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PW Contest launch

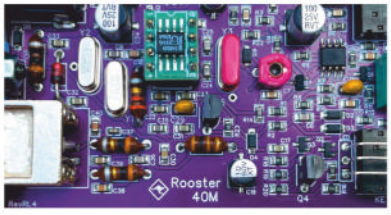
Full details of our 16th annual 70 MHz readers' competition

Friedrichshafen 2024

Full report from our man at Europe's top ham radio event

PROJECT Kanga's 'Rooster' transceiver

An easy & fun build including pre-populated circuit board



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Keylines

It was good to have some hot weather finally in July! And I managed over 900 CW contacts in the IARU Contest, which was fun and got me back into the spirit of things. W3LPL is saying that we now have a record number of sunspots for the current cycle and that the peak may occur this autumn, so polish up those antennas (I feel sure polished antennas work better than dull ones, hi!) and be ready!

UK magazines

I was taken to task (in the nicest possible way!) by **Tex G1TEX**, our previous technical editor, for saying in my last *Keylines* that *PW* was the only remaining independent amateur radio magazine in the UK. Tex edits *Sprat*, the journal of the G-QRP club, which comes out every quarter. And, of course, there are many similar and excellent club magazines, from ISWL's *Monitor*, mentioned last month, to the CDXC's *Digest*, BATC, BARTG, UK Microwave Group and others plus, of course, the many local club newsletters, some of which are very impressive. So, I do hope you know what I meant but I am more than ready to acknowledge all these other journals, appealing to a local group or one with specialist interests. Long may they continue.

FT8

As we mention in the *News* pages, there is a new (experimental) release of WSJT-X supporting the so-called SuperFox mode, which **Mike Richards G4WNC** discusses in this month's *Data Modes* column. It will be interesting to see whether this takes off – results to date, with it being used by the K8R (American Samoa) expedition do seem to be impressive, both in terms of QSO rate and also in terms of the DX station being able to copy very weak callers. Watch this space!

National Hamfest

September sees the return of the National Hamfest after a year's absence. This has become the premier UK event for getting together with fellow amateur radio enthusiasts, seeing all the goodies available from the various vendors, shopping around for bargains in the flea market and so on. I plan to be there and look forward to meeting many readers. It runs over two days, with the Friday usually being the busiest.

Letters wanted

I notice that our Letters pages often carry letters from the same few correspondents. I certainly wouldn't want to lose them but would love to receive letters from a wider range of readers. Many of you are, I'm sure, busily building gadgets for the shack, helping out with worthy events, taking to the hills for activating Summits on the Air, etc, etc. Do share with other readers what you are up to, or your thoughts on topics that have been raised in the pages of our magazine. We'd love to hear from you!

Clubs

I know , especially since COVID, some clubs are struggling to regain the numbers of in-person attendees that they used to have (in some cases, continuing to bring members in by Zoom). Others, though, have found Zoom to be a boon because they can have presentations not just by local presenters but from presenters on the other side of the globe. Some are simply suffering from the increasing age and infirmity of members. But, equally, I know of one club relatively local to me that was set up a few years ago specifically to cater for new and younger amateurs and it seems to be thriving. I guess there isn't a single formula that works.

Emergency communications

One of my UK amateur radio friends (who was away from his home station) contacted me recently. A friend of his, living in Grenada in the Caribbean, was worried that the approaching hurricane would take out phones and internet on the island and could I be available if necessary to handle traffic back to his family in the UK. The guy on Grenada is an amateur, and had equipment that he could run off a car battery if necessary. As it happened, the hurricane largely missed Grenada although it did a lot of damage elsewhere, but it certainly reminded me of the fragility of modern communications in such situations and how amateur radio can still become a lifeline.

Don Field G3XTT
Editor, *Practical Wireless* Magazine

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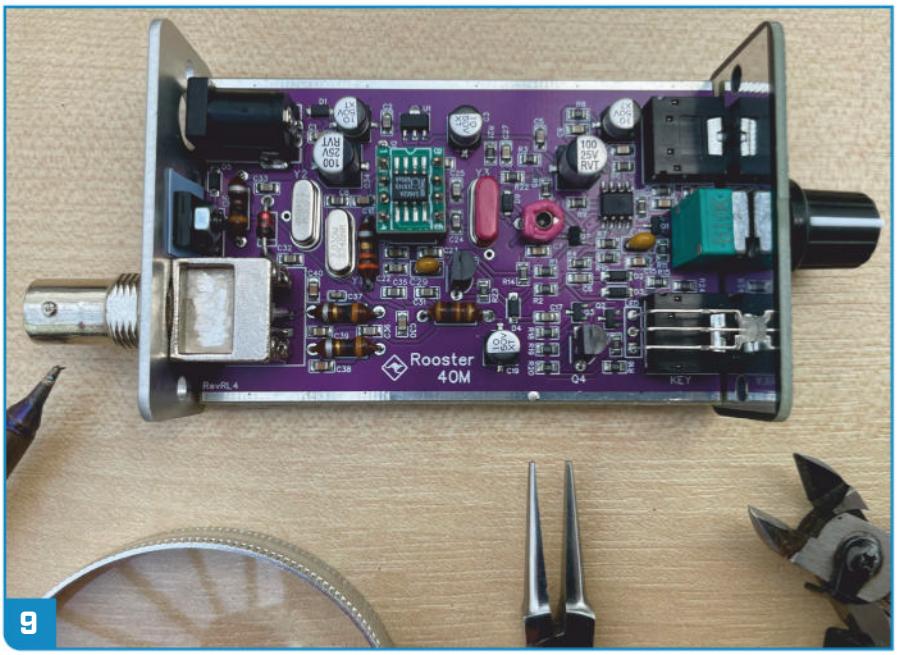

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Newsdesk

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

Direct to full syllabus update

The new amateur radio licence has now been in effect for a few months and changes to the licence conditions have necessitated revision to the examination syllabus. **Tony Kent G8PBH**, the RSGB Examinations Standards Committee Chair, has announced that he is pleased to release v2.0 of the Direct to Full syllabus, including these revisions. Compared to the version in current use, the only section that has seen major changes is Section 1: "Licensing and station identification". Section 2: "Operating practices and procedures" has seen some minor changes, for example with regard to suffixes. The RSGB will begin examining to v2.0 of the syllabus on 1 October 2024. It will not be taking any bookings for Direct to Full examinations to take place in September. You can find the syllabus on the RSGB website at:
rsgb.org/direct-to-full

RSGB Planning Advisory Committee needs volunteers

The RSGB Planning Advisory Committee still needs additional volunteers to join its advisory panel. Volunteers deal with queries from members about problems they face in getting planning permission for masts and aerials. These enquiries can be for support in making an application to the local council, or in submitting an appeal. If you have a relevant professional background, not necessarily as a planner, or have some knowledge of how the planning system works, please get in touch. Find out more about the committee at the URL below and then email the Board Liaison for planning **Len Paget GM0ONX** at **gm0onx@rsgb.org.uk** to arrange a chat.
rsgb.org/pac

RSGB youth representative goes to YOTA Czechia

The RSGB announced that it would be represented at this summer's Youngsters on the Air camp by **Rhys Williams M0WGY/AJ6XD**. The event, which is organised by the IARU Region 1 Youth Working Group together with the Czech Radio Club, was due to be held between 16 and 23 August 2024 in Prague, Czechia. Rhys is currently studying aerospace engineering at Cambridge University and is going on to do a PhD in engineering at Oxford University from September. He says he has found a lot of joy in the building aspect of amateur radio and enjoys contesting with his university amateur radio club. Find out more about Rhys and this inspirational annual YOTA camp on the RSGB website at: **rsgb.org/yota-camp**

RSGB British Science Week challenge

Are you looking for your next construction challenge? Then the RSGB British Science Week Time challenge could be for you. The task is to provide a method of either measuring the frequency of a radio frequency source or signal, or providing a time reference to a radio operator or radio system. You must use readily available components, material or other resources. The activity is open to all ages and is divided into three groups: under 18 or still in school; under 21 or an undergraduate up to the age of 23; and a category with no age restriction. The winner of each group will win a prize of £150 with the winners being announced at this year's RSGB Convention in October. Deadline for entries is 1 September. You can find out more by visiting the website below and selecting the 'Time-related challenge' link under the BSW24 header.
rsgb.org/bsw

The National Hamfest

27/28 September 2024

Excitement is in the air as we announce that the online ticket sales for The National Hamfest 2024 are now live! Along with the flea market, early bird discounts are being offered to all eager participants. Prepare yourselves for a remarkable two-day event filled with all things amateur radio. Traders and specialist groups will be in attendance, showcasing the very best in this fantastic and inspiring hobby. We look forward to reuniting with familiar faces and welcoming new enthusiasts to join us for an unforgettable experience. Stay tuned to our website and social media channels for all the latest news and updates as we gear up and continue to build and promote this event. Let's come together for The National Hamfest 2024 and celebrate the passion and innovation within the world of Amateur Radio!

www.nationalhamfest.org.uk

New Icom ID-52E 60th Anniversary Version

At the KANHAM 2024 event (13/14 July) held in Ikeda in the Kansai region of Japan, close to Osaka, ICOM launched a special ID-52 60th Anniversary Version. The ID-52 60th Anniversary model was shown for the first time to celebrate ICOM's incredible milestone of six decades of innovation and mark its ongoing dedication to Amateur Radio and the amazing journey its HAM roots have taken over the past 60 years.

The ID-52 60th Anniversary special should be available in limited numbers in the UK sometime in late August or early September (TBC).

- USB Type-C connector (replacing the Type-B connector)
- A new Bluetooth module allowing wireless connection to a smartphone (RS-MS3A for TM/AP modes, faster picture transmission by the ST-4001I)
- It will come with the FA-S270C Antenna, a BP-272 Battery pack, an MB-127 Belt clip, an OPC-2480USB cable and a very special matching hand strap, embossed and stitched.
- The 60th anniversary version will be finished in a beautiful metallic titanium colour and comes in a unique and dedicated, special dressing box.
- It offers the same RF features, transmit power, frequency ranges and modes as the ID-52 series.

New Accessories:

- CS-52 Plus (free download)
- RS-MS3A New version (free download)
- ST-4001I New version (free download)

Pricing

£516.66 SRP ex VAT (inc. £619.99)

To watch a short promo video on our YouTube channel about this special model, click on:

www.youtube.com/watch?v=zu5qNPW3eFM

To download the PDF brochure about this special model, click here:

https://tinyurl.com/57aca4d6

RSGB VIDEO SUMMARY OF THE OFCOM LICENCE CHANGES: The RSGB has released a video summary of the Ofcom licence changes that came into effect in February. This is an extended version of the video shown at the Society's AGM. It covers the range of changes from power increases and callsigns, to additional options for Foundation licensees and new opportunities for sharing amateur radio with people without a licence. It also looks at the next phases of Ofcom's licence changes.

If you don't feel you're making the most of the new licence conditions, or you're unsure about some of the changes, why not watch this short video and see what you could do! You can find it on the RSGB YouTube channel and on the RSGB website.

MESAT1 AMATEUR SATELLITE IN ORBIT: A satellite of interest to the amateur radio community is MESAT1. Built by the University of Maine, in cooperation with AMSAT, this satellite carries a 30kHz wide V/U Transponder plus a 1k2 BPSK telemetry downlink. Telemetry downlink 435.800MHz with transponder downlink 435.810-435.840MHz, and transponder uplink 145.910-145.940MHz. Amateurs are encouraged to use AMSAT's FoxTelem software to collect telemetry.

https://www.amsat.org

WSJT-X 2.7.0: Release Candidate WSJT-X 2.7.0-rc6 was made available for download during July, for testing of the new SuperFox mode to work K8R (American Samoa), in anticipation of the forthcoming Jarvis Island (N5J) DXpedition. This testing was intended to help the development team exercise RC6 thoroughly before putting it to use for the DXpedition.

BROADCAST ENGINEERING MUSEUM & CONSERVATION GROUP: **Godfrey G4GLM** has kindly drawn our attention to the above group, located near Gainsborough, Lincs. The Museum is housed in a former RAF Sergeant's Mess. Exhibits include a BBC TV camera that participated in coverage of the 1953 coronation, the fully restored Southern TV OB van (previously seen in radio magazine news pages) and the typical T1154/R1155 Lancaster combination which, although not for broadcasting, pays tribute to the airmen who were once stationed at the site.

https://becg.org.uk

50 YEARS OF G-QRP: In the October 1974 edition of *Short Wave Magazine*, there was a small item suggesting that some form of UK QRP Club should be set up. The **Reverend George Dobbs G3RJV** indicated that he *"would be prepared to do the donkey-work to get the Club off the ground"*. He did and in September 2024 the Club celebrates its 50-year anniversary.
The anniversary will be marked at the Club's annual Convention, held in conjunction with the Telford Hamfest, over the weekend of 31 August and 1 September. There will be a Buildathon, an evening social supper, talks by some well-known QRPers and Club Sales will be there selling components, kits and books. Members will be able to claim some special anniversary freebies, but they will need to bring their membership number. A special anniversary *SPRAT* magazine is being prepared, which will bring together some of George's writings from *Short Wave Magazine* and *Practical Wireless*, and there will be a new RSGB book available showcasing the best of 50 years of *SPRAT*.
The Club has around 4,000 paid-up members and has produced 200 editions of *SPRAT*, its quarterly journal. In addition to *SPRAT*, the Club has a YouTube channel with recordings of some excellent presentations from its annual Conventions, and a website with lots of technical information, as well as details of the Club, its awards and trophy winners and a news page.
Information on how to join the G-QRP Club can be found at:
www.gqrp.com/join.htm

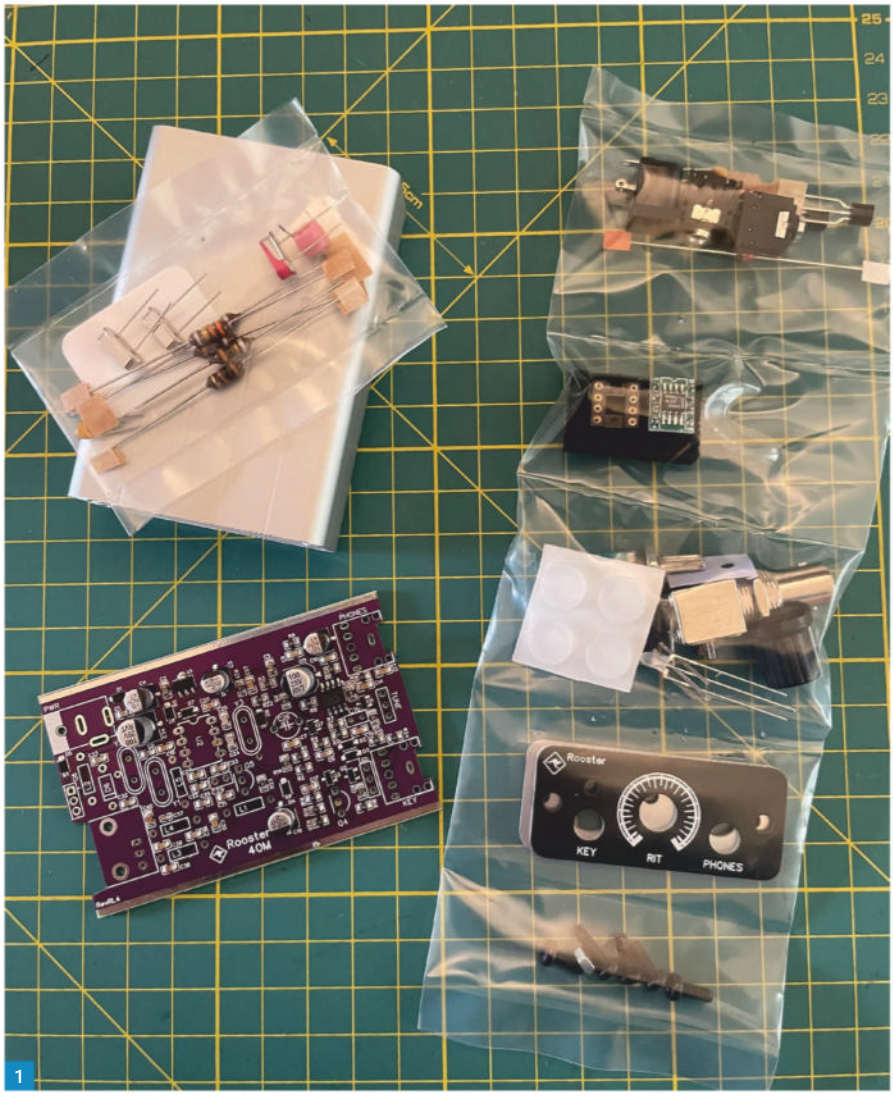
ANNOUNCING THE 2024 CW OPEN CONTEST: (included at the request of our *Morse Mode* author, **Roger G3LDI**) Now that summer is here, at least for those of us in the northern hemisphere, the weather is getting warmer and often just plain HOT! In less than two months September will here and with it, the annual running of the CW Open. So, no time like the present to stay in your air-conditioned ham shack and get your rigs warmed up, and antennas and logging software tested.
The dates and times for the 2024 sessions are:
Session 1: Sept 7 (00:00 – 03:59 UTC)
Session 2: Sept 7 (12:00 – 15:59 UTC)
Session 3: Sept 7 (20:00 – 23:59 UTC)

One of the guns undergoing restoration at the Predannack Lizard Museum.

