating the model at 10m the figures change dramatically. Peak EIRP rises to 162W as the predicted gain of the array has risen to 12dBi (see **Figs 5** & **6**). Note the difference ground makes to the antenna's performance.

The article goes on to describes how these figures may be used to assess EMF levels. In the UK consideration has to be given to transmit time.

In the RSGB calculator this taken over a period of six minutes, and varies as a percentage with the mode being used. This is covered in the section *The Significance of Time Averages*. It is explained that: *"The average power of a transmitter, typically a fraction of its peak power, is significantly influenced by the* ***duty cycle****, also known as the* ***duty factor****, of its transmit mode. This factor represents the percentage of time the transmitter actively sends a signal compared to the total time period. Notably, the duty cycle varies depending on the modulation technique employed. The* ***mode factor*** *represents the multiplier applied to the transmitter's Peak Envelope Power (PEP) to obtain the average input power, which ultimately contributes to the EIRP calculations.*

"Furthermore, it's crucial to consider the percentage of time the station remains active within a specific time frame, such as a 6-minute period. As an example, if telegraph mode transmits for only 3 minutes out of every 6 minutes, the power level considered for the EIRP calculation undergoes a 50% reduction. Therefore, to determine the average input power, we need to multiply the PEP by both the mode factor and the fraction of time within each 6-minute block that the transmitter is active."

For those wishing to make their own calculations Table 3 'Duty Cycle Comparison Chart of Common Transmit Modes' has been included in the article. Most usefully this includes their equivalents in decibels for cases where power is expressed in dB.

While this article is in the main about modelling EMF using AN-SOF it will also provide the reader with a good knowledge of the subject as well as an insight into using simulation/modelling to estimate EMF levels of any type of antenna. Remember that in most cases the RSGB calculator is all you will need. This info is presented for those who wish to make their own calculations or who just wish to know more about the subject. This valuable resource may be found at:

http://tinyurl.com/2neufa7z

While on the subject, AN-SOF 9 is soon to be released featuring a 'ground breaking' **Tuner Calculator**. This tool will enable users to incorporate an **impedance matching network** (L, Pi, T), account for output **stray capacitance**, and include a **balun**. Additionally, it will be possible to model quality factors in capacitors and inductors, along with balun losses. This will provide a comprehensive solution for simulating real-case scenarios and accurately represent all components between the transmitter and the antenna.

See you next month. **PW**

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- Splash and dustproof case
- Using both in the home and in the field

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Dealing with SMDs

Mike Richards G4WNC has a hotch-potch of random goodies from the G4WNC workshop! He begins with a technique for removing high pin-count SMD ICs from a PCB, then looks at virtualisation.

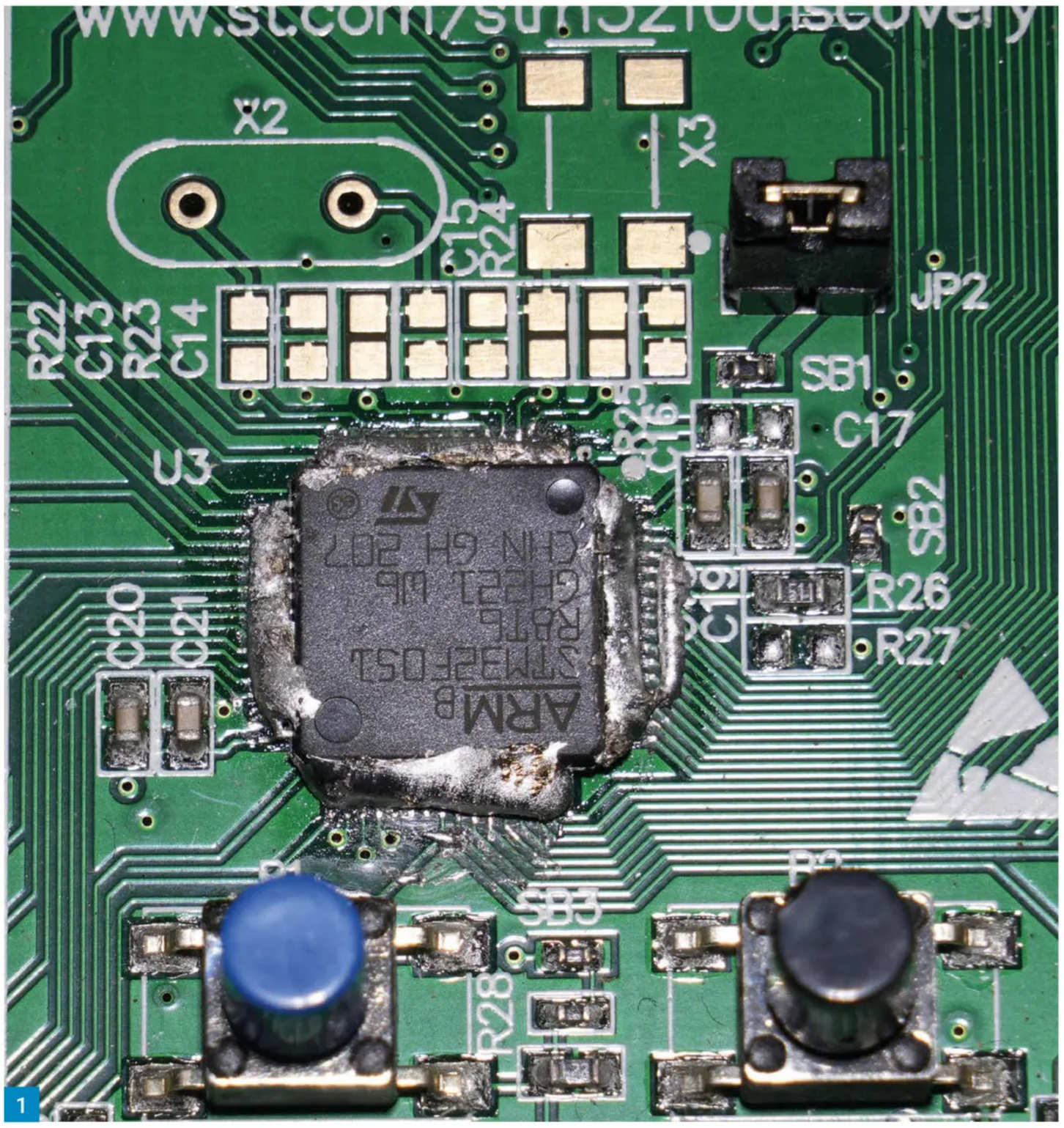
Mike Richards G4WNC
practicalwireless@warnersgroup.co.uk

I always have several projects on the go in the workshop, and this month I've been working on a motorised sliding rail for extreme close-up photography. Although it has nothing to do with radio, my problem is common for anyone working with modern SMD components. While working out the correct serial port connections, I accidentally flashed a bare ground wire across the exposed PCB with disastrous effects.

Although some parts of the processor continued to work normally, it ran extremely hot, and some pins had stopped working. A new motor controller costs around £70, but the STM32F401 processor chip is cheap at around £6 each. The problem was extracting the tiny 64-pin chip from the delicate PCB without damaging the surrounding components or those mounted on the underside of the PCB. It looked hopeless, but there was a straightforward solution – low melting point solder. The technique is to apply flux and then use a soldering iron to crudely blob low melting point solder across all the device pins. The low melting point solder mixes with the existing solder and produces a mix with a far lower melting point.

This has two benefits:1) The lower temperatures mean you're far less likely to disturb or damage the delicate PCB tracks or adjacent components, and 2) the solder stays molten for much longer. Once you've applied low melting point solder to all the pins, you keep moving around the chip with your iron until all the solder is molten and then carefully lift off the chip with tweezers, **Fig. 1**. When the chip's been removed, you can use your iron and solder wick to remove all the surplus solder, followed by alcohol wipes or flux remover to clean up the board, ready to fit the replacement chip, **Fig. 2**. The most popular low melting point solder manufacturer is ChipQuik and they supply a small kit designed explicitly for SMD extraction, **Fig. 3**. The kit includes the low melting point solder, a tube of flux and several alcohol wipes. It comes with enough material for extracting many chips.

Fitting the new chip is not trivial and demands care and a decent magnifying light. The first task is to inspect the PCB and ensure the pads are scrupulously clean with no solder bridges. That's followed by a final clean with an alcohol wipe and applying a suitable flux. The soldering iron choice is important; you need a good quality fine-tip unit. My favourite is the Hakko FM2032 Micro, a 24V 48W miniature iron with a temperature-controlled heating element close to the bit, **Fig. 4**. I usually use a chip sucker to lift and position the chip. This is a hand-held vacuum device designed specifically for placing SMD components. Once I achieve good alignment of the pins, I solder a single pin to hold it in place. That gives me the flexibility to relocate the chip slightly if necessary. Before soldering the remaining pins, I closely examine all the pins to ensure good alignment. If all is well, I solder a second pin opposite the first one. That helps ensure the chip doesn't shift when I begin soldering the remaining pins. I usually use a fine gauge solder, and my current reel is 0.48mm diameter. I normally manage to avoid solder bridges, but they are easily fixed by applying flux and some of the finer gauge solder wick.



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Virtual machines

Many software packages are only available in Linux, while others run better under Linux. One of the best ways to play with Linux is to get a Raspberry Pi with the latest Pi 5 being the preferred model. However, you can also run Linux safely on your Windows PC using what's known as virtualisation. Now that's a somewhat overused and under-explained word, so let me clarify. When you start your Windows computer, the operating system takes over all the computer's resources, memory, disk drives, video cards, etc. As a result, the entire computer becomes a Windows machine. The decision on the operating system is made when the computer hardware first accesses the disk drive. One potential solution is to create what's known as a dual boot machine. In this configuration, a menu is added that lets the user choose the operating system before the system boots. However, there is another, more flexible

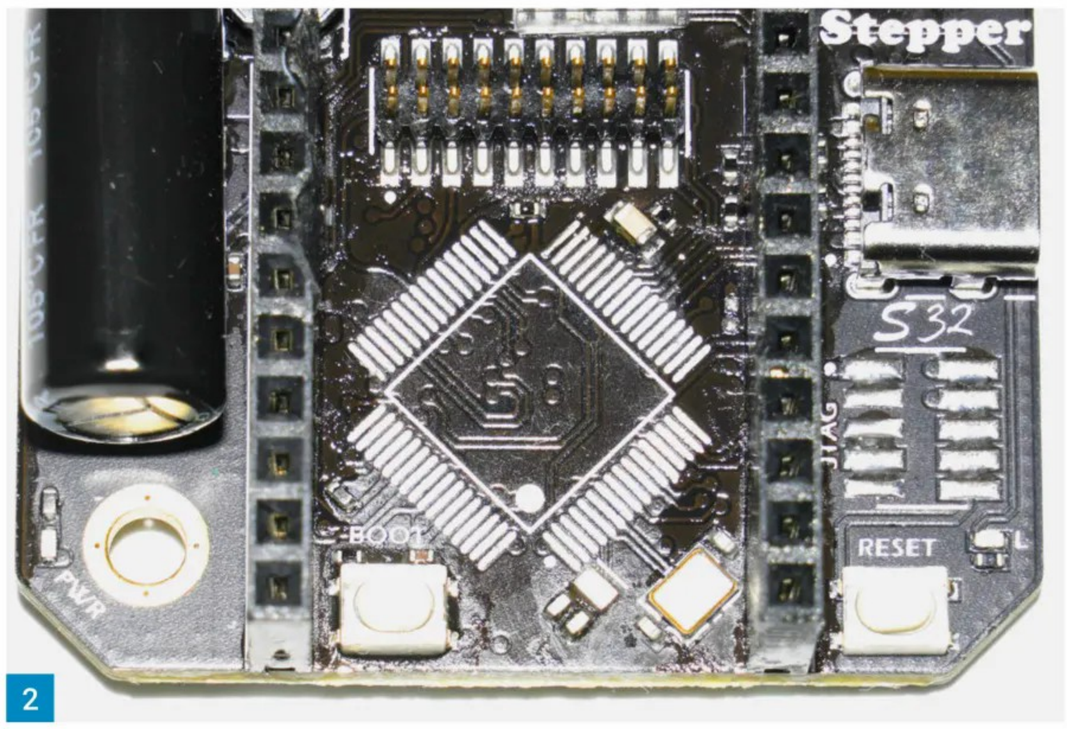

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Fig. 1: Low melting point solder applied to chip prior to removal. Fig. 2: Motor control board ready for a replacement processor.
Fig. 3: ChipQuik SMD replacement kit.
Fig. 4: Hakko FM2032 Micro soldering iron.
Fig. 5: VMware install VM wizard.

4

option, and that's to use a virtual machine. A virtual machine uses software to install a new operating system in your chosen directory. This does not affect your main PC, but running the virtualisation software will boot the new operating system in a separate window that's isolated from your Windows PC.

There are two leading virtualisation providers: VMware and Oracle VM VirtualBox. For this example, I chose VMware mainly because I'm already familiar with it, and it's always worked well for me. Both suppliers have versions that are free for non-profit use. To get the VMware software, look for VMware Workstation Player 17 on this link:

http://tinyurl.com/5ybxdw2k

Once downloaded, follow the installation instructions using the default settings. Now, you have the virtualisation software but still need to add an operating system. Assuming you want to add Linux, there are a couple of suggestions. Ubuntu is the most comprehensive and widespread distribution, but if you're new to Linux, then Linux Mint would be a better choice. Linux Mint is a lighter-weight installation with an efficient user interface that often results in a faster VM. I've shown links for both downloads here:

Linux Mint:

https://linuxmint.com/edition.php?id=311

Ubuntu:

https://ubuntu.com/download/desktop

These links will download an .ISO file, which we need to complete the installation. However, before installing, you must decide where to store the new operating system(s). You will probably need around 20GB for each operating system. If you have a choice, I recommend using a solid-state drive to speed up the boot and program launch. On my PC, I use an NVME 1TB drive for VMs (Virtual Machines) and other software that benefits from fast access.

With all the software installed/downloaded, you can install your chosen version of Linux. Here's a step-by-step guide to using VMware Workstation.

Open VMware Workstation and click Create a New Virtual Machine

In the Install Wizard click ' Installer disc image file (iso): and browse to your downloaded iso file, **Fig.5**

The installer will probably recognise the distribution and report that it will use Easy Install. If you are installing Linux Mint, the installer probably won't recognise the version, and you must choose that on the next page. I suggest you select Ubuntu as it is the closest match and simplifies installation.

Click Next

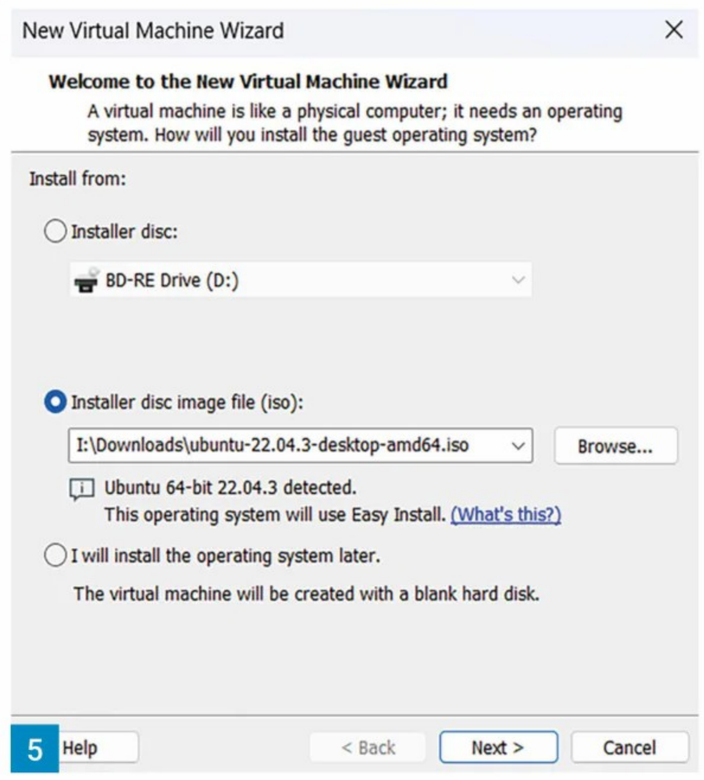
In the next panel, you will set your username and password – carefully note this!

In the next panel, you can choose a name for your machine and select the location you decided earlier

Click Next

On the next screen, leave the defaults and click Next

The final screen summarises the installation and shows how the hardware will be allocated, **Fig. 6**. You can use the hardware customisation button to change the allocation. If you have lots of installed RAM, it might be worth increasing the RAM to at least 8GB.



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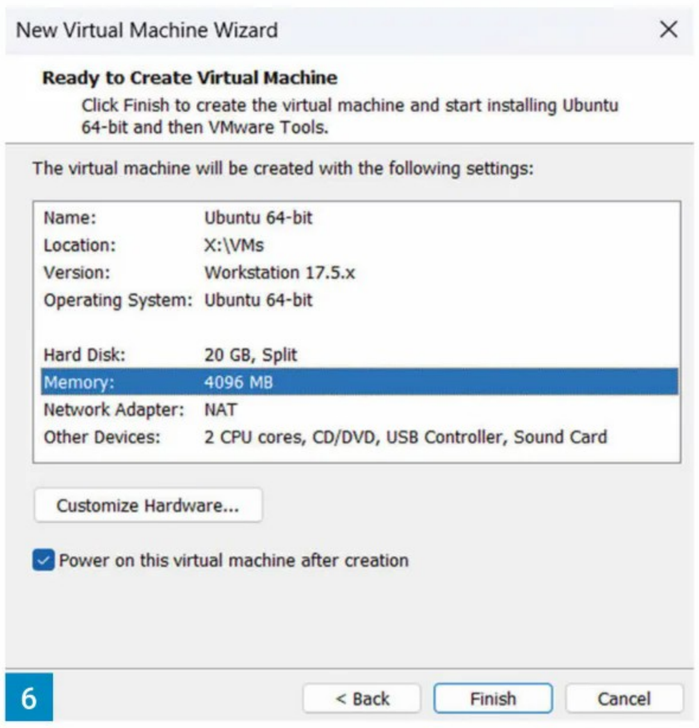
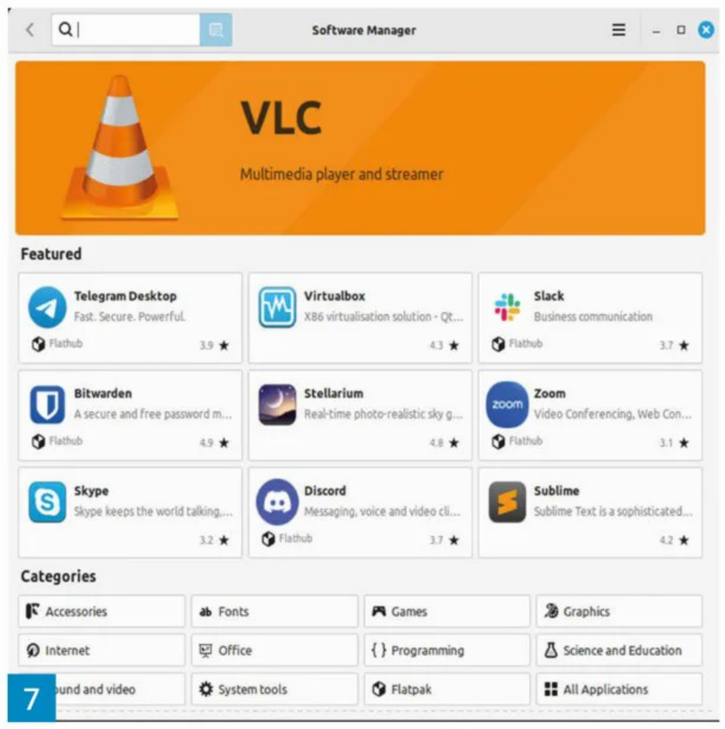
The new operating system will progress through its regular installation routine, where you choose the keyboard, location, etc. The scary part is when it asks if you want to erase the disk and install Ubuntu. Don't panic; it will just erase the folder where you've chosen to install the operating system! Once installation is complete, it will reboot and offer to install updates when it restarts. This is normal, and you should go ahead. When the updating has finished, I suggest getting familiar with Linux. The simplest way to find software is to click the Home/Find button (bottom left in Mint & Ubuntu). This will show popular Apps and display a search box you can use to locate





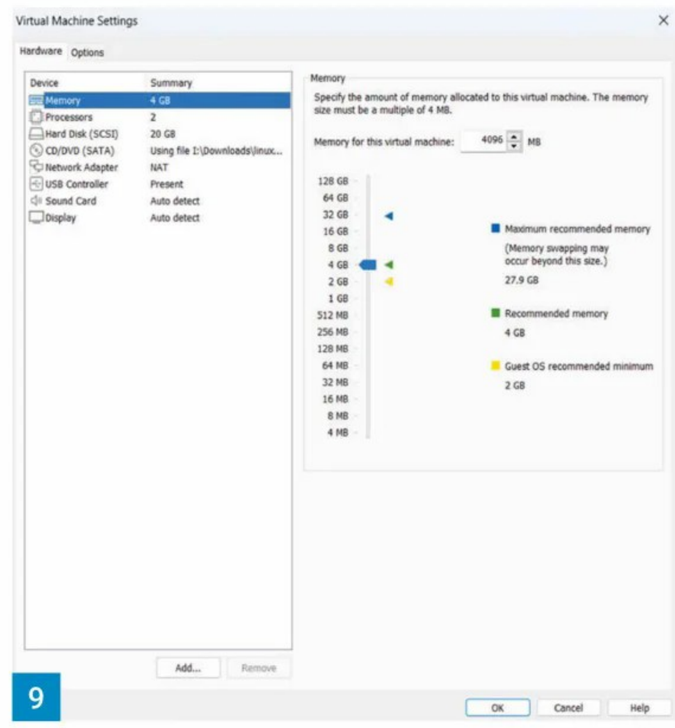


Fig. 6: VMware machine summary screen.
Fig. 7: Linux Mint Software Manager.
Fig. 8: Linux Mint running GNUradio with a Pluto 70cm transceiver. Fig. 9: Virtual machine hardware configuration panel.

other installed software. On Ubuntu, opening the Ubuntu Software App will open this useful app where you can access a huge range of Linux software. A similar function exists in Linux Mint, but it's called Software Manager, **Fig. 7**.

In **Fig. 8** I've shown a screenshot of Linux Mint on my Windows 11 main PC using VMware Player with GNUradio configured to run an ADLM Pluto development board as a 70cm transceiver. GNUradio generally runs better on Linux, so virtualisation is a great way to run Linux without getting another PC. The Linux installation is also fully isolated, so it doesn't interfere with Windows. Providing you have enough space on a hard drive, you can add multiple operating systems to your computer.

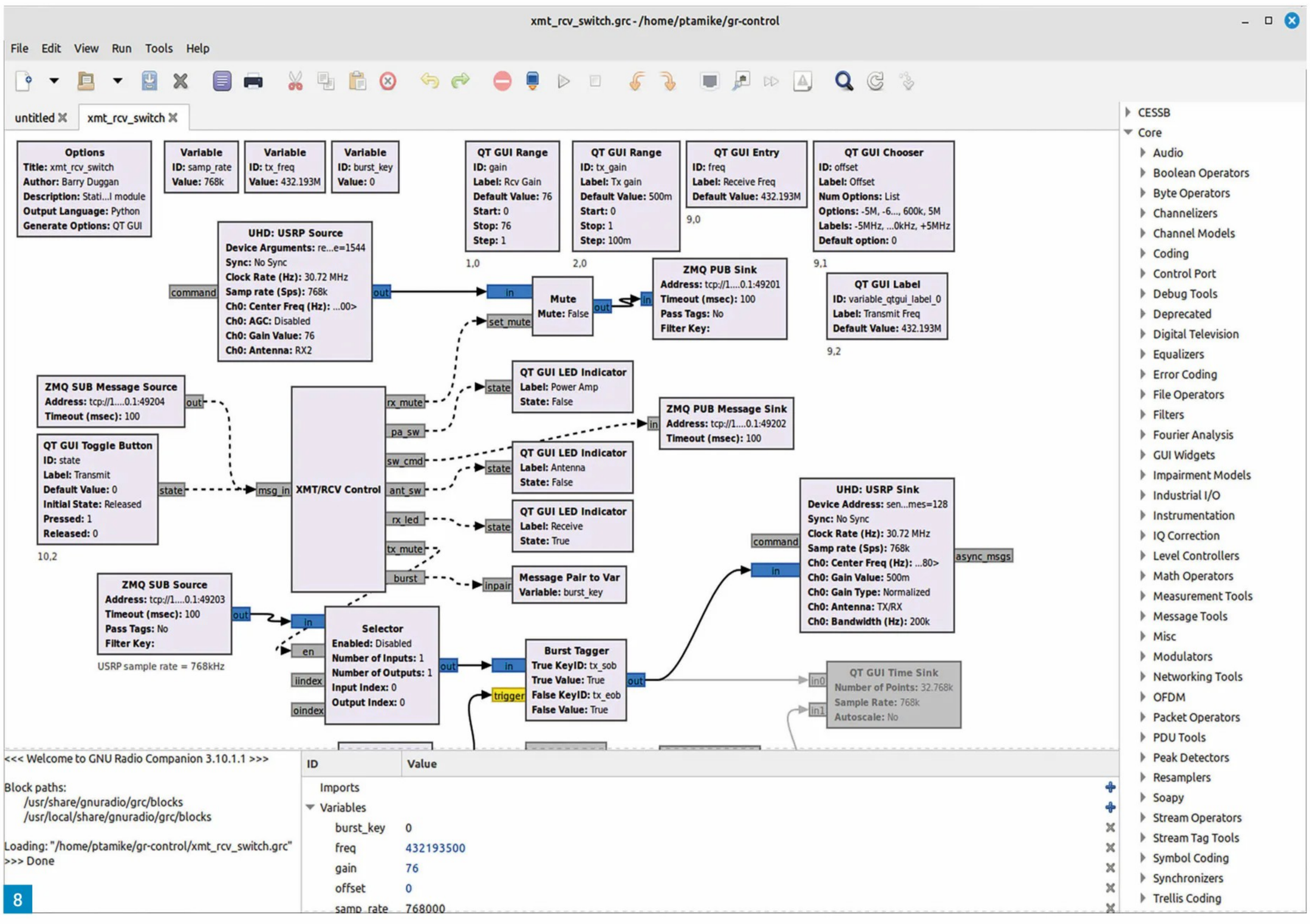
Hardware tweaks: While the default VM configuration works well for most applications, there may be times when you need to change the configuration, perhaps to add more processors, memory or ports. This can be done by editing the virtual machine settings in VMware Workstation. Here's how to do that:

Select but don't start the VM in the Workstation

Click the Edit virtual machine settings icon

This will open the Virtual Machine settings panel, **Fig. 9**.

In the settings panel you can edit the currently available hardware or use the Add button to make other items available. **PW**



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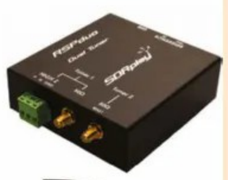

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Daimon Tilley G4USI
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1

Simple FM Receiver kit and making CW keys

Daimon Tilley G4USI describes a great first step into building an electronic circuit.

My local radio club in Taunton recently decided to hold a Build-A-Thon, with the aim of encouraging members to have a go at building from kits. While it was mainly aimed at those who had never built an electronic circuit before, a number of people who had not built for many years also participated.

In order to provide some variety and yet simplicity, the Club decided to order several different kits from Kanga Products here in the UK at the more simple end of their range, including a CW keyer/training oscillator, an FM radio for the Broadcast bands, a dummy load and an SWR resistive bridge. Members were able to choose the kit of their choice and had a couple of hours to build them on a club night. I decided to have a bash at the FM stereo, but in the end, I helped a new young member, who had never built before, to build one, and kept mine for later.

While assisting him with basic construction techniques it was a pleasure to see him improve in a short space of time, and have the benefit of instant gratification when we applied power for the first time. It took him about 90 minutes or so to build and he was following Kanga's usual excellent instructions.