It is also an excellent time to start to organize your team and get it registered. Last year there were 24 registered teams with representation from all three ITU regions. The team rosters ranged from a full ten member team down to three members. Talk to your ham buddies and sign up! They do not need to be CWops members to be on a team. It is always more fun being part of a team and might just increase your BIC (Butt in Chair) time and score! Please register early and beat the September 5 and 6 rush!!
If you have not yet participated in the CW Open, you should give it a try! Each session is a standalone event and is only 4 hours long. With that flexibility you can operate as little or as much as you want. You can even win an award by only participating in one session. Unlike the weekly CWTs, the CW Open is more of a contest and less of a sprint. You don't need tons of aluminium in the air and KWs of power. Low power and dipoles work just fine for this event. Plaques and Trophies are awarded for all power classes.
While talking about plaques and awards, I would like to thank ICOM America for their continued sponsoring of the trophies and plaques for the 2024 CW Open.
For additional information please refer to the CW Open website at the following URL:
https://cwops.org/cwops-tests/cw-open
Look down the web page for the team sign-up link. It is lots of fun as a single op but even more fun to be part of a team. The team membership has NO GEOGRAPHIC RESTRICTIONS. It can be local, national, or international.
Hope to get you in my log for one or even better, all three sessions!
73, **Bruce N1LN**, CW Open Manager

PREDANNACK LIZARD MUSEUM: (from **Maurice Richards G3WKF**) Discovering the Predannack Anti-Aircraft Battery of WW2 on the Lizard.
This gave me the opportunity to arrange operation of GB0PLM on 7MHz for the Museums on the Air weekends. Good radio SSB contacts were made throughout the UK.
The museum displays large guns in various stages of restoration, typical guns include 12 PDR of 12cwt, Vickers 3.7AA gun, Vickers 3.7AA gun now mounted on a 105mm Abbot. Befors 40/60 light AA gun, Befors 40/60 light AA gun on mobile platform, 2.5PDR Field gun, Russian 2A4 light AA gun.
Open days are arranged throughout the year with demonstrations of a Cannon, WW2 range of guns and finally Muzzle Loaded types (where the term 'Flash in the pan' comes from).

Richard Constantine G3UGF
richard@norcomm.co.uk



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Building Kanga's 'Rooster' Transceiver

Richard Constantine G3UGF describes a project that is fun to build with a professional and 'Practical' outcome.

When I first heard that Kanga was about to produce a successor to the amazing and ever popular *Foxx-3* miniature QRP radio that was to be to be called the *Rooster,* it didn't immediately click with me as to why the very odd name. My first thought – Fox in the hen house? One strong coffee later stirred the grey matter and it came to me – Kanga-Roo.

Synonymous with the G-QRP club, Kanga kits is a living legend and much loved by QRP'ers old and new worldwide. Each custodian of the Kanga name and there have been a few, adds their own personality, innovation and moves with the times.

Now when it comes to building things I'm old enough to remember the last of the government surplus boom plus the scavenging of old TV chassis and anything else you could get your hands on for useful items that you couldn't otherwise afford. Local electrical shops would sell you resistors and capacitors if you were desperate – try that in Curry's. If you saw a basic circuit diagram and a picture in *PW*, annoyingly Part 2 was usually next month so you had to wait for it for agonising weeks. You scrapped half-built items in readiness, rummaged round for bits and often sent Postal Orders (what's a Postal Order?) to mail order companies for key parts. Then you just sat on your hands and waited. Was that really the good old days?

In the main, if you completed the project and it actually worked and as a teenager I had a high failure rate, what you were building was much less sophisticated than today. Nevertheless, if you stayed the course, you learned something. A level of knowledge for logic and fault finding if nothing else.

By comparison, the *Rooster* is science fiction compared with my early transmitter efforts. For openers it's a complete transceiver. It's from a reliable source with no waiting for parts plus, it has all the bits including the case and decals, no metal bashing required.

Whatisit?

What first attracted me apart from the name was that the main circuit board came partially built. For those of us more used to components with legs, all of the surface mount components (SMD) are already populated on the 8cm x 5cm circuit board. No fiddling with tweezers and in my case magnifying spectacles. Providing the circuit board partially populated also makes the kit more attractive to less experienced constructors. Brilliant!

As usual, I downloaded the build instructions from the website and was amazed and delighted to see how comprehensive they were. For those with memories of DIY Heathkit radios of old, the manual and user guide are a nostalgic trip, no tick boxes this time but real colour pictures! For newer builders the photographs are a genuine confidence rooster-booster.

Every stage of the build is detailed in a step-by-step guide accompanied by photographs. At each stage you're shown how to check and test your work so far. No waiting to the end, finding out it doesn't work and not knowing where the problem might be. I sincerely wish I had experienced this kind of support when I was younger.

As a technical writer I know how much time and work goes into producing manuals, it's a lot. **Paul** at Kanga is to be congratulated as he's obviously taken care to produce a very readable step-by-step guide. Over 33 pages the manual details everything from how to mount the components, test each stage and finally simply align the radio. It includes a complete component list as well as straightforward circuit diagrams. These tell the full story and help you to understand what you're actually making.

The kit comes in two flavours, for 40 metres with 2 watts or 30 metres with 1.5 watts RF output into a 50Ω load. The finished kit needs to be operated via an antenna matching unit or better still a resonant antenna.

The receiver is designed around an NE612 front-end mixer oscillator with an op-amp audio stage plus an active audio filter. The same internal oscillator is used for both the receiver and

Photo 1: Kit and components, as received.
Photo 2: Step by step instructions
Photo 3: Rooster board completed

transmitter. There's a buffer stage that feeds a high gain (relatively speaking) power amplifier using a 2SC1162 utilising the rear panel as a heatsink.

Crystal controlled on transmit, the receiver has an independent tuning control (RIT). A nice touch is the very pleasant sinewave CW sidetone monitor and two-colour TX/RX indicator LED. A big advantage over its predecessor the *Foxx-3* is that having no Tx/Rx relay it's designed to operate QSK break-in giving you a listen-through facility. You know when to stop sending if there's QRM and you can easily chit-chat back and forth with your contact.

The radio is designed to operate from a nominal 12V supply over a range of 10.5-14V DC from an external battery. It draws only around 20mA on receive and around 380mA on transmit. The *Rooster* is highly portable. My small lithium-ion battery pack looks as though it will run it forever. Direct conversion receivers simply don't like bench power supplies as they introduce AC hum into the receive line, so QRP'ers tend to use batteries.

The build

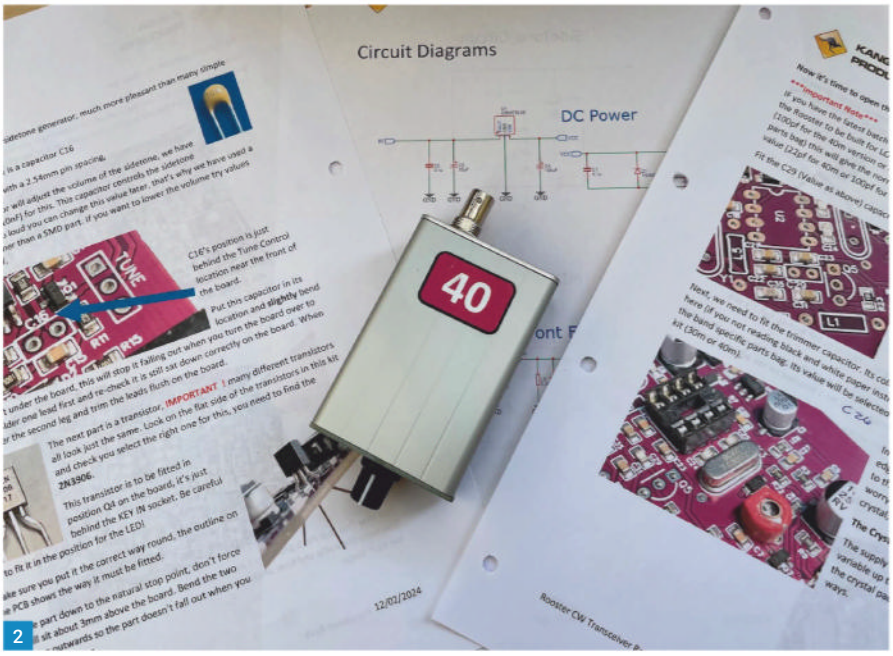
For the less dexterous among us the band/ low pass filter coils (yes it has one) come ready made. Actually, the inductors look like small resistors. When the time comes pay attention to which band you're building. Due to misplaced enthusiasm, I misread the instructions as one manual covers both versions. I made the schoolboy error of believing I had the wrong inductors for the version that I was making, even measuring the values to be certain. Checking the main components list seemed to confirm it until an email from Kanga pointed out that I was reading the 30m component list and not the 40m list. RTFI – read the flipping instructions… you have been warned.

Don't be tempted to open every packet just to have a look at things That's a recipe for trouble when you can't identify the components or worse still lose one or two.

Trouble has been taken to heat seal components into separate compartments of a clear plastic bandoleer strip. You only need to use one section at a time, testing as you go. Even the experienced make mistakes so don't ignore the test routines they are valuable.

As always, my personal mantra is, 'Build with care because you're a long time looking at it'.

The instructions say that the transceiver can be built in around an hour but I would caution against this. Far better to take time to enjoy your investment. Take a break or even spread the work over an afternoon etc.



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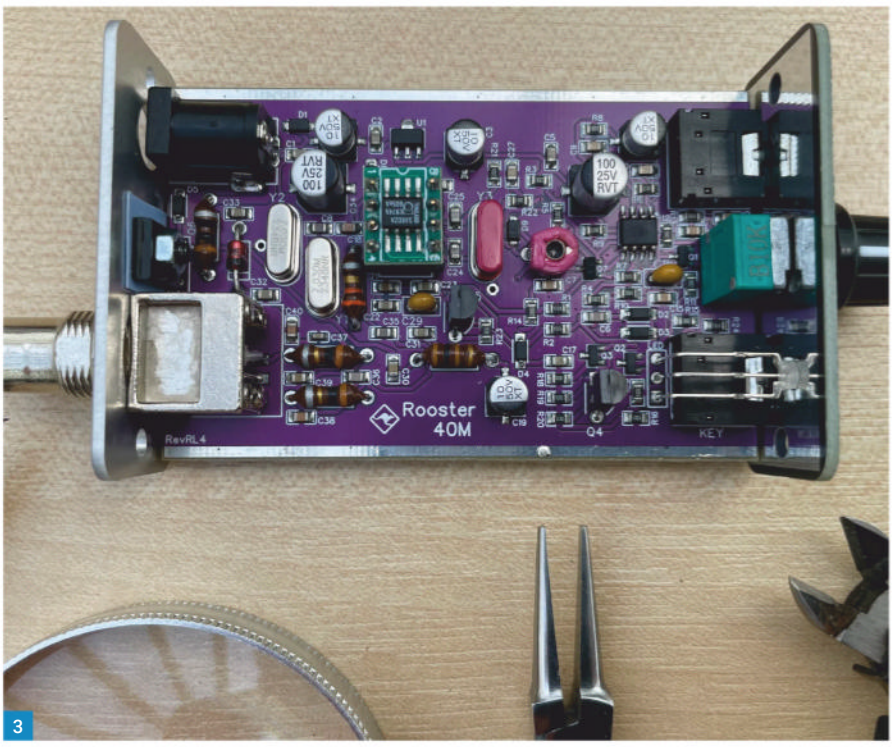

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I would say that I spent around 2.5 hours, including testing, across two sessions as I just love coffee, a muse over circuit diagrams and a quick tune around the bands.

The test stages that punctuate the build process and confirm all is going well shouldn't be ignored, even by a seasoned constructor. They definitely keep you on the right lines.

Construction and final test

Most of the soldering is done on the underside of the board. Being a compact circuit board, the holes and pads are closely spaced in one or two areas especially those for the PA transistor. A medium tip soldering iron will do the whole job but a fine tipped soldering iron is better. If you don't have one, borrow one or invest in the best you can afford as it will repay you long term.

The only other tools likely required are a small, sharp pair of side cutters and some needle nosed pliers. The instructions repeatedly remind you to cut any soldered leads as close to the board as possible. This is because there is only a small clearance between the board and the metal case. As an added precaution I slipped a piece of thin

Photo 4: The Rooster on the air.
Photo 5: Foxx-3 and Rooster comparison.

card (old credit cards are better) into the bottom of the case.

Although not essential I would suggest the use of a magnifier, preferably illuminated. They too are a good investment for close checking the quality of your soldering. It's something I now find essential and indispensable as my eyes are not what they once were.

When complete and checked the final frequency can be adjusted by means of a small trimmer on the circuit board. 7.030MHz is a popular centre of activity for QRP on the 40m band and there are others. The supplied crystal may end up slightly above or below that nominal frequency. Not a problem because dead centre tends to be busy at times and QRP activity spreads both sides of the centre. The FISTS channel that's not necessarily QRP is 7.028MHz. For the 30m band QRP is 10.116MHz and FISTS 10.118MHz.

Finding out where your particular crystal ends up is easy as it's covered in the manual. It involves simply listening to the signal on a nearby receiver in CW mode and adjusting the *Rooster's i*nternal trimmer for zero beat to get it to where you want it to be.

On the air

I haven't used a straight key much in years and I found it quite a refreshing experience for a change. I never cease to be amazed at how good direct conversion receivers are. Connected via a tuner unit to my long-wire the band really came to life. There's no volume control on the radio so if a station is loud, it's really loud in your headphones That said you can also hear really weak stations too.

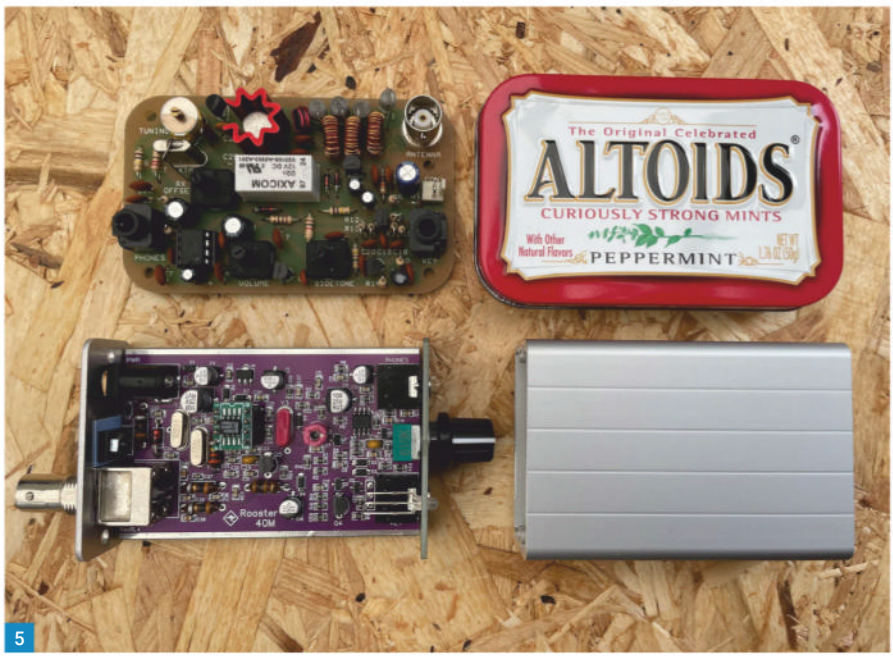
The only front-mounted control is the RIT. It permits listening to stations that may not be directly on your crystal frequency. This is a bit of a two-edged sword and you can be tempted to call a station that won't hear you if they have tight filters in their receiver.

Two things you can do is to first establish at what point the RIT control is set directly on your transmit frequency then simply mark the dial. I did this as part of the final set up process, first sending to my main transceiver and then transmitting back to the *Rooster*. Having done this, I refitted the RIT pointer knob top dead centre, easy.

The receiver does have a built-in audio filter to help ward off unwanted signals but to quote the manual: *"It's centred around 700Hz and has a bandwidth of 500Hz. It's not a brick wall but does have a useful peak about 12dB to its centre".*

Notwithstanding any percentage errors in the procedure my Bird 43 wattmeter measured the key-down output at 2.0 watts on 40m, for a 12V supply, and 2.4 watts at 13V.

4



5

Allowing for the usual QSB, contest dodging and picking quieter times, contacts across the UK and Europe have been good thus far. It's better to call when the band is slightly less crowded because you do have to use your ears as additional filtering at busy times. Using the 40m version definitely benefits from the addition of an external filter. The 10MHz Rooster could be really interesting as the band is usually quieter. Any chance of a 5MHz version? I am still looking to work US states and into South America as that's my current challenge.

And finally

The build experience was fun and the outcome a pleasure. As I said at the start each custodian of the name has brought to it their own special flare and innovation. I can't wait to see what comes next. There are many possibilities and I can think of several right now. A version with internal keyer option, maybe a mini-ATU or a VFO would get my vote.

As Kanga has done the hard part by producing a high-quality circuit board pre-populated with SMD components, plus a step-by-step guide the project is well within the range of a novice builder. Maybe a great little club project or activity as it's even worth learning CW for!

All in all, the *Rooster* is the most radio fun for the money I've had in quite a few years. Available from Kanga online at £37.99.

www.kanga-products.co.uk

1a

The ICOM IC-R 15 Analogue Scanner and the AOR AR-DV10 (2024 Version) Digital Wideband Receiver

Georg Wiessala checks out two very different scanners.

Georg Wiessala
wiessala@hotmail.com

ICOM IC-R 15 Analogue Scanner

In April 2024, the new ICOM IC-R15 scanner (**Fig. 1**) finally arrived in Europe. This new portable receiver does not come that long after the earlier flagship ICOM IC-R30 digital scanner, and it offers arguably a much simpler and more immediate operating environment for the scanner user. This comparative uncomplicatedness, when compared to its bigger cousin, is now being promoted as a key USP by ICOM. The firm is thus making a virtue out of a necessity, faced with the comments of many users who may have found the IC-R30 just a little too complex and unwieldy.

In its pre-sales advertising, ICOM (UK) also emphasised that the IC-R15 has two VFOs and can thus receive two signals simultaneously on VHF&VHF, UHF&UHF, and VHF&UHF (Dualwatch). The colour LCD screen, USB-C port (charging, not power delivery), Bluetooth, a recording function, and a microSD card slot were also foregrounded by the main traders who offered the IC-R15 just in time to coincide with the major global radio shows at Dayton and Friedrichshafen over the summer (cf: *The Spectrum Monitor*, June 2024: 64).

ICOM (UK) Product Page:
https://tinyurl.com/z84bt775
Brochure:
https://tinyurl.com/2rk9sj3j

I have owned several ICOM scanners, including the IC-R30 and IC-R20. Among those, the IC-R20 has always been my firm favourite, on account of its tactile keys, ease of use, remote monitoring/recording functionalities, wideband coverage, and general ease of use. How would the new IC-R15 measure up? For this review, I used a range of portable antennas and one fixed outdoor discone (the Scanking 25-1,300MHz). However, you might wish to treat yourself to the ICOM IH-8000 super-wideband omnidirectional antenna, to stay 'on brand', as it were. My location here is ideal: it overlooks a wide valley, close to the Warton/BAE airfield (callsign EGNO). For VHF and Airband, I also utilised the versatile (and now rare) set-top Diamond RHS1000 component antenna, directly mounted onto the IC-R15.

Coverage and modes

What one notices, first of all, is that the ICOM IC R-15 is not a 'wideband' receiver. The radio covers the various international FM Broadcast bands (EU: 76-108MHz; USA: 88-108MHz) and otherwise receives communications from (just) 108 to 500MHz. By comparison, the Whistler TRX-1 is digital and receives 25-1300MHz, albeit with gaps. The IC R-30 operates from 0.1 to 3304.999 MHz, and the IC R-20 still covers between 0.150 to 3304.999MHz. The IC R-15 does, therefore, not cover the HF bands.

Neither is this a digital scanner. It receives analogue radio in FM, FM-N, WFM, AM, and AM-N. The colour screen is OK (but not large) and the frequency readout digits are well-readable in all lighting conditions but smaller than on the IC-R20 and IC-R30 models. To be clear, this handheld does not receive signals from DMR, NXDN, Tetra, and so on. There aren't any decoders for digimodes built into this radio, or available through any extra paid-for service or subscription. The IC R-15 does not have a keyboard, and the screen is not a touchscreen. The USB cable does not double up as a power supply conduit.

Thus, with this scanner, ICOM appears to have swung the pendulum back, in favour of smaller, easier-to-use receivers for beginners, albeit at a price. In my opinion, and that of many other scannerists I have spoken to, the IC R-30 was getting too complicated for all but professional and demanding private users. The IC R-15 reverses this trend, which may well be good news for scanner hobbyists whose

interests lie in a few relatively simply defined (frequency) areas.

Setup, operation and watch-receive

The setup procedure for the ICOM IC-R 15 is simplicity itself – just pop in the battery and a microSD card (not included) and away you go. In operation on the Civil Airband, the ICOM IC-R 15 proved itself very capable, both with its own supplied antenna and with several small set-top alternatives. In fact, the IC-R15 proved to be significantly more sensitive than most other handheld hardware scanners I have tried.

If you do use an antenna other than the one supplied – which you should – make sure you have a suitable adapter to hand (SMA male to BNC female). When I connected the IC-R15 to my discone, the strength of the signals made it necessary to switch in the onboard attenuator to at least level 2 (of 4) to avoid overload. A nice result. The sound from the built-in speaker is sufficiently clear. If you do suffer from hearing loss or want a 'fuller' sound, consider connecting an external speaker; mine was the nifty Sony XRS-SB12.

In practice, transmissions from my local ATIS / Aeronautical Automated Voice Services (Manchester 121.975 and 128.175MHz, Blackpool 127.200MHz, and Warton ATIS 121.725MHz) can be a real challenge for scanners, even at my exposed location. Here, the IC-R 15 excelled and resolved them crystal clear and with a near full-on signal, even on the ATT 2 setting. Another example was Manchester DEL GROUND, which I actually heard at my location for the first time on the local frequency (121.700MHz).

I often use my scanners as one-frequency watch-and-record devices, leaving them on all day to keep an eye on a specific service. Most of you will know that I am an avid weather monitor, and I like to have updated information at my fingertips, on my smartphone and radio. For me, one of the main reasons for running a scanner is the facility to remote-record, i.e. with a setting where the radio records transmissions only when they occur. For instance, a frequency I watch daily is Holyhead Coastguard, from our regional Maritime Rescue Coordination Centre (MRCC; 160.775MHz).

But you can, of course, monitor any other intermittent transmission, such as your favourite military airband or emergency comms channel.

HM Coastguard:
https://hmcoastguard.uk
Holyhead Coastguard (BBC):
www.bbc.co.uk/news/topics/cg729vz7w1zt
The ICR-20 – although being able to do this – had always been a little cumbersome in that way, and many a time I did not press the right buttons in sequence. The IC-R15, I am glad to say, is a doddle to use in this way, thanks to a menu system. Put in your microSD card, format it and make the remote-watch facility your default: (Menu > Record > Recorder Set > RX REC Condition > Squelch Auto). Then press the '☐ REC key for one second, and you are ready to come home to the day's comms action, neatly compressed into one dense package. By the way, each segment of speech is recorded as a separate voice player file on the IC-R 15. On playback, recordings are rendered back as a whole, and in successive order.

Fig. 1a: The ICOM IC-R 15 analogue scanner receiver. Fig. 1b: the AOR AR-DV10 (2024 Version) Digital Wideband Receiver.

Using the Butel ARC-R15 software and resolving data signals

The ICOM IC R-15 can be controlled with the newly-developed ARC-R15 software by Dutch specialist firm Butel (**Fig. 2**) and there is also the proprietary Icom CS-R15 software. Which one is the better alternative? I think this will be a matter of personal preference. As far as I can determine there is really very little between them, other than price. However, which software to use with the IC-R15 and how seems to be one of the main topics on the minds of some participants in the IC-R15 Facebook Group at the moment.

Butel ARC-R15:
https://tinyurl.com/4s5xc3ff
ICOM CS-R15:
https://tinyurl.com/387t2jud
Naturally, you can also receive the Aircraft Communications Addressing and Reporting System (ACARS) data transmissions (in AM) with the IC-R15. The European VHF ACARS frequencies are 131.725 (Main), 131.525 (Backup 1) and 136.900MHz (Backup 2). Check the latest (11th) edition of **David Smith's** *Air Traffic Control Handbook* for background information and more details on ACARS.

ACARS VHF signals require quite a stable receiver to get these in properly, and the IC-R15 is such a radio. In terms of software, I have used the AirNav ACARS decoder and various software packages in the past (e.g. ACARS-D, AirNav, MultiPSK, PlanePlotter, Sorcerer, and WACARS). Some of these are now quite obsolete. For the time being, I have settled on the Black Cat Systems ACARS Decoder (**Fig. 3**). Black Cat Systems has established a good name for itself in the maritime weather data decoding market (RTTY, WX FAX). Elsewhere – and if you are using the new SDRplay RSPdx R-2 in tandem with the *SDRuno* software suite – an ACARS plugin makes your ACARS

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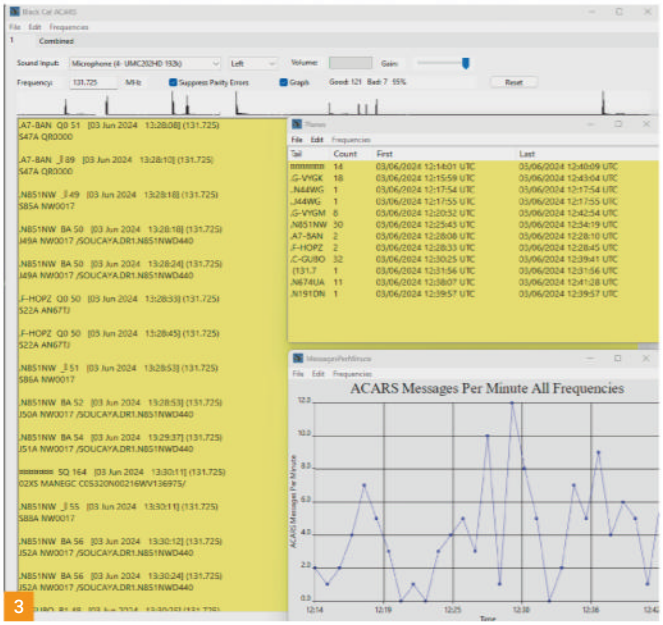


3

Fig. 2: The Butel ARC-15 control program for the ICOM IC-R 15. Fig. 3: The reception of ACARS signals with the IC-R 15 and Black Cat ACARS software.

reception quick and easy.

You can also use an SDRplay SDRuno plug-in with Black Cat if you operate one of the SDRplay RSP SDRs. Try a fully functional version of Black Cat ACARS and connect the ICOM IC-R15's headphone socket to your soundcard, using a high-quality cable. Last but not least, and while we are here, our friend and former *RadioUser* columnist **Nils Schiffhauer DK8OK** has written a most instructive guide for setting up the 'SDR Console' program to serve multi-channel reception, in cases such as ACARS with scanners.

The ICOM IC-R15 will also receive other (European) VHF data transmissions within its frequency range, for instance VHF Data Link (VDL), Satellite Band emissions (137-138MHz), AIS (Automatic Identification System) signals (AIS 1: 161.975MHz; AIS 2: 162.025MHz) and DSC (Digital Selective Calling; 156.525) transmissions. You will, in all these cases, naturally require external software for decoding and display, the ICOM IC R-15 has no inbuilt facilities in this regard.

Black Cat Systems:
https://tinyurl.com/32jp63vt
SDRplay SDRuno ACARS Plug-in:
www.sdrplay.com/sdruno-acars-plugin

The AOR AR-DV10 Digital Wideband Receiver

It is more than five years now since the AOR ('Authority on Radio') AR-DV10 (henceforth: 'DV10') digital receiver hit traders' shelves here. In June 2024, Moonraker advertised a new version of this radio with firmware 2307A:
https://tinyurl.com/3h74jpw8

The firmware update to 2307A takes into account that some of the newer AR-DV10s have slightly different hardware inside. Other than that, and according to the latest AOR Release Notes of 6 February 2024, this latest firmware update is about the following:

· Functions: COSPAS monitoring (see below): Regarding the *AviationUser* type, the last five digits of the 15HexID now represent the location information and the aircraft's tail number. However, the decoded information is not displayed (This update applies only to users who activated the optional COSPAS-SARSAT beacon decoder function).

· Bugfixes: With this firmware, AOR resolved an issue where turning the power off, and then on again, during a SCAN operation (with *BankLink* enabled) would sometimes cause the system to start scanning at startup without engaging *BankLink*.

A fuller record of past and present firmware updates for this high-level scanner can be found at the AOR Firmware Archive:
https://tinyurl.com/bdekkyww

What is more, the short video in the URL below explains how you can update your AOR's Firmware to version 2307A with the aid of the SC card:
www.youtube.com/watch?v=nszCDjcToAo

Another look at a remarkable radio

What passes as 'summer' this year is now in full swing, and the various Airshows and Radio Rallies currently happening are a good time to look at this handheld multi-talent once again as it presents itself now, with new firmware and improvements. A plethora of user groups, Facebook fora and other hobby initiatives have sprung up and appear devoted to getting the best out of this scanner.

However, for reasons of space, I am not going to reinvent the wheel. Much of what a reviewer stated on the DV10 in 2019 still holds true. (*RadioUser*, February 2029: 14-18; for FW version 1807A/ 1810A/ AA SN; **Fig. 4**). I feel confident referring you back to that very comprehensive review, in terms of the full technical details of this receiver, its accessories, controls, and so on.

Moreover, the in-depth manual is available on the AOR Japan download page and elsewhere. In addition to this, at the time of writing in July 2024, there was also some supplementary documentation available, regarding new features, for example, improvements to recording I/Q data on an SD card, and playback with the SDR# ('SDR Sharp') software (from Firmware version 1810A; see below).

Features: Standard and PRO

Next to the radio's features that come as standard, there are also optional (chargeable) 'PRO' features in the DV10. These include a Tetra GSSI User Group Filter and a COSPAS/ SARSAT (PLB, EPIRB and ELT) Distress Beacon Decoder for 121.500 and 406.000 MHz.
COSPAS/ SARSAT:
www.cospas-sarsat.int/en

But first, let's recap the key specs and stats of the DV10 and digest some comments made by other reviewers. The AOR AR-DV10 (do not confuse it with the base station AOR AR-DV1) competently ranges over a frequency array from 100kHz to 1,300MHz. Modes received are the analogue modes WFM, NFM, AM, LSB (USB & LSB), and CW. The radio is further equipped to resolve the following digital modes (see **Table 1** for more resources).

1. Alinco EJ 47
2. APCO25 (Phase1)
3. DMR (Tiers 1 and 2, MOTOTRBO)
4. dPMR (446 Tier 1)
5. D-STAR

Fig. 4: Check out this earlier review of the older-version AOR AR-DV10 (*RadioUser*, February 2019: 14-18). Fig. 5: Features of the AOR AR-DV10 include recording to a microSD card, PC display and the monitoring of certain emergency communications.

6. GMSK
7. Japanese D-CR
8. NDXN (6.25k)
9. TETRA (direct mode)
10. Yaesu FUSION (C4FM: 'Continuous Four-Level Frequency Modulation')

The DV10 is a large, and relatively heavy, handheld, crammed full of advanced technology. It offers 2,000 memories (in 40 banks of 50), CTCSS and DSC decoding, and a veritable plethora of search modes, squelch types, memory management and scanning methods. The latter include bank-link scanning and what I would call 'bookend-searching'. This is where you search between two frequency edges you have put in. This is the one feature that most of you might use most – if you are like me – and the DV10 excels at it.

The DV10 also offers an onboard analogue voice descrambler. Perhaps more importantly, you can record signals to a microSD card – an essential function for any scanner these days. The 2019 reviewer was happy with his basic SINAD (signal-to-noise and distortion-ratio) measurements, and five years later the sensitivity of the set has if anything improved further. The automatic detection of the digital transmit format is a great bonus and will make life so much easier.

In this area, the DV10, arguably, sets the bar for others to follow. Scanner hobbyists are likely to take note of the innovative COSPAS/SARSAT reception feature and the PLB, EPIRB and ELT Distress Beacon Decoder. The emergency comms monitoring and maritime radio aspects of our hobby are experiencing somewhat of a renaissance at the moment, and I can see these features being popular with enthusiasts using an SD card and a PC with this receiver (**Fig. 5**).

Overall conclusions: ICOM IC-R15 and AOR AR-DV10

The new ICOM IC-R15 is a pared-down, analogue-only scanner with a narrow frequency range and no inbuilt decoders, bandscope view or add-ons. It is sensitive, simple and intuitive to use, and it does very well within the scope of its functions. It will no doubt appeal to many beginners, airshow visitors, marine monitors and general hobbyists looking for a lightweight portable scanning hobby solution. However, the IC-R 15 will have to find its place in a market of competing SDRs and scanners which now also offer digital scanning, at a similar, or just slightly higher, price point (e.g. Uniden UBCD-3600XLT, Whistler TRX-1, and others). The ICOM IC-R 15 currently retails for £449.95 in the UK.

The 2024 version of the AOR AR-DV10 makes for an advanced wideband receiver, aiming at being a 'one-stop solution' for most, if not all, of your semi-professional reception and monitoring requirements. The issues on sensitivity and frequency drift that were raised in connection with early versions of this receiver have been ironed out in the meantime. However, in my view, the AOR AR-DV10 is not a beginner's scanner but rather an advanced signals analysis machine. The more you put into learning how to operate this radio, the more you will get out of it, especially in terms of the new functions advertised at the time of writing. Available from Martin Lynch & Sons for £799.