Having brought mine home with me to build, and while thinking about what to write for this month's *On a Budget* I thought I would bring the two things together. The radio is good value at just £11.85 and makes an excellent first kit to build confidence. As long as the instructions are followed carefully and the solder joints are OK, it is almost guaranteed to work, and by describing it here, I hope to encourage readers with little or no building experience to have a go.

As is typical with kits from Kanga it comes well packaged and with good instructions, **Fig. 1**. The components are individually packaged by section to assist the constructor, **Fig. 2,** and you need only open the packaging stage by stage as you build. This helps with component identification and prevents component loss. Helpfully for the novice, the main body of the radio, the SMD IC (RDA5807FP) is pre-soldered onto the board, which is shown in **Fig. 3**. It took me about 20 minutes to fully assemble the board, and this consists of installing the following components:

- 3 x resistors
- 3 x moulded inductors
- a crystal
- 4 x disc capacitors
- 2 x electrolytic capacitors
- 4 x header pins
- 5 x push switches
- 1 x headphone socket
- 1 x AAA battery holder (batteries not included.)

The only two issues for the novice to be aware of (apart from ensuring the right components are in the right place) is to ensure the electrolytic capacitors are installed the correct way round, and to take care installing the crystal, which has fine leads close together. Again, the instructions are very clear in this regard.

Once assembled, one must then place four shorting connectors on the four sets of header pins. This is to select either the use of headphones or to use the radio with an external amplifier. I chose headphones.

The radio is powered by a short press of the Power button at which point you should hear some hiss. Then press, momentarily, either the Tune – or Tune + button. This initiates a search of the band. Do not be concerned at this stage – when you press the button, the background noise will disappear for a second or two while the radio scans for the next station. The photo, **Fig. 4** shows my finalised receiver.

In my case I was able to receive many stations without connecting an antenna, but if you cannot hear much, then you can add about 30cm of wire to the antenna connection on the board.

That is all there is to it! For a few minutes of your time you get a nice quality FM radio that can fit in your pocket or be used with an external audio amplifier. It really is a great way to 'dip your toe' in construction methods. With a little care there is a very high likelihood it will work first time, you will gain confidence in construction, and, hopefully, it will encourage you to try more simple kits. Good luck!

A few simple CW (Morse) key ideas

I quite enjoying making the odd CW key, of various complexities, and thought as this month has a construction theme, I would share a few ideas for very simple keys.

I enjoy travelling portable, and although my key of choice is an iambic paddle, I do, through bitter experience, always carry at least one simple spare key. Today, I intend to share three very simple straight CW keys of differing designs and size, before sharing two simple portable iambic paddles.

They say a picture paints a thousand words so, for the straight keys there will be no instructions, but construction should be obvious from the photographs. In each of the straight keys, different 'momentary' switches are used. These are switches which only make a contact for as long as they are pressed, lending themselves nicely to CW keying, as well as being incredibly cheap.

Figs 5 and **6** show a simple key switch mounted on a 3.5mm audio jack. The keen eyed among you will notice that the audio jack is stereo and

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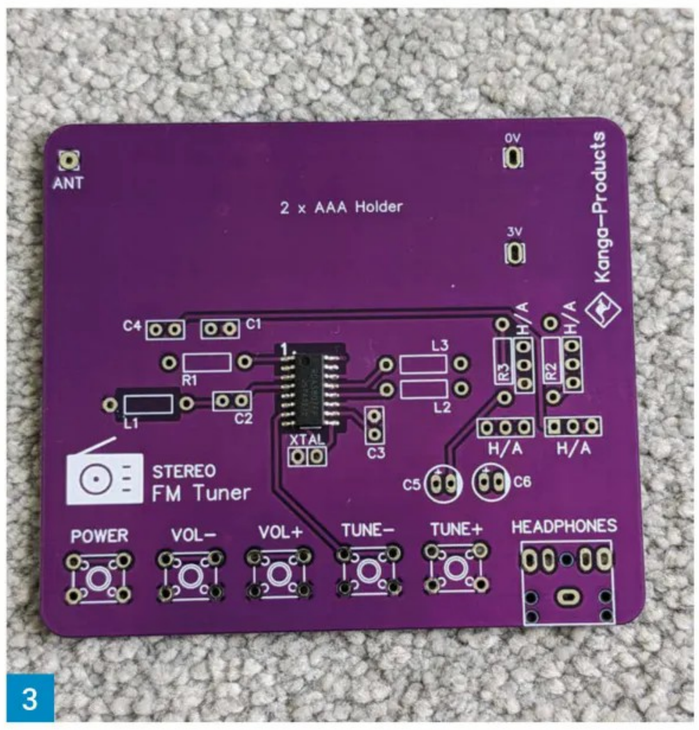

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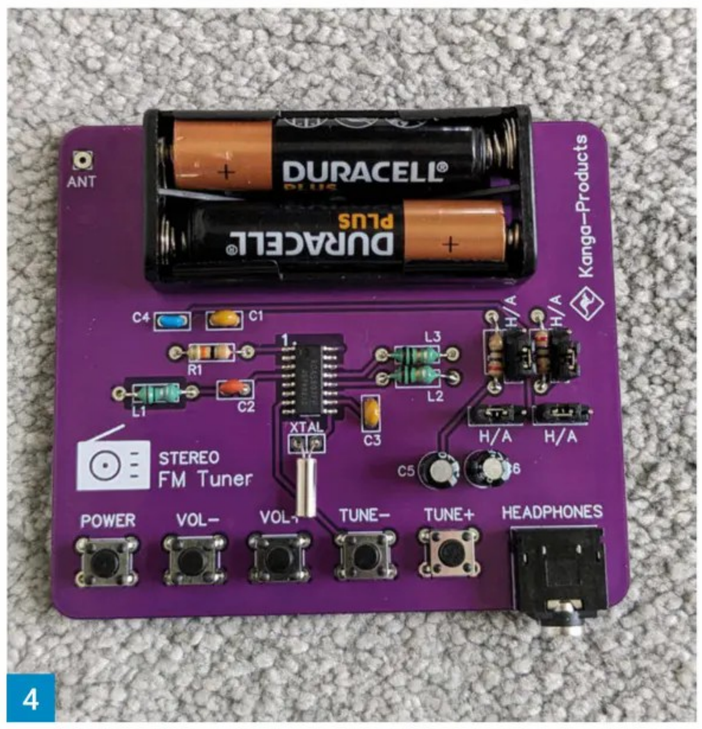

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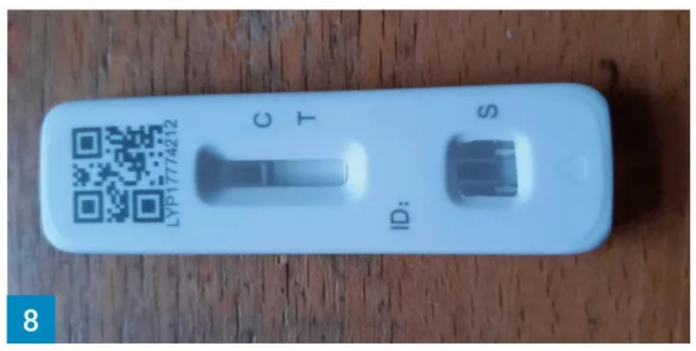

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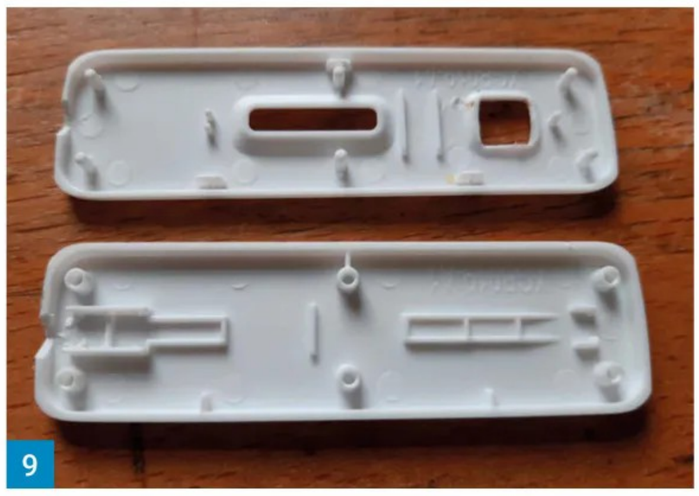

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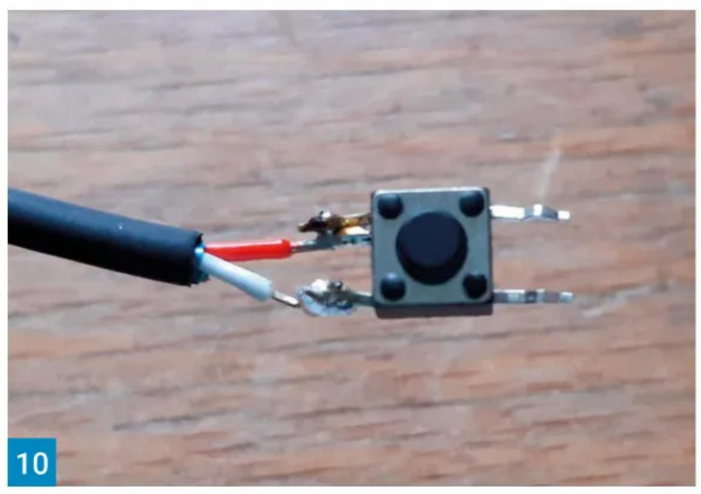

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Fig. 1: The Kanga FM receiver kit. Fig. 2: The Kanga receiver component package. Fig. 3: The PCB, with SMD component ready mounted. Fig. 4: The completed receiver. Fig. 5: A jack-plug key under construction. Fig. 6: The completed jack-plug key. Fig. 7: A pen key. Fig. 8: A used (negative!) COVID test. Fig. 9: COVID test disassembled. Fig. 10: Wiring the COVID key. Fig. 11: Fixing in place.

therefore the switch is connected between the tip and the sleeve connections of the plug, snipping off the Ring connection on the plug with side cutting pliers. Through hard-won experience, I now always use stereo jacks, even on straight keys that only need two connections. You may spot in Fig. 6 that I merely cut off the cable strain relief sleeve from the plug cover and found this to be rigid enough, but you could fill the plug sleeve with glue to provide support for the switch. This is a great 'emergency' key, or for an ultra-compact portable setup and I find it works well just plugged straight into my QCX Mini and other portable transceivers.

Fig. 7 shows a similar switch mounted into a slightly modified pen. This was a pen I picked up from a local used radio dealer, so it was a particularly prime candidate for a key! In this case I used an audio stereo patch lead from which I removed the plug at one end, soldering tip and sleeve connections to the switch. In this case I was able to use the switch nut to secure it in position where the pen operating lever was. I hold this pen in my palm and operate the button with my thumb. Again, it works very well.

Some time ago now (how time flies) may of us were COVID testing, and I had an idea to use an old COVID test as a key. **Figs 8** through **11** show the process of making this key. I carefully prised the test apart, removed the innards, and then glued in a PCB-mount momentary switch, which I had soldered to an old stereo audio lead. I had to use a craft knife to enlarge the square hole to make the switch fit and glued it into place. **Fig. 12** shows my first CW QSO with this key and my vintage TenTec Century 22.

So, it is pretty easy to make a straight CW key for portable use, but what about iambic paddles? Well, I have made a lot of these, including many 3D printed ones, but will just share two of them here. **Figs 13** to **16** show my 'Plumber's Paddle'. This is nothing more than a length of 21.5mm overflow pipe and two copper 'saddle' pipe clips, bent to shape. A little more explanation is required here. I drilled and riveted one end of the two saddle clips to the pipe, trapping a solder tag inside in the process, such that when they were bent over 180° they would sit as shown in the photographs. These solder tags were soldered together, essentially electrically connecting the two clips as one and were connected to the ground wire of three core cable. Two brass nuts and bolts were inserted into holes drilled in the pipe in such

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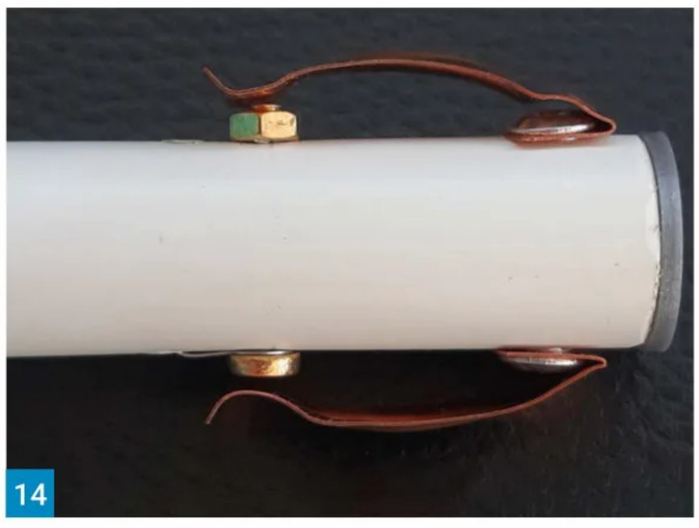

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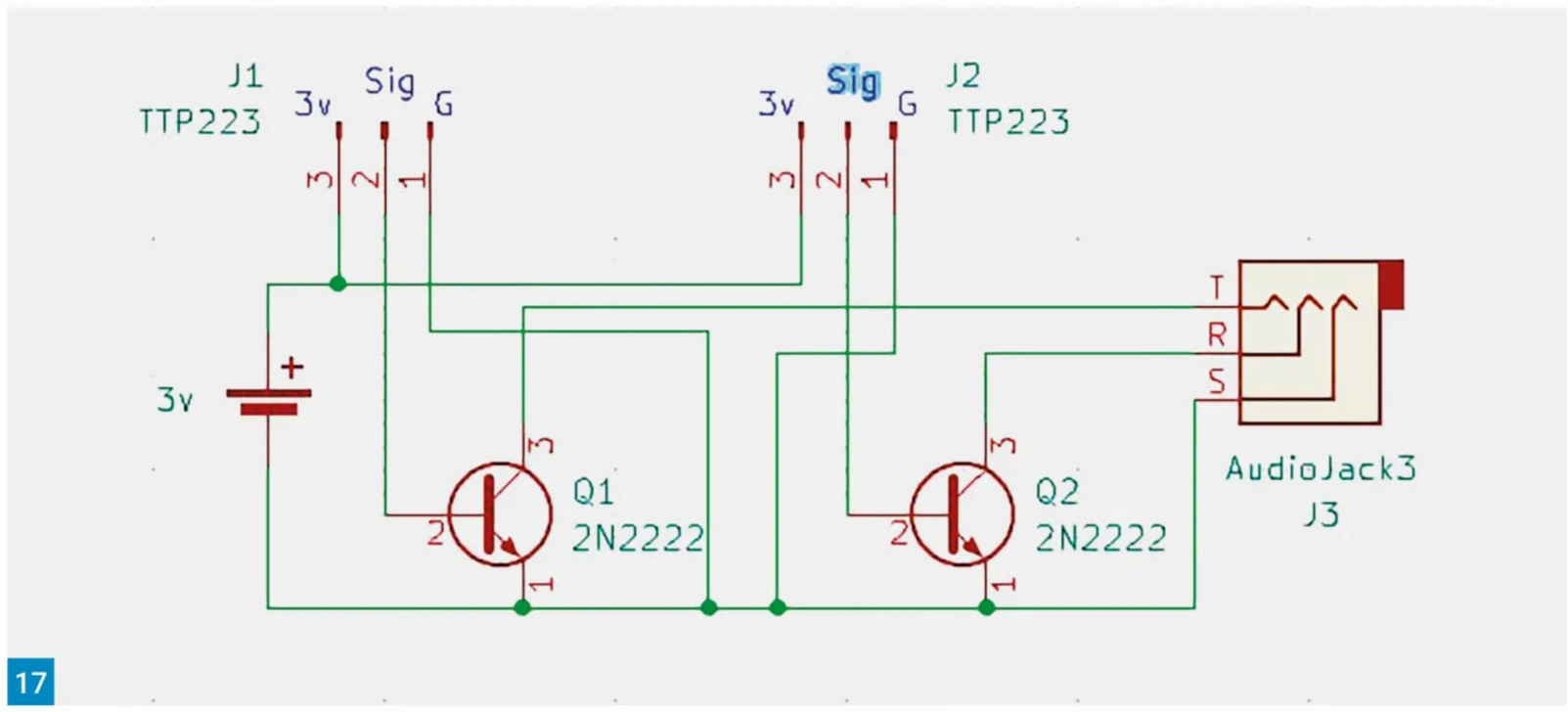
Fig. 12: Making the first QSO with the COVID key. Fig. 13: The plumber's paddle. Fig. 14: Business end of the plumber's paddle. Fig. 15: Close-up of plumber's paddle contacts. Fig. 16: The audio jack connector for the plumber's paddle. Fig. 17: Circuit for the capacitance paddle. Fig. 18: TIP223 touch sensor. Fig. 19: Putting the capacitive key together. Fig. 20: Adding the battery and Veroboard circuit. Fig. 21: The completed capacitive key.

a position as to make the contacts that the two pipe clips would contact in use. Each of these nuts and bolts were connected to solder tags (seen in Fig. 15) one of which was connected to the tip and one to the ring of a 3.5 mm audio jack at the far end of the pipe. In my case (Fig. 16) I 3D printed an end plug to hold the jack, but you could use the proper plumbing blanking end if you wish. In use it is simply a matter of bending each pipe clip to get the required distance for the contact. The clips are quite flexible and with a little care a close gap can be obtained by careful bending. There is sufficient 'spring' in the clips to allow them to return to their starting position after each contact closure. Providing you are using a radio with inbuilt keying software, or an external keyer, this makes a really nice reliable key for pennies and you can comfortably hold the pipe in one hand while keying with the other.

My final offering is a little more sophisticated! A capacitance touch paddle. This is simple and very cheap to make. I cannot take credit for the design, which I found on the internet some years ago, but I am rather pleased with it, and writing this article meant I recovered it from a drawer and was using it yesterday. It sits nicely in one hand while keying with the other, and it was a nice change to operate from the shack while reclining in my chair and keying, rather than sat upright keying at the desk.

The circuit is shown in **Fig. 17**. Any NPN transistors will work. J1 and J2 are TTP223 capacitive touch sensors and are available at Amazon and elsewhere very cheaply. For example, I have just found a deal for 20 for £5.99 – enough for ten keys! **Fig. 18** shows a single such sensor. They do vary but typically the have three connections, +3V, Ground, and a signal pin which is used to switch on a transistor. There are a variety of these sensors for sale now, and some have options for latching or non-latching outputs, as well as the level of signal provided on the signal pin. We want a non-latching output, but careful examination of the specification of sensor you choose should make it clear what you need to do with your sensor to make it work. For example, sometimes there is a need to make a solder bridge to create the logic you require.

Essentially, touching one of the paddles causes a signal on the signal pin, this activates our



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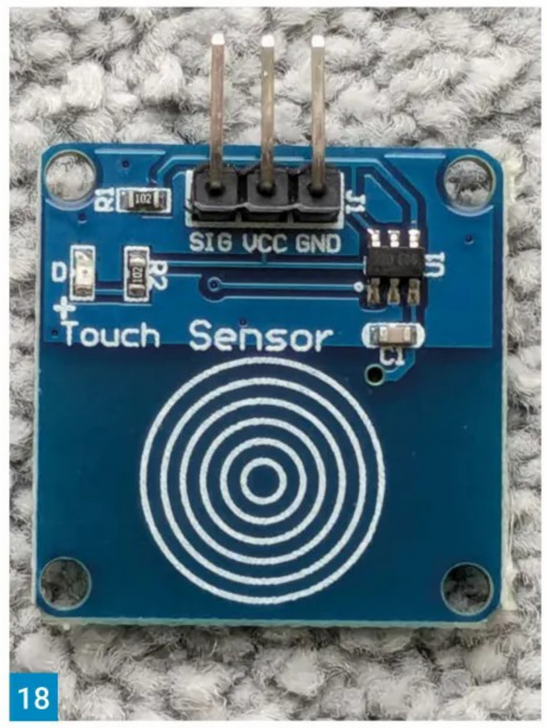

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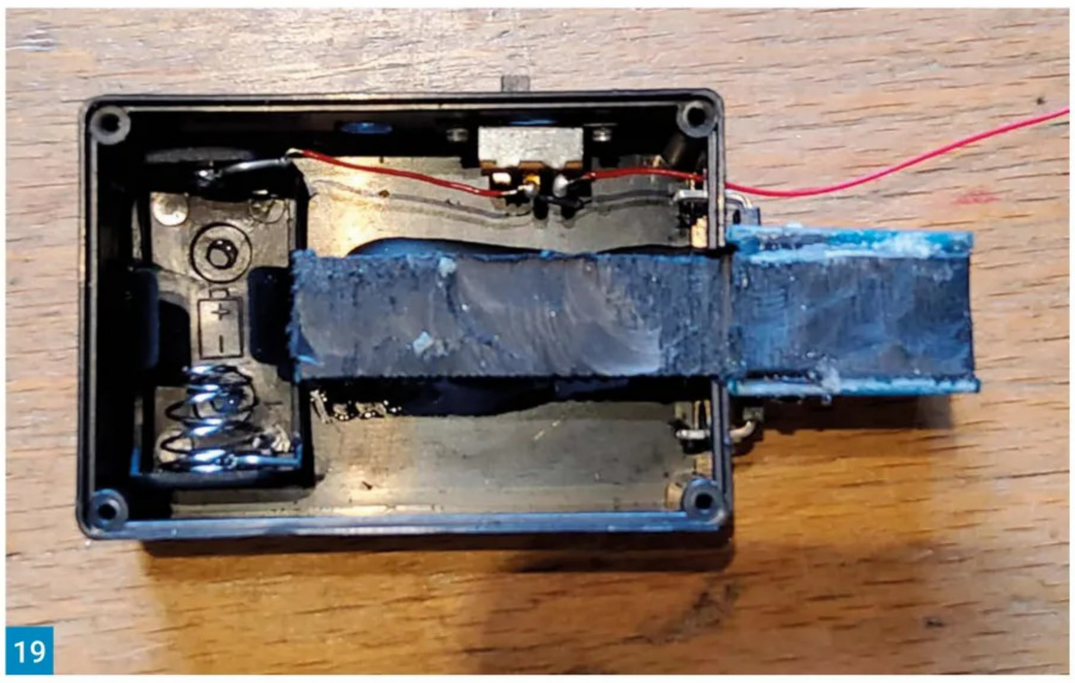
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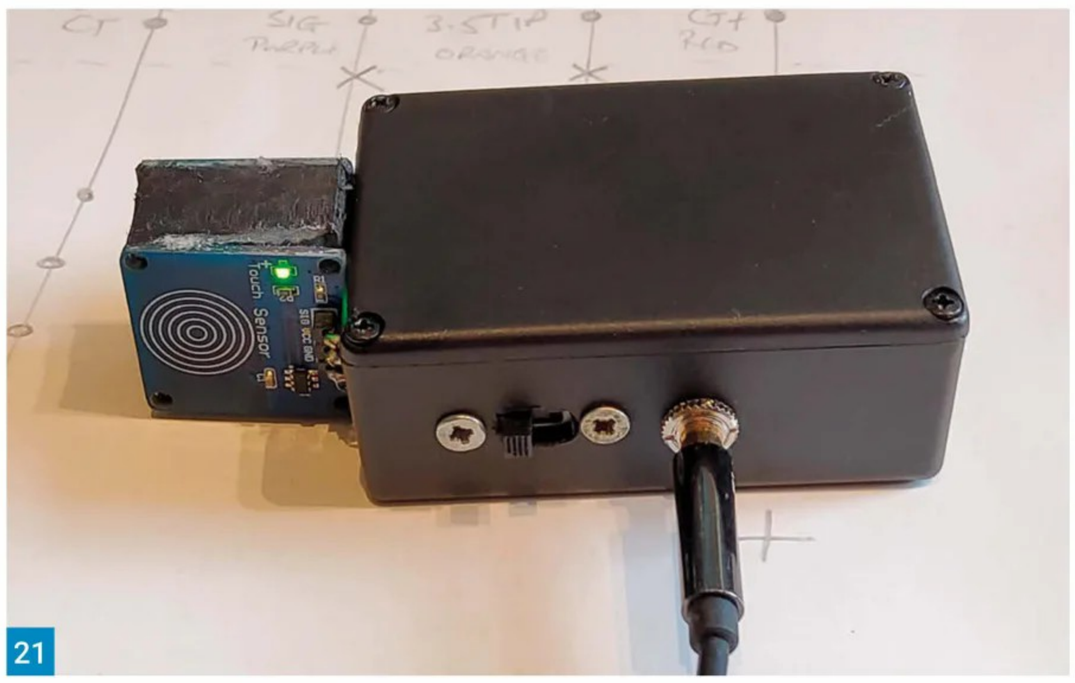

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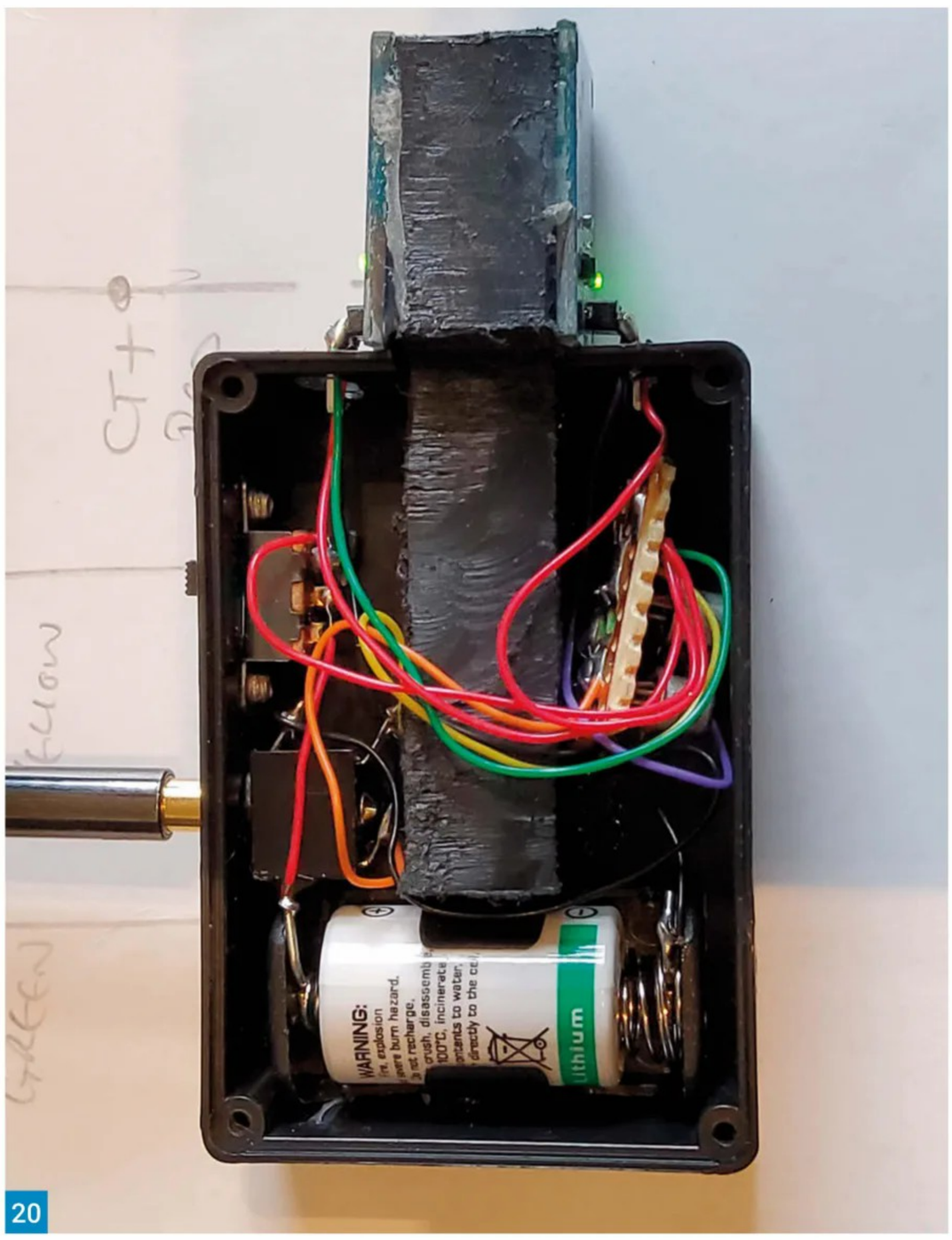

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transistor, providing a path to ground for either the 'Dit' or 'Dah' transistor. Note that the normal wiring convention to our stereo audio jack is as follows: Tip for Dit; Ring for Dah; and Sleeve for Ground.

I created my circuit on Veroboard, but 'ugly' construction would work just as well. I chose to use a 3V Lithium battery of the type used in alarm sensors, and a small slide switch, to preserve battery life. Mine is three years old now and still on the original battery!

Construction is mostly a case of providing a solid mechanical basis for which to fix things. Mine is built in a plastic project box about 60 x 40 x 25mm. I cut a piece of plastic 15mm thick as the base for the TTP223's. I cut a hole in the end of the case and epoxied this in place, leaving space at the end for the battery case. Once that was set, holes were cut for the 3.5mm audio jack and for the slide switch. Holes were also cut to allow the header pins from the TP223 to pass to the inside and these were glued into place using epoxy resin. **Figs 19** to **21** detail the construction technique.

The finished key works very well indeed, although I have noticed when portable that much more that 5 watts can cause keying issues and this is clearly RF affecting the circuit, despite a shielded cable. At home it is not an issue as the antennas are removed from the operating position. If you wanted to make this and plan to use it /P with more than a few watts, it might be worth building it in a metal box, but you may need to modify construction techniques to do so, but it may be that the exposed parts of the TP223 are the issue. The square box is small and sits reasonably well in one hand while keying with the other, but you may choose to add Velcro or magnets to mount it in your operating position, or, as I may do, perhaps enclose it in a round object, maybe some more 21.5mm overflow pipe perhaps?

Well, that is another month's *On a Budget* at a conclusion. I hope you found some useful inspiration, and perhaps the motivation to have a go yourself. Certainly the projects presented are achievable on a small budget. Do let the Editor know if you decide to try one of these items and how you got on. **PW**

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Clipperton and more

Steve Telenius-Lowe PJ4DX/G4JVG reports plenty of success among his reporters in working the Clipperton Island DXpedition.

As of the deadline date of this column, 11 February, we have not yet had official notification from Ofcom of precisely when they are implementing changes to UK amateur radio licences. However, the document *Updating the Amateur Radio licensing framework: overview of key changes*, published on Ofcom's website, states that the first phase is to take place during February, so it should already have been implemented by the time this issue of *PW* is read.

For HF operators, unless Ofcom made any last-minute changes before implementation, the main points of Phase 1 include the use of Regional Secondary Locators (RSLs) becoming optional (other than for Intermediate licensees with 2*0 or 2*1 callsigns); Foundation and Full licensees in England may add the RSL 'E' to their callsigns (e.g. GE4JVG), although this will not be mandatory; any suffix may be added to the callsign *"so long as the station remains identifiable"*; and maximum permitted power levels are being increased to 25W PEP for Foundation licensees, 100W PEP for Intermediate licensees and 1000W PEP for Full licensees (although with certain frequency restrictions).

After just over 135,000 QSOs, PJ4DX is now QRT: the antennas came down, **Fig. 1**, in February. **Eva PJ4EVA** and I are returning to live in the UK in late March.


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The month on the air

The World Wide Award, commemorating the 150th anniversary of the birth year of **Guglielmo Marconi** (see last month's *HF Highlights*) continued until the end of January (although Marconi was actually born in April, 1874). Numerous special event stations were on the air throughout the month attracting the attention of almost 111,000 participants who together made an astonishing 1.73 *million* QSOs with the special event stations! Awards were available for SSB, CW, Data and Mixed mode contacts with these stations, **Fig. 2**. Take a look at the QRZ.com page of any of the participating stations for more impressive statistics, e.g.:
www.qrz.com/db/GB2WWA

DXpeditioner extraordinaire (see his QRZ.com page!) **Janusz SP9FIH** has been very active as PJ5/SP9FIH from St Eustatius from 11 January onwards. He is expected to be there until 3 April.

Another well-known world traveller, **Elvira IV3FSG**, **Fig. 3**, has been on her travels again. Previously heard as 9U5R from Burundi in February-March last year and then 6W/IV3FSG from Senegal in September-October, Elvira was active as ZD7Z from St Helena from 16 January to 3 February, making over 47,000 contacts.

Vlad OK2WX is active from Socotra Island, Yemen, as 7O2WX as this column is being compiled. He started operations on 25 January and is scheduled to continue until 12 February, with a focus on 160, 80 and 40m.

TX5S Clipperton Island

The TX5S DXpedition to Clipperton Island, **Fig. 4**, was active from 20 to 28 January. High seas and bad weather meant the operation started later and ended earlier than originally planned, but the group still made over 113,000 QSOs. This was an easy shot from Bonaire, signals were good, the operators were good, and I worked them on all ten bands from 10 to 160m and on the three main modes of SSB, CW and FT8, a total of no fewer than 22 band-mode 'slots'.

One of *HF Highlights'* regular contributors, **Reg Williams G0OOF**, sent in a report of his efforts working TX5S and I thought it worth quoting in detail here. *"Their website explained their proposed operating activity with the bonus of them using* Club Log *Live Stream. Also they were able to use a satellite link to upload their logs. FT8 digital mode would be strictly WSJT-X, F/H mode... The bands were bedlam on SSB with the usual culprits at fault, ignoring the etiquette of ham radio, especially with split frequency operation. Then there's the barrage of European 'policemen'.*

"I decided to concentrate on working FT8. Three bands were worked, 7, 10 and 14MHz. Times were between 0516 and 0850UTC. On any of these bands I did not have to wait long to be in the queue and worked them first time around. Lots of stations appeared to be calling blindly and not being worked by TX5S...

"I understood from the latest web bulletins that some stalwarts from the DXpedition would stay on the island for a few hours operating on the very last morning before their departure on 28 January. They appeared to only be working SSB and on 7MHz. I listened from about 0650UTC. As usual it was very busy with the operator working split frequency. His signal was barely audible but I continued listening. Two hours later mainland Europe signals started to die off, I guess because the propagation was changing. The operator [**Nodir EY8MM** – *Ed*]*, who was stronger in signal strength by this time, announced a single frequency to call on. Within a couple of minutes I was heard and the exchange of information was complete and later confirmed in the log. I think this is the first time I have worked a major DXpedition on SSB so I was very pleased. A first-class operation from TX5S."*

Silent keys

Some sad news: well-known contester and DXpeditioner **Bob Allphin K4UEE** became a Silent Key in February. Over the last 20 years Bob was on many expeditions to some of the world's rarest DXCC entities, including Navassa Island (K1N in 2015).

Slavko Celarc S57DX also became a Silent Key in February. Anyone who has been active on HF recently, particularly on 14MHz SSB, can't have failed to have worked, or at least heard, the big signal from Slavko in Slovenia. One of the most active amateurs anywhere, Slavko made an astonishing 984,000 QSOs. He came from a particularly 'radio active' family: his brother **Janez S51DX** passed 700,000 contacts in January and his wife **Pavla S56DX** and another brother, **Bojan S53YT**, are also licensed.

What to look for in April

There are few DXpeditions planned for April, although members of the EI DX Group will be on the air as 7P8EI from Lesotho from 19 to 30 March.

Fig. 1: Bert PJ4KY (left) and Steve PJ4DX taking down the Hexbeam. Fig. 2: The World Wide Award commemorated the 150th anniversary of the birth year of Marconi. Fig. 3: Elvira IV3FSG, seen here operating as 9U5R last year (photo: qrz.com/db/9U5R). Fig. 4: Clipperton Island (photo: National Oceanic and Atmospheric Administration). Fig. 5: Look for the Belgian 5P5LI operation from Fanø at the end of April. Fig. 6: Etienne OS8D with his awards for activating 250 Belgian castles in one year.

Joris Vermost ON7VM wrote to say he will be part of a group of Belgian operators active as 5P5LI, **Fig. 5**, from the Danish island of Lolland between 29 April and 6 May, using SSB, CW and digital modes. This is the same group that operated from Bornholm in 2022 and Fanø in 2023 (see *HF Highlights*, *PW*, April 2023).

Readers' news

As well as sending his report about working TX5S, Reg G0OOF commented that *"HF conditions seemed fairly good so I decided to continue my quest to collect world grids and USA counties. Recently I achieved the POTA* [Parks On The Air – *Ed*] *200 parks award worked as a hunter. This is a very small number compared to the hundreds of parks that can be worked around the world. This can be a real challenge trying to work parks outside Europe because of distance and park activators generally using QRP power and limitations of practicalities on their antennas."*

There were two contributions from **Etienne Vrebos OS8D** this month. First, he sent in the photo shown in **Fig. 6**, saying *"it actually snows very seriously here!"* The awards he is holding are for activating 250 Belgian castles in one year, the first such award, and for being 'Activator King 2023', activating the most castles in the calendar year: *"it starts all over again every year,"* he explained. Etienne wrote about his motivation and why he enjoys this aspect of the hobby so much: *"Tremendous work and research for being at the right place, within a radius of 1km of each castle, mostly very early activation from 0600UTC to avoid traffic. Took of course a lot of kilometres to drive too, with several times a recce trip with my motorcycle to find out where I could stay with the car... In grand total nearly 20,000 people reached with the best results being ZL and CO, confirmed by QSL, always with 70W, a SOTAbeams dipole and the Yaesu FT-710. All QSOs have been done on SSB. Most chasers: ON, DL, G, F and I of course, but every single European country in the log with strong signals from EA8 every morning.*

"Happy too that I've found my 'road' in this very large hobby that is ham radio operation. It's nice from home but it's even nicer from outside, middle of nowhere, and being retired is of course a huge advantage: 74 years old is not too old to start this part of the hobby. Plenty of other sections as Fauna/Flora, SOTA, BOTA in UK and so on are possible too and give plenty of satisfaction to the activator and to the chasers. A great advantage too for the starting, younger operator: you don't need huge equipment, you don't need a large investment and you don't need a power amplifier. I'm a very individual person, my new hobby suits me 100%, but those activations can be done by clubs, friends and so on." More details on Etienne's favourite aspect of the hobby are at: **www.belgiancastlesfortresses.be**

Later in the month Etienne also gave an update on his activity from his home station (see 'Band highlights' below), saying: *"I bought a SkyLoop (40m long) and hung it up in trees at 5m height. It seems the best antenna I ever got for reception. It's very strange, no QRM at all in comparison with the end-fed antenna... The transmission is OK too with an SWR of 2:1 or lower over the entire band of 40m. Eventually the SkyLoop could be used for the other bands too, but I'm sure the Hexbeam performs better."*

During January **Kev Hewitt ZB2GI** made more than 250 QSOs on 28MHz FT8 from his home station, running less than 20W from an Icom IC-7300 to a 5m wire connected via a 9:1 balun. These contacts were mostly with North America, as shown in **Fig. 7**. Kev also operated maritime mobile as ZB2GI/MM from the Bay of Gibraltar.

Jim Bovill PA3FDR said *"The new year started well with generally improved propagation, with most days good openings to the Far East in the mornings, with as usual the majority of contacts being with Japan, and late afternoon and early evenings to the west coast of North America. I managed to log three new countries, Namibia (V51CO), Haiti (HH220OY) and Laos (XW4KV). I had been chasing XW4KV for several days without success before finally making contact and a complete QSO. Persistence pays! Other QSOs worth mentioning were with two small British islands, the Isle of Man (MD0RTZ) and Guernsey (GU0SUP) and, in the Caribbean, only my second*

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Fig. 7: 10m FT8 QSOs made by ZB2GI during January using low power and a simple antenna.
Fig. 8: Paul PJ4SON is mainly active on 28MHz SSB.

QSO with the island of Aruba (P40AA).”

Mainly an SSB operator, **Owen Williams G0PHY** gave FT8 a go this month. *“I had a short session on 14MHz on FT8 one morning that resulted in a few contacts with European stations. However, when I looked at the PSK Reporter map I was astonished at how far 20 watts and a dipole could go. There were reports from several East Coast USA stations and one from Louisiana and also from Belize. The real surprises were spots from JA and VK4.”* However, Owen said that, back on SSB, *“most of the activity in the later part of January was centred on gaining points from the WWA stations; mostly Europeans. Conditions on 28MHz have been good recently with stations in California, Wyoming, Arizona and Montana being audible at good strength. On 14MHz I had a QSO with AX3EY on Australia Day.”*

Tim Kirby GW4VXE reports that his highlight of the month was working the TX5S expedition to Clipperton on five bands. Tim would have liked to have worked them on CW, but that didn’t work out, but he was very pleased to complete FT8 QSOs with them on 7, 10, 14, 18 and 24MHz. Tim writes, *“Perhaps the most memorable QSO was on 7MHz, I thought I might as well start calling them while the PA was warming up (it takes around three minutes), so I started calling them with the drive set on the FTdx10 to around 20W. To my surprise, they came back first call and the QSO was completed before the PA had completed warming up”*. With a little help from **Allan GM4ZUK**, Tim has set up DXLog with MMVARI so as to be able to give a few points away in RTTY contests. Tim writes, *“Twenty-odd years ago, I loved RTTY contesting but somehow I don’t feel quite the same draw now”*. Nevertheless, during the recent BARTG Sprint contest, he worked TG9ADQ on both 10 and 15m RTTY – Guatemala turned out to be a ‘new one’ from Wales. Tim noticed that the morning long-path conditions to VK/ZL were very good in the first week of February: one morning VK3DBD was coming through on 20m with a huge echo, signals arriving by both short and long paths! Another morning, Tim worked ZL4YY with a lovely signal on 15m CW.

28MHz beacons

Neil Clarke G0CAS reports on the 28MHz beacons logged during the month of January. The number of European beacons heard was down, possibly due to the lack of Sporadic E openings during the short winter season that takes place every year around the Christmas/New Year period. From the Middle East, 5B4CY 28219 and YM7TEN 28225 were logged on 18 and 15 days respectively. Looking towards Australia and New Zealand, VK8VF 28268 was heard on seven days and ZL3TEN 28228 on 14. In South America, LU2DT on 28193 was heard on 28 days. From the USA all ten call areas were heard on numerous days. The W7 call area is by far the hardest area to hear: WG7I 28231 in Washington state is probably the easiest in the W7 area but, saying that, it was only logged on five days throughout the month. Further north, in Canada, VA3KAR 28168 and VE3TEN 28175 were both heard on 30 days while VA3XCD 28170 and VE1VDM 28174 were logged on 29 days.

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Band highlights

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

Reg G0OOF (MS): 7MHz SSB: TX5S. **7MHz, 10MHz and 14MHz FT8:** TX5S. **18MHz FT8:** KG6JDX, VK3JMA, VR2ZUZ. **21MHz FT8:** HL3GOB. JG6CDH. **24MHz FT8:** JE6DOI, KP4ZZ, ZD7CTO. **28MHz FT4:** V31MA, VP8WA.

Kev ZB2GI (MS): 5MHz FT8: EA9ACR. **14MHz SSB:** EG8WWA. **14MHz FT8:** TX5S. **18MHz FT8:** TX5S. **24MHz SSB:** N0W. **28MHz SSB:** 8P9AK/P, AA7V, CE5DSQ, K6YRA, KP2B, LU3DDH, PJ4SON (**Fig. 8**), PY1NS, TZ4AM, V31XX, VA3CD, WP4JCF, ZP5JJS, ZS1WY. **28MHz FM:** AB7LW, HI5MAH, YY5RVC. **28MHz FT8:** AC7P, CO2AV, K6RO, PP5RG, VA7KO.

And as **ZB2GI/MM: 28MHz SSB:** M7SKY.

Jim PA3FDR (MS): 7MHz FT8: MD0RTZ. **10MHz FT8:** GU0SUP. **14MHz FT4:** WE9V. **14MHz FT8:** AI6US, JH5FXP, N9W, RZ9UO, ZS5HR. **18MHz FT4:** KP4JRS, NS9I. **18MHz FT8:** DS5WQR, EK6KB, JA1QWT, JF3IPR, K7PTC, N6PE, NP4TX, UA0LOQ, VE6WQ, ZS6HON. **21MHz FT4:** BA3RA, BY8DX, CN8PA, PY2ZZ, W7CT. **21MHz FT8:** BG0DXC, BY9NX, DS4CSD, HH220Y, JA8JC, JK1IHE, PY2EEG, R0ACR, UN9L, V51CO, VE7ON, XW4KV, ZL1BQD. **24MHz FT4:** KP4JRS, NS9I, ZS4JAN. **24MHz FT8:** 8A0RARI, A71UN/P, AD6D, BH4SCF, BY1RX, DS4WI, JA4YT, JA8CVH, RA0QD, UN7PME, VE3DZ. **28MHz FT4:** KZ9DX, OD5KU, P40AA. **28MHz FT8:** 9K2YD, N0TB, UE81M.

Etienne OS8D (HB): 7MHz SSB: V31XX. **14MHz SSB:** 8A0RARI, EP4IRN, UP7WWA. **18MHz SSB:** JW5E. **21MHz SSB:** XW4KV. **24MHz SSB:** BY8DX, C6A/W1DED, CE2JHE, FK4QX/P, J79BH, TX5S, V31XX, WP4YR. **28MHz SSB:** CO2XN, D4M, EY8BI, FM8QR, HI8AT, HJ3ESF, JS6RRR, KP2B, PJ4SON, PJ5/SP9FIH, TZ4AM, ZF2PG.

Owen G0PHY (HS): 14MHz SSB: AX3EY, PR1WWA. **28MHz SSB:** N0W, N9W, PJ5/SP9FIH.

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 June issue the deadline is 11 April. Photos of your station, antennas or you in the shack are always welcome. 73, Steve PJ4DX. **PW**

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Making communications work for everyone

Ofcom Licensing Review Implications

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Colin Redwood G6MXL looks at a few of the implications of the recent Ofcom Licensing Review.

Following the Ofcom Licensing review, I'm going to look at some of the implications. This is far from an exhaustive review, but will focus on some practical implications of the changes, particularly in respect of what Ofcom term 'Regional Secondary Locators', which most amateurs would probably term callsign prefix (e.g. GM, MW, etc.). I have used xxx to anonymise the callsigns I've used as examples.

Callsign prefixes

The very clear message for all operators is that if you are going to log your contacts and upload them to one or more of the popular web-based systems, then you need to log and upload the actual callsign you used on the air with the correct account. For example, you cannot expect these systems to match a contact you made while on a holiday in Wales using the callsign M3xxx to know that you were in Wales. If you want to get credit for contacts made from Wales as Welsh contacts, then you must operate using the callsign MW3xxx, log using the callsign MW3xxx and upload your log to your MW3xxx account on the various systems. If you choose to use M3xxx for any of these, then your contacts will be credited as contacts made from England. A similar situation will occur with traditional paper QSL cards. If you use MW3xxx on the air, then your paper QSL card should also state MW3xxx.

Callsign suffixes

It is just the same if you use a suffix such as /P or /QRP. M3xxx, M3xxx/P and M3xxx/QRP are all different callsigns in the eyes of the program logic of systems such as eQSL, LoTW, Club Log and QRZ.COM. Setting up the different flavours of your callsign can be done in each of these four systems – some more easily than others. Some allow you to combine contacts made using different suffixes in the same country for award purposes. If you want to take advantage of this, then you'll need to configure each of the systems accordingly. With the greater freedoms for suffixes, make sure you don't add to confusion by using a format of suffix that might give rise to confusion. For example, M1xxx/ZL might be read by some as M1xxx operating from New Zealand and credit the contact to New Zealand!

Other considerations

If you think that the callsign arrangements have got a whole lot more complex, spare a passing thought for amateurs in other countries working stations in the UK. If they work M3xxx, they will assume that the station is in England, and will expect your paper or electronic confirmation of the contact to give them credit for England. Just in case you are thinking of not bothering with Regional Secondary Locators, because you just natter to friends on the 2m or 80m net, you may regret this in future years as your interests in the hobby evolve. I'd suggest sticking with regional secondary locators and logging and uploading to the correct account for the part of the British Isles where you operate from. And likewise, QSL cards if you use them. If you are planning to enter contests, you should note that contest organisers are likely to require entrants to use a callsign that correctly defines which DXCC country they are operating from.

Power levels

Besides the relaxation of the Ofcom's requirements for Regional Secondary Locators, I think the main headline change is the possibility of using increased power on primary bands. A number of amateurs will be keen to use the increased power levels permitted with the changes. It is worth noting that these increases only apply to those bands and parts of bands that are shown as primary allocations. For those bands and part of bands which are secondary allocations, the current power levels remain. If you are considering increasing your power, I'd recommend checking the new licence schedule for your licence class, and remember to revisit your EMF assessments – the light-touch assessment for 10W at Foundation level may no longer suffice with 25W. If you operate in contests, then you should also check the contest sections, which may change as a result of changes of permitted power levels.

Licence revalidation

Our current UK licence conditions require that we revalidate our licence periodically. If you've not done this in the last year or two, it would make a lot of sense to do so sooner rather than later. At some point Ofcom are going to embark on a process of 'cancelling' callsigns that have not been revalidated in the last few years. These cancelled callsigns will subsequently be made available for re-issue to other amateurs. So, make a point of logging on to the Ofcom website and revalidating. If you are in any doubt, I'd suggest make a minor change to your entry such as adding a full stop after your postal town. When you next come to re-validate, you can remove the full stop.
http://tinyurl.com/yrx8srju

eQSL

I've recently been working my way through a backlog of unmatched contacts on eQSL. I found it interesting to note the various reasons why the contacts didn't match, besides errors on my part in recording the callsign I had worked.

SWL reports

As a transmitting amateur you don't make contacts with shortwave listeners (SWLs) so, quite reasonably, you can't expect eQSL to find a match for SWL reports submitted as you won't have logged them. You'll need to process these manually. I found the quality of the SWL reports varied. The better ones

give the callsign of a station that the SWL heard me working. Some reported me calling CQ, and others just gave a date, time, band and mode. It's up to you to decide which SWL reports to accept. Personally, I expect to see the callsign of the station I was working or stating that I was calling CQ. Anything less really is of little value to me, and to the SWL if they are chasing SWL awards.

Special events

I was amazed how many eQSL contacts had been submitted by stations where the callsign did not match the callsign I worked on the air. Chief among these were where a special event callsign was used during the QSO, but the eQSL submitted by the station was using their own personal callsign. For example, I worked AM50xxx and received an eQSL from EC3xxx. This station managed to send the correct data to LoTW so that I got a match (confirmation) on LoTW. eQSL allows the setting up of additional accounts under your main callsign, so it is quite possible to submit the contact under the special event callsign. If you do this, then make sure you upload to the correct account!

If you're considering using the new flexibility to use more letters as part of a special event callsign (e.g. GB3SWANAGE), don't forget that the extra letters will need to be accurately communicated to stations you work if you want them to log it. Remember that data modes such as FT8 and FT4 cannot handle long callsigns due to constraints on message lengths.

/QRP etc.

I worked a number of stations with suffixes such as /QRP or /P. If you use /QRP or /P etc. as part of your callsign on data modes such as FT8, then the stations you work will automatically record your callsign in their log with the /QRP or /P. You'll therefore need to make sure that you upload your log to eQSL, LoTW, QRZ and Club Log etc. with the appropriate suffix (/QRP or /P for example). During a phone or CW contact, you'll have to guess what suffix the station actually used for uploading their log. In the case of QRP, POTA, SOTA, WWFF etc, I think it is safest to call CQ QRP M3xxx or CQ POTA M3xxx rather than CQ M3xxx/QRP or CQ M3xxx/POTA etc.

Operating abroad

I was surprised at the number of eQSLs for contacts where I had logged a station operating abroad, yet the eQSL submitted was from their home call. Had I accepted these, I could have claimed credit for a contact with the wrong country! In one case I worked GM/SPxxx (a Polish amateur in Scotland), but the eQSL was for SPxxx, so I was potentially credited with a contact with Poland rather than Scotland!

Adding additional callsigns to QRZ.COM

I'd also suggest checking the entry on QRZ.COM for additional callsigns you might use including Special Event callsigns. This enables QSLing arrangements to be made clear. To do this, log into QRZ.COM. On the top right of the screen under your callsign, select the Account option. There are then two separate options. The first, termed secondary callsigns, are calls where a '/' is added after your main callsign (like /P or /QRP) or a prefix is added in front of your callsign when you operate abroad (e.g. EA8/ or F/). You'll need to specify the special callsign type. The other, termed managed callsigns, is for callsigns that you are looking after such as a special event callsign that you might be managing on behalf of your local club.

Adding additional callsigns to Club Log

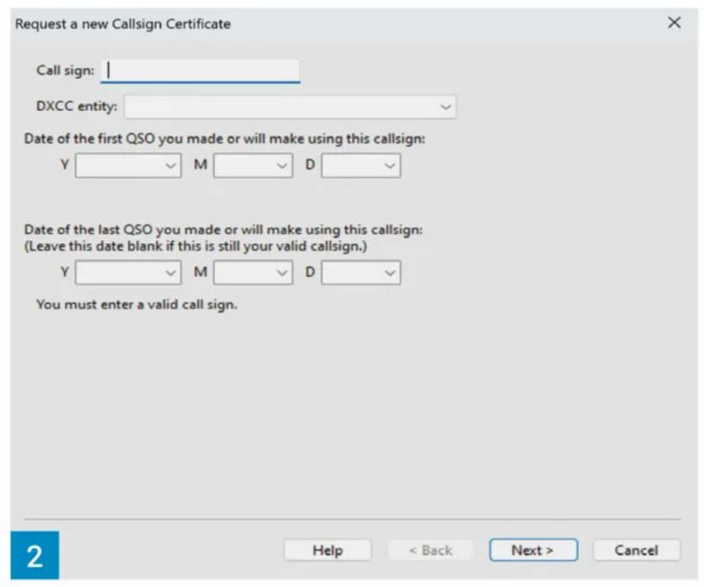
Adding a callsign to your existing Club Log account is very easy. Log into Club Log. From Settings, select the Callsigns button. At the bottom of the page, you simply enter the new callsign in the box at the bottom of the screen, **Fig. 1**.

Adding accounts to eQSL

You can add additional accounts (callsigns) to eQSL quite easily, **Fig. 2**. Don't forget to 'design' your eQSL card for the new callsign.