My sincere thanks go to **Jezz Faulks** and **Justin Godefroy** at Moonraker UK, **Ian Lockyer** at ICOM UK, and **Tony Wiltshire**, at Martin Lynch and Sons for the kind loan of the review units, for answering my many questions, and for providing much-valued advice. **PW**

Resources

AOR AR-DV10 Brochure Link:
https://tinyurl.com/yeyje8t3
AOR AR-DV10: Addendum Handbook:
https://tinyurl.com/5yrvtj4v
AOR Japan:
www.aorja.com/receivers/ar-dv10.html
AOR Operating Manuals Archive:
www.aorja.com/support/manuals.html
Butel (Netherlands), CS-R15 programming software:
https://tinyurl.com/bdzd77nx
Command-List Summaries
(for the AOR AR-DV1 and the AOR AR-DV10):
https://tinyurl.com/4c2bz86r
Facebook Group: ICOM IC-R 15:
https://tinyurl.com/4m75xbw3
Facebook Group: AOR AR-DV10:
https://tinyurl.com/3hwbckub
Hargreaves, L. (2019) 'The AOR AR-DV10 Digital Handheld Receiver' (*RadioUser*, February 2019: 14-18)
ICOM IC-R 15 Product Page (ICOM UK):
https://tinyurl.com/y5h4m2em
ICOM IC-R 15: YouTube Review:
www.youtube.com/watch?v=w4z6ehhwUkU
ICOM IC-R 15: General Information:
https://tinyurl.com/4t5mz2pp
ICOM IC-R 15: Preview (Waters & Stanton):
www.youtube.com/watch?v=XWWi3F8otOQ
ICOM IC-R15 Basic Manual:
https://tinyurl.com/3ts65vku
ICOM IC-R15: Advanced Manual:
https://tinyurl.com/4ujbpr8a
ICOM Marketing (UK):
Marketing@icomuk.co.uk
Moonraker Product Page:
https://tinyurl.com/3h74jpw8
Review ICOM IC-R 30:
RadioUser, September 2018: 10

Table 1: Further Resources on the ICOM IC-R15 and AOR AR-DV10.

Rod Angel G4ZUP
practicalwireless@warnersgroup.co.uk

An Inconspicuous Antenna for VHF FM working

Rod Angel G4ZUP describes an effective but low-visual-impact solution.

It has long been accepted wisdom that VHF antennas work best when they are out in the clear, and high up in the air – so we should all like our amateur radio installations to be that way. Unfortunately, our enthusiasm for aerial structures is not always shared by our spouses, neighbours, and planning authorities, so compromises are sometimes necessary.

The main objection to radio antennas is typically on grounds of visual impact, although somehow this seems not to apply to TV aerials! Prominent radio antennas are also more likely to attract complaints about QRM/TVI, whether or not the signals that emanate from them actually cause any interference.

So, for day-to-day VHF operation we may need something that is, paradoxically, both high up and low-profile. Is that possible? Well, in some cases, yes.

Design considerations

For local-area stuff (and even for the occasional bit of DX via Sporadic E on the lower VHF bands) a transmitter output of about 5W to 10W fed into a low-gain antenna is often sufficient. This combination is compatible with thin whip aerials, which can work without loading coils or other paraphernalia. These will invariably be fed with 50Ω co-ax, so they do need to present a nominal impedance of about that value at the feedpoint.

Probably the simplest and easiest form of such an antenna is the base-fed quarter-wave (or λ/4) design. Some careful pruning of element length is all that's needed to produce a largely-resistive 50Ω impedance at the intended operating frequency. The previously described split-coax antenna [**1**] is one example of a practical implementation. However, for a permanent installation, something more durable would be appropriate. A springy stainless-steel rod, as used in mobile antennas, is ideal. (Longer versions with a continuous taper are available from CB suppliers.) But thin elements made of copper, brass, or aluminium do not fare well when large birds fly into them – as they do, with monotonous regularity.

To work properly, the λ/4 whip does need a conductive groundplane, or at least something that will serve as a groundplane. In practice, this can be quite skeletal; and in the extreme, can be reduced to a single horizontal element, as seen above [1].

A λ/4 whip, with a minimal groundplane, is thus a reasonable starting point for an inconspicuous antenna. In the 4m band – which is the main focus of this article – even λ/4 elements are more than 1m long, so greater fractions of a wavelength would be impractical with very thin elements.

I noted at the start of this article that TV aerials (even fairly large ones) are strangely invisible to objectors; and since there is enough metal in most types to form viable 'groundplane' at VHF, this gives some clues about how the design might develop.

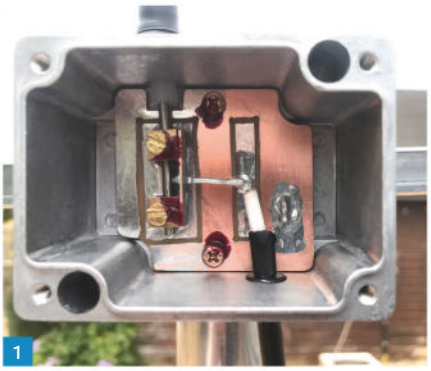
The downside of re-using your existing TV aerial in this way is that you will, almost certainly, create some TVI in your own home. That is easily cured with a simple filter, so it is not really a serious problem.

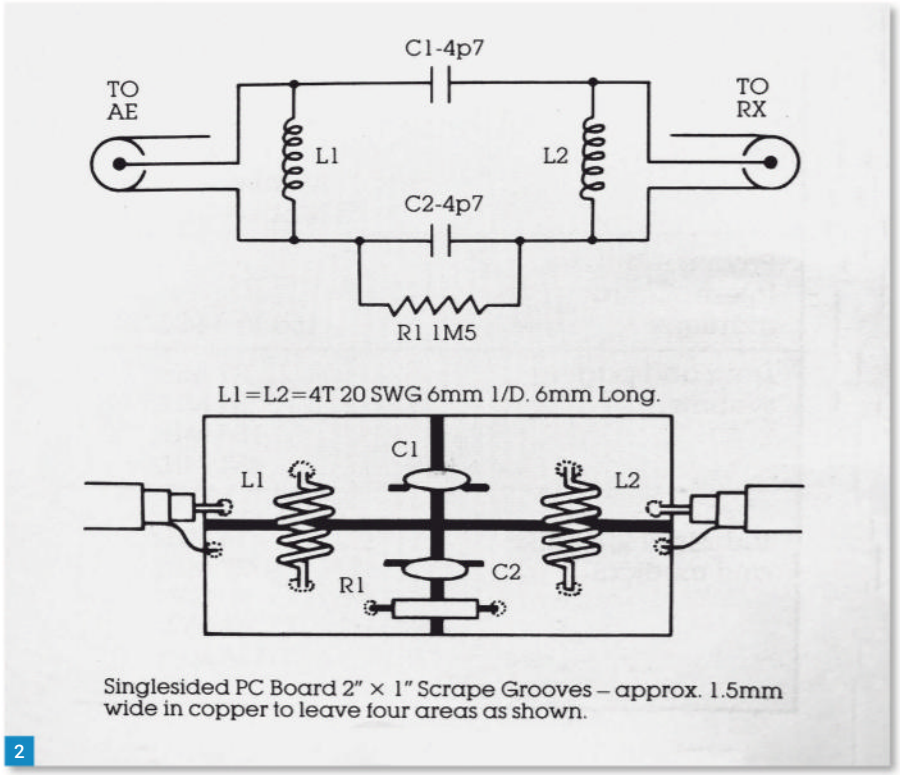
Construction

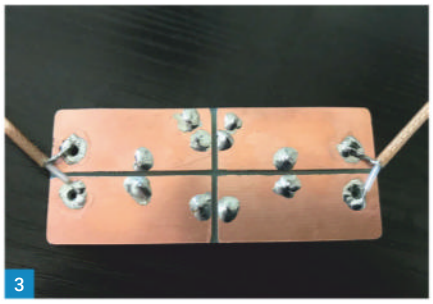
In the suggested design, there are only two parts to build: The antenna mount, and a filter.

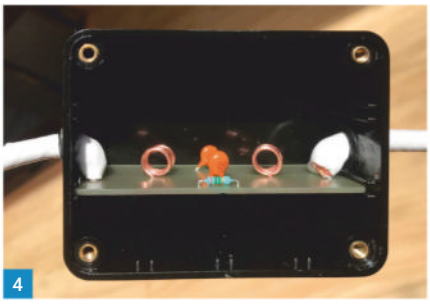
Antenna mount

The antenna mount is a weatherproof diecast aluminium box, with provision for mounting a small piece of copper-clad circuit board inside. This can be seen in the photo, **Fig. 1**. The whip is clamped in place with a brass terminal salvaged from an old mains socket. The right-hand island on the board was made to facilitate the inclusion of some series reactance, but in the event none was needed.









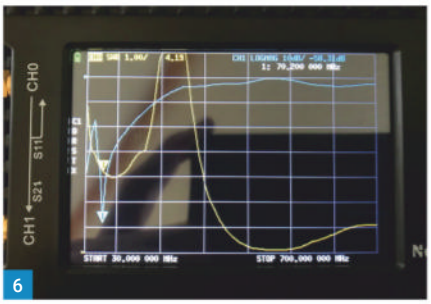


Fig. 1: The inside of the whip mounting box.
Fig. 2: Extract from the 1986 public information booklet. Figs 3 through 5: Filter construction and installation.
Fig. 6: VNA sweep of the completed filter, showing a small insertion loss in the TV band, and a deep notch at 70MHz.

The whip is insulated from the box with a tube of dielectric material, salvaged from a redundant piece of RG213 (UR67) co-ax cable. That part of the steel rod which is inside the box does not count towards the calculated element length, so care is needed to cut the rod long enough.

Thorough waterproofing is also needed, especially around the base of the whip. I covered the whole thing with black heatshrink tubing, and then added several more layers on the bottom few inches. Apart from weatherproofing, covering the whole whip in this way has other benefits: It adds slightly to its electrical length (so the tuned physical length is less); it inhibits corrosion; and in some situations it makes the whip generally less visible. This can be seen in the header photo, which also shows the co-ax feeder coiled to form an RF choke immediately below the mounting box.

Filter

The filter is installed indoors, in the TV aerial down lead, immediately before my distribution amplifier. Technically a combination of braid-breaker, static bleed, and high-pass filter, it is nevertheless a very simple unit. The design, **Fig. 2**, was copied directly from a 40-year old public information booklet [**2**]. The photos, **Figs 3** to **5**, show my implementation of that design.

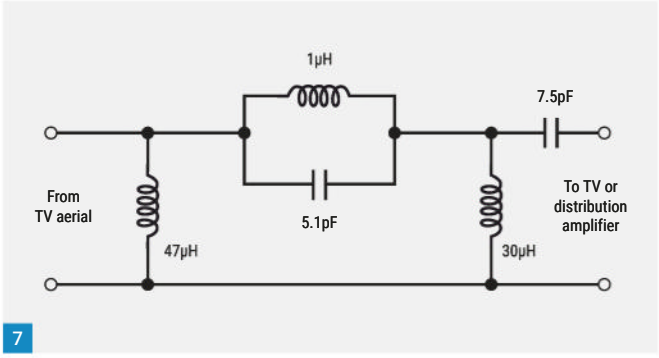
Fig. 7 shows a VNA sweep of the finished product. It can be seen that insertion loss in the TV band is small, and that there is a deep notch at 70MHz. This is enough to completely eliminate TVI in the G4ZUP household.

My 4m FM rig outputs a maximum of 15W and, since I have never fed more than that to my whip antenna, I don't know how much 'headroom' this filter may have. It is possible that a deeper notch may be needed for higher transmitter powers. Should that prove to be the case, it might be worth exploring the arrangement shown in **Fig. 8**. This is described as a 4th-order elliptic high-pass filter with (in theory) a 90dB notch at 70MHz. **Fig. 9** shows the expected response characteristic, as calculated and plotted by the Markimicrowave filter design tool [**3**].

Rigging and testing

While construction is mostly a bench job, rigging and testing are necessarily done with the TV and radio antennas in their Siamese-twin configuration. Tuning is effected by trimming short lengths off the top of the whip; and since this is an iterative process, it needs to be done at ground level. To make that possible, the actual hardware is assembled into a test rig, which is electrically as close as possible to the rooftop installation. The photo, **Fig. 9**, shows how it was done at the G4ZUP QTH.

With care, the VSWR at the feedpoint of the finished antenna can be trimmed very close to 1:1. Mine was, and even after spoiling it somewhat with a post-installation disconnect



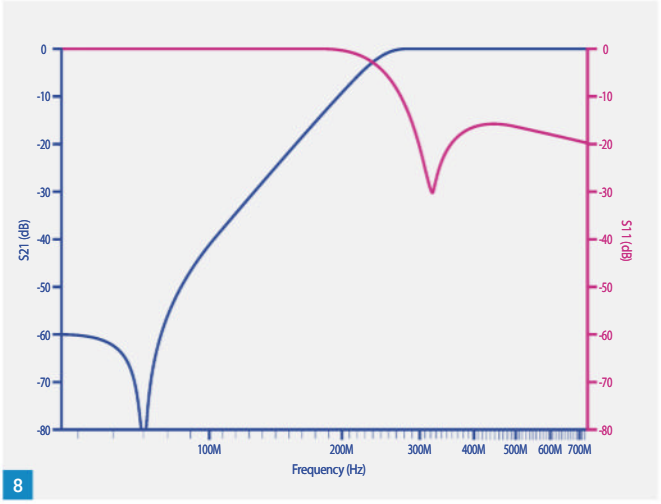


Fig. 7: A 4th-order elliptic high-pass filter for use in a 75Ω downlead. Fig.8: Theoretical response of the 4th-order elliptic filter, as plotted by the Markimicrowave filter design tool. Fig. 9: A suitable rig for testing and tuning.

point, the transmitter still sees a VSWR of less than 1.5:1. Said disconnection point was incorporated after I looked up at my new antenna and realised how much it resembled a lightning conductor – so now I unplug it whenever there's thundery weather about; or if we go away.

I'm fortunate in that I have easy and safe access to my chimney-mounted antenna mast, without long ladders, or gymnastics on the house roof. Unless you are similarly blessed, it might be best to get a professional rigger in to do the final rooftop installation.

Conclusion

For normal day-to-day working on VHF FM, an unobtrusive λ/4 whip, which uses an existing TV aerial as its groundplane, can be pleasingly effective without upsetting those who do not share our enthusiasm for radio.

Some self-inflicted TVI is almost inevitable, but that is easily cured with a simple filter in the TV antenna downlead.

Construction and testing are straightforward, and are done at ground level, but final installation is best left to professional riggers, unless you have easy and safe access to the rooftop mounting site.

Provided normal best practice is followed, no in-service maintenance should be needed. My 4m band version has been giving faultless service since its installation in the summer of 2022 – but I do unplug the downleads (both TV and radio) if there is thundery weather about. So, perhaps a new antenna project this summer?

References

1. *An Instant Antenna for VHF FM*, by Rod Angel G4ZUP, in *PW* January 2023 ed, pp 42-44.
2. *How to Improve Television and Radio Reception – A guide for householders and television and radio dealers*; a booklet prepared by the Radio Investigation Service of Department of Trade and Industry, revised November 1986.
3. **https://tinyurl.com/34d4j4kz**

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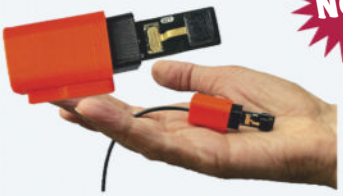

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Tim Bolt
tim@timbolt.co.uk

A PC Controlled Wobbulator

Tim Bolt offers a handy piece of test equipment for aligning old sets.

One of the faults I've come across more than once in AM/FM superhets is loss of sensitivity on FM, while AM performs fine. My Cossor 523A started to develop this symptom recently. Changing the ECC85 and cleaning the aerial connector both improved matters, but the FM performance was still disappointing. It was time to re-align the FM stages.

In common with similar receivers of the time, the service sheet called for a wobbulator. A wobbulator, or sweep generator allows you to view the frequency response of a circuit in conjunction with an oscilloscope; historically a sawtooth waveform was used to alter the frequency of a voltage-controlled oscillator, while synchronised to the X displacement of an oscilloscope measuring the demodulated circuit output.

By coincidence, the wobbulator model recommended on the service sheet was for sale on an online auction site. However, it was rather expensive, bulky and requiring repair. The somewhat-dated Raspberry Pi wobbulator looked promising from a design point of view, but wasn't a good match to specified instrument; I wanted to use my own oscilloscope, I already have a PC in my workshop and don't need any more keyboards and monitors. This project is the result.

Circuit description

As with the Raspberry Pi instrument, the RF signal is generated by a plug-in DDS module containing an Analog Devices AD9850. Instead of a Raspberry Pi connected to the serial interface, a PIC18F2621 microcontroller interfaces with its parallel inputs. The choice of microcontroller was determined by the following criteria:

- It had enough IO ports
- It had a UART
- It had enough program memory
- I had some already from another project

There are many other devices that would work equally well and that the code could be ported to.

So as not to compromise the output signal with a home-built attenuator, I decided to use the microcontroller's IO pins to control a digital attenuator. This is also available as a module and features the Peregrine Semiconductor PE4302. A 74LS374 latch was used to decouple some control lines shared with the DDS module, as the parallel input, which would have simplified matters, is not available on the module version.

To synchronise the sweep with the scope scan, a digital output is taken from a spare microcontroller port. This is fed either to a second input, or to an external trigger input on the scope. Either way, the scope needs to be configured to start its scan when the RF sweep begins.

Finally, to allow user control by a PC, there is an interface to a DB9 RS232 port via an Analog Devices MAX233. For those whose PCs don't have serial ports, there are two options;

- Use a USB to a DB9 serial adapter
- Replace the MAX233 with a USB UART

Either will create a serial port on the PC application and the latter option opens up the possibility for the instrument to be powered via the USB interface.

The prototype used an external power 12V source, which feeds a 7805 IC regulator supplying 5V for the microcontroller, the latch, RS232 level shifter and the two modules.

After prototyping on breadboard, DesignSpark PCB was used to create a two sided PCB to fit a in a Hammond 1445 extruded aluminium case. **Figs 1** and **2** show the circuit and PCB layout respectively. A component list appears as **Table 1**.

Firmware design

The firmware is written in C, using Microchip's MPLABX IDE and the free version of their compiler. It was designed to operate in one of two modes:

1. To act immediately on instructions sent via RS232 at 9600 Baud, from the PC
2. To increment the frequency of the synthesiser module in programmed frequency steps over the sweep range and to generate a trigger pulse at the start of sweep

Interrupts

Two sources of interrupts are used in the design:

- A 1ms timer, used for general timing functions
- Incoming characters arriving at the UART, which are placed into a circular buffer.

Message format

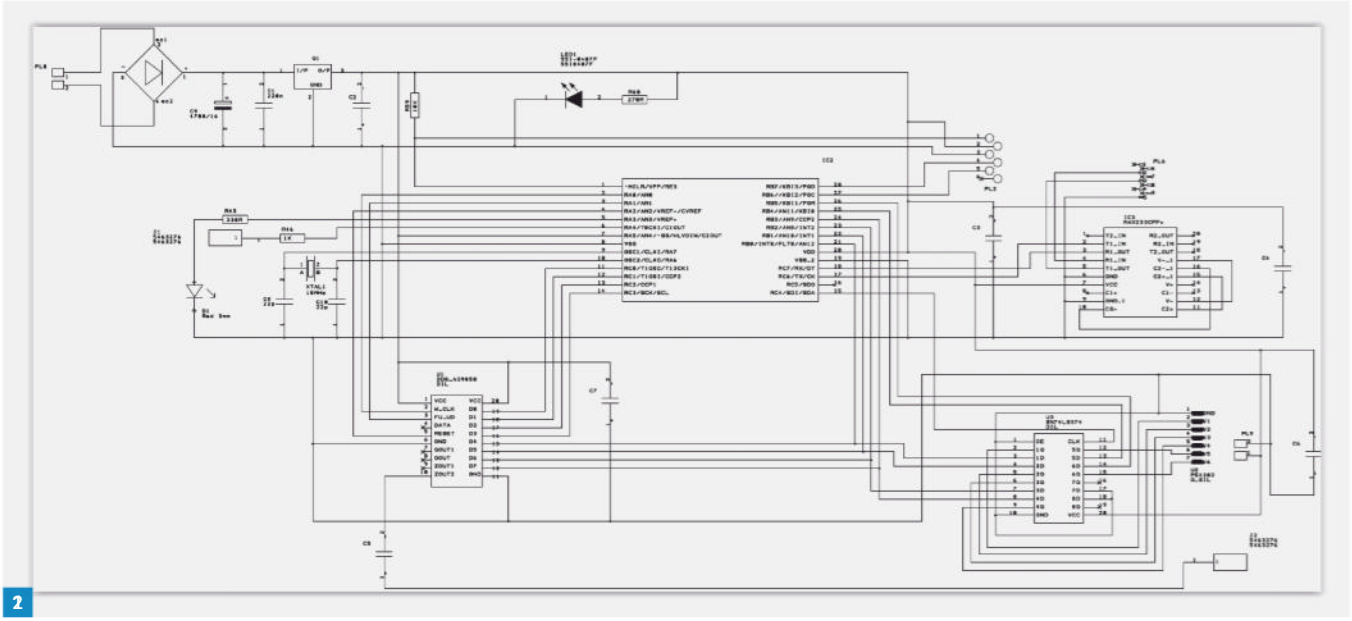
Both sent and received messages have a similar format:

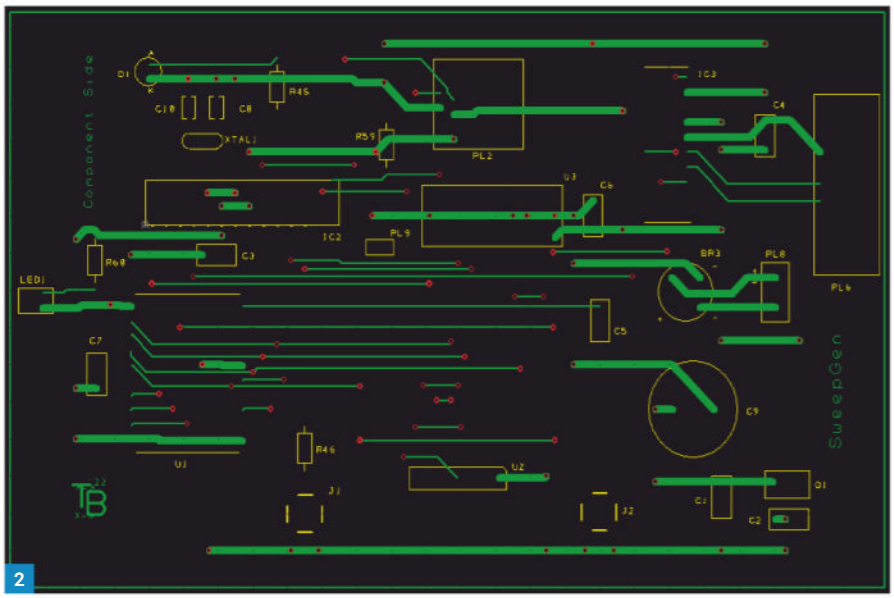
Received: SW<message_id><data1><data2><data3><data4><Checksum><return>

Sent: SW<message_id><status_id><data1><data2><data3><data4><Checksum><return>

The main program reads from the circular buffer and waits for a valid message to be completed. Each message type has an identifying id, which is used to select a matching function. The function updates variables used to control the modules. Rather than each message having a dedicated reply, the PIC application periodically updates the PC with a cycle of status messages.

When sweeping, the PIC firmware goes into a loop to update the synthesiser with the next frequency, without the need for a command from the PC. If required, the firmware can insert a delay between instructions to the synthesiser, so that the sweep duration can be trimmed. A similar effect can be obtained by decreasing the frequency step size. Both methods can be used simultaneously.





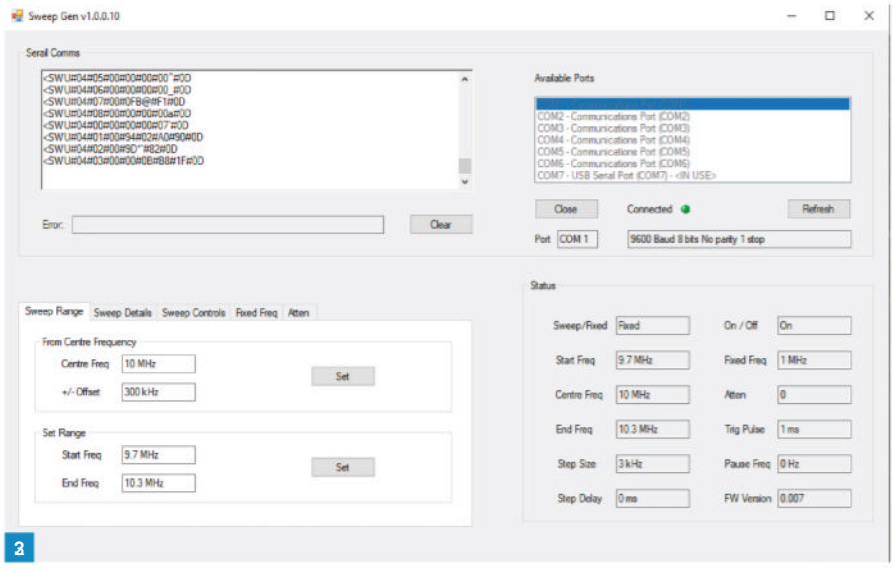


Fig. 1: Wobbulator circuit.
Fig. 2: Component layout.
Fig. 3: - PC application.

PC application design

This is a Visual Studio Windows Forms application in C#. On start-up, the PC's serial ports are enumerated and displayed in a list for the user to select. Once selected, the port can be connected and raw serial data displayed on a scrolling list. In fixed frequency operation, the user can control the frequency and the amplitude, by simply inputting the desired parameters.

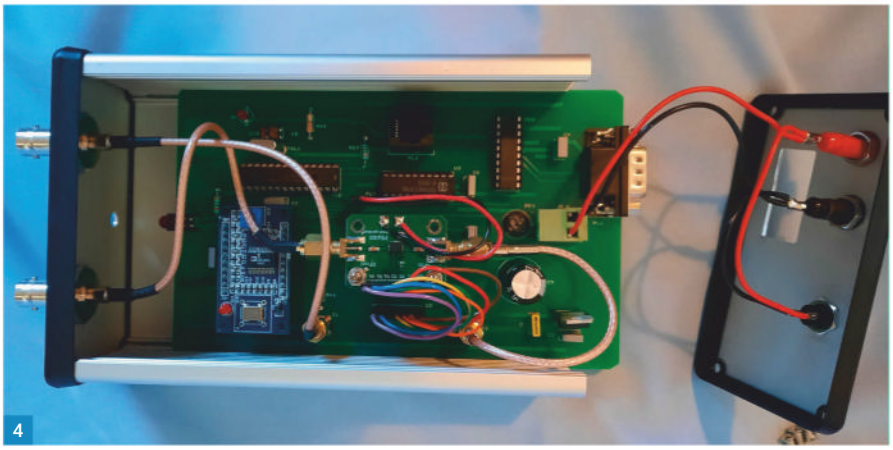
For Sweep operation, the user can either enter a centre frequency with a sweep range, or enter a start and stop frequency value. The application can calculate a default step frequency and number of steps. The user can alter these defaults and enter a delay between steps, before starting the sweep. If necessary, the duration of the trigger pulse can be extended. The sweep can be halted or incremented in single steps if required. The attenuation can be varied over 64 0.5 dB steps and the output can be turned on and off.

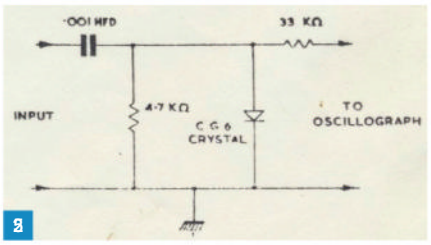
The firmware sends a status message at 1s intervals. The status identifier byte is used to determine the meaning of the status data bytes and to update the display accordingly. **Fig. 3** shows a screenshot of the application in use.

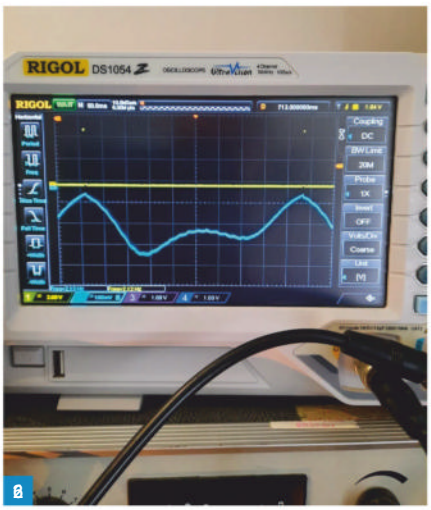
Hardware design

A single PCB slides into the rails of the extruded aluminium case. It holds the three DIP ICs, the regulator IC and the sockets and headers for the synthesiser and attenuator modules. A rectangular slot is cut in the rear panel for the DB9 connector and a hole is drilled in the front panel for the LED. Other connectors are screwed to the front and rear panels and plug into the main PCB or the modules.

Fig. 4: Partially dismantled view.
Fig. 5: The Cossor-recommended probe; the orientation of the diode causes inversion of the trace. Fig. 6: The familiar 'M' trace (inverted) between two trigger pulses.







It may be necessary to chamfer the board corners slightly to clear the plastic of the front and rear panels. Any tendency to rattle may be cured by using thin self-adhesive pads on the insides of the end panels.

Standard BNC connectors were used on the front panel for the output and trigger connections, but SMA connectors were used internally, making use of ready-made cable assemblies. A PCB-mounted LED indicates power at the front. An internally mounted 'heartbeat' LED flashes in time with the status message.

On the rear panel, a PCB-mounted DB9 connector is used for the serial connection. 12V Power enters the board via a two-pin connector. A bridge rectifier is included, allowing a transformer to be used. The prototype used 4mm sockets and standard DC connector. Programming is via a 6p6c connector, to suit an ICD3/4 programmer or a Pickit programmer with an adapter.

Operation

12V DC is applied to the rear of the instrument, which should result in the front panel LED being lit. The serial connection is made to an available RS232 port on the PC, using a null modem cable. The PC application should be started and the serial port selected in the list box. On pressing the Select button, the 'connected' indicator should turn green, raw data should appear in the Serial Comms display and decoded data in the status area.

The sweep parameters should now be entered using the tabs in the bottom left of the display; as an example, enter a centre frequency of 10.7MHz and an offset of 300kHz in the Sweep Range tab and press the top 'Set' button. Two outgoing messages should be seen in the Serial Comms display and the status display updated.

Select the Sweep Details tab and press the Set Defaults button. Edit the values if required and press the Set button. Now select the Sweep Control tab and press the Start Sweep button.

Connect the Trigger output to one channel of an oscilloscope and the RF output to a second channel. Adjust the scope to trigger on the 'Trigger' signal, then alter the timebase to show one sweep on the scope.

The wobbulator output can now be transferred to the circuit under test and a diode probe connected to the circuit's output should replace the scope's input.

Experiences in use

So far the Cossor receiver has been the only one realigned with the aid of the wobbulator, but several interesting observations have been made. Although the FM IF stage could be tuned to 10.7MHz, its resonance was closer to 10.5MHz. I made the pragmatic decision to use the slightly lower frequency, rather than disturb the IF transformers. The circuit of the diode probe showed the polarity of the diode in the opposite sense to that in the Cossor alignment generator, which meant the observed responses were inverted compared to the printed examples.

The final oscillator adjustment of the receiver alignment brought about an increase in output of several dBs, bringing the receiver performance more in line with expectations.

Although the receiver was not far out of alignment, the wobbulator proved useful in optimising the performance, especially after experimentation with the IF frequency setting.

A file with the firmware and a Windows executable for the controller, along with Gerber files for the PCB, are available from the author (email address above). **PW**

Components

Circuit Ref	Description	Comments
C1	330nF	Polyester
C2	100nF	Polyester
C3	100nF	Polyester
C4	100nF	Polyester
C5	100nF	Polyester
C6	100nF	Polyester
C7	100nF	Polyester
C8	15pF	Ceramic
C9	4700µF /16V	PCB Radial Elect
C10	15pF	Ceramic
R45	330Ω	
R46	1kΩ	
R59	10kΩ	
R60	270kΩ	
XTAL1	10MHz	
BR3	1.5A 1000V Bridge rectifier	
Q1	7805 regulator	
IC2	PIC18F2610 28pin DIP	
IC3	MAX233 RS232 level shifter	
U1	AD9850 DDS module	
U2	PE4302 attenuator module	
U3	74LS374 latch	
D1	Red PCB mount Panel LED	Dialight 551-0407F
LED1	Red LED 3mm	Heartbeat
PL8	2-pin TRU Connect PCB plug and line socket	DC to board
PL2	PCB Mount 6p6c socket	PIC programming
PL6	9-way D PCB plug	RS232
PL9	2-way 0.1" header	PE4302
J1	SMA PCB socket	
J2	SMA PCB socket	
	28 pin DIL socket 0.3"	IC2
	20 pin DIL socket 0.3"	U3
	20 pin DIL socket 0.3"	IC3
	PCB	
	1455N1601 Hammond Enclosure	
	BNC panel mount socket - SMA plug	
	BNC panel mount socket - SMA plug	
	SMA plug - SMA plug	
	4mm socket red	
	4mm socket black	
	panel mount DC PSU plug	
	20 way 0.1" socket strip	U1
	7 way 0.1" PCB Header	U2
	2 x M3 hex pillar with screws and nuts	U2
	7 way 0.1" SIL housing and receptacles	U2
	2 way 0.1" SIL housing and receptacles	U2 power

Table 1: Components

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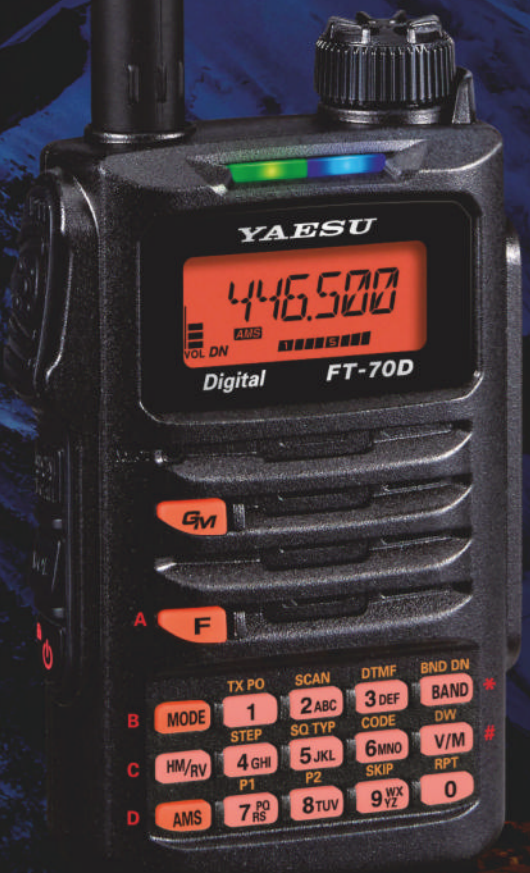

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Reaching for the moon

Roger Dowling G3NKH meets Malc Smith G4FQI and Kim G8DBO on their Leicestershire farm.