Adding accounts to LoTW

If you operate using a different callsign to the one you initially registered with LoTW, you'll need to obtain an additional certificate to use with TQSL so that you upload your log with the correct callsign. If the additional callsign is covered by your main licence (e.g. operating in a different part of Britain or abroad under the HAREC agreement), then the process is very simple. You just request an additional certificate, **Fig. 3**. This is also the process to use if you acquire a new callsign by passing a new exam and already have a certificate for an existing callsign, or if you decide to take advantage of Ofcom's offer to transfer from a 2E0 callsign to an M8 callsign for example. If, however, the additional callsign is actually a variation to someone else's licence (e.g. you are administering the logs on behalf of a special event or club callsign), then you'll need to send a copy of the licence for that person's callsign to the LoTW administrators at ARRL HQ – which can be done by email. Note that you can also set up start and end dates for callsign certificates, which may be very relevant if you are using a special event callsign that may have been used by another group. **PW**



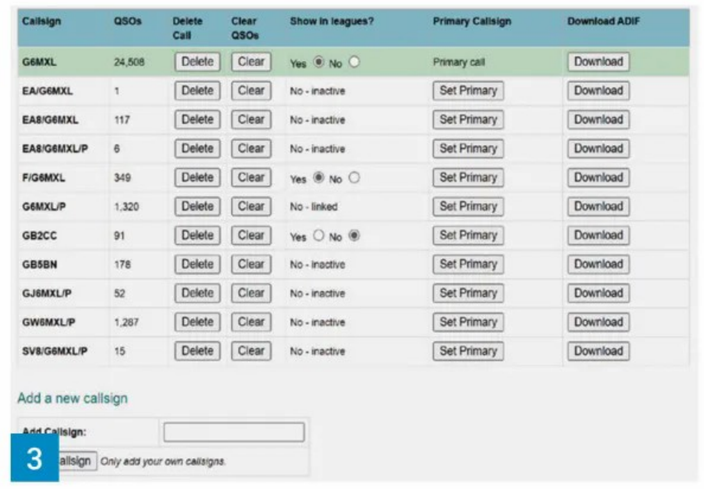
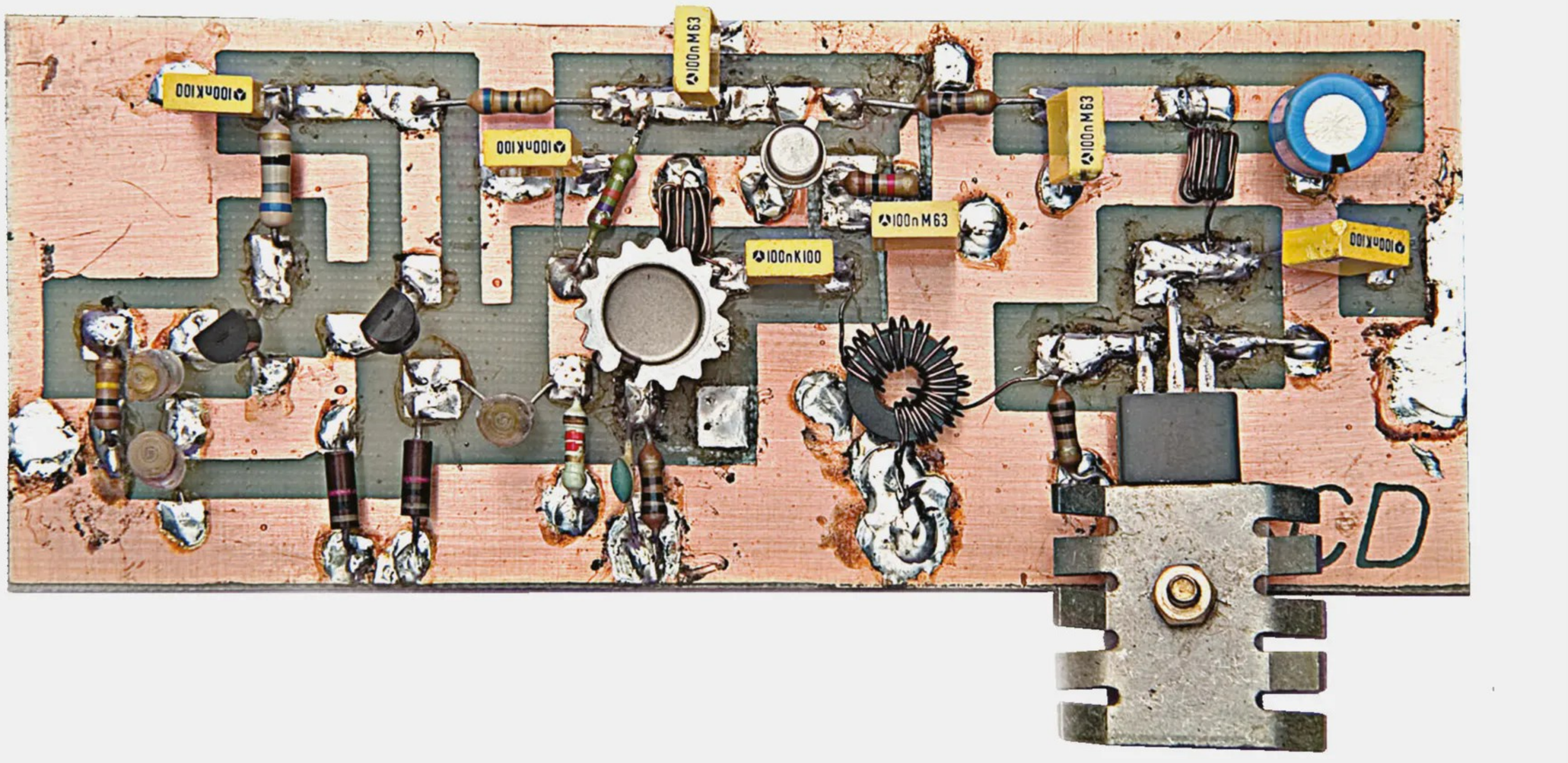


Fig. 1: Adding an additional callsign to your Club Log account. Fig. 2: Adding an additional account (callsign) to eQSL. Fig. 3: Requesting an additional callsign certificate for a callsign that is covered by your main licence.



1

The G3RJV SCD QRP Transceiver Revisited (Pt I)

Steve Hartley G0FUW starts a series revisiting a classic QRP transceiver from the late George Dobbs G3RJV.

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It seems odd to be writing this, because it was an article by the **Reverend George Dobbs G3RJV** in *PW* May 1983 that convinced me I could build my own amateur radio equipment. I have been doing so ever since and have enjoyed it very much. 40 years later I find myself as Chairman of the G-QRP Club and writing for *PW*.

This particular project came about following feedback that there were few 'starting from scratch' project articles for newcomers to homebrew radio construction. I had to agree and when several people suggested revisiting the SCD, one of George's classic projects, I did some research.

The original SCD project was a crystal-controlled transceiver capable of being used on 80, 40 or 20m and was published in *Short Wave Magazine* between January and April 1980. The receiver was a simple direct conversion type and the transmitter used just four transistors to generate a few watts of CW.

Modifications appeared in the same magazine in 1981 and in 1987 adding a Variable Frequency Oscillator and semi-break-in keying to remove the need to switch manually from receive to transmit. George even revisited the transmitter in *PW* in February 2006, **Fig. 1**, so it is fair to say that the project has a good long pedigree, and continued interest has shown it is worthy of an update.

But can you still get the parts?

One of the issues in revisiting older projects like this is the non-availability of the components used. So, this series of articles will aim to provide details of suitable replacements for any parts that have become 'unobtainium' in the last 30 or 40 years.

Project overview

This 'Revisited' version of the SCD was originally built for the 5MHz (60m) band but test builds have also been completed on 80, 40, 30 and 20m. You can therefore be fully confident that the design is 'tried and tested'. Performance drops off a bit as you go up in frequency, but even the 20m version can transmit a few watts and is certainly capable of some interesting QRP contacts.

The project plan is to cover one module at a time and to pull them together as we progress. The modules are:

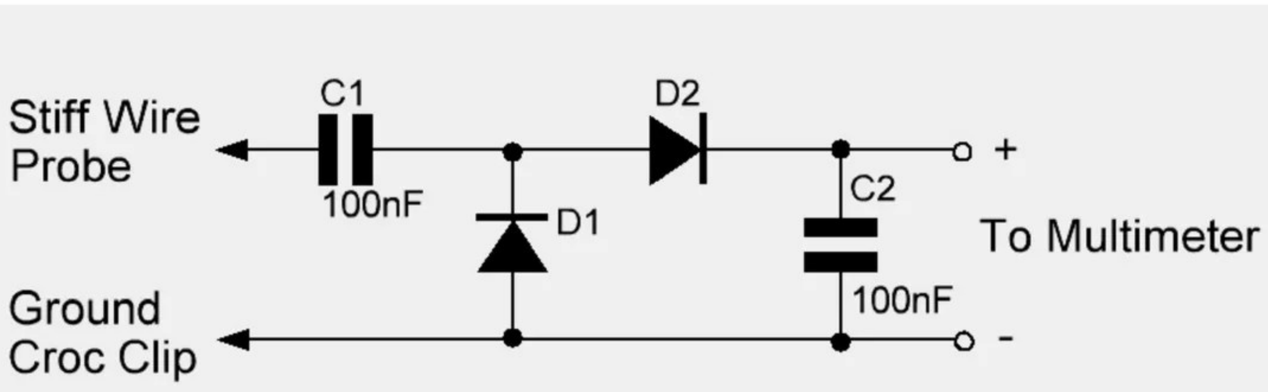
- Variable Frequency Oscillator (VFO)
- Receiver
- Transmitter and
- Transceiver Changeover and Sidetone

The final article will also look at boxing up the project, an aspect that many find quite daunting.

If there is sufficient interest, there may even be a further 21st century upgrade with a microprocessor-based digital VFO/keyer module.

Each article will cover some theory together with details on building and testing as you go; they will assume very little prior knowledge.

I should point out that anyone can build the VFO and the receiver boards to listen on the bands. However, you will need a suitable amateur radio licence to use the transmitter, and, in the UK, a Full level licence if you build it for transmitting on 60m.



2

Fig. 1: SCD revisited by G3RJV in 2006.
Fig. 2: Circuit diagram of the RF probe.
Fig. 3: The latest RF probe on the G0FUW test bench. Fig. 4: Prototype PCBs made using nothing more than kitchen table technology!
Fig. 5: Example of a VFO using MeSquares.
Fig. 6: Example of a receiver PCB using Top Ground Plane construction.
Fig. 7: Wiring side of top ground plane board.

Test equipment

No highly specialist test equipment will be required. The only assumptions made are that the builder will have knowledge of how to recognise components, be able to solder and use a multimeter.

One very useful addition to your multimeter is an RF probe. These are very useful for checking that RF levels at various points in the build are about right. The AC range on most multimeters is not really up to measuring RF so a little probe is a great asset when used with the DC volts ranges. I have a couple knocking around my radio workspace, but I could not find either of them when I was writing this, so I made a new one. I used two 1N5711 diodes, but 'common or garden' 1N4148 diodes will work just as well, **Fig. 2**.

As you can see in the photo, **Fig. 3**, it is made on a scrap piece of PCB material with three 'MeSquares' for the 'live' joints. The wee pads can also be made from scrap PCB material 'superglued' to the main piece; take care not to glue your fingers too!

One of the legs of C1 forms the actual test probe and a short lead with a crocodile clip forms the ground connection. If you want to make a really good job of it, you can add some red and black meter leads with banana plugs on the end to plug into your multimeter.

Printed circuit boards

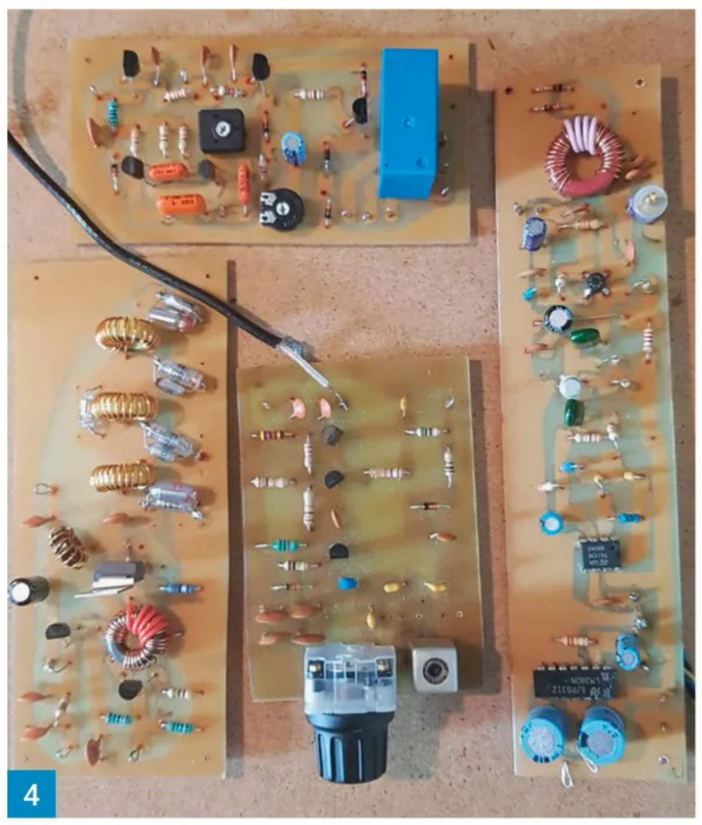
The prototype PCBs were made using good old 'kitchen table technology', **Fig. 4**.

My preferred technique for making PCBs is to stick a track-side plan to the copper side of some single-sided PCB material that has been cut to size. I centre punch each of the hole positions with a masonry nail and then drill 0.8mm or 1mm holes in the appropriate places.

After removing the paper plan I clean the copper with a wet wire-wool soap pad (e.g. Brillo) and dry it. Then it is a case of joining the dots (holes) and colouring in the larger ground planes using a spirit-based felt tip marker pen, or an acrylic paint marker pen.

After double (triple?) checking the track pattern I then etch away the exposed copper in a solution of ferric chloride solution – make sure you read the safety data on use and disposal (it is not highly toxic but it does need some care and attention). Oh, and don't get it on your skin, your clothes or the kitchen sink as it stains, really badly.


3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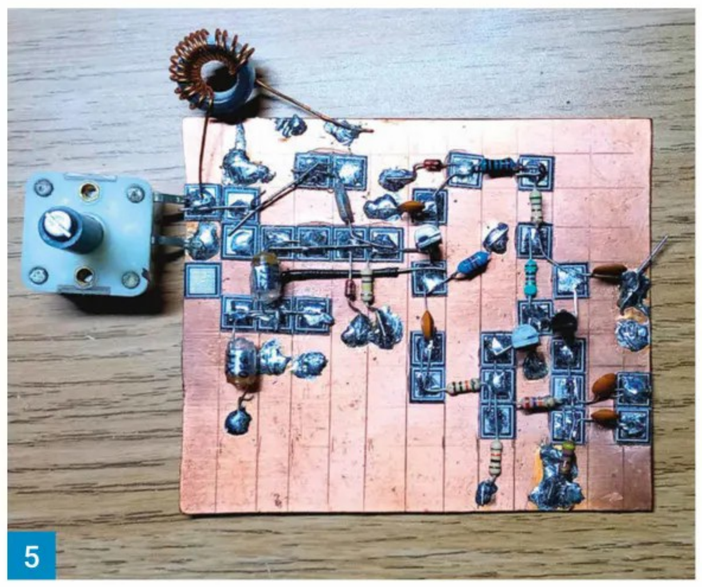
5

There are plenty of YouTube videos on how to make PCBs with a wide range of methods for making the etch mask. For one-offs, my technique is pretty quick and not too ugly.

In the process of working through the various options for this update, I made a number of 'test bed', circuit boards using MeSquares, **Fig. 5**, which worked very well. Sitting with the circuit and a piece of graph paper, you transcribe the component layout to what some call 'Manhattan' style; the PCB copper is used as a ground and the MeSquares are glued in place to form circuit joints.

MeSquares are available from the G-QRP Club and come in sheets so you snap off as many as you need. Some constructors make their own pads from scraps of PCB material. Either method works and the technique allows for components to be changed quite easily, should the need arise.


6


7

I also made a couple of PCBs using 'Top Ground Plane' construction, **Fig. 6**. Single-sided copper-clad PCB material is used with the copper ground plane uppermost. Grounded component leads are soldered to the top ground plane and other leads go through countersunk holes with the interconnections made 'point-to-point' on the underside, **Fig. 7**. The main advantage of this type

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1

GB2CW

Roger Cooke G3LDI has an update on the GB2CW Morse programme and a miscellany of other Morse related news.

One of our long serving volunteers to the GB2CW Morse scheme, **Martyn Vincent G3UKV**, **Fig. 1**, has become a silent key.

Martyn had been running GB2CW at 0900 on 3605kHz every Thursday morning for many years. He was also an RSGB Morse code Assessor, plus a very valued Vice Chairman of Telford and District Amateur Radio Society. He was responsible for the running of the famous Hamfest with great success. He will be sadly missed by all.

Losing volunteers like Martyn is always very sad; a fact of life of course, but it is also very difficult to replace people like him. It is not very often that I bring news of a 'new' volunteer, but the fact is that we do need many more around the UK.

It can be a very fulfilling vocation and seeing new people using CW after attending classes is very satisfying and it helps to keep the mode very much alive.

I realise that these days with Apps such as Skype and Zoom etc, it is sometimes easier to run classes online. Indeed, we have one class in Norfolk that runs on Zoom. Unfortunately, that does not get the publicity it so deserves, or show to the local amateur fraternity that this is indeed running.

If there are any such classes running, I would like to see it published in the RSGB GB2CW schedule. That way, it could provide some incentive to both students and tutors. It would add to the information in the schedule and also provide some stimulus to prospective students who might be nervous about joining an on-air group.

If there are such classes running in your area, please email me the details and I will try to get a separate table on the GB2CW site. I realise that using GB2CW is not needed under those circumstances but the publicity would be very useful.

Scripted vs conversational sending

This subject has been discussed at length on the CWops reflector. There are a varied selection of views and reasons given as to why anybody would use 'Scripted' sending in the first place. It is probably a crutch to rely on when sending. When you consider a test, you normally have to send from a script and it does serve to relax the operator somewhat, thus reducing possible mistakes. However, there will come a time when this is unreliable, or the other person in the QSO will have heard it before!

A good CW operator has developed the skill of conversation using a Morse key. It is not easy, but not that difficult either. When in a QSO, it is always a good idea to jot down notes like bullet points as you are copying the other person. Then you have a skeleton on which to put the meat when it comes to your turn. If you don't do that, you **will** forget and the conversation will not flow. Of course, you also have to be fully familiar with all the abbreviations.

One of my students several years ago was so nervous that he used this system for about six months and found out that it did become too repetitive. He soon dumped his crib card and got down to serious practice. That has become so serious that he does not have a microphone now! I am talking about **Les MM0UMH**, **Fig. 2.** Les is very active on the FISTS frequencies and wrote to me recently: *"HNY to you Roger. I just wanted to thank you again for suggesting that I take part in the Fists ladder. I'm afraid that I got bit obsessed with it last year, but it has been good for my CW and I managed to stay top all year. The results have just been confirmed in* Brasspounder*":*

Christmas greetings using Morse code

I was sent the following by **Chris G5VZ**. Quite a novel idea really and it could catch on in some circles! The piece is accompanied by several pictures.

"Back in the autumn of 2023, ***Nicole Elders*** *got in touch with the FISTS CW Club. Nicole was planning a range of Morse Code greetings cards and I had the pleasure of helping her with that.*

"Nicole introduced herself to the club not as a radio amateur but as an award-winning greetings card designer and artist, as well as being an aeronautical engineer. She told us that she was working on creating a range of greetings cards, which would increase knowledge and awareness of Morse code, as well as carry a fond message.

Fig. 1: Martyn Vincent G3UKV.

"Nicole said, "They are inspired by my late grandfather who was a passionate radio operator and served 33 years in the RAF, first as aircrew and then as an air electronics operator. He maintained a love of radio throughout his lifetime, and amongst other things I have inherited his radio equipment."

"Even before we started talking about how we use Morse on the air these days, Nicole's curiosity was aroused: "I'm finding Morse Code to be utterly fascinating," *she continued,* "but I am a novice. I wish I had learnt more from my grandfather while he was alive." *So, with her ideas to incorporate Morse – not just the symbols but the culture of the code – she wanted us to double check her designs – and her Morse code – before finalising them and sending them to the printers.*

"After we checked and fine-tuned the designs they were printed. They make an attractive and unusual greetings card, sending their message in a unique way. But alongside all that, Nicole says, "My intent is to bring Morse Code to a new audience, a goal which appears to align nicely with your club." *Meaning FISTS CW Club*. "I have entitled the range Long Live Morse Code (it felt appropriate)" *which is, after all, the mission of us all.*

"The cards are available in an ever-increasing number of independent gift shops in the UK, including BBMF, as well as one or two other aviation heritage museum shops. The range has been shortlisted for the award, Gift of the Year in the Heritage Gifts category".

See **Fig. 3**. Nicole's website is at: **www.nicoleelders.com.**

Keyidentification

I was sent a picture of a straight key to identify last month by **Rod Angel G4ZUP** from the Isle Of Wight Radio Society. I had a couple of replies, one being from **Fred G4BWP** who referred me to the Morse Mad site:

www.morsemad.com/nato.htm

The other was from **Bruce G4EUW** who said: *"This key is one issued to new ships of the Royal Navy from the mid-1960s. Sometimes called the NATO key, why? It is a 'Jack (sailor) proofed' copy of the splendid Lennart Pettersson keys and was made in the UK by various companies. A very robust key, which replaced the Navy 7681 key introduced in 1922.*

"During my service (Feb 1960-Dec 1969) I didn't see the NATO key at all but on joining a nearly new ship, subsequent to RN days, RFA Grey Rover, *with a Naval Radio Station and an MN Station, this key was fitted. I thought it was going to be a 'Rolls Royce' of keys but found it a bit heavy and cumbersome to adjust to one's liking. I have one and the last time I saw one aboard an RN ship was when I visited* HMS Illustrious *circa 2013. It was kept in a radio room drawer".*

Essex CW operator of the year

This from **Andy G0IBN** of the Essex CW Club. They just held on of their CW Bootcamps. I will mention more on that next time with some pictures, but I separated this one and have presented it in this issue.

A presentation was made, The **Peter Hale G4OAD** Memorial Key. This is presented annually to the person considered by his peers to have either:

1. furthered the use of Morse Code during the past year;
2. to be the most promising CW operator of the year – not necessarily the best CW operator but will be considered as one who has the most promise, making the most progress.
3. to be the best ambassador to the CW mode.

This year, **Lee 2E0DYH** is a worthy recipient. Lee has shown the committee his sending and receiving skills. Lee works mobile with low power, patiently working very good DX across the globe.

Fig. 2: Les MM0UMH. Fig. 3: The Morse cards by Nicole Elders. Fig. 4: Presentation to Lee 2E0DYH (tall chap) by G3WGE.

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

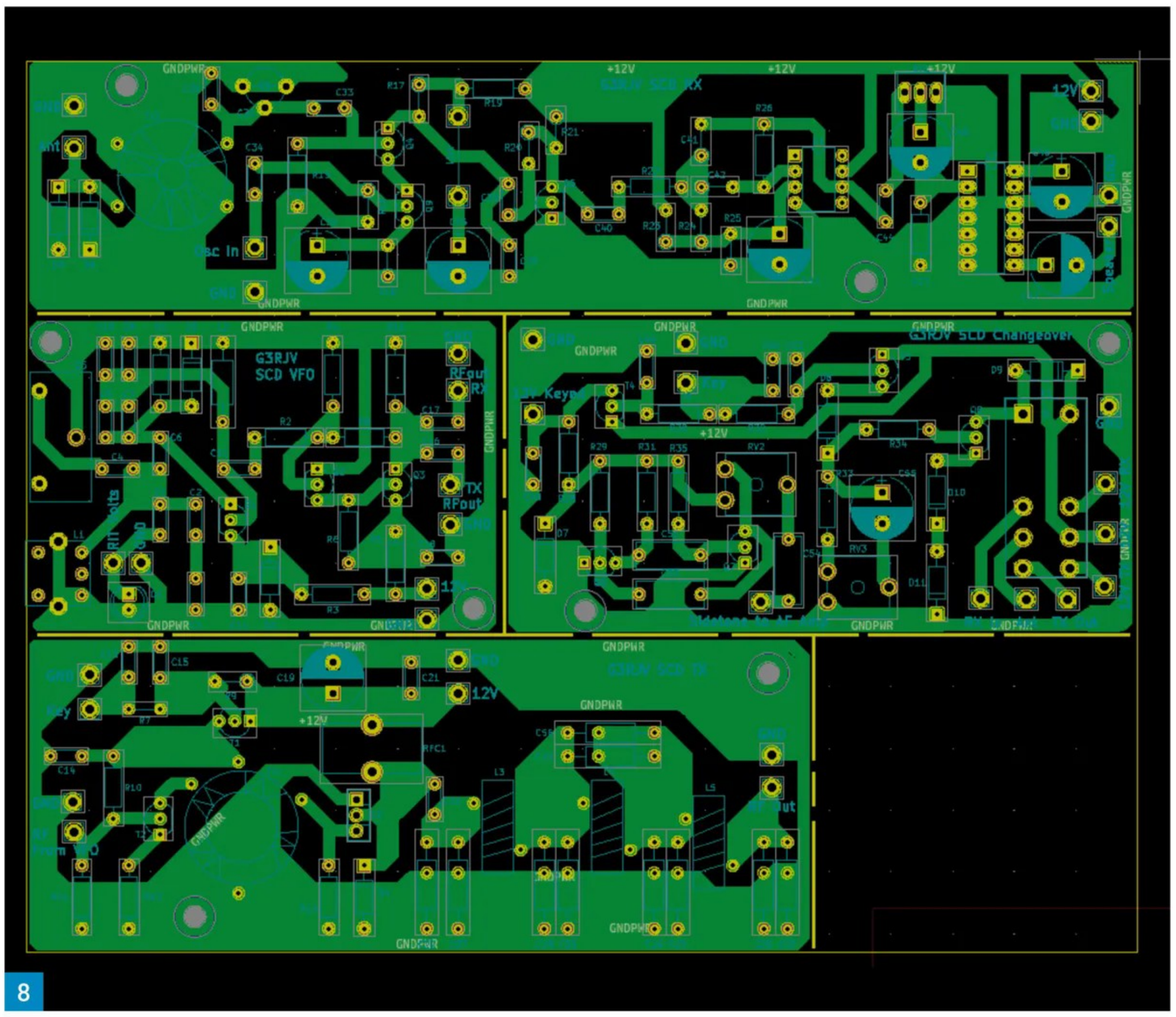

Fig. 8: Commercial PCB set.

Continued from page 45

of construction is that you can use a PCB layout and there is no need for any etching chemicals or hazardous adhesives.

Finally, with the help of **Heather M0HMO**, the G-QRP Club had some professional PCBs made up, **Fig. 8**. By the time you read this, the PCBs may well be available to G-QRP Club members.

It is worth mentioning that 2024 sees the 50th anniversary of the G-QRP Club. It was in September 1974 that G3RJV offered to form a Club for anyone interested in low powered radio communication. 50 years later, although George is no longer with us, the Club continues to thrive and has around 4,000 members.

Next time

The next part of the project will be along soon and will cover the construction and testing of the Variable Frequency Oscillator (VFO) board.

Weblinks:

G-QRP Club:
https://www.gqrp.com
RCF Charity:
https://commsfoundation.org

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Transmit Quality Among Modern Transceivers (Pt III)

Frank M. Howell K4FMH discusses grouping transceivers having optimal characteristics.

In the first two parts of this series, I presented new publicly available bench test data on HF transceiver transmit noise (Part I) and compared these radios to their Sherwood receive performance, what they cost when entering the amateur market, and the overall satisfaction that hams say they have with them (Part II). In Part III, I put these results together for practical use by amateurs seeking to purchase a new HF transceiver in this list. Can we identify transceivers having low transmit noise, high level receive performance, at a lower market-entry price, and that are rated with higher satisfaction by ham operators? Yes, we can! The reader is left with subjectively evaluating the radio in terms of features, ergonomics, and other personal choice elements.

I present the results of this approach using the transmit composite noise index, the Sherwood (receive) Performance Index, market-entry price, and average eHam rating. I used a technique called hierarchical cluster analysis, which has a long history of being used by many disciplines to find groups in data (see URL below). This method uses the four variables to identify meaningful 'clusters' of similar transceivers. They are relatively homogeneous (similar) in terms of transmit composite noise, receive performance, price and consumer satisfaction. I experimented with several multi-group solutions but found that the 5-cluster one seemed to be optimal for the data.

https://en.wikipedia.org/wiki/Hierarchical_clustering

If the reader has not read the two previous articles, it would be advantageous to do so as the data and results depend on some familiarity with the information in Parts I and II.

To best illustrate how the four variables combine in the cluster analysis results, the scatter plot in **Fig. 1** contains transmit noise (vertical) and receive performance (horizontal) on the two axes. Each transceiver is colour-coded and labeled by cluster group. Note that price and eHam rating are *not directly displayed* in the scatter plot but *are* part of the cluster grouping. A bar chart (lower left) is included to show how each factor defined the cluster group. A listing of each radio and its cluster group is in the right panel of the figure with the same colour codes for the scatter plot. I'll review each group's characterisation so the reader can see how these modern HF transceivers are similar and why.

The scatter plot of transceivers helps the reader see the cluster grouping of similar radios. Just visually splitting the transceivers by those above or below the median transmit noise and receive performance scores shows that there are two large groups delineated by these performance metrics. Once price point and consumer satisfaction are brought into the mix through the cluster analysis, the five groups emerge from the data.

The optimal or 'best' set of transceivers on these four factors are those in Group 4, coded in purple, consisting of the Apache 7000DLE, Flex 6700, and the three Elecraft radios (K3, K3S, K4D). The bar chart shows that they have the highest receive performance, lowest transmit noise, are above average on satisfaction, but are also above average in price. Group 2 radios actually have higher average receive performance but more transmit noise, lower satisfaction, and a higher market-entry price. These are the Flex 6400 and 6600, Yaesu FTdx101D and FTdx10, plus the Icom IC-7610. Radios in Group 1 appear oddly placed, at first glance. The premium Kenwood TS-890S and entry-level Yaesu FT-710 transceivers, however, do score similarly on receive performance and transmit noise (in the middle of the pack) but have above average satisfaction ratings by users. They do differ in price but not enough to overcome these strong similarities.

Extreme price, however, does overcome the top-level receive and transmit scores plus high consumer satisfaction in the case of the Icom IC-7851. It is in a group by itself because of its high price point being several times that of other radios with similar scores on bench-tested performance and satisfaction in the marketplace. There may indeed be other aspects of this flagship transceiver by Icom that make it worth the much higher price but they do not seem to be contained in the three elements examined here in addition to price at market-entry.

The final group shown as Group 3 comprises a large set of radios that are characterised by higher transmit composite noise than the others. Some are quite good sellers (IC-7300, IC-705, Kenwood TS-590SG) and at very good price-points in the market for HF radios. But they score average on satisfaction as a group and only just above average on receive performance.

Conclusions on modern HF transceivers and transmit noise

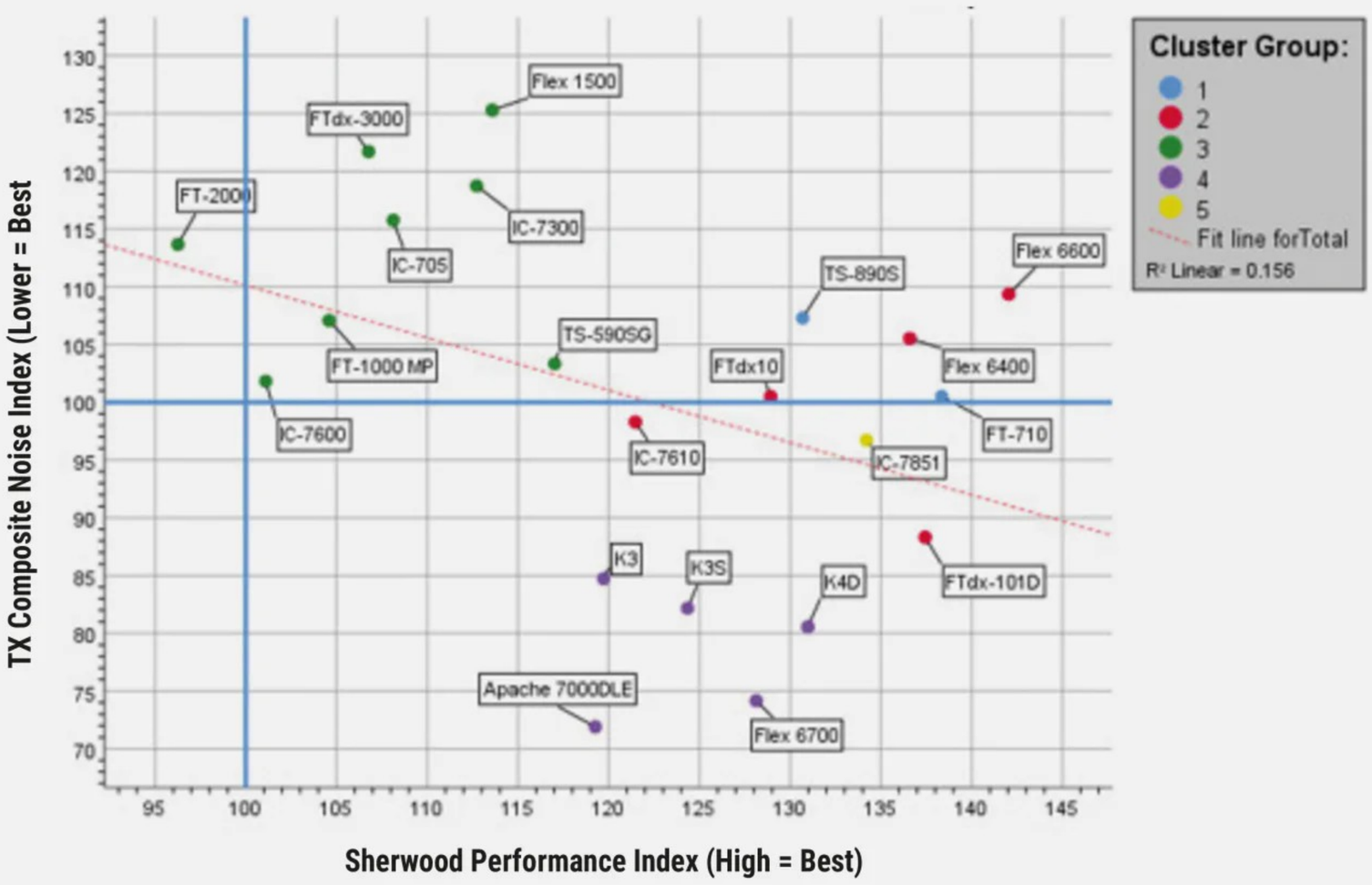
Rob Sherwood's mental benchmark (2019) for how transmit purity fits into manufacturing design and production served as my point of departure in Part I of this article series. I added how transmit noise fits into a consumer's paradigm of measured receive performance, price and satisfaction with transceivers. Several key findings are worth noting with discussion.

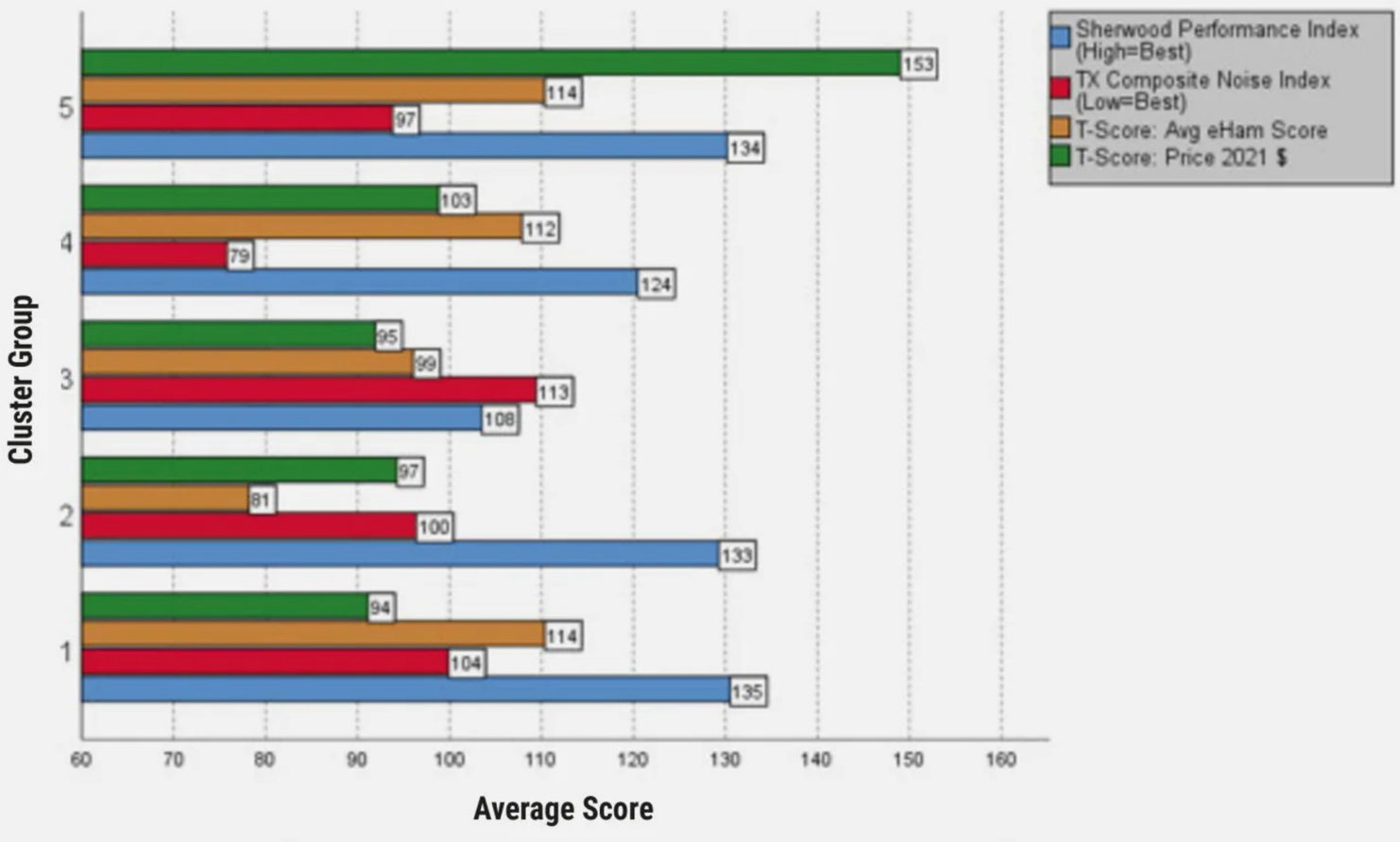
There was no observable trend in the improvement of transmit composite noise over time in this set of modern transceivers (see Part I article). There was also no pattern of higher priced transceivers having 'dirty' transmitters as **Brown** (2014) noted previously (see Part II). This may be due to the data sources and transceivers upon which measurements were taken but, nonetheless, I do not confirm his findings of a decade ago using ARRL data from published *QST* reviews. (The ARRL now does not publicly share these data.)

Consistent with Sherwood's concerns, there is a significant variation among modern transceivers in transmitter composite noise. This was true even within the same manufacturer's radios. The single exception to this might be those made by Elecraft. They have had a nominal continuous improvement in the measures observed in these data.

Only a few transceivers capture the best scores in both transmission and receive performance metrics. *No single radio had superior measurements across both metrics.* Radios with the best metrics in receive or transmit noise vary widely in market-entry price and consumer satisfaction by other ham operators. We do not know what the engineering design team intended but can only make interpretations of the bench measurements on the realised radios themselves. Further evaluation of transceiver particulars is left to the reader for which I provide additional interactive tools for doing so at foxmikehotel.com.

The transceivers rising to the top scores in various ways among this set of radios include: Apache 7000 DLE; Flex 6700; Elecraft K4D; and Yaesu FTdx101D. Other transceivers may have features or ergonomics that outweigh the bench measurements reported in this study or the price-point or general satisfaction reported by owners. Some of these aspects of transceivers can be highly subjective (e.g. weight, VFO knob size, how a given feature is implemented, etc.). The amateur operator should evaluate what they are paying for in this subjective realm when the price of the radio is considerably more than other models with





Cluster Group Membership

Transceiver	Cluster Group
FT-710	1
TS-890S	1
Flex 6400	2
Flex 6600	2
FTdX-101D	2
FTdx10	2
IC-7610	2
Flex 1500	3
FT-1000 MP	3
FT-2000	3
FTdx-3000	3
IC-705	3
IC-7300	3
IC-7600	3
TS-590SG	3
Apache	4
7000DLE Flex 6700	4
K3	4
K3S	4
K4D	4
IC-7851	5

Note: (Above) the cluster group assignment was made by simultaneously 'clustering' the four variables: TX composite noise index, Sherwood (receive) Performance Index, market-entry price in 2021 $, and average eHam rating (see text). (Upper left) Transmit Noise by Sherwood Performance Index. (Left) Bar chart of the average scores on the four variables used to create the duster groups. The average eHam score and market-entry price in 2021 dollars were converted to T-Scores to match the metric of the transmit and receive measurements. All four variables are significantly difference across the five duster groups (P < .05).

Note: the blue reference lines in the scatter plot (upper left) are set at the median value. Cluster Groups are denoted by color circles in the graph and colored numbers in the list on the right. The bar chart (lower left) has the four variables used in the cluster analysis transformed into a T-Score so that the relative metrics are directly comparable for this illustration.

Fig. 1. Scatter Plot of TX Composite Noise Index by Sherwood Performance Index by Cluster Group.

similar or better objective characteristics. But it is also clear that average satisfaction is largely not associated with the optimal receive performance and transmit noise among the radios in this study (see Part II).

While the best performing transceivers are indeed that, they still may not be what an individual amateur operator wants or desires. Few can argue, however, that improved transmit noise would not be desirable. No ham operator wants a 'dirty' transmitter, of course, but they might choose to settle for one in relative terms. This is because there was no transceiver having optimal characteristics on both transmit noise and receiver performance at price-points available to each amateur. Let us hope that papers like Sherwood's in *QST*, Brown's unpublished but widely-circulated 2014 paper, Asbrink's earlier published work, and this additional empirical analysis help spur on both the consumer demand and the manufacturer production of radios with cleaner transmissions. Examining the data further at my foxmikehotel.com website might be a useful exercise before a final HF transceiver purchase is made.

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BBC coronations Pt XII

Keith Hamer and **Garry Smith** continue the special series looking back at the BBC's coverage of Coronations since 1937. There is also a special vintage radio and television Coronation goodwill message from 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 shortage of radio frequencies available in Europe. A new series begins covering the early years of BBC-2. We also continue the series about the development of Swiss Radio and Television since 1922.

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In countries outside Europe which could not receive the television broadcast direct, viewers were able to see the 1953 Coronation by means of a *telerecording,* which was a film of the actual broadcast. In Canada and the USA, it became possible to televise the full BBC telerecording of the Coronation on the same day due to an arrangement with the *Royal Air Force*. This involved the use of helicopters in the United Kingdom, a Canberra jet bomber to carry the film across the Atlantic, and collaboration with the *Royal Canadian Air Force* for the final stages of the journey. The first pictures appeared on Canadian television screens only a few hours after the events they depicted had taken place in London. Networks in the USA carried either the BBC telerecording, or others that were produced independently, and flown across by the same means.

Telerecordings were also supplied to broadcasting organisations in Germany, the Netherlands, Denmark, Italy, Japan, Venezuela and Cuba. Full recordings were made of all the main Coronation Day broadcasts, both for immediate use and for archive purposes. For the sound broadcasts, simultaneous use was made of 50 disc-recording channels, 16 magnetic tape-recording devices, and 14 portable magnetic-recording machines. Recording staff and equipment had to be called in from various BBC Regions to augment the central resources.

Vintage coronation radio & television equipment

This month's ramble through vintage copies of bedraggled newspapers and magazines has unleashed a special advertisement by **E. K. Cole Limited** to celebrate the Coronation of **Queen Elizabeth II** on 2 June 1953, **Fig. 1**. 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 advertisement, which didn't actually advertise any particular equipment by E. K. Cole Limited – it was simply a Coronation goodwill message to the Sovereign and her subjects.

Now for a brief royal history lesson. The coronation of **William IV** on Thursday 8 September 1831 was held 14 months after he succeeded to the throne of Great Britain and Ireland. Aged 64, he was the oldest person to assume the throne until **Charles III** in 2022. By marriage to William IV, **Adelaide** became not only *Queen Consort*, but also assumed the title of **Königin Adelheid von Hannover**. She was the daughter of **Georg I** of Sachsen-Meiningen, and **Luise Eleonore** of Hohenlohe-Langenburg.

Please note that following further extensive research, the series called *The Ekco Story*, which began in the March issue, is currently being expanded and will be continued at a later date.

Roland Pièce archives: Part VI

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.

Before the official inauguration of the *Champ-de-l'Air* transmitter, scheduled for Saturday 14 October 1922, Roland Pièce carried out various engineering tests. Although the transmitter was intended solely for the requirements of the Paris-Lausanne airline, he had the idea of using a roll-type phonograph, which he placed in front of the microphone, to transmit music to the passengers of the *Goliath* aircraft.

The French journalist and writer, **Louise Faure-Favier**, author of a 1922 Paris-Lausanne travel guide said: *"The flight was marvellous and as the plane crossed the Swiss border, I heard a fragment of 'William Tell' by Rossini!"*

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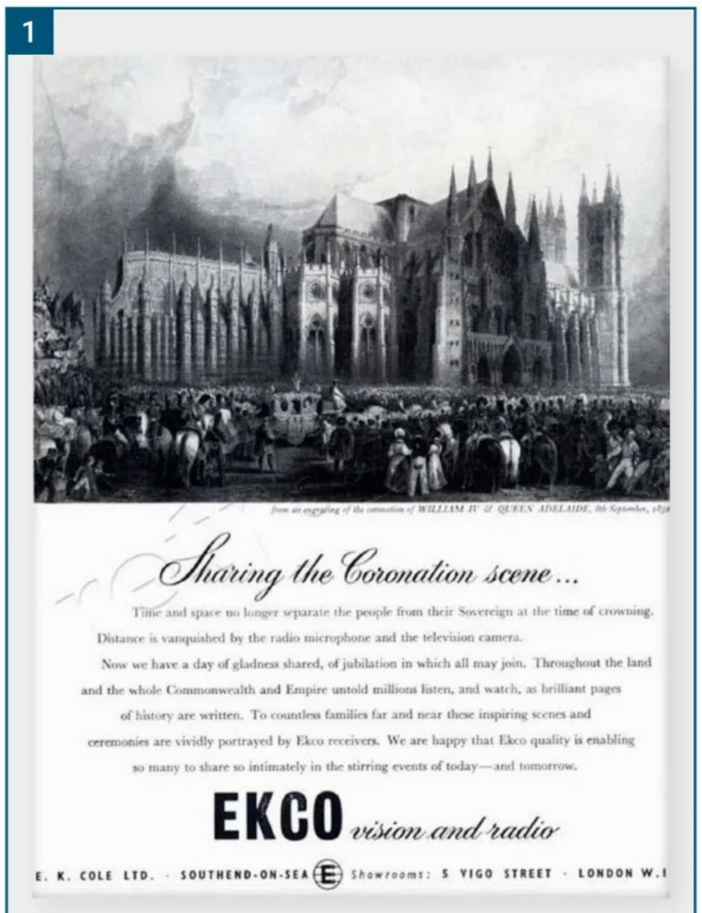

Sharing the Coronation scene…
Time and space no longer separate the people from their Sovereign at the time of crowning. Distance is vanquished by the radio microphone and the television camera.
Now we have a day of gladness shared, of jubilation in which all may join. Throughout the land and the whole Commonwealth and Empire untold millions listen, and watch, as brilliant pages of history are written. To countless families far and near these inspiring scenes and ceremonies are vividly portrayed by Ekco receivers. We are happy that Ekco quality is enabling so many to share so intimately in the stirring events of today - and tomorrow. **EKCO Vision and Radio:** E. K. Cole Ltd., Southend-on-Sea Showroom: 5 Vigo Street London W.1 The caption to the accompanying photograph reads: *from an engraving of the coronation of William IV & Queen Adelaide, 8th September, 1831.*

On the day prior to the inauguration, Roland Pièce proceeded, in great secrecy, with the final tests for a surprise he had planned to give all the official guests of the *Municipality of Lausanne*. With the help of his friend, **Albert Moiton**, and a local radio shop called *Jupiter*, Roland Pièce hid a state-of-the-art receiver and loudspeaker behind the curtains of the reception room of the *Beau-Rivage Palace* in Ouchy, where the official banquet was to be held. Ouchy is a picturesque port and popular lakeside resort near the centre of Lausanne on the shore of *lac Léman*.

The Rise and Fall of 198kHz: Part V

The new *Midland Region 5GB* long-wave transmitter, which was technically identical to the installations at Brookman's Park, Moorside Edge, Westerglen, and Washford Cross, operated with an aerial power of approximately 50kW.

It soon became apparent that, as a result of the relatively large number of BBC transmitters operating on separate frequencies, there was a conflict with newly-opened European radio stations. A solution to interference needed to be addressed. At the time, there was no specific European frequency plan and stations operated

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Fig. 1: A special advertisement placed in newspapers by E. K. Cole Limited to celebrate the Coronation of Queen Elizabeth II on 2 June 1953. Fig. 2: The BBC's Chief Engineer, Captain Peter Pendleton Eckersley. Fig. 3: The planned official launch of BBC-2 was due on 20 April 1964, but celebrations had to be delayed by one day following a fire and subsequent major power failure at the Battersea Power Station.

on wavelengths between 300 and 500m. A *Technical Committee* was established by the BBC's Chief Engineer, **Captain Peter Pendleton Eckersley, Fig. 2**. This involved representatives from most of the European broadcasters.

Eventually, a frequency plan was accepted. This was known at the *Luzern Plan* and its success depended upon every transmitter having a carrier frequency which was kept under very close tolerance. After many delays for technical reasons, the Plan finally came to fruition on 14 November 1926.

There was somewhat of a scramble among all the broadcasters as each one wanted their own preferred wavelength. An initial compromise solution was found whereby those countries which pioneered broadcasting were deemed to have established themselves with specific wavelengths, whereas relative newcomers had to broadcast in a comparatively limited spectrum. Arguments arose because the fledgeling broadcasters assumed that they had the right to set up national systems and demanded additional wavelengths. Consequently, countries which had been broadcasting on a national basis for many years were obliged to agree to some sacrifice, whereas nations less advanced in this respect were given additional channels in an effort to pacify them!

60 years of BBC-2: Part I

BBC-2 officially began on 20 April 1964, although celebrations were short-lived, **Fig. 3**! The full launch had to be postponed until the following day due to a fire and subsequent major power failure throughout large areas of London, including *BBC Television Centre*.

Experimental monochrome television transmissions began in the Ultra High Frequency (UHF) Band V on 405 lines from the Crystal Palace transmitter on 11 November 1957. The tests were successful and it soon became apparent that UHF could be used for extra television services. For launch, though, the system was upgraded to 625 lines.

BBC-2 began life as a gleam in the eye of the *Pilkington Committee,* which published its report on broadcasting in 1960. The committee realised that within a year or so, two extra television channels could be made available. The problem, as they saw it, was whether there would be enough material for the proposed networks, bearing in mind that two channels already existed serving a population of around 50-million people.

Service information: Switzerland, Part XIV

The elections to the Swiss *Federal Council* (effectively the national parliament) and the *Council of States* in 1963 were the first to feature SRG television debates with politicians representing their parties. However, the broadcasts generated little interest among the public.

The Federal Council approved the introduction of television advertising. Switzerland's first television commercial was broadcast on 1 February 1965, and cost each advertiser the princely sum of SFr. 6,000 per minute.

Also in 1965, the radio and television studio in Bern's *Federal Palace* was officially opened. Two years later, **Tiziano Mona** became the first woman in Switzerland to host a flagship news programme. This was broadcast in the *Cantone Ticino* region by the Italian-language service, *Televisione della Svizzera Italiana* (*TSI*).

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**

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Basic spectrum scope calibration

A quantitative analysis and calibration of the FT-710 spectrum scope.

The relatively new FT-710, a very competitively priced, high specification, full SDR radio, has gained great respect. Like all the similar radios from the big names, it has a spectrum scope/waterfall display. It's tempting to treat these just as pretty pictures but in theory these can in most cases be used quantitatively to measure a range of received signal and noise level parameters. To analyse the FT-710, the figures below were obtained using an RF signal generator, the Elecraft XG3 Signal Source [**1**] giving several pre-set levels on each amateur band, including –73dBm, 50µV, S9 into 50Ω and –107dBm, 1µV. The microphone was unplugged, obviously. An external switched attenuator was also available to set levels in 1dB steps.

The spectrum scope on the FT-710 is divided into ten divisions vertically, totalling a height of 100dB, the divisions being levels in –dBm. (this figure is not in the manual) This is the default scale. It can be changed in the scope menu settings from normal to '**Hi Sensitivity**' giving a 50dB vertical scale of 5dB per division for improved accuracy and ease of vision. This 50dB vertical scale was used in all measurements.

The scope has **span display widths** of 1.0, 2.0, 5.0, 10, 20, 50, 100, 200, 500 and 1000kHz. Changing these changes the displayed noise floor level (see below).

The baseline level of the scope is dependent on front-end gain and attenuation as is the S-meter, and trace position is moved up or down according to the front end settings.

Each of the two pre-amps has a gain of 10dB. The attenuator reduces gain by 6/12/18dB. These are fairly accurately set and are very good features of the radio.

The scope baseline can also be displaced vertically by +30 to –30dB by the **vertical level offset control**. A level of 0dB was used for most of the scope calibration. All these changes affect the colour density of the waterfall. The use of an external monitor set to 800 x 600 maximises the vertical resolution of the display to a good level of discrimination.

There is an **expansion function** on the scope, which enlarges the height of the scope + waterfall from 28mm to 36mm but the scope is even more compressed giving priority to a higher waterfall. A moveable boundary would be far better.

Using the signal generator, the parameters of the scope were measured and are shown in **Table 1**.

In the table, in the normal sensitivity 100dB range, using the **vertical level control** allows the 100dB range to be placed anywhere between –160 dBm to +20dBm.

For Hi sensitivity, the 50dB vertical range can be placed anywhere between –150dBm and –20dBm.

Adding in the attenuator, moves the lower and upper levels up by as much as 18dB. These features provide great versatility.

S-meter calibration

The radio has an excellent facsimile of a moving coil S-meter. Unfortunately, it has a typical Japanese S-meter calibration of approximately 3dB/S-point, which is almost linear down to S5 (ie 15dB below S9) but is not so linear at the lower end of the scale. Like all Japanese transceivers, it does not have the IARU 6dB/S-point-scale agreed in 1981 [**2**]. With pre-amp 1 switched in it does, however, give the IARU agreed signal level very close to S9 for 50µV (–73dBm) input on all bands, **Fig. 1**. For signals Below S9, the meter departs an additional 3dB/S-point from correct. So at S5 it's about 15dB in error. Thus the following calibration on 14.2MHz with preamp 1 switched in is what can be expected, **Table 2**. Switching to IPO or adding preamp 2 moves the scale down or up by close to 10dB. And remember, the lower the S-meter reading, the more inaccurate it is, so don't be fooled by an S3 noise floor reading, it's nearer S6!

Comparing the figures in Table 2 with the spectrum scope response, further tests at different levels show the scope vertical level to be quite accurate over the full range.

The S-meter reading is not affected by scope span selection. With preamp1 switched in, a fairly good reading of signal strength in –dBm is possible on the spectrum scope, right down to the noise floor, extending the range of signal strength reading to well below the displayed S-meter level.

Scope span & noise floor level measurement

The FT-710 was set with preamp 1 on to give a correct S-meter display at S9 and the vertical scale to 50dB range, –110 to –60dBm using Hi sensitivity on the screen with no vertical level offset initially. The AGC was set to auto. The expansion function was not used._

External noise received by the receiver at the antenna socket is a function of noise power (in mW) received by the antenna, temperature of the physical system (assumed constant) and receive bandwidth in Hz [**3**], [**4**].

In a chosen scope span, the noise floor as seen on the S-meter, is specific to the receive filter bandwidth set for the mode of reception, but the S-meter level falls with narrowing the receive filter. For example, the displayed noise floor is 10dB lower in a CW bandwidth of 250Hz than when set for an SSB bandwidth of 2500Hz.

Keeping the receive filter bandwidth fixed, reducing the scope span by one order of magnitude drops the noise floor on the scope by 10dB etc, but the S-meter reading does not change, so a 1kHz span compared with 1000kHz span moves the noise floor down 30dB on the scope.

In summary

Changing the **receive filter** changes the S-meter reading, scope noise level remains constant. Changing the **span**, S-meter remains constant, the scope noise floor is different on each span width.

To explain this further, each scope span is swept at a high speed many times per second, and the sweep bandwidth, also known as resolution bandwidth, is a variable derived from the scope span in Hz/(a specific number). In the 710 scope, this number appears to be about 400. For 1MHz span, 1,000,000Hz/400 = 2500Hz sweep bandwidth. This number, scope span Hz/(filter width Hz) = 400 with the RX filter at 2500Hz for SSB gives about the right answer for the noise floor in –dBm. This can be checked in Fig. 2 showing VDSL noise at my location on 80m. The scope level offset has been lowered by 20dB, giving a –40 to –90dBm scale to prevent the display being saturated. The S-meter is hovering around S9 (6dB/S-point scale, –73dBm), with the noise floor jumping around a similar level of –75dBm on the spectrum scope.