Roger Dowling G3NKH
practicalwireless@warnersgroup.co.uk

For most people, the words 'radio telescope' are immediately associated with Jodrell Bank, a few miles from my own home QTH in Cheshire. It hard to believe that that the 250ft (76m) diameter Lovell telescope, which came into service in 1957, is now definitely of pensionable age though it has been constantly upgraded over the years. It is still doing brilliant work as part of the MERLIN chain of linked telescopes around the UK and a similar network of telescopes across Europe and Asia.

What may be less well known is that after Jodrell Bank the UK had two further steerable dishes, at the Royal Radar Establishment in Defford, Worcestershire. Located on railways tracks to provide a separation of up to 1,000m, the 25m (82ft) dishes could be used independently for radio or radar astronomy, or together for accurate observations using interferometry. I remember the telescopes well, as I worked on them as a young student apprentice in the early 1960s, and have clear memories of cranking a Yagi at the focus in order to make observations on the polarisation of radio waves from the planet Jupiter.

I have retained a keen interest in steerable telescopes over the years and it was with great pleasure that I accepted an invitation from **Malcolm ('Malc') Smith G4FQI** and his wife **Kim G8DBO**, **Fig. 1**, to see their own impressive dish, **Fig. 2**, in action. But their interest, as we shall see, is not so much in astronomy but in Moonbounce, the technique of reflecting amateur radio signals from the surface of the moon.

How it all began

Malc was born in Ashby-de-la-Zouch, a few miles away from his present Leicestershire QTH, and went to Loughborough Secondary School. Always keen on technology, he was *"forever playing with switches and relays"* and in due course he took his 'A' levels in Technical Drawing and Metalwork. He left school to work on the 400-acre family farm, which he took over from his father in 1988. For six years he also

became engineering manager of an agricultural research company adjacent to the farm, work which he continues to do on a part-time basis today.

Malc's interest in amateur radio dates back to his schooldays. *"I had a pal in the village whose dad was a keen member of Derby and District Amateur Radio Club (DADARS)"*, he reCallsed. *"They had regular junk sales and he would take me along to them"*. There, Malc made the acquaintance of the late **Denis Bosworth G8BAV**, a great 70cm enthusiast who encouraged him to enrol for the RAE course at Derby Technical College being run there by the late **Fred Ward G2CVV**. *"I finally got my G8DBO licence in 1969"*, said Malc. *"Like most G8 stations I started off with a few watts of AM on 70cm and 2m using homebrew or converted ex-commercial equipment, before progressing to FM and SSB"*.

It took Malc 'ages' to get round to taking his Morse test. He taught himself from records, greatly encouraged by the late **Alan Stafford G3NYZ**, and he finally became G4FQI in 1976. *"I started off with a KW-2000A"*, Malc reCallsed. *"I had access to a 100ft turntable ladder from an old Leicester Fire Brigade fire engine and I mounted a three-element quad on top. It was quite the talk of the village!"*

Malc and Kim moved to the farm in 1978, bringing the turntable ladder with them. Malc fitted it up with a three-phase motor and gearbox and a 5-element 20m beam. *"We used that for quite a while"*, said Malc. *"We became quite involved in the local Derby RAYNET Group at the time, one of the earliest such groups in the country"*.

Fig. 1: Malc Smith G4FQI and Kim G8DBO in their shack. Fig. 2: The 4m diameter EME dish. Standing below (l to r): Martyn Coldicutt G8DKV, the owner of the original 3m dish; Malc Smith G4FQI and Kim G8DBO. Fig. 3: Malc's home-built linear uses four 4CX250 valves and will run up to 1kW. Fig. 4: Left to right: An Icom IC-735, Kenwood VFO-820 and two Trio TS-820. An ELAD FDM-Duo sits on top of the Icom IC-735. Fig. 5: Four element SteppIR beam. Fig. 6: Three element SteppIR beam. Fig. 7: Six element vertical cage antenna.

Shack and antennas today

"I seem to acquire radios but never actually dispose of any", Malc confessed cheerfully as he showed me round his shack. A keen constructor in the past, Malc is particularly proud of his home-built 1kW linear, **Fig. 3**, which uses four venerable 4CX250 valves – and is still in excellent working order. His main rig is a Yaesu FTdx5000 (HF-6m), which he

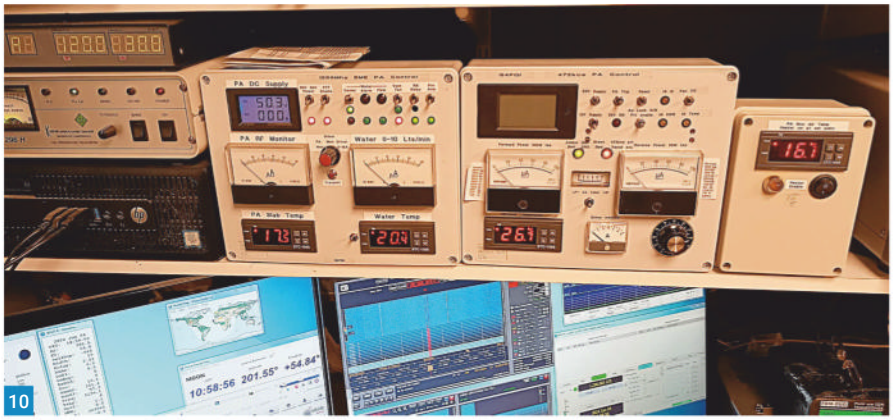
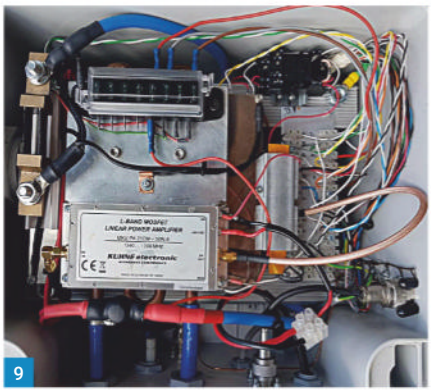


Fig. 8: The 4m diameter dish used for EME. The dotted line shows the size of the original 3m dish before being enlarged. Fig. 9: The interior of the PA box, which contains KUHNE water-cooled power amplifiers. The water cooler is located in a box at the base of the mast.
Fig. 10: Centre: home-built control and monitoring units for the EME system. On the extreme left is the Kuhne TR 1296 H transverter. The box on the right monitors air temperature in the PA box and heats it as necessary to prevent dew and damp.
Fig. 11: Kim G8DBO demonstrates her new stained-glass skills. Fig. 12: Happy – though not always successful – days of motorbike/sidecar racing. Fig. 13: Malc at the controls of a Beech Beechjet 400A twin-jet aircraft.



uses as required in association with a Yaesu Quadra VL-1000 linear. His more venerable rigs include two Trio TS-820 transceivers, a Trio R-820, an Icom IC-735 and a Kenwood SM-220 station monitor. Other current radios include an ELAD FDM-DUO transceiver, used on 472kHz and for Moonbounce work, **Fig. 4**. The antennas at G4FQI reflect Malc's wide range of radio interests. He has two SteppIR beams, one a four-element on a heavy-duty 80ft tower, **Fig. 5**, and the other on a 60ft tower, **Fig. 6**; both are used from 20m down to 6m. One of the towers also carries a collinear for 2m and 70cm. A novel 100ft high wideband vertical cage antenna with six wire elements, **Fig. 7**, is used both for 160m and for 472kHz in association with the ELAD DUO transceiver. Also for topband, Malc has an impressive 328ft doublet strung at around 80ft between the various masts.

Moonbounce (Earth-Moon-Earth/EME)

The idea of reflecting radio signals from the moon is not new: it was first proposed by the Post Office as early as 1940 when it was thought that a single voice channel might techniCallsy be possible. The idea was taken up again after World War II, though the launch of communications satellites in the 1960s made the technique largely redundant in commercial terms.

The idea continued to attract radio amateurs, however. The first successful Moonbounce link was reported in *QST* magazine in March 1953 when two American amateurs, **Ross Bateman W4AO** and **Bill Smith W3KGP**, finally achieved definitive echoes using a 1kW transmitter on 2m. In the UK, the first successful Moonbounce QSO was in 1964 when **Peter Blair G3LTF** contacted a Puerto Rico station KP4BPZ using a 4.5m dish at his QTH in Essex.

The technical challenges of EME, in an amateur radio context, are very considerable. For a start, the moon is quite a small object, only 3,475km in diameter, and 383,500km away, so it subtends an angle of only about half a degree from earth. Obtaining reflections would be hard enough if the moon were a flat copper disc – but in reality it is spherical and is a fairly poor RF reflector. Moreover, the moon's relative motion with the earth requires it to be accurately tracked, and propagation is also subject to Doppler effect and changes in polarisation.

However, the introduction of digital modes and modern tracking software, developed largely by the amateur radio community, has brought EME within reach of amateurs with relatively modest equipment and it is now an increasingly popular activity, especially on 23cm (1296MHz).

Malc had thought about EME over the years but only became involved around 2018 thanks to his good friend and neighbour **Martyn Coldicott G8DKV** who was making excellent progress on 23cm using a 3m diameter dish produced in kit form by the Dutch company RF Hamdesign. Malc worked closely with Martyn, helping with the assembly and other mechanical tasks, including the dish support assembly. The

project was going very well until, sadly, Martyn's activities fell foul of his local planners so Malc took a deep breath and decided to rebuild the whole system at his own QTH.

It was not a simple task, involving a 1m^3 concrete foundation and a 110mm cable duct back to the shack. With the mast mounted on the ground post, it was then time to mount the rotator, dish and associated cables; these not only comprised the signal feeders but also power, control and sensor cables for the pre-amp and PA as well as water pipes for the PA cooling. *"I had not appreciated at the time how much work was involved in designing and building all the control and monitoring systems"*, reCallsed Malc, *"but it was well worth the effort"*.

Initial results were encouraging but Malc soon set to work on improvements. *"I felt sure that I could obtain better results by increasing the diameter of the dish from 3m to 4m"*, said Malc, **Fig. 8**. *"I was hoping for an extra 2dB gain – not a lot, but with EME every little bit counts"*. It was a task that was easier said than done, though he was greatly helped by having excellent workshop facilities. He used a wooden former to establish the precise parabolic shape of the extended sections, which used ½in alloy box section pop-rivetted to the original dish. To bend the section to the required profile, Malc improvised a small 'rolling mill' using ball bearings and other workshop parts.

EME software and hardware

Because of the very small signals involved in Moonbounce, special software has been developed by the amateur radio community. Most commonly used is JT65, perhaps best described as a sort of EME-equivalent of FT8. Malc originates this using WSJT-X, originally written by **Joe Taylor K1JT** but now available as open source software.

The JT65 signals are fed to the ELAD FDM-DUO transceiver running on 28MHz and thence to a Kuhne TR 1296H transverter, which produces about 10W at 23cm that is fed to the PA box, **Fig. 9**, on the dish. This contains a Kuhne PA 23CM 50 and a Kuhne PA 23CM 1000, which in combination generate the 1kW feed to the dish antenna. Both are water-cooled via a water cooler located at the base of the mast. I particularly admired the beautifully designed and constructed home-built control and monitoring units, **Fig. 10**. *"An enormous amount of work went into these units"*. Malc told me. *"They perform a vital role monitoring water flows and power supplies to the PA and driver units"*.

On the receive side, the incoming signal is fed to a DDK VLNA (Very Low Noise Pre-Amplifier) to a design by **Sam Jewell G4DDK** and then back to the Kuhne transverter and ELAD FDM-DUO transceiver.

To track the moon, Malc uses the superb MoonTrack software developed by the late **David Anderson GM4JJJ**. Results to date have been very encouraging, with 630 successful contacts into 43 countries all over the world.

Kim's story

I asked Kim, now the proud owner of Malc's original G8DBO Calls, how she became involved in amateur radio. *"I had two goes at it"*, she admitted. *"I failed what Malc Callss the 'proper exam' but then they brought in the multiple-choice paper, which I found much easier. I did an evening class with a friend at a school in Heanor and even got a 'credit' on the technical paper!"* Kim admits she is a member of the 'If you can't beat 'em, join 'em' community of radio amateurs' wives, but is happy to join in any ragchews that take her interest. She has even passed on the radio bug to daughter **Jackie** who, though not currently active, is the owner of the Calls **M3IHU**.

Kim is kept busy running the day-to-day operations on the farm, but she has recently embarked on a new interest in stained glass, proudly showing me one of her latest panels for which she was making a frame, **Fig. 11**.

Beyond radio

Amateur radio is only one of many interests Malc has pursued with enthusiasm over the years. *"I had a mad obsession back in the 1970s with a motorbike/sidecar racing, (**Fig. 12**)"*, he admitted to me. *"It was great fun, though we were not very good and I soon got it out my system!"*

Malc also has a first class workshop and demonstrated to me his working steam engines and an impressive range of agricultural engines he has restored over the years.

But flying has been a Malc's major passion since the early 1990s, and one which continues to occupy a significant amount of his time. *"It's all my fault"*, said Kim. *"I asked some friends if they could organise a helicopter flight for a birthday present but it proved too expensive so they arranged a £25 trip in a light aircraft. Malc was immediately hooked!"* He enrolled for flying lessons at East Midlands Airport, where thanks to a 'great' instructor he gained his Private Pilot Licence (PPL) after around 50 hours of flying, enabling him to fly small single-engine light aircraft. Instrument Rating (IR) tuition for single and twin-engine aircraft followed.

With further family encouragement, Malc then went on to train for a commercial pilot's licence (CPL) followed by his Air Transport Pilot's Licence (ATPL). In due course he graduated to twin-jet aircraft and regularly flies a Beechjet 400A aircraft to destinations all over Europe, **Fig. 13**.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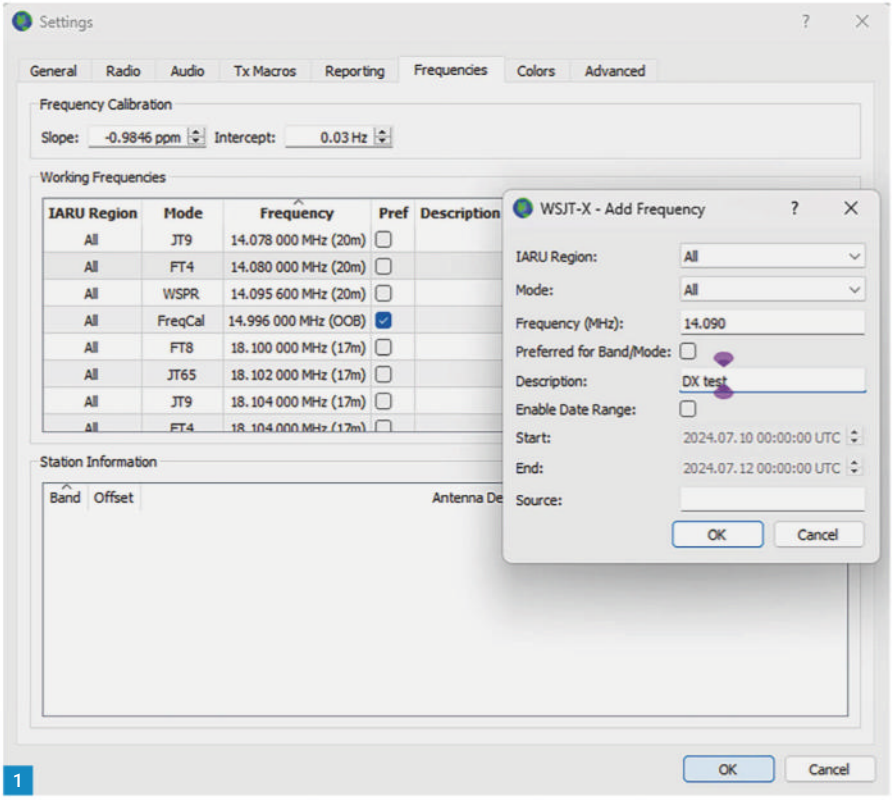
Moonbounce: further reading

An excellent booklet *Getting started in EME* by **Stephen Appleyard** and **Philip Malme** is available on Amazon.com. **PW**

Mike Richards G4WNC
practicalwireless@warnersgroup.co.uk



Fox & Hounds Update

Mike Richards G4WNC has the latest update from the WSJT-X team and a roundup of Pi NVMe solutions.