To measure the noise floor correctly for the RX set to a smaller filter width, the chosen span must be span/400 = RX filter bandwidth`, see **Table 3**. So for a receiver set up for CW using a 250Hz filter (0.1 of the SSB bandwidth), the noise floor in this example would be 10dB lower using the 100kHz scope span. This is exactly what is seen on the

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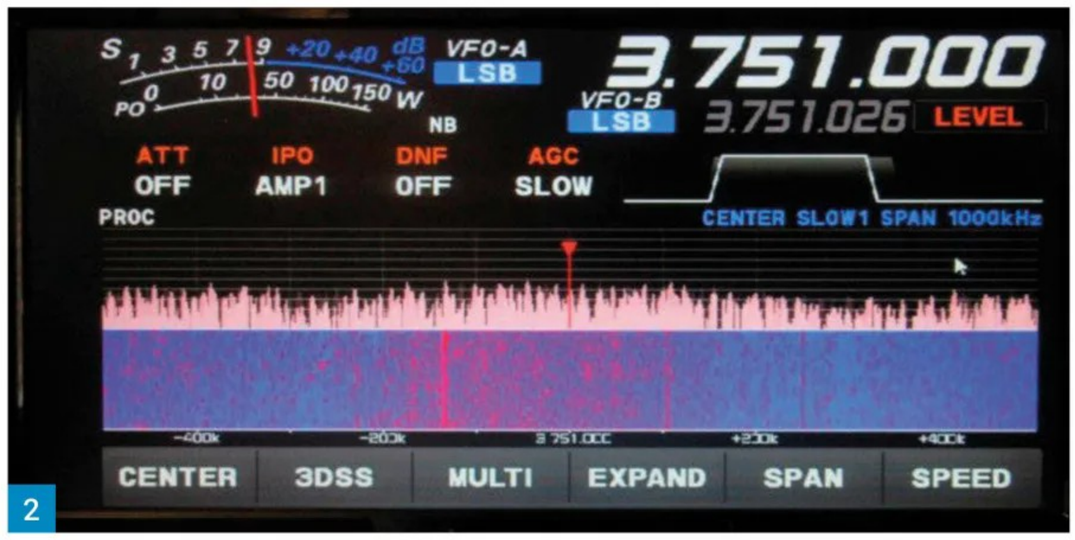

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Fig 1: –73dBm signal, Amp 1, Vert. scale –110 to –60dBm, meter at S9, scope close to –73dBm. Level control set to 0dB. Level.
Fig. 2: Spectrum Scope, –110 to –60dBm, peak noise floor at around –79dBm.

scope. These are measured figures from analysis of the equipment and are consistent with spectrum analyser practice.

Note: In the absence of specific parameters published by Yaesu, the figure of 400 may be slightly different.

None of this information is mentioned in the *Operating Manual* or is available from Yaesu on the web so the figures cannot be confirmed.

Table 3 shows a 10dB drop in average noise floor level for each order of magnitude of scope bandwidth reduction, which is correct. Bearing in mind the S-meter needle is fluttering +/- rapidly and the noise trace on the scope anything but constant, an exact figure is not realistic.

There is another adjustable scope parameter, the **Resolution bandwidth, RBW**, that is, the sweep bandwidth. For a chosen span, it slightly changes the number '400' derived above. It is in FUNC>DISPLAY SETTING>Scope>RBW and can be set to low, mid and Hi, which is the default. These slightly change the scope noise floor level , and the trace detail to more or less 'grassy'. It should be set to low for the calibrations above to be correct. This function is not well explained in the manual.

Conclusions

The FT-710 S-meter is typical of Japanese HF transceivers, it looks good but fails almost totally as a signal strength measuring device. The FT-710 spectrum scope is sharp and clear. It is well calibrated in electrical units, such that noise floor measurements can be made in –dBm in a specific span for a particular RX filter width appropriate to the modulation being received. Signal levels can be correctly measured in –dBm on the scope down to the noise floor, below –120dBm on 50MHz for example. Using the 100dB vertical scale, compressed into only 13mm, makes this difficult. The vertical scope scale changed to

1a. IPO only, no pre-amps. Scope baseline is **-110dBm**, top is **-10dBm**. **+/- 30dB offset level**
1b. pre-amp 1. " **-120dBm** " **-20dBm**. "
1c pre-amp2. " **-130dBm** " **-30dBm.** "

In the **Hi sensitivity 50 dB vertical scale** the settings are shown below.
1a. IPO only, no pre-amps. Scope baseline is **-100dBm**, top is **-50dBm**. "
1b. pre-amp 1. " **-110dBm** " **-60dBm.** "
1c pre-amp2. " **-120dBm** " **-70dBm.** "

Note: Using the sig. gen. at 10dB level changes, the signal was exactly on the vertical scale in multiples of 10. E.g. -70dBm input gave -70dBm on the scope. When pre-amp 1 was switched in, the accuracy fell slightly indication the pre-amp gain was not exactly 10dB.

Table 1: The vertical level values dependent on front end gain & level control, 100dB scale

710 S meter	-dBm	µV	IARU level 6dB scale
9	-75	40	S8.7 ..... S9 to S1 is about 23dB on 710 S meter scale
7	-83	16	S7.3 ..... This is far too small.
5	-89	8	S6.5
3	-93	5	S5.8 ..... linearity below 710 S5 becomes poor.
1	-97.5	3	S5

Table 2: S Meter Calibration, Pre Amp 1 Sig Gen Input level.

Span	Approx. ave. noise floor -dB, and avge Spt IARU	Scan BW	fixed factor	Appropriate RX filter width
1000kHz	c -75dBm cS8.8	2500Hz	400	2.5KHz
100kHz	c -85dBm c S7	250Hz	400	250Hz
10kHz	c -95dBm c S5.2	25Hz	400	25Hz
1kHz	c -105dBm cS3.8	2.5Hz	400	

Table 3: Example on 3.7MHz band. NOISE FLOOR measurements. Example using a high VDSL broadband noise on the 80m Band.

'Hi sensitivity', eg 50dB for the same height, and adjusted up or down using the offset level control, greatly improves its ease of use and coupled with an external monitor it becomes a competent tool. Overall, it appears that the calibration across all the ranges is probably better than 3dB of correct and considering its price, is a very impressive HF transceiver.

Final comment

It's obvious that with so much processing power already installed, the software behind the FT-710 scope has great potential to make it a really good measuring instrument and I'm sure this applies to most the modern SDR based transceivers from Yaesu, Kenwood and Icom. It is a huge shame that few of these names have bothered to design into the user interface, implement and explain to the customer the huge potential that is available. Without exception, all the S-meters on all the radios from the three big names above still have the wrong S-meter scale, which is a big mistake. At this point is has to be said that the Elecraft P3 Spectrum Scope and the scope on the K4 Transceiver are in a completely different class.

The Elecraft transceivers display the signal level at the antenna socket regardless of front-end settings. They are laboratory/professional grade equipment with very high accuracy and functionality and a price tag to match. While it is certainly not usual for most modern partly or fully SDR-based transceivers to achieve this professional level, the basic hardware and software is already present in most models to provide a much more useful and accurate spectrum scope/waterfall/S-meter display if the manufacturers chose to do so.

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2. **https://en.wikipedia.org/wiki/S_meter**
3. **http://tinyurl.com/2v7j4efp**
4. Analysis of received RF noise, *RadCom* Vol 88, No 8, Aug 2012, Vin Robinson G4JTR. **PW**

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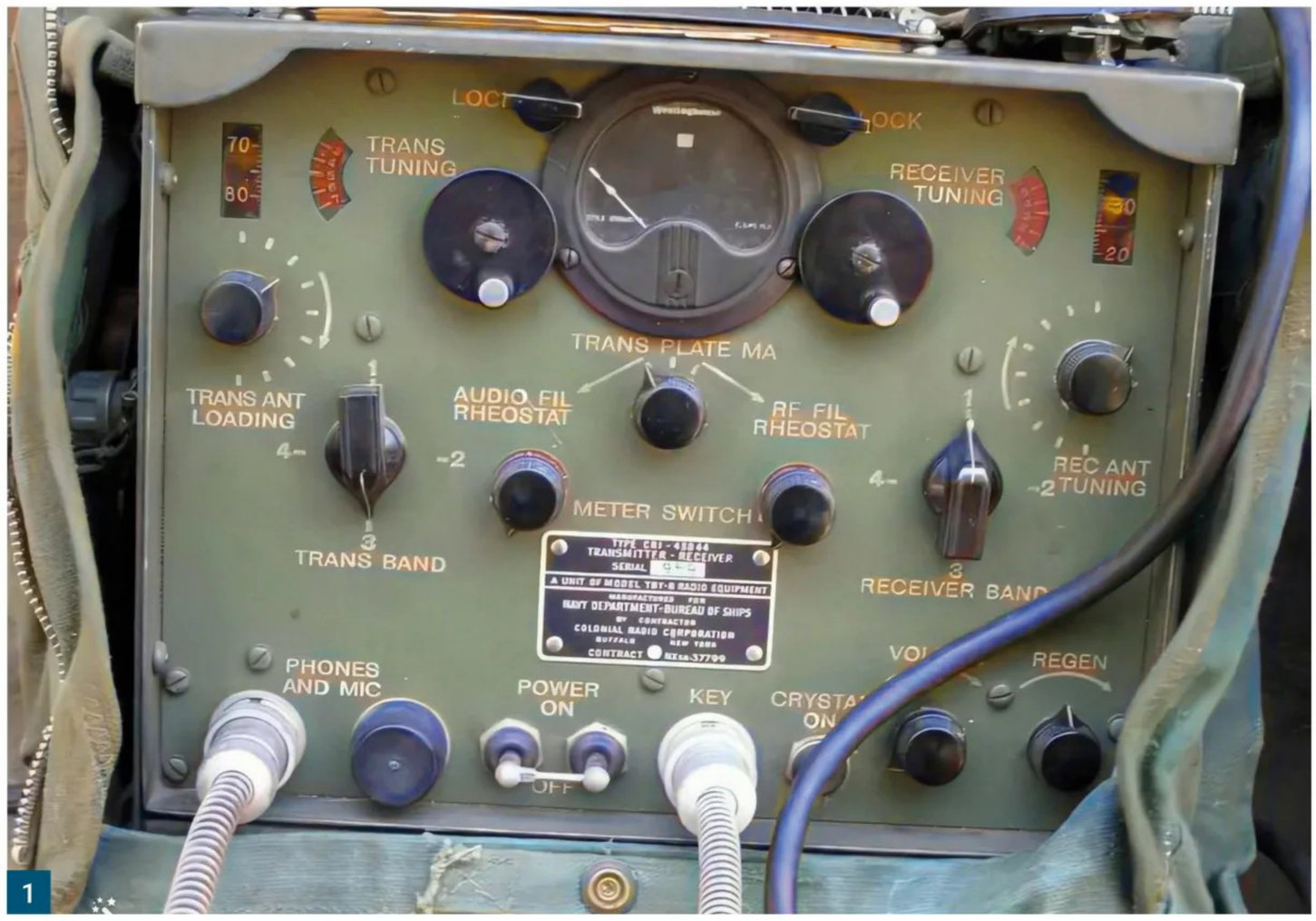

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Portable military radio communications of WWII

Graham Caldwell looks at the rapid development of American portable radio equipment during WWII, their collecting potential and cost for immediate use or restoration.

The early German blitzkrieg, employing close communication between tanks, infantry and ground attack aircraft, placed a new order of importance on allied radio development. Portable radio sets, issued as far down in the military echelons as the platoon, were thereafter continuously redesigned and improved. America was a latecomer to radio technology, having lagged behind Britain and Germany in radio research and development between the wars. In 1939 the US Army possessed only two suitable, yet inadequate, AM (amplitude modulated) radios at the small unit level. However, America caught up quickly and surpassed its rivals in radio innovation during the war thanks to its vast industrial and scientific resources. The pioneering use of FM tactical radios led to the SCR-300, the army's first true walkie-talkie, which first saw combat service in Sicily in 1943 and is arguably one of the most successful portable radios of the Second World War. To understand sales terminology, the prefix 'BC' refers to 'Basic Component' of the radio, i.e. the transmitter-receiver; whereas 'SCR' means 'Set Complete Radio', which is used to describe the complete set with its added power supply, antenna and all accessories.

Early model portable sets: 1938-40

TBY (CRI-42044/43007). At the outset of the war, the United States Marine Corps (USMC) used United States Navy (USN) designed radios. The TBY series (models 1-8) of ultra-portable backpack radios, were used at Guadalcanal, Bougainville, Tarawa and Iwo Jima. They were also notably operated by the Navajo Code Talkers, who were organic with the USMC divisions for amphibious operations in the Pacific, speaking in their own unique language as a more secure method than traditional radio code. These UHF (Ultra High Frequency, using WWII terminology) portable sets operated on the AM mode. They were employed at battalion and company levels using either WT (wireless telegraphy or voice) or MCW (modulated continuous wave or Morse). The sheet-aluminium cabinet, sized 30.7 x 30.1 x 18.4cm and weighing 15.2kg, housed the transmitter-receiver and dry battery pack, producing 500mW on a frequency of 28-80MHz. A canvas carrying case, with wide shoulder straps, holds the radio and the 2.7m ten-sectional antenna. A separate sheet-steel shipping case contained added equipment and spare parts, including the CTE-51022 handset, which incorporates a press-to-talk switch. The TBY-1 was introduced in 1938, but by mid-1944 the USMC had switched to employing the SCR-536 and SCR-300 (see below). Currently, there are several TBYs for sale between £245-£420; however, two in very good condition, complete with antenna, carry-bag and all accessories, sold recently for an estimated price of around the £1,200 mark.

SCR-194/195 (BC-322/222). The SCR-195 was introduced in 1939 and was one of the first AM man-packed UHF transceiver radios capable of being operated by one man on the move. It was used at company and battalion level on a frequency of 52.9-65.7MHz producing 100mW, with a range of up to five miles under good conditions, but the life of its dry battery was short-lived. All the radio equipment is carried on the back of the operator in a canvas bag, including the 14.0 x 20.0 x 22.0cm BC receiver-transmitter, the telescoping tubular antenna and the battery, totalling 12.15kg. Auxiliary equipment and spare parts were transported in a compartmentalised rectangular wooden box weighing 29kg. The standard HS-22-B headset, T-24-E microphone and TS-11-E handset were most commonly used. The identical SCR-194 was the artillery version, except that it operated on different frequencies of 27.7-38.5MHz (coil C-174) and 36.9-52.1MHz (coil C-175). This prevented the two sets from cross-communication, a common drawback for the period when single radios were unable to accommodate the number of necessary frequencies. When this article went to press there were no SCR-194/195s for sale online, suggesting that this radio is now scarce. In the USA, both sets operate legally, the SCR-194 on the 50-54MHz band and the SCR-195 on the 28-29.7MHz band. However, **Martin Bösch** of the Radio Museum, Lucerne, Switzerland (radiomuseum.org) explained that these sets cannot be easily operated on amateur radio frequencies despite covering the 6 and 4m bands, simply because the dial accuracy and poor frequency stability render them unsuitable. Consequently, an unrestored price in Europe would be in the £200-£450 range; although prices in America tend to be much higher.

Mid-war portable sets: 1941-42

MAB (CCI-60041) Para-Talkie was initially developed by the USN for USMC Paramarines (the Pacific theatre short-lived 1st US Marine Parachute Regiment) as one of a series of small portable single-channel AM Voice radio sets. Due to its lightweight small size and extreme portability, it became the USMC's tactical equipment for beach assaults, reconnaissance and outpost communications, as well as USN ship-to-shore emergency radio. It was also employed later in the war as a two-way ground-air communicator for OSS agents (Office of Strategic Services). The CCI transmitter, with power derived from a dry battery (or an optional vibrator pack powered by small wet cells) had an output of 200mW on a frequency range of 2.3-4.6MHz. The set is crys-

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Fig. 1: TBY US Navy portable radios were used by the United States Marine Corps in the Pacific theatre, including by the Navajo Code Talkers speaking in their own unique language. Illustrated is the TBY-8 introduced in September 1943. *(usmilitariaforum.com)*

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Fig. 2: This lucky collector owns two TBY's, including their original canvas carry bags, antenna and headsets. Left: TBY-8 from September 1943. Right: TBY-2 introduced in January 1941. *(usmilitariaforum.com)*

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Fig. 3: The 30.7 x 30.1 x 18.4cm TBY's aluminium cabinet housed the transceiver and dry battery pack. Carried in a canvas case, together with the sectional antenna, the man-pack weighed 15.2kg. *(invaluable.com)* Fig. 4: A US Marine Navajo Code Talker operating his TBY radio. The Japanese were never able to understand their language, which proved to be more successful than using standard code. Fig. 5: The BC-322 transmitter-receiver for the lightweight SCR-195 radio is carried on the back of the operator in a canvas bag, together with the telescoping tubular antenna and battery, for a total weight of only 12.15kg. *(armyradio.ch)* Fig. 6: The lightweight SCR-195 portable company-battalion level radio, which had a range of up to five miles, is seen here inside its canvas backpack. *(imageevent.com)* Fig. 7: Left: the SCR-194 artillery observer version. Right: the SCR-195 infantry version. Also illustrated are the radio's backpacks, base for the antenna, TS-11 headset and box BX-13 for added connection ports. *(Radio-us-ww2.blog4ever.com)* Fig. 8: This pre-war publicity photograph illustrates the SCR-194 operated as a ground station. The operator is using a T-24 microphone and is wearing the TS-11 headset. *(timetoast.com)* Fig. 9: This photograph provides a clear understanding of how the lightweight SCR-195, when carried in a backpack, can be operated by one man on the move. *(life.com)*

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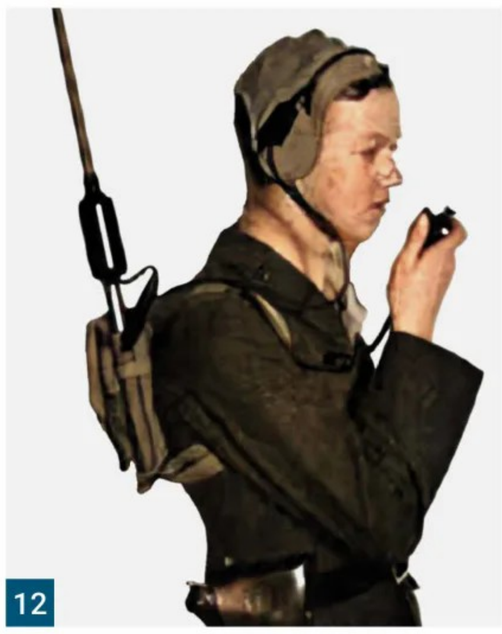
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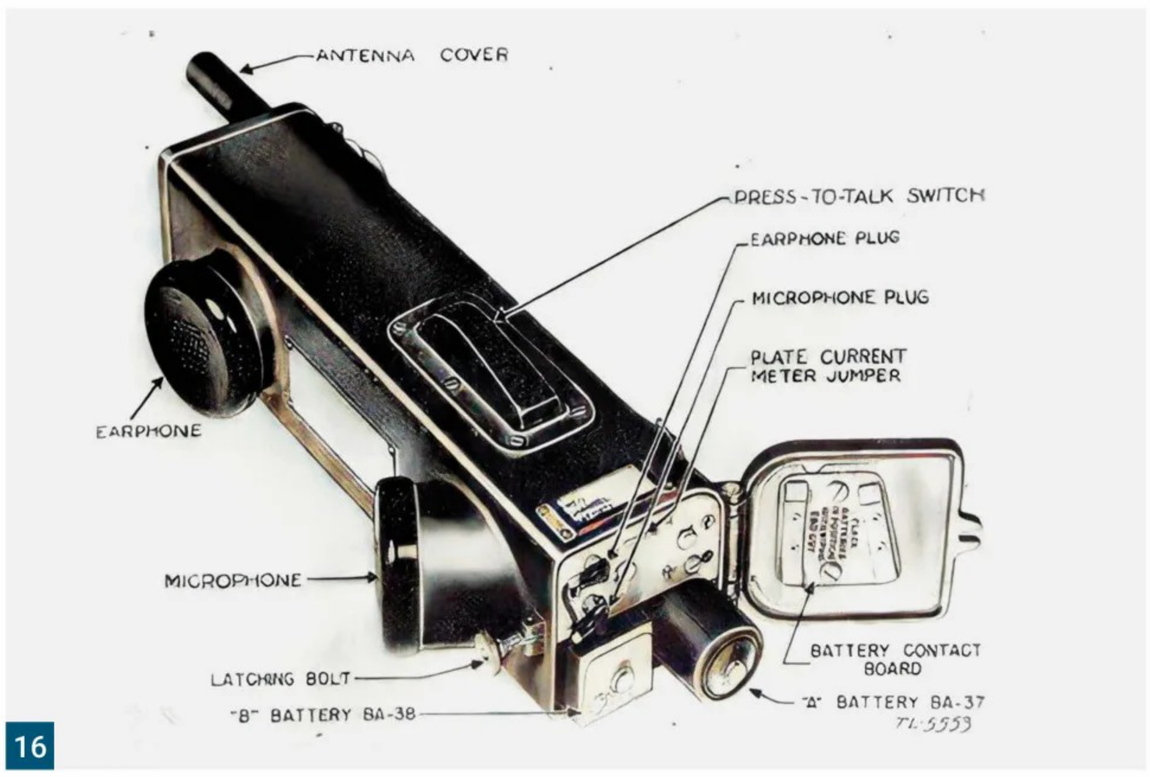

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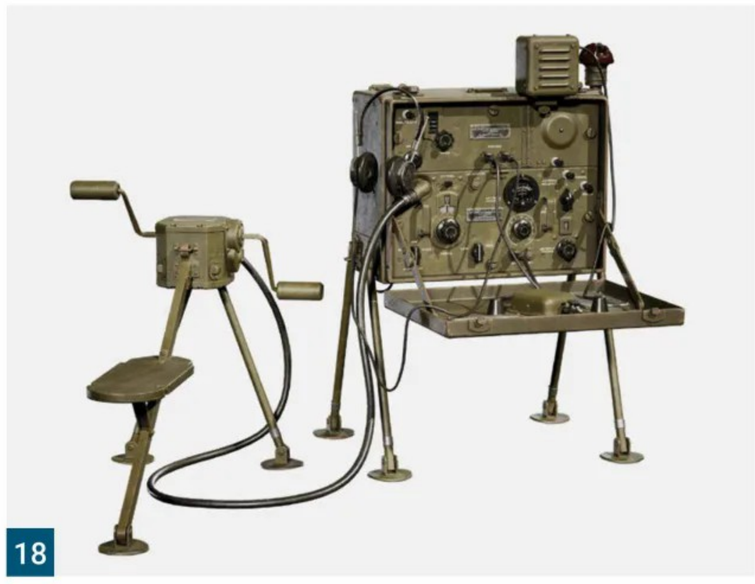
Fig. 10: The lightweight 19kg MAB Para-Talkie, became the US Marine Corps tactical radio for beach assaults, reconnaissance and ship-to-shore communication. It was later employed as a two-way ground-to-air radio by clandestine OSS agents. *(greenradio.de)* Fig. 11: International Military Antiques sold this MAB radio as 'previously unissued', complete with carry-case, transmitter, antenna, microphone and headset, but minus its battery. Price was undisclosed, but other similar complete sets sold for between £1,500 and £1,900. *(Ima-sa.com)* Fig. 12: This colourised illustration, from the *MAB Instruction Book 1942*, depicts the portability of the radio when set-up as a backpack. The skull cap allows use of the CTE-49213 headset and CTE-51042 handset when wearing a steel helmet. Fig. 13: The SCR-536 design breakthrough in 1942 produced the world's first hand-held, self-contained Handie-Talkie (two-way radio). The outstanding feature of the compact design was its extreme portability; the downside being its short range. Fig. 14: The US Marine Corps were equipped with the SCR-536 handie-talkie for all their amphibious landings in the Pacific from 1943 onwards. This photograph was taken in 1945 on Iwo Jima. Fig. 15: This typical movie scene, of a soldier calling in fire support on his SCR-536 radio from ships, aircraft or artillery stationed several miles away, is pure fiction, because its range varied between 100yds to a maximum of one mile depending upon the terrain! Fig. 16: Diagram from the *SCR-536 Technical Manual 1943* illustrating the integral battery compartment and other features. Fig. 17: Handie-Talkie meets Walkie-Talkie! Carrying the platoon level SCR-536 (left) and the company level SCR-300 (right) both at the same time, is the ultimate in radio portability. *(90thidpg.us-Enhance)*

tal controlled with a seven-valve circuit for a range of one mile depending upon terrain, but up to five miles over water, thus was very compact for the technology available at the time. The CCI transmitter-receiver and battery fit into a waterproof plastic case sized 31.1 x 63.5 x 41.9cm and weighing 19kg, which was carried in a canvas haversack with the A15/CCI extendable antenna and CTE-51042 handset. Currently there are two complete MAB sets for sale, including carry-bag and accessories. Paratroopers.fr are asking €1,750 (£1,500) and on vintageproductions.com the asking price is US$2,100 (£1,690).

SCR-536 (BC-611) Handie-Talkie is considered to be the first modern hand-held, self-contained Handie-Talkie (two-way radio). The outstanding feature of its design was its extreme portability. SCR-536-A entered service in November 1942 during Operation Torch, the Allied invasion of French North Africa, followed by incremental wartime modifications, culminating in the model (F). It was developed by Galvin Manufacturing in 1940 (now Motorola Solutions) for paratroopers due to its small size and weight of 40.0 x 13.6 x 9.2cm and 2.3kg respectively. During 1943-44 it saw extensive service in Sicily, Italy and North West Europe as an infantry company-platoon communication device and by the end of the war over 130,000 sets had been issued. However, its limited range of only up to one mile made it strictly an intra-company radio. The SCR-536 incorporated five vacuum tubes (valves) in a waterproof case, but there was no external power switch. The operator simply pulled out or pushed in the antenna, which operated an internal switch to turn the radio on or off. The power was supplied by a BA-37 1.5V dry battery for the filament supply and a 103.5V BA-38 battery for the plate supply, providing a power output of 360mW. The unit operated in AM voice mode on a frequency of 3.5-6MHz on any one of 50 channels. Plug-in crystals and coils were used to control the frequency of the BC-611 transceiver. The antenna was a one metre fully retractable telescoping rod. A major disadvantage was that the SCR-536 was not compatible with the SCR-300, but only with other SCR-536s. The SCR-536 is one of the most popular radios today to be restored and operated by military radio collectors. Expect to pay £350-£450 for a single unit in good condition. Foxhole 8467 (eBay) have a pair of units from the estate of a long-time collector in excellent condition for US$1,750 (£1,400). For the reenactor, full scale working replicas are plentiful for under £150.