Fox and Hounds is not the local pub but the WSJT-X mode, developed to help DX stations work more contacts. I'm sure we've all experienced pileups as everyone tries to exploit an opening to a special DX station. The Fox & Hounds mode aims to improve the FT8 contact rate for DXpedition stations, i.e. stations set up specifically to activate a rare DX location. The mode can simultaneously complete QSOs with up to five stations. When working well, the DX station can work up to 500 stations per hour!

Before I describe the mode in more detail, there are a few restrictions to note. The mode will only be used by rare DX locations where more than 100/hour call rates are expected. Fox & Hounds mode must not be used in the normal FT8 allocations but in a free slot in the general data modes band allocation. All Fox & Hounds must have CAT control with split operation enabled (Rig or Fake It). You must also have "***Monitor returns to last used frequency***" checked.

For clarity, Fox is the rare DX station, and Hounds are the stations trying to work that DX station. The Fox & Hounds mode can occupy an entire 4kHz speech channel, so it must operate outside the dedicated FT8 allocations. The speech channel uses the audio range 300-900Hz for the Fox transmissions and 1kHz to 4kHz for the hounds.

Operating Fox & Hounds

Let's begin by running through the required WSJT-X settings. As we'll be operating outside the normal FT8 channels, we need to add the DX station frequency to the FT8 frequency list. Here's how:

1. Open File – Settings – Frequencies.
2. Right-click anywhere in the Working Frequencies chart and choose Insert, **Fig. 1.**
3. Enter the DX station details and click OK twice to close.

You should now find that the new DX frequency is available in the band drop-down in WSJT-X. Let's move on to the main configuration settings. Here's a step-by-step guide:

1. Open File – Settings – Advanced and tick Special operating activity followed by Hound, then OK.
2. Open File – Settings – General and tick the following: ***Monitor returns to last used frequency*** and ***Double-click on calls sets Tx enable***.
3. Enter the Fox callsign and locator in the marked boxes on the main panel, **Fig. 2**.
4. In the Messages section, select Tab 1 and the Tx 1 message.

The final step is to set your transmit frequency using the Waterfall display. You will be transmitting between 1kHz and 4kHz, and the key here is to find a quiet frequency. Once you've found a suitable frequency, place the mouse cursor and use Shift + Left Click to set the red Tx marker. In Hound mode, WSJT-X will only decode signals below 1kHz, so you don't need to set a specific receive frequency. If you want to decode all the activity, check the Rx All Freqs button on the main panel, Fig. 2. Don't forget to ensure the Monitor button is green!

The next step is to wait for the DX station to call CQ. When you see their CQ call, double-click on their call to begin your response. You can keep calling until you get a response. As with normal FT8 operation, Enable Tx will drop out after two minutes, and you will need to reactivate it if you haven't completed your QSO. This drop-out is to prevent unattended operation.

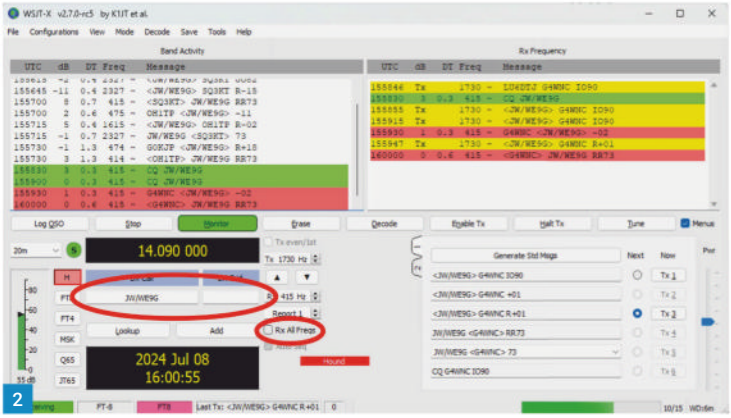
When the DX station responds to your call, WSJT-X will automatically change your Tx frequency to that of the DX station and send Tx 3 (R+rpt). The Fox will then send RR73 to conclude the call. For successful DX operation, it's essential not to use high transmit power with efficient antennas. FT8 is designed as a weak signal mode, and the Fox settings include a Max dB threshold. When this is set (and usually is), WSJT-X will ignore stations with a S:N figure better than the preset value! As a result, very loud signals will be excluded in favour of weak stations.

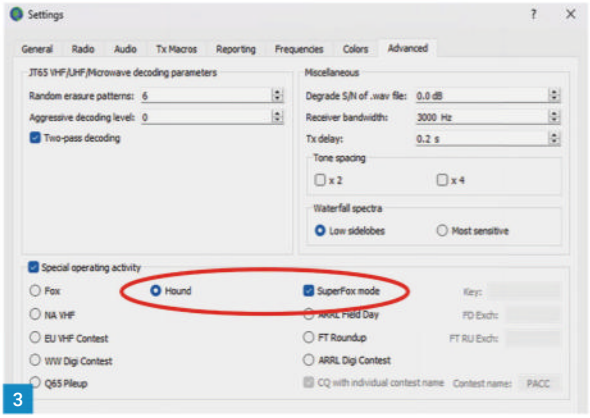
SuperFox

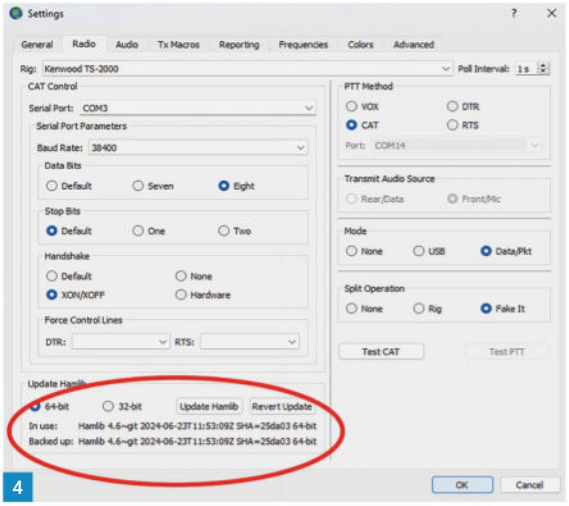
The latest WSJT-X release candidate (rc5) introduces a new variant to the Fox & Hounds mode called SuperFox. The Fox can work up to nine Hound stations simultaneously in this new system. Operation of the Fox is radically different as the Fox signal employs a 1512Hz bandwidth signal from 750Hz to 2262Hz. The transmission includes reports for up to nine stations plus a unique key to validate the station. The Northern California DX Foundation allocates this key. For Hounds, there has been very little change in the operation. The restriction to operate above 1kHz has been removed, but that's all that changes. To activate SuperFox, go to File – Settings – Advanced and select SuperFox and Hound, **Fig. 3**. DXpeditions are likely to start using this new mode from September, so make sure you've upgraded WSJT-X to v2.7.0 rc5 or later so you can join in the fun.

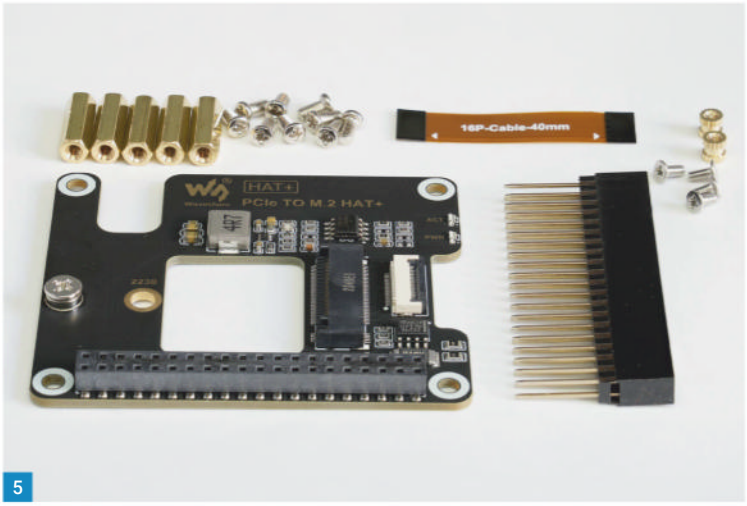
WSJT-X v2.7.0 rc Extras

In addition to the new SuperFox mode, the latest WSJT-X includes a new Q65 pileup mode that will









particularly help EME (Earth-Moon-Earth) operators. This mode assembles the decoded calling stations into a convenient list, and a response to that station can be triggered simply by clicking the appropriate line. Another interesting enhancement is the new facility to update Hamlib from within WSJT-X. As shown in **Fig. 4**, the Hamlib versions are listed at the bottom of the Settings – Radio page. You can choose between 32-bit and 64-bit versions and update or revert to the current version.

Waveshare PCIe to M.2 HAT+

The Waveshare M.2 HAT+ for the Raspberry Pi is currently the cheapest available and might be one of the best! As with the official Pi version, the Waveshare only accepts 2230 and 2242 format M.2 devices. For most users, the main attraction of an NVMe connection will be the potential to fit an NVMe solid-state drive for increased storage and faster boot and program load times. The Waveshare HAT was very well made with metal PCB spacers and screws, which enable it to be mounted above the official Pi 5 Active Cooler. An excellent attention to detail was a 20mm square cutout in the HAT PCB to improve the airflow to the Active Cooler and allow that air to flow past the installed NVMe device to aid cooling, **Fig. 5**. Assembly was straightforward and everything

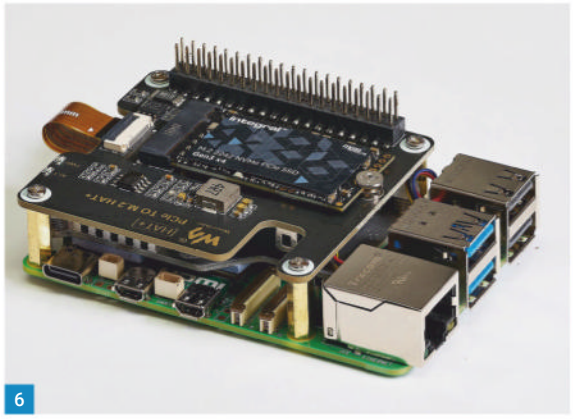


Fig. 1: Inserting a new frequency into WSJT-X. Fig. 2: Enter the Fox call and optional locator in main panel plus set Rx all if required. Fig. 3: Selecting the new SuperFox mode in WSJT-X rc5. Fig. 4: Hamlib options available in WSJT-X. Fig. 5: Waveshare M.2 HAT+. Fig. 6: Waveshare M.2 HAT+ installed on a Pi 5 with Active Cooler. Fig. 7: The new and very compact Pineboard HatDrive Nano.

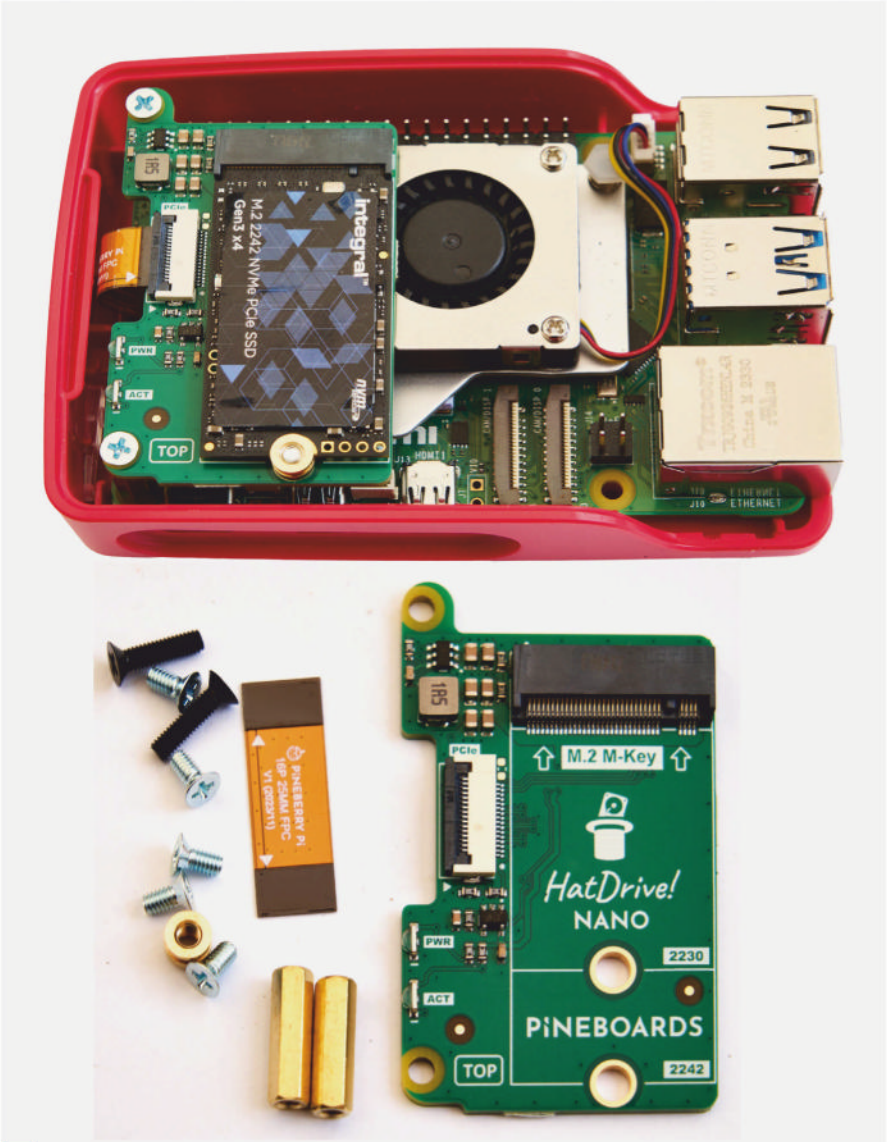
fitted as it should, **Fig. 6**. For my testing I paired the Waveshare M.2 HAT+ with an Integral 250GB M.2 2242 size NVMe drive. I installed the recommended Raspberry Pi Bookworm OS (Operating System) with desktop; the result was a boot time of 23 seconds. To check the read and write speeds of the NVMe, I used the Linux Fio utility included in the Pi OS. You can find detailed instructions for Fio via this link:

https://tinyurl.com/2t5r2xp7

The Waveshare HAT+ and Integral NVMe drive results were a very respectable 394MB/s write and 457MB/s read. I've shown the assembled unit on a Pi 5, 8GB board in Fig. 6.

Pineboards HatDrive Nano

The final M.2 solution is the recently released HatDrive Nano that PiHut is selling at just £9. As the name suggests, this is the smallest M.2 adapter I've seen, and its primary benefit is that it fits inside the standard Pi 5 case, even with the Active Cooler fitted. It can accept any M.2 device in either the 2230 or 2242 size format, **Fig. 7**. The mechanical construction was very good with two metal spacers and screws to secure the board to the Pi 5. If you're using the HatDrive Nano with the Pi case, you have to use the longer fixing screws and pass these through the bottom of the case. I've shown a photo of



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the assembled HatDrive Nano mounted on a Pi 5 in Fig. 7.

PI5 M.2 Board Summary

Now that I've purchased and tried several NVMe solutions, I'll summarise my thoughts here.

Pimoroni NVMe BASE (£13.50): This was the first one to be available. It follows the same high quality as the rest of Pimoroni products but is not a HAT because it fits underneath the Pi 5. This can be a significant advantage if you want to add other boards to the Pi, as it leaves all the GPIO pins and the top side of the Pi untouched. The Pimoroni base picks up power and the PCIe data connection from a single ribbon cable that connects to the PCIe connector on the edge of the Pi 5. The downside is that it doesn't fit in standard cases.

Official Pi M.2 HAT+(£11.50): While this is the official solution and is fully compatible with the Pi, the mechanical build quality of my example was not what you'd expect from an official Pi product. The PCB spacers and screws were made of a soft plastic that I found difficult to thread but easy to cross-thread! Also, neither of the NVMe retaining stud threads were fully cut, making it difficult to fix the screw.

Waveshare PCIe to M.2 HAT+(£8.50): Although the cheapest of the three options, the Waveshare was, in my view, better than the Official M.2 HAT+. There were three clear advantages: 1 – Good quality metal mixings, 2 – The ventilation hole in the PCB to aid processor and NVMe device cooling, 3 – The price, it's the cheapest!

Pineboards HatDrive Nano (£9.00): A good quality option and compact size make ideal for those who want to use the Official Pi 5 case with the Active Cooler. Although restricted to 2230 & 2242 formats, it makes a very compact solution for those wishing to add NVMe boot and loading speeds to their Pi 5. **PW**

News Extra

MASTER THE SECRETS OF HF PROPAGATION WITH VOACAP ONLINE: The new and improved *VOACAP Online User's Manual* by **Jari Perkiömäki OH6BG** is now published! Unlock the full potential of your HF radio station and conquer the airwaves with this comprehensive guide.
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SOFTWARE FOR BLIND AND SIGHT IMPAIRED: (from **Chris G5VZ**) I don't know if you are familiar with the accessibility software developed by **Ian Spencer DJ0HF/G3ULO**, based in Germany. Ian has been working on these accessibility applications for a couple of years or so now. A great deal of the information about this has been made available through Active Elements (URL below) and RAIBC:
https://active-elements.org
Just this week Ian has announced that there are new versions of all of his Talk programs for Elecraft, ICOM, Kenwood and Yaesu radios.
Ian says, *"All of the new versions of my Talk programs now support both what is often called wide FM where 25kHz channel spacing is being used and FM Narrow where 12.5kHz channel spacing is in use.*
"My programs always use single key presses for commands, such as F for frequency, M for modes, AM, LSB, USB and so on. There is also an Extended Command Mode, activated with the X key, while the program speaks to the user."
Ian's software has a solid user base and he provides useful, responsive support to those using his software.
All Talk programs can be found on Ian's Downloads page at:
www.spencerweb.net/Downloads/downloads.html
Clearly having control applications with voice commands and settings makes these mainstream radios accessible to anyone who struggles to see clearly but, more importantly, allows radios with touchscreens and multi-layer menu structures to become accessible, too. Information about the full range of Talk apps is also on his website.