SCR-284 (BC-654) is a heavy AM set for communication between a regiment and its battalions. Available in two versions: a man-packed set carried in three loads, including generator and accessories, or a vehicle-mounted model commonly carried in jeeps. The man-portable version is set up on extendable legs and could not be operated on the move. The SCR-284 was first introduced in North Africa during Operation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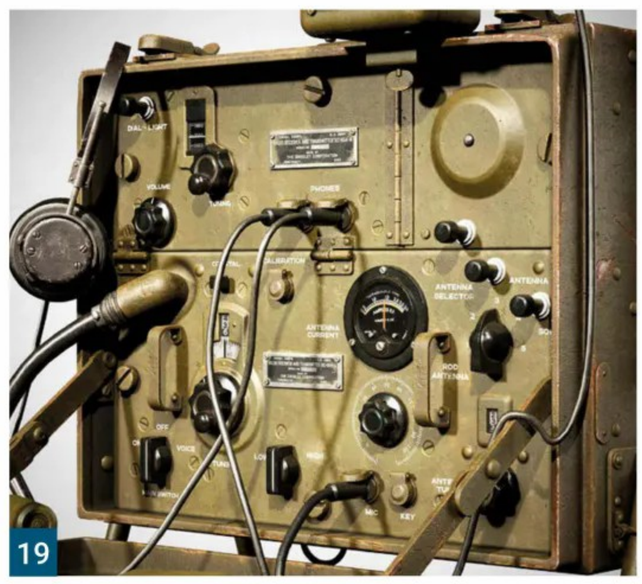
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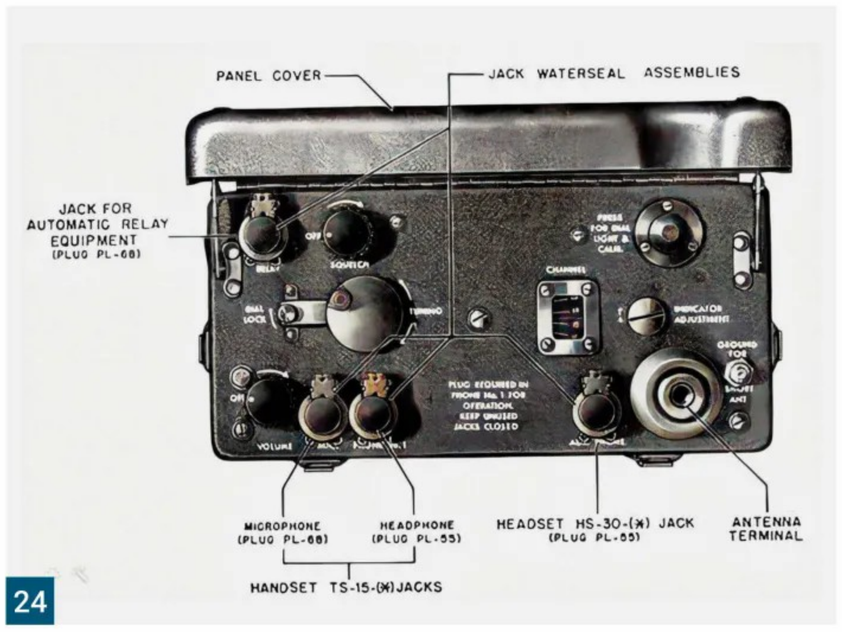

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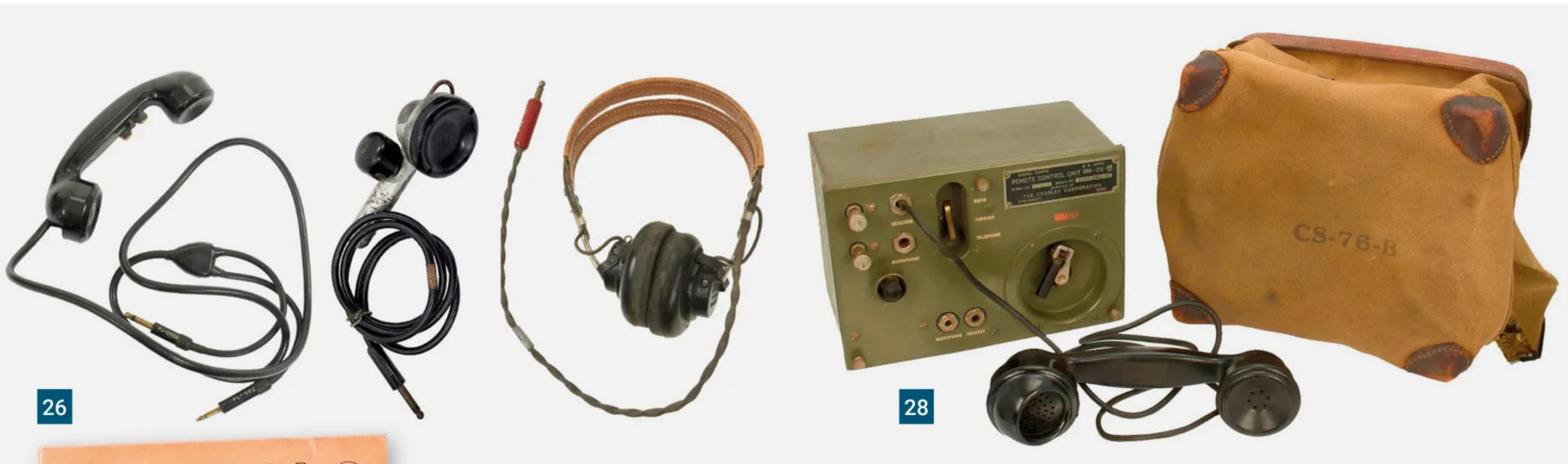
Fig. 18: The SCR-284 is a heavy AM set for communication between regiment and battalion and could not be operated on the move. In the field it was set up on extendable legs. The PE-104 vibrator powers the receiver when using the hand-cranked GN-45 generator. *(artstation.com)* Fig. 19: First introduced in 1942 for the invasion of North Africa, the SCR-284 saw service in the Pacific war and in NW Europe, when over 50,000 sets were allocated to US forces in June 1944 for D-Day. *(artstation.com)* Fig. 20: Merrill's Marauders in a clearing behind Japanese lines operating an SCR-284 radio. Note the mules in the background, which were used to transport the set in three separate 17kg loads. *(n6cc.com)* Fig. 21: This SCR-284 is being operated aboard an amphibious landing vessel. EIMAC Inc. produced radio power vacuum tubes (valves) and this was the cover picture of their news magazine for June 1945. *(n6cc.com)* Fig. 22: Nicknamed the true Walkie-Talkie, the SCR-300 launched in 1943. Galvin Inc. (today's Motorola) turned to the FM band as the solution for superior communication, range and portability, to create what is arguably the best portable radio of WWII. *(radiomilitari.com)* Fig. 23: A view of the SCR-300's top control panel and its HS-30 handset. *(wa8ywo.com)* Fig. 24: This control panel diagram is illustrated in the free online *SCR-300 Technical Manual 1943*, found at *repeater-builder.com/Motorola/pdfs/scr300.pdf* Fig. 25: A US First Army signalman at a crossroads in Germany in 1945. The SCR-300 man-pack radio, with a range up to eight miles, was light enough to be operated by one man on the move.



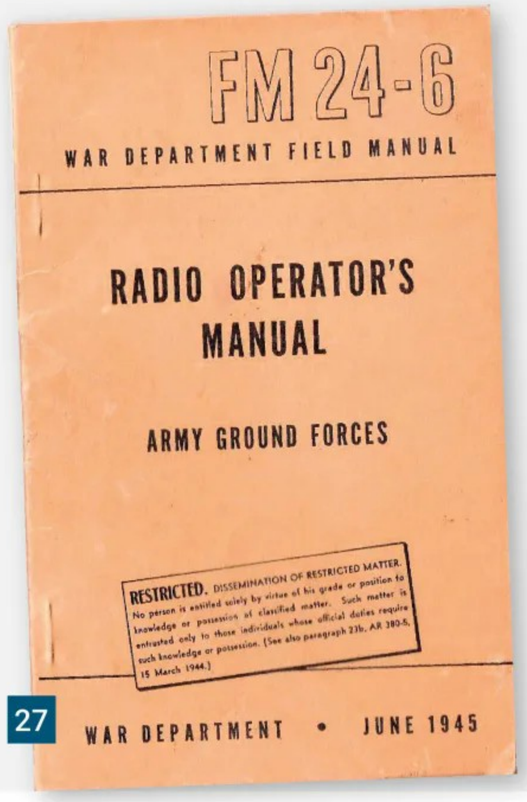


Fig. 26: Genuine US portable radio necessities. L-R: T-15 handset, T-17 microphone, HB-7 headset. These and other similar accessories are plentiful on eBay for around the £60 mark. Fig. 27: This booklet, *Radio Operators Manual - Army Ground Forces 1945,* is free online at *archive.org/details/m24-6*. Original US WWII radio manuals come up on eBay all the time for about £10-£15 each. Fig. 28: Expect to pay £80-£200 for one of these RM-29-A Remote Control Units for the SCR-284, dependent upon condition and if it's sold with its original CS-76-B canvas bag. *(ima-usa.com)*

Torch in November 1942 and was the first beach radio to network with US warships to coordinate supporting naval gunfire. The set was also used from December 1943 by Merrill's Marauders (5307th Long Range Penetration Group) to communicate with USAAF transport supply drops behind the Japanese lines in the China-Burma-India theatre. The SCR-284 also saw wide service at Guadalcanal, New Guinea and in the D-Day invasion of Normandy, when over 50,000 sets were employed by the 1st US Army. Frequency coverage is 3.8-5.8MHz, transmitted in Voice or CW Morse. In field use, the hand-cranked GN-45 generator powers the transmitter and via the PE-104 vibrator power supply, the receiver. Transmitter power is up to 17W CW, but less on voice. The optional Remote Control Unit RM-29-A provides flexible control over a two-wire telephone line in various combinations. The main component is the BC-654 transmitter/receiver, sized 45.7 x 35.5 x 24.7cm and weighing 20kg, but when the battery, generator, legs, antenna and accessories are added, the total weight is 50kg, which was divided into three sections for transport. Estimates of wartime production vary between 40,000 (Galvin/Motorola's own production) and 130,000. The latter assumes that contracts were issued to other manufacturers. Immediately after the war thousands of surplus BC-684s were sold for as little as US$15! The basic B-654 transceiver (untested) will cost US$200-US$500 (£160-£400) but complete SCR-284s with base, frame, power unit, antenna sections, speaker, straps and accessories are currently being advertised at US$1,250-US$1,500 (£1,000-£1,200).

The first true Walkie-Talkie: 1943-45

SCR-300 (BC-1000). Following Galvin Manufacturing Corporation's success with the hand-held two-way AM SCR-536 radio in 1942 (nicknamed the Handie-Talkie, see above) the manufacturer approached the US Signal Corps claiming that they could do better, because the range of the SCR-536 of only a quarter of a mile was not enough for communication between advancing troops and company/battalion headquarters situated further back. A new lightweight portable radio was needed with a range of five to ten miles, but still light enough to be carried and operated by one man. The answer, said Galvin's engineers, was to utilise the FM (Frequency Modulation) band, which provided superior interference-free radio communication. Full scale production ramped up in early 1942 after it was found that a range of eight miles was feasible. SCR-300, nicknamed the true Walkie-Talkie, made its combat debut during the invasion of Italy in September 1943 and went on to become standard issue to Army Artillery Observers, Army Airborne, USN and USMC in the Pacific War. The frequency range was 40-48MHz using the 6.8kg BA-70 battery with an operational life of 20-25 hours producing 0.3W. The optional, much lighter 4kg BA-80 battery lasted 12-15 hours. The BC-1000 transmitter-receiver and battery, weighing 16kg, was carried in a backpack with the aid of a canvas harness. Using the lighter BA-80 battery the weight was reduced to 14.6kg. A short 83cm whip, or a nine-sectional 3.25m antenna, was optional depending on circumstances. The HS-30 headset and TS-15 handset completed the package. Prices vary for this radio, from £750 for just the basic BC-1000 radio transceiver, increasing substantially for an SCR-300 in good condition with all its accessories and backpack straps, ranging from £950 to £1,980. It's therefore recommended to shop around, including French and Belgian websites, which are equally active in selling this radio as are the USA websites.

Collecting WWII American radio accessories and spare parts

American mass production during WWII has resulted in the odd military radio being found in a virtually new, unpacked condition, but when these come up for sale expect to pay a premium price. Most surplus US military radio sets and accessories are offered by worldwide specialist online dealers, usually 'as seen' and untested. For US WWII sets, first try Worthpoint.com, International Military Antiques (ima-usa.com) and ICMS Militaria (imcsmilitaria.com). Unsurprisingly, most US military radio accessories are found on eBay, where the average cost for a genuine WWII handset, headset or microphone is around the £50 mark. For free online US radio manuals check out tuberadio.com/robinson/Manuals. When considering taking up vintage radio collecting, it's important to always factor in the freight cost, particularly for heavy sets such as the SCR-284, which can often make what appears to be a great deal price prohibitive.

Acknowledgement

Thanks **Antonio Fucci** at **www.radiomilitari.com** Fano, Italy, and **Tim Sammons** at **www.N6CC.com San Ramon CA, USA.** Prices and availability of sets mentioned were current in late 2023. **PW**

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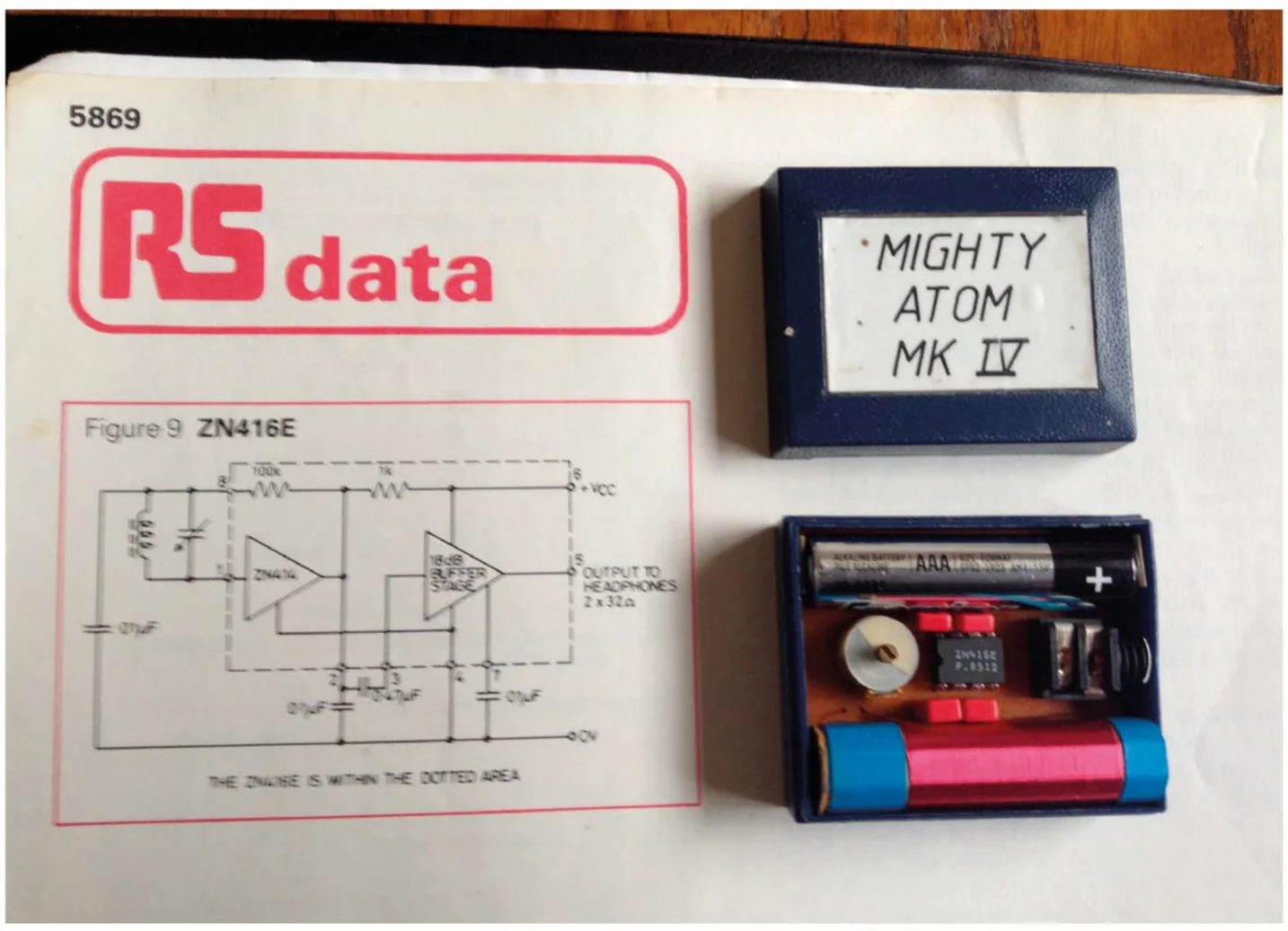

Simple receivers

Dear Don,
Another excellent issue. The article by **Daimon Tilley G4USI** brought back memories from the past.

I too played with the ZN414 and built small medium wave radio sets. Our local BBC home service on 276m came from the Postwick transmitter a few miles east of the city of Norwich so we had very good signals into the city. In the mid to late eighties our son built this minute MW radio as a school project (see photo); they were fortunate to have such a science teacher!

This example used a ZN416E and was one of many at that time, no doubt these can still be found on the internet.

Paul Burgess G3VPT
Norwich

Observing the Universe

Dear Don,
Having just turned to the *Letters* pages in this month's *PW* I couldn't believe what I was reading in the first letter from **Ray Howes G4OWY**.
Ray states that scientists are limited because they can only 'see' visible light. Sorry Ray, utter rubbish! Scientists can 'see', with appropriate instruments, the entire spectrum from essentially 0 Hertz through all the radio frequencies, then IR, visible light, UV and gamma rays, in the exaHertz region. We can't 'see' so-called dark matter because it doesn't radiate in any of that spectrum, not just visible light.

Ray then goes on to pontificate about the mystery of wave-particle duality, at which point I gave up. There is a great deal of speculation and many theories which try to 'explain' the weirdness of the quantum world, from the classical Copenhagen interpretation to more exotic theories, such as the many-worlds interpretation, and lots more besides. All the talk of 'holographic illusions' etc in Ray's missive is pure conjecture, or, some might say, bunkum! Ray has as much right as anyone to speculate on the mysteries of the quantum world and to be, in his words, a 'contrarian', but to present such speculation as fact is simply wrong.

Tim Kearsley G4WFT
Rushden, Northants

*(**Editor's comment**: Thanks Tim. I did, in my reply, point out, as you say, that we can see pretty much the whole electromagnetic spectrum nowadays. But, rightly, you also point out that wave/particle duality, etc remain something of a mystery. I am currently reading a book about the development of the atom bomb, which starts with the early work on the structure of the atom – the speed at which scientists went from a vague understanding through to Heisenberg's uncertainty principle, quantum physics, etc. is truly mind-blowing. Even **Einstein** got rather left behind ("God doesn't play dice" he said). But 80 years or more later and we are still at a loss to explain some of the more fundamental concepts that would bring the macro and micro worlds together.)*

PW combined format

Dear Don,
There are I know mixed views on the new topics from *RadioUser*. I realise that it was necessary for economic reasons and as an amateur feel it brings a greater diversity to the magazine. I am reading interesting articles on subjects that I previously knew nothing about but are still loosely linked to the hobby. The world is always changing and we need to keep up.

On a different note, my friend in Australia, **Peter VK3RV**, can obtain *PW* and has commented that he has seen the occasional letter from me in there!

John Sones M0AAO
Ipswich

*(**Editor's comment**: Thanks John. With such a wide range of activities under the broader topic of 'hobby radio' it can be hard to cover everything but I will try to continue bringing a variety of radio-related topics that are not necessarily specific to 'amateur radio'. And, yes, one of the benefits of our acquisition by Warners a few years ago is that an electronic version of* PW *is available, an advantage to overseas readers for whom the massive increases in postal costs has rendered a paper subscription unsustainable.)*

EKCO

Dear Don,
Recently, a copy of the February 2024 issue of *Practical Wireless* was loaned to me.

I could recall the journal's title, which I first read in the late 1940s; it may have have been a Newnes publication then. Your banner title proudly states it to have been the UK's No.1 Amateur Radio Magazine since 1932. In that case, you might Imagine my dismay on page 52 that the author's *Vintage TV and Radio* article quoting 'ECKO' twice.

For such a well-regarded Company, noted for its innovative designs and the wide range of its products, formally incorporated in 1926 as E K Cole Ltd, traded for 40 years as EKCO, until it merged with Pye Ltd of Cambridge. I am surprised the error was not picked up at the galley-proof stage; however, I trust you will forgive my reminding you and your team that the Company trademark was derived from the founder's name: **Eric Kirkham Cole**, thus EKCO.

John M Brown OBE

(Proud to have been an EKCO Indentured five-year Student Apprentice 1950-55).

*(**Editor's comment**: Thanks John and you are quite right. Our apologies. The good news is that we used the correct EKCO in the March issue of the same column. And, yes,* PW *was once published by Newnes.)*

The Face Behind the Call PW March 2024

Dear Don,

I didn't even open the front cover of March 2024 copy when my interest was deeply piqued; I refer to the name **Mark Stuckey**. I did not connect the name with BBC's *Repair Shop* either, not recognising the face. I had seen the episode where he tackled the EKCO receiver and made certain wasted comments to my wife concerning technical matters.

My mother's maiden name was Stuckey with links to Norwich and Essex through her cousins whom I never met.

Another link to amateur radio, of course but Mark is not the only link to the hobby by having a callsign.

My mother, **Brenda Stuckey** (when single) visited a now late cousin in Wickford, Essex. His name was **Alec Turner G3YPN**. She returned to my house where she stayed for her London visit and stated that Alec was like me with a room with radios and antennas in the garden.

I spoke with Alec on the phone and we exchanged information, including RSARS numbers. This being the first time we'd met each other another surprise was to be had, my RSARS number 1132 was just one lower than his. I never got to meet Alec, although we had stated we would make steps to do so. Alec passed on a few months later but my wife and I attended his funeral.

Whilst the family were not over talkative to us, we spoke at length with the radio amateurs there and who shared an AM slot on 80 at the weekend.

I doubt any familial link to Mark Stuckey G0SQK but it is interesting for the hobby to be at question too.

Paul Beaumont G7VAK

London

Gordon King

Dear Don,

I was delighted (*Your Letters*, February) to see that **Gordon J King G4VFV** has been commemorated by way of a blue plaque from the Torbay Civic Society and I am pleased to see that the plaque describes Gordon as a 'technical author'.

In the 1960s and 1970s I read a lot of audio and hi-fi magazines and these often published reviews of audio equipment such as amplifiers, tuners and speakers. The three predominant (and pre-eminent) authors were **Fred Judd G2BCX** (who also wrote for *PW*), **Angus McKenzie MBE G3OSS** and Gordon J King (this was long before his G4VFV licence was issued and I wonder if he held a class B licence).

I tended to place most weight on the reviews written by Gordon. They seemed more detailed and incisive than reviews by Fred and Angus though this might simply be due to my lack of knowledge regarding electronics. I shall have to find the magazines and read the reviews again to see if my preference has changed.

I noticed that some equipment gave consistent results regardless of who reviewed it whereas for other equipment the results varied from one review to the next. I suspected that this might be due to different authors using different techniques but in the case of one manufacturer the reason that its equipment consistently produced the same results was more mundane. The manufacturer sent out the same item to all the reviewers.

Ian Brothwell G4EAN

Nottingham

Silent keys and club licences

Dear Don,

I had an informal chat with Ofcom a few years ago regarding club licences and it seems there might be a problem. When the holder of a club licence becomes a silent key the club licence would be terminated (club licences are held by a person and not by the club) and the callsign would probably go into the pool of available callsigns. It would not automatically be offered to the club. The club may have to bid along with other interested parties for the licence and callsign.

One get-around might be for the club licensee to let Ofcom know that in the event of the club licensee being unable to hold the licence and callsign, it should be offered to someone else in the club nominated by the club's committee.

I would be interested to hear if any club has had problems retaining the club licence and callsign when the licensee has become a silent key.

Ian Brothwell G4EAN

Nottingham

Comet CHA-350HD/BXII antenna

Dear Don,

Luckily, the March 2024 issue of *PW* had plenty of interesting content to keep me suitably

entertained. As I write this particular missive, I'm incarcerated in hospital. Well, old age ain't for cissies (and I can still step off a pavement without falling over). This time though, unlike my usual race-type reading style, I've had to force myself to slow down, take one word at a time rather than leap through several paragraphs on each page as I usually do. Trouble is, now I've read *PW* three times and upside down; I could recite most of its contents verbatim.

Onto more relevant matters. The Comet CHA-250HD/BXII multi-band vertical antenna. At this juncture, I should say that I enjoyed reading **Steve's (PJ4DX)** review of it. I really did. Anyhow, like Steve commented, I immediately knew how and why it did what it did too, The seeming 'magic' of a 49:1 transformer. Of course, it's not literally 'magic'. But when so many flowers are born to blush unseen, I like to think that perhaps that is 'magic'.

This antenna does indeed serve a need – the very small garden antenna conundrum. Screwed together and up and running in 'just a few minutes'. What more could you possibly want? Plus ten ham bands too. And all shiny brand new. Oh, before I move on further (again, as Steve commented), if I bought one I'd definitely ground mount it and tie a few radials to it. That would really perk it up. Maybe like chalk and cheese? But of course, not everyone can do that. And yes, the Comet CHA-250HD/BXII is a 'compromise' antenna. There again, in its defence, every antenna is a compromise in some way.

So yes, I can see why the Comet antenna is a tempting purchase and probably why many people for one reason or the other, will get the plastic out and order one. But because I prefer to spend a lot less money on antennas than I do in fancy restaurants (and I love to look for bargains too, as they give me such pleasure), I'd rather build them myself. So, I suspect you might know where this is going? You'd be right.

Because last September/October I knocked up a similar DIY HF vertical antenna using a 49:1 type balun too. In a nutshell, about 30ft of wire helically wound on a 16ft pole, ground-mounted with a few radials. A bit Heath-Robinson, but it worked a treat. Even without the radials. And the cost? Obviously not £350. More like £40. And no, to be fair, as it is it probably wouldn't survive a 70mph wind either. In fact, I've sent Don an article describing this very antenna.

Ray Howes G4OWY/G6AUW
Weymouth

(***Editor's comment***: *Always good to hear from you Ray but sorry to learn about the hospitalisation. Hopefully you are now recovered and back home. I agree that antennas remain an area of the hobby where we can 'roll our own' and experiment until the cows come home. But I do understand why some amateurs will want to buy commercial – it can be a way of getting on the air quickly and, in this case, having something that can be assembled 'in the field' should the need arise. My own latest antenna, incidentally, is a 160m inverted-L that I put up at my son's place, with a 20m Spiderpole mast (22m with the top section removed) and 2:1 transformer at the base, plus a bunch of ground-mounted radials. It works a treat and got me 8R7X for a 'new one' on the band. But I realise that most readers don't have the space to put up such a monster!)*

RalliesListings

Dear Don,
The Rallies Listing is usually the first thing we turn to. Last year we managed to attend one, at Milton Keynes, and found it 'small but perfectly formed'.

What we do observe is that the attendees are not getting any younger, also the state of the roads is bad, some wheeled armour, such as a surplus armoured personnel carrier might cope with the potholes and missing drain covers (five tyres in two months!).

William Blankley G8CMK
Thelma BlankleyG8SBJ
St Leonards on Sea

(***Editor's comment***: *Thanks both. Yes, you are right, a sign of the gradual aging of the hobby, unfortunately. Many rallies are closing a lot earlier than they used to. Shame of course and, as you say, the state of the roads certainly doesn't help! I also suspect a number of rallies lost momentum during COVID – let's hope they bounce back in the next few years.)*

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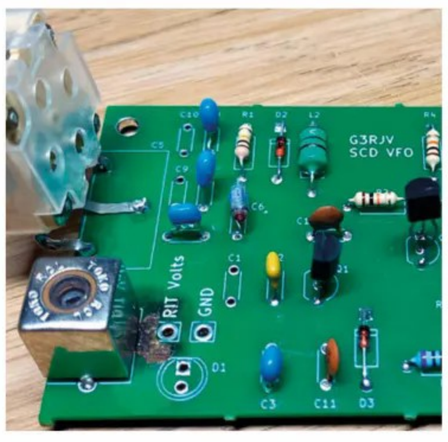

HF-100 REVIEW: Richard Constantine G3UGF reviews an unusual compact antenna from Taiwan.
PORTABLE MILITARY RADIO COMMUNICATIONS OF WWII: Graham Caldwell completes his series of articles on WWII portable radio equipment, including their collecting potential. This issue will cover Imperial Japan and the Soviet Union.
RADIO IN THE BRITISH ISLES IN DECEMBER: Chris Burger ZS6EZ says "DXFC ruined my life!"
JUNK TO JOY: Billy McFarland GM6DX describes how to construct a simple ARDF antenna.
A WSPR BEACON: Colin Campbell MM5AGM takes readers through the design and build of an Arduino-based WSPR beacon.
AN EASY ARDUINO NANO VFO AND SIGNAL GENERATOR: Steve Macdonald G4AQB offers a simple-to-build project based on low-cost modules.

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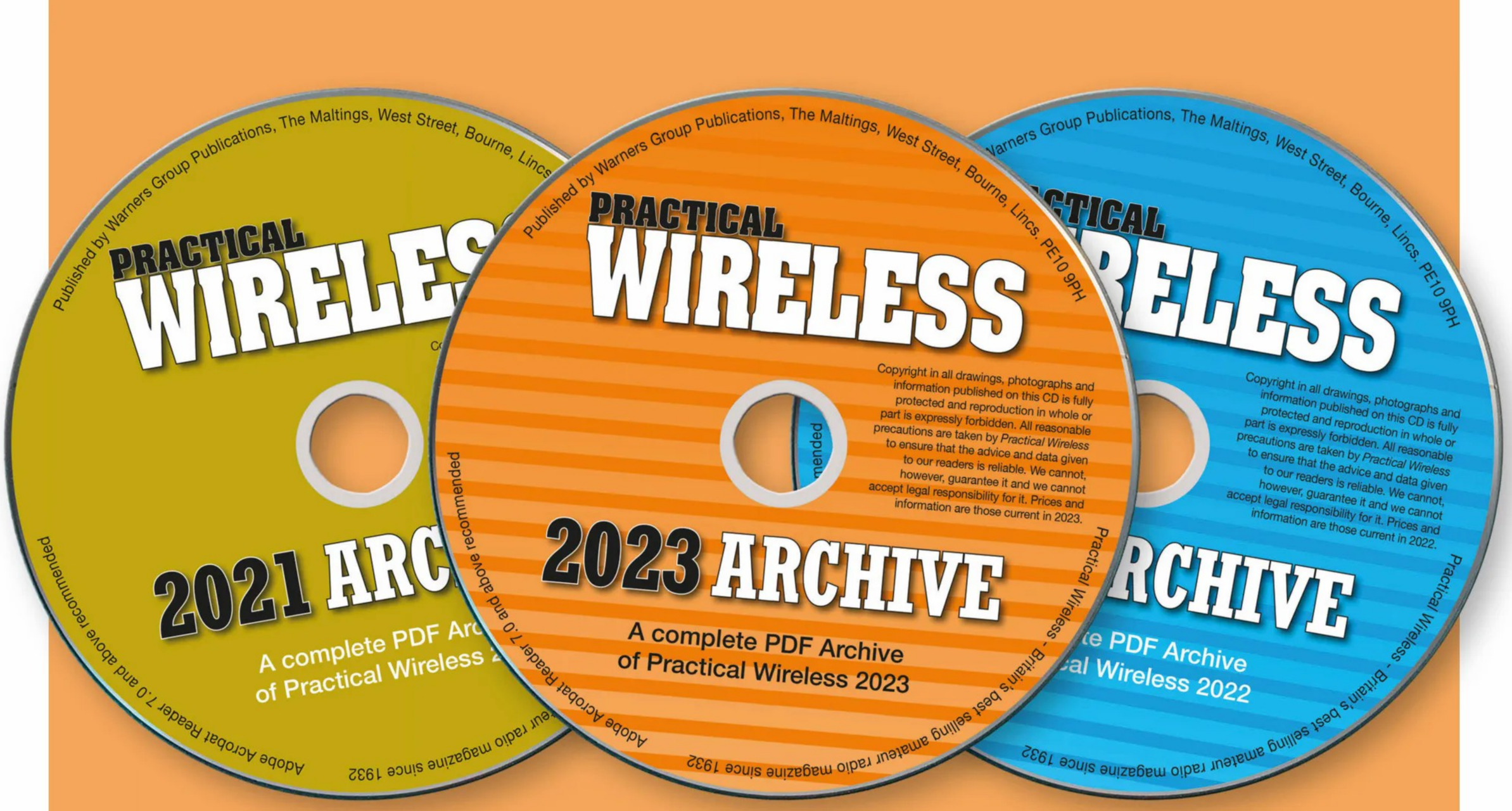

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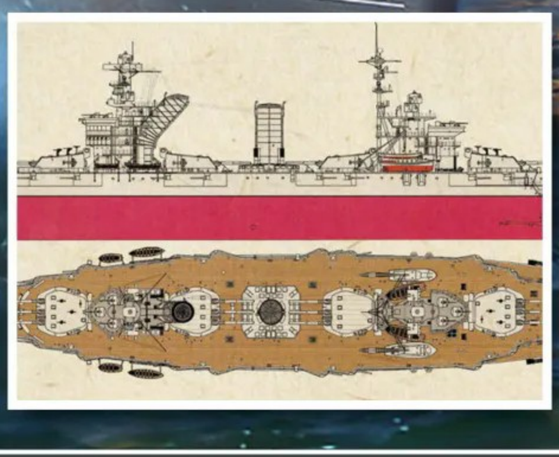

+ KEY NAVAL BATTLES

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

+ ESSENTIAL NAVY MEDIA

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

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

BATTLESHIPS OF WWII

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Cover image courtesy of World of Warships

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

Welcome

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

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

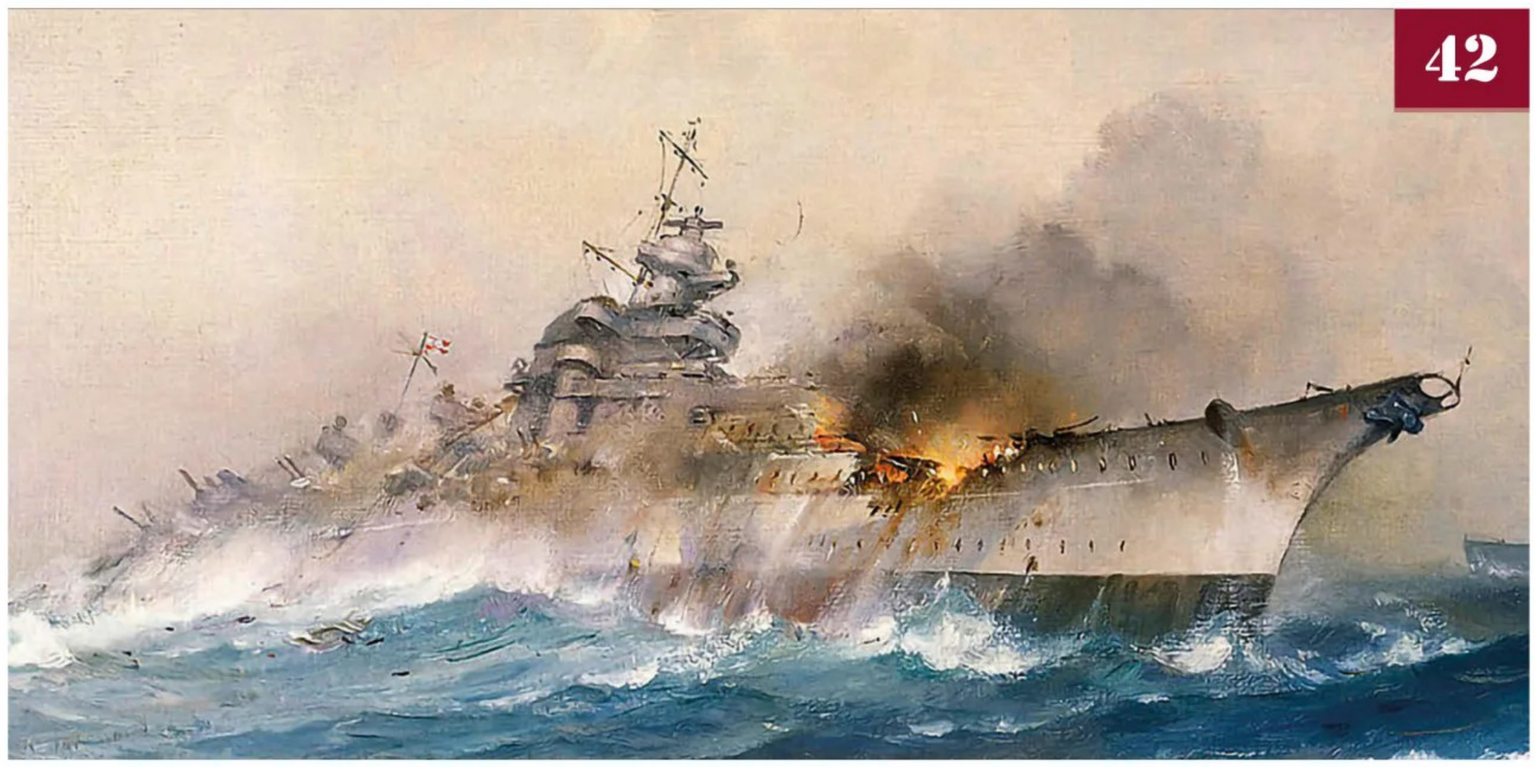
Here you will find 85 battleships and pocket battleships, with schematics for each class, a build history and their role in WWII. They are organised by country and then by class, such as the Queen Elizabeth class, where the ships had similar characteristics. There are specification panels for all classes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

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

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

Duncan Evans, Editor

BATTLESHIPS OF WWII



ALLIED BATTLESHIPS

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

BRITISH SHIPS

FRENCH SHIPS

AMERICAN SHIPS

SOVIET SHIPS

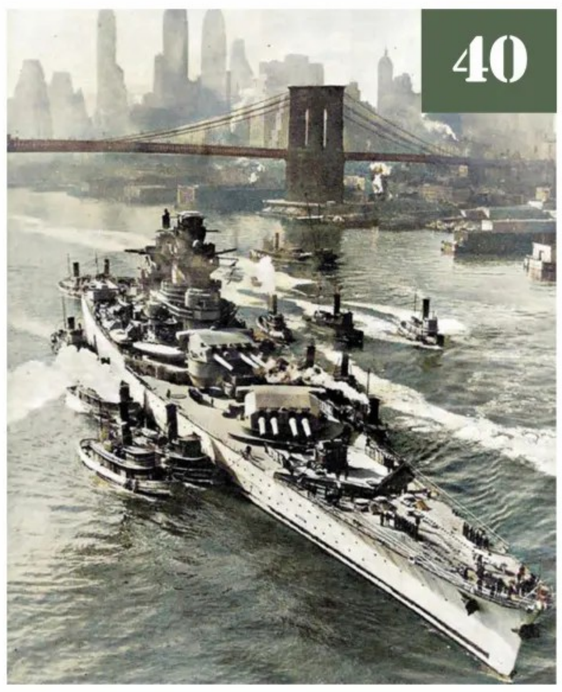
AXIS BATTLESHIPS

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

GERMAN SHIPS

JAPANESE SHIPS

ITALIAN SHIPS

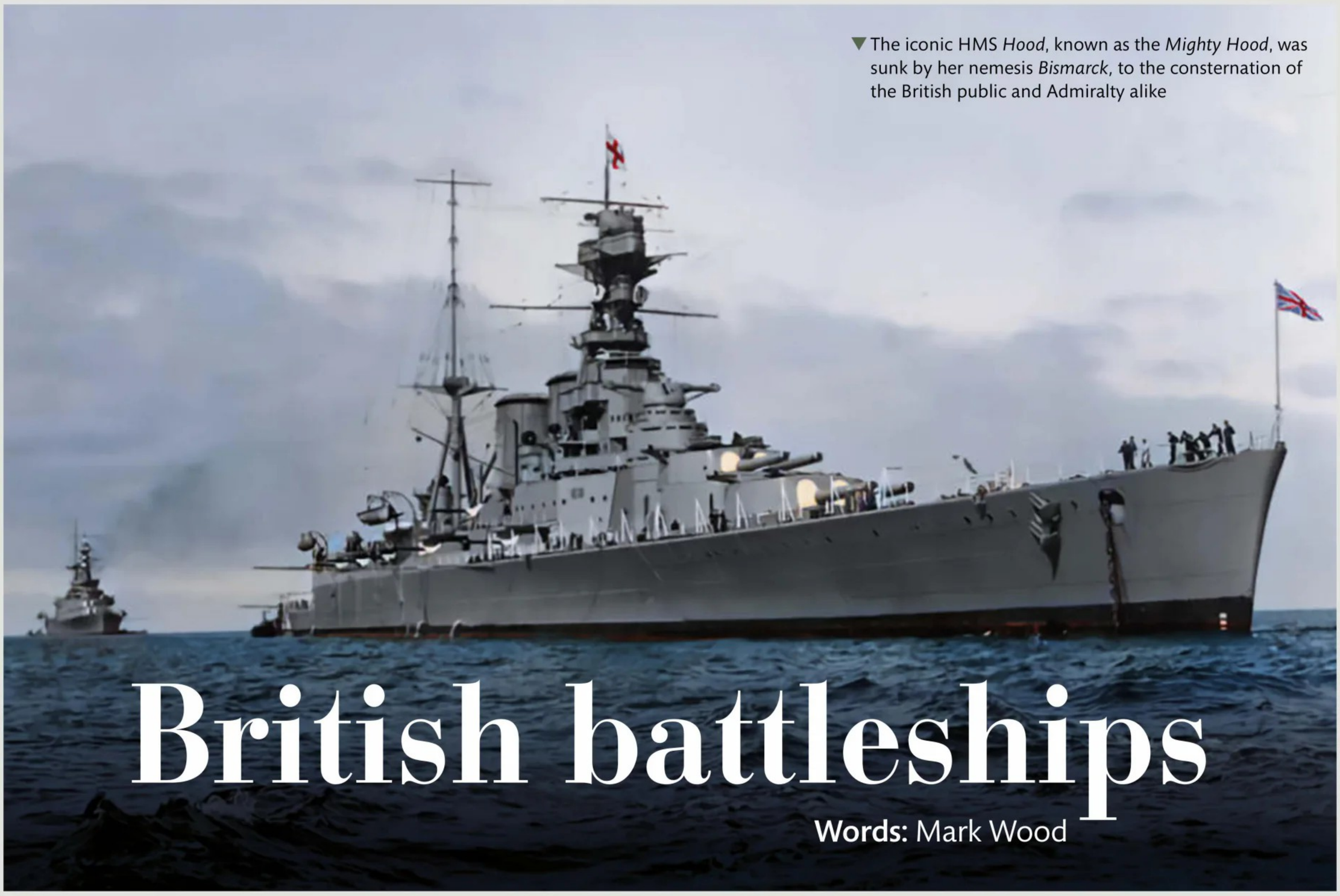


KEY NAVAL BATTLES

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

NAVY MEDIA

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



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

British battleships

Words: Mark Wood

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

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

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

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

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

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

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

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

Raid on Taranto

Words: John C Pursley

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

Although at the time, the British Royal Navy was the strongest sea power afloat, it was spread out across the globe, and had no modern battleships. The number of Italian Regia Marina (Royal Navy) capital ships stationed in the Mediterranean theatre outnumbered British vessels, but the British did have an aircraft carrier, whereas the Italians depended upon airbases surrounding the contested waters.

Taranto, Italy was the home port of the First Squadron of the Regia Marina fleet. Their force consisted of six battleships (two of the modern Littorio class and their older ships had been extensively modified), seven heavy cruisers, seven light cruisers and 13 destroyers.

Although the Italians commanded a strategic central position, the British had bases at the western and eastern ends of the Mediterranean whose forces could, if brought together, pose a significant threat to the Italian fleet.

The base locations became a real problem for Britain when the war began,

▲ *Italian Naval harbour positions around the Mediterranean in 1940*

especially in June 1940 when fighting between British and Italian forces in North Africa broke out. Both sides now needed to transport men, equipment, and supplies onto the African continent.

For the Italians the challenge was minimal as they only had to cross one of the narrower parts of the Mediterranean. The British, on the other hand were not so fortunate and their options limited to two less than satisfactory choices. They could expose their ships to attacks from Italian air, surface naval ships, and submarines by traveling down the European coastline, through Gibraltar, then making a lengthwise crossing of the Mediterranean, past Sicily, and Italy.

The second choice was safer but time consuming and would expend a considerable amount of fuel as the route to Egypt required sailing down the entire west coast of Africa, back north along the east coast, through the Red Sea and the Suez Canal. The situation was compounded after France was invaded by the Germans which eliminated French naval assistance. The British could not sit by and lose the war in Africa simply because of supply problems. They had to do something to counter the Italian advantage.

The Italian posture in the central Mediterranean offered the opportunity to defeat the Royal Navy, except for two serious issues with their fleet. The Italians did not have enough oil to maintain their ships at sea for long periods as would be necessary to gain naval superiority in the Mediterranean and they lacked confidence needed to threaten or engage in a sea battle.

Planning the attack

Attacking the Italians at Taranto was not a new concept as the idea of launching

▲ *A Swordfish practices shallow water torpedo attacks in preparation for the raid on Taranto*

▲ *Swordfish 4A torpedoed Conti di Cavour. Her crew survived but were captured*

BATTLE STATS

United Kingdom

COMMANDERS
Admiral of the Fleet Andrew Cunningham
Vice Admiral Lumley Lyster

FORCES
1 aircraft carrier • 2 heavy cruisers • 2 light cruisers
4 destroyers • 21 torpedo bombers

CASUALTIES
Killed: 2 • Captured: 2 • 2 aircraft lost

Italy

COMMANDERS
Admiral Inigio Campioni

FORCES
6 battleships • 7 heavy cruisers
7 light destroyers • 13 destroyers

CASUALTIES
Killed: 59 • Wounded: 600
2 fighters lost • 3 ships disabled • 3 ships damaged

▲ *Swordfish lining up in anticipation of the Taranto raid (Warthunder.com)*

an air attack against the fleet was first conceived in the fall of 1938 when the commander of the British Mediterranean Fleet, Admiral Sir Dudley Pound, expressed concern over the survival probabilities of the aircraft carrier HMS *Glorious* in case of a war with Italy.

The Captain of the carrier, Lumley Lister, told the Admiral that Fairey Swordfish torpedo bombers were suitable for a nighttime attack, and that the Royal Navy's Fleet Air Arm was capable of such an operation.

The Fairey Swordfish was one of aerial warfare's improbable heroes. Entering service in 1936, it looked like a relic from WWI. In an era of all-metal monoplanes, it was a fabric skinned, two-seater biplane. With a top speed of 143mph the plane was incredibly slow. So slow, it could be argued that the lack of speed was a blessing in disguise as faster modern enemy planes kept overshooting them while attacking.

Admiral Pound had the foresight to realise the significance of this proposition and ordered training to commence for such an operation. At the time an airborne attack against ships from a carrier was considered so revolutionary, that training was performed in utmost secrecy.

The shallow waters of the Italian port posed a significant technological challenge as British aerial torpedoes could only be dropped into water at least 75ft deep lest they hit the bottom. The harbour at Taranto was only about 39ft.

To overcome the problem, engineers designed a system that would force the torpedo to land with a belly splash in lieu of a nose-dive. A rotating drum was attached under the belly of the Swordfish with one end of a cable wound around it, and the other end attached to the nose of the torpedo. Once the torpedo was released, it unspooled the cable as it fell. The nose of the torpedo was prevented from dipping downward by the tension of the cable. Once the torpedo hit the water, it would run close to the surface.

A month before WWII broke out Adm
Pound was replaced by Admiral Sir
Cunningham who was caught off
when Italian dictator Benito M
declared war on 10 June 19
military assets in the M
been previously redu
transferred to the
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READ THE FULL FEATURE HERE

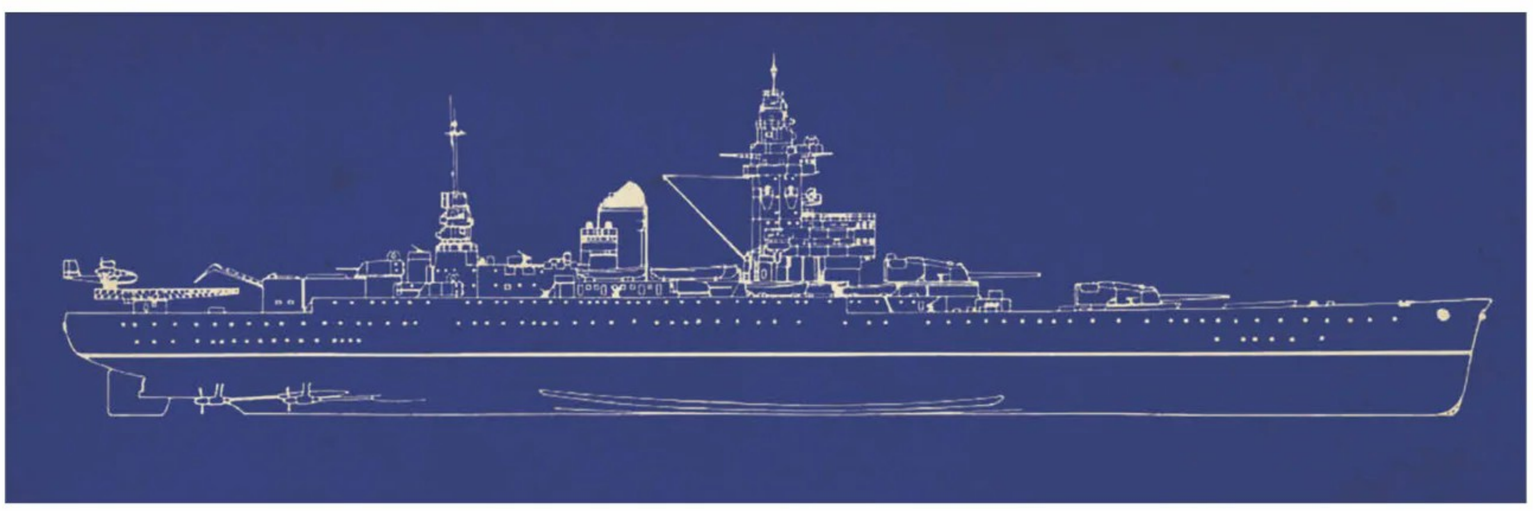
▼ *A side profile of Dunkerque highlighting her forward facing armament*

Dunkerque class

DUNKERQUE

It was 20 years after the Bretagne class before France commissioned further battleships, leading to the *Dunkerque* being laid down in 1932. This ship was very different from anything that had come before and was heavily influenced by the Washington Naval Treaty and the other treaty battleships around the world. Like the British Nelson class, *Dunkerque* had all her armament facing forward in two massive turrets, each of which housed four 330mm (8in) guns. Her armour was designed to counter the German *Deutschland's* 283mm guns and she had a top speed of 29.5 knots, far faster than the older designs of dreadnoughts that had previously served France. *Dunkerque* was launched in 1935 and entered service in 1937. With all her main armament facing forward, her fantail was an ideal launch point for aircraft so she had a catapult on her stern and carried two float planes to assist spotting for her guns and other general duties.

The outbreak of war saw *Dunkerque* serving in the Force de Raid alongside her sister ship *Strasbourg*, three light cruisers and eight destroyers. This force was based at Brest and was sent forth on the opening day of the war to counter any chance of a surprise naval attack from Germany's Deutschland class pocket battleships. The battleship was used on convoy work and joined HMS *Hood* in patrols to try to hunt down *Scharnhorst* and *Gneisenau.* Patrolling off Iceland highlighted defects in the design of *Dunkerque* and she had to drop to 10 knots to avoid damage due to her limited freeboard and light construction. On 11 December 1939, like many other French battleships, *Dunkerque* carried part of France's gold reserve to



▲ *Side profile of Strasbourg*

Canada and escorted troop ships back again. In the Spring of 1940 *Dunkerque* moved to the port of Mers-el-Kébir and she was here when France surrendered.

When the British fired on the French fleet, *Dunkerque* was tied up facing the wrong way so could not bring her guns to bear. The crew quickly loosed the anchor and manoeuvred to try to fire on HMS *Hood*. Although *Dunkerque* fired off several salvos, none hit the target. *Hood* was more accurate and the French battleship was hit by four 15in shells. These shells damaged the ship's rudder and the final shell destroyed one of her boilers and took out electrical power so her crew were forced to beach the ship to prevent her sinking. Most of the crew were evacuated and repairs began with the intention of allowing the ship to limp home to Toulon. On learning of this the British launched aircraft armed with torpedoes that caused further, extensive damage and the ship would have been lost by a hit to the magazine had her Captain not had the foresight to flood it at the first sign of British aircraft. After further emergency repairs the ship crawled back to Toulon for more permanent repairs.

When the Germans and Italians decided to seize the Vichy France ships, her crew opened the dock gates and tried to flood and sink the ship. By the time the Italians reached the battleship she was declared a complete loss and the Axis began to scrap her in situ but it was not until 1958 that the final remains of *Dunkerque* were sold for scrap.

STRASBOURG

The second ship of the Dunkerque class, *Strasbourg* was similar but not identical to her sister ship. It was decided to increase the armour thickness of the ship during construction and so she boasted an extra 58mm of armour on her belt and an extra 12mm of armour thickness on her decks. The combination of these increased her displacement by an extra 1,200 tons. *Strasbourg* was laid down in 1934 and launched two years later. She entered service with the French navy in 1938 and joined *Dunkerque* in April 1939 as the 1st Battle Squadron. *Strasbourg* received two identification tripes on her funnel in comparison to *Dunkerque*'s one to allow the two vessels to be quickly told apart. At the outbreak of war *Strasbourg* completed her duties in tandem with *Dunkerque* until October 1939 when she joined HMS *Hermes* and a pair of destroyers to patrol the central Atlantic. Although the patrol was mostly uneventful, *Strasbourg* did

▼ *The twin turrets of Strasbourg seen from the bow*

SPECIFICATIONS

Dunkerque

Class: Dunkerque
Displacement: 26,500 tonnes
Length: 214.5m (703ft 9in)
Beam: 31.08m (102ft)
Draft: 8.7m (28ft 6.5in)
Speed: 29.5 knots
Range: 14,537km (9,033 miles)
Crew: 1381-1431 men
Armament: 8 x 330mm guns • 16 x 130mm guns • 8 x 37mm AA guns • 32 x 13.2mm AA MGs
Armour: Deck – 11.5cm (4.5in), Waterline belt – 22.5cm (8.86in)

SPECIFICATIONS

Strasbourg

Class: Dunkerque
Displacement: 27.700 tonnes
Length: 214.5m (703ft 9in)
Beam: 31.08m (102ft)
Draft: 8.7m (28ft 6.5in)
Speed: 29.5 knots
Range: 13,888km (8,630 miles)
Crew: 1381-1431 men
Armament: 8 x 330mm guns • 16 x 130mm guns • 8 x 37mm AA guns • 32 x 13.2mm AA machineguns
Armour: Deck – 12.7cm (5in), Waterline belt – 28.3cm (11.14in)

▲ *The sleek bulk of Strasbourg when newly commissioned*

successfully capture the German merchant ship *Santa Fe* on 25 October.

Strasbourg was ordered to Mers-el-Kébir in April of 1940 following an abortive operation to Norway to defend that nation against the Germans. *Strasbourg* returned to the Mediterranean to undertake patrols against Italian shipping following Mussolini's declaration of war against the Allies. Following France's surrender, *Strasbourg* was one of the many battleships in Mers-el-Kébir when the British issued their ultimatum. *Strasbourg* was moored with her stern facing the sea so she had to slip her moorings and she headed for open waters along with four destroyers. Although damaged by some near misses, *Strasbourg* managed to clear the harbour and elude the British. Debris had entered her boiler room, slowing *Strasbourg* to no more than 20 knots and leaving her with black smoke belching out. On realising their quarry was escaping, the British launched a series of carrier aircraft attacks, all of which missed and *Strasbourg* managed to reach the safety of Toulon. *Strasbourg* became the flagship of the Vichy French navy and underwent repairs and refit in 1942 including the fitting of radar.

In November 1942 the Germans moved to seize the remaining French fleet in Toulon but to prevent this the crew of the *Strasbourg* sabotaged and scuttled the ship. Any equipment that might have been of use to the Germans such as rangefinders and radios were smashed with sledgehammers and the boilers were lit, with the water feeds cut off to cause them to explode. The ship's seacocks were opened to flood the ship and scuttling charges were detonated to prevent her being easily refloated. The Italians refloated the ship anyway but decided to scrap her due to her poor condition.

Following the Italian surrender, the ship returned to Vichy hands and moored in the Bay of Lazaret where she was sunk by gunfire from the USS *Nevada* during Operation *Dragoon*. Refloated once more she was used as a testbed for underwater explosions before being scrapped in 1955. ■