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End-fire array for the 10m band

Jonathan Hare G1EXG
jphcreativescience@gmail.com

Jonathan Hare G1EXG describes a full-sized 10m band two-element end-fire array using two 5.2m telescopic rods. It can be collapsed down when not use or in bad weather. Jonathan uses it from his home QTH but it would also make an interesting antenna for portable use from the side of a vehicle.

I first read about the end-fire array antenna in *PW's* classic antenna booklet *Out of Thin Air*, which I recommend [**1**]. In one of the articles, *Compact 2m beam antennas*, the late **Fred Judd G2BCX** describes a two-element 2m band end-fire array that he claims makes a great 'flat dwellers' antenna. I made one of these and I can vouch for its effectiveness – much better than a mobile antenna on a poor ground plane that might well be firing most of the RF up into the sky.

Description

The end-fire array consists of two halfwave verticals spaced about 1/8th wavelength apart. Each halfwave is fed out of phase via an open wire phasing section (fed at the centre). The symmetrical arrangement and centre feed means it has a bi-directional radiation pattern having roughly 4dB gain over a dipole. With this pattern you only have to rotate the antenna by 90° to get 360° coverage. One practical advantage of this vertical antenna is that it does not need any radials.

There is something particularly satisfying about the symmetry of this sort of array. You can feed the antenna with coax, but the wideband characteristics are only achieved if you use open-wire feeder and a proper balanced ATU. I will describe both methods so you can experiment with your own versions.

Other bands

The 2m band version worked so well I decided to explore the concept on other bands. I made a 4m version, which I have been using successfully for a couple of years. The bi-directional pattern allows me to work stations up and down the coast from my location in Brighton giving me coverage all the way from Littlehampton in the west to Eastbourne in the east.

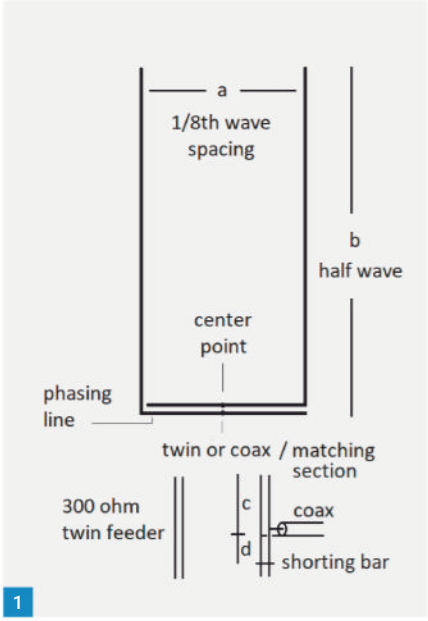
The 4m band version was made simply by scaling up all dimensions in the original article by a factor of 145/70 = 2. The 10m band version was made by scaling up by a factor of 145/28.5 = 5. I used 600Ω ladder line for all the antenna phasing harnesses, making it a little longer than the eighth wavelength figures.

As the antenna is matched using the matching stub and shorting bar (or 300Ω feeder and ATU) none of the dimensions are very critical so you can make much of the antenna from 'junk box' parts you might already have.

I have summarised the dimensions I used in **Table 1**. The general configuration is shown in **Fig. 1**.

A note on 5m long telescopic rods

I was amazed a few years ago to find you can buy 5.2m long stainless-steel telescopic rods, available on eBay or from Moonraker (search for MRQ213 17.5ft stainless steel telescopic antenna). They are about 75cm long when retracted and have around 12 sections. Unfortunately, they are quite fragile and can easily be damaged when you pull out the sections. My suggestion is never to completely collapse them, but rather to slide them down very carefully till each section is about 1cm from fully retracted. Otherwise, some of the tubes seem to get stuck and can come out completely (along with the internal copper shims) if pulled too hard, and then the telescopic rod is broken. Unfortunately, this has happened to me twice: once at home and once while out 'portable' – very annoying (and costly too).



1

The support structure of the end-fire array antenna is shown in **Fig. 2** with the telescopic rods retracted. You can also see the black 3D-printed insulators, the large sheet of plastic support at the centre as well as the 600Ω phasing line and 300Ω feeder to the radio room (sorry about the very dirty North facing wall!).

Centre vs. end fixing

Ideally you want to fix the half-wave verticals at the current maximum, the centre point. However, for a vertical antenna like this, using telescopic rods, this is impracticable (although you could put a thin Perspex or fibre rod support bar half-way up for stability). The vertical arrangement, fed at the bottom and supported at the base, means the antenna is higher than the equivalent centre supported antenna, which is a bonus.

The photo, **Fig. 3**, shows the 4m band version with the temporary use of croc-clips to home in on the matching positions for the coax and shorting stub. Once near a good match you can remove the clips and solder in place to get the best SWR, then waterproof with feedpoint sealant.

Matching and feeding

I first tried using 50Ω cable (just like the 2m antenna). The coax cable had five large slide-on ferrite beads at the antenna end, to choke any RF flowing down the outside of the coax. I adjusted the matching point and sliding bar to get the best SWR. Small crocs-clips are a useful temporary trick to make an easy to change connection to get near to the best match (see Fig. 3 again). However, whatever part of the 10m band the 2:1 SWR 'bandwidth' (using 10m of mini-8 coax) was only around 300kHz or so.

I then tried feeding the antenna via a 4:1 balun and found a new matching point and shorting bar position for this arrangement (see Table). I kept the ferrite beads to choke any RF that might try and flow down the outside of the coax. The 4:1 arrangement worked and provided a little more 'SWR bandwidth' giving ca. 600kHz on the 10m band (via 10m of mini-8 coax).

The array is inherently wide band, but the 10m band stub matching section is fairly narrow. As this sort of antenna array can work over a wide frequency range, you don't get the best results using coax. It is better to connect 300Ω (or 600Ω) twin feeder at the centre point of the phasing harness, the other end of which is connected to a balanced ATU in the radio room. Losses at 28MHz using ladder line are minimal (it works OK on the 4m version as well).

In this arrangement we don't need the stub line and shorting bar. With this method the antenna can be used over the whole of the 10m band and perhaps down to 18MHz. It has useful performance from 14MHz up to 50MHz if your ATU can stretch that far.

Fig. 1: General arrangement of end-fire array. Fig. 2: The support structure of the end-fire array antenna shown with the telescopic rods retracted. Fig. 3: 4m version with croc-clips in place temporarily. Fig. 4: Balanced ATU circuit.

Balanced ATU

Use a true balanced ATU (see circuit, **Fig. 4** and photo, **Fig. 5**). A lot of unbalanced ATUs offer what they call a 'balanced' antenna connection by utilising a switch-in 1:1 or 4:1 ferrite ring balun. These devices will probably work but may not provide the low noise characteristics or versatility of a fully balanced setup.

The balanced ATU is very simple, consisting of two coils and two variable capacitors. In my prototype L1 was ca. 12 turns (40mm diameter) while L2 was inside L1 and ca. 3 turns (20mm diameter). The feeder taps in one turn from each end of L1. There is a lot of scope for modifications of this circuit to fit the variable capacitors you happen to have etc. You need a dual gang capacitor for C1.

Using the open-wire feeder and balanced ATU I found I could get a perfect 1:1 SWR with the end-fire anywhere on the 10m band.

Antenna construction

I used two pieces of wood about 1.6m x 20mm to form a frame to hold and space the two halfwave telescopic verticals (see photo, **Fig. 6**). I used vertical wooden pieces to separate and hold the two horizontal bars about 30cm apart. You might get away with using thick bamboo poles, but I expect wind will tend to flex them a bit too much and the halfwaves will then not stay parallel. A few coats of marine varnish is a good idea for all the wooden parts.

At the centre is a ca. 40 x 40cm 8mm thick plastic sheet (old kitchen chopping board) that stabilises the whole system and provides two places for supporting U-bolts.

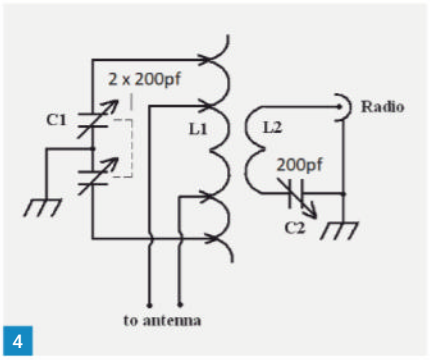
I 3D-printed plastic (PLA) insulators [**2**] to hold the telescopic rods. All four insulators cost less than a pound to make. The insulators each have two bolt holes so they can be attached to the wooden supports. The telescopic rod slides into the top insulator and then into the cup-like bottom insulator and secured using the telescopic rod thread and a nut. You don't of course need to use my 3D-printed insulators, but you do need to implement some kind of decent insulation at the base of each vertical. The insulation of the wood supports will probably not be good enough during or after wet weather, for example.

The centre of the 600Ω phasing line goes either to the matching stub and coax or is directly wired to 300Ω ohm feeder. The phasing line goes from one telescopic rod to the other but note that one wire at each end is always left unconnected. The connection to the telescopic rods uses alternate wires of this phasing line and hence is always 180° out of phase. The length of the phasing line is not very critical, as long as it's fed at the centre. Large solder tags connect the phasing line wires to the bottom of the telescopic rods using a nut and the bottom of the insulators.


2


3a


3b



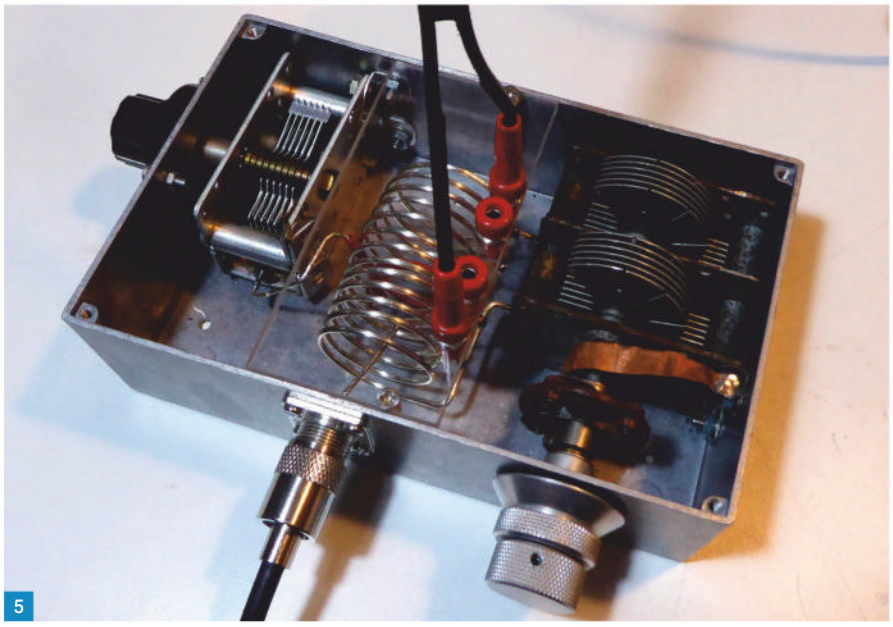
4

Side of house and slide mount

The north side of my house is connected to the garage roof, and a ladder provides easy access. This allows me to get to the antennas mounted on the side of the wall. I recently fixed the end-fire to a home-made slide mount, **Fig. 7**, that allows me to drop the whole set up so I can easily extend the telescopic rods then I can raise the whole system near to the peak of the roof.

End-fed and RFI

My immediate neighbour south of me has a high-end audio system. I live in a terrace of three houses, so his audio equipment is physically quite close. I cause RFI through his speakers when I transmit on certain bands. I have tried all the obvious things to stop this such as fitting ferrite rings



Part	2m band	4m band	10m band
1/8λ spacing (a)	30cm	62cm	1.53m
halfwave length (b)	1m	2.1m	5.2m
stub length (c+d)	18cm	40cm	91cm

(see original article for 2m band dimensions [1])

Note: I have shown the stub length (c+d) a little on the long side; you can cut off the bit past the shorting bar once you have arrived at the best match.

Approximate 10m band matching stub and coax cable position details:
c = 80cm d = 8cm for 1:1 balun
c = 72cm d = 15cm for 4:1 balun
(Note: all these lengths will depend on your own arrangement)

Table 1: Sizes and spacing

Fig. 5: The author's balanced ATU.
Fig. 6: The array in place – see wooden support structure. Fig. 7: Slide mount.

on the speaker cables, mains filters, chokes on the input leads etc. but nothing has so far solved the problem completely. However, the possibility of working low power on the 10m band is one way to help and setting up the end-fire so it beams east-west, so that little power is sent south, is another.

Results

As we head into sunspot maximum conditions on the 10m band have become much more perky. Apart from pile-ups and stations who have strong local noise, I seem to be able to work pretty much everything I can hear, and often using just 5 or 10 watts.

The antenna seems to work as well on CW and the beacon part of the band, at the low end of 28MHz, as it does with the USA and Canadian FM repeaters near the top end of 29MHz.

As the halfwave radiators are supported at the ends (voltage maxima) any degradation of the insulators will have a negative effect on performance. At the very least it will tend to detune the system. Water and snow can affect the SWR in the coax driven setup but if you use the open-wire feeder and ATU, it's simply a case of retuning.

As we had such a wet February in 2024 it was useful month to test out the wet-weather results. I worked all around Europe and into the USA using the antenna and often on regular nets with local amateurs to act as a reference point for comparisons. I found that a wet antenna did de-tune a bit, but this didn't seem to affect performance when using open-wire feeder and the balanced ATU.

I have been having weekly chats with Ukrainian stations on 10m band and seem to get similar performance to G3ZAF who is using a Hexbeam with the same power. I have been able to test the antenna with a station in Florida and find as expected, the end-fire outperforms multiband dipoles. Simultaneously logging into the University of Sussex club station remotely, I have found the end-fire gave roughly similar performance to the club's old horizontal 3-element tribander at 50ft, with interesting moment-by-moment variations between the two setups presumably due to polarisation and propagation differences between our two relatively nearby stations (ca. 8km apart). I have used the array on 21MHz with some success.

I have also found that I can even tune up the antenna with the telescopic rods retracted to less than a metre long. Although I would not transmit using it like this, it does create a basic receive antenna to 'check the band' for activity before going out and extending the telescopic rods.

Acknowledgments

I would like to thank **Roger W4/M0TJK**, **Graham G8BZL**, University of Sussex Radio club G4AQG, **Colin G3ZAF** and **Volodymyr US7IGN** for on-air tests and comments.

References

[1] Out of Thin Air, Practical Wireless publication e.g. my copy was 4th edition 1981.
[2] for details of my other projects and the 3D printed insulators see my website at:
http://www.creative-science.org.uk/3D.html

Steve Telenius-Lowe G4JVG
teleniuslowe@gmail.com

1

A disappointing month?

Steve Telenius-Lowe G4JVG reports that HF conditions were disappointing during June, but nevertheless there was quite a bit of interest to be found.

I had planned to attend the HamRadio trade show in Friedrichshafen, Germany, over the weekend of 28 to 30 June but unfortunately had to cancel my visit for personal reasons. Luckily for me, though, the (expensive!) hotel allowed cancellations at no cost and the cost of the air tickets have been offset against a European city break later in the year. Nevertheless, I missed out on what sounds like another very successful event. **Erik Swartz WA6HHQ**, the Managing Director of Elecraft, was one of the 150 commercial exhibitors at the show, where the Elecraft K4 HF transceiver and KPA500 amplifier (**Fig. 1**) were being demonstrated.

A press release issued by the organisers on 30 June stated that more than 11,300 people from 58 different countries had attended the exhibition: *"For three days, more than 380 participants showcased the wide-ranging world of radio... The joy of reuniting again with fellow hobbyists was clearly evident throughout the four exhibition halls... Some 77 young technology enthusiasts... engaged in a technical scavenger hunt, decoding Morse code, solving quiz questions, practising soldering, and taking part in various other activities.*

"More than 110 lectures, exams, and workshops were attended by a diverse group of attendees, including IOTA enthusiasts, diploma program participants, educators, and tech fans." (The slogan of this year's event was *"60 years of Islands On The Air (IOTA): Where technology meets adventure!"*)

It is not only the UK where the licensing administration recently introduced new amateur radio regulations. According to the HamRadio press release, in Germany: *"The new amateur radio regulations and Class N entry-level license aim to increase interest and participation in amateur radio by attracting more people to the hobby...* 'Many people took the amateur radio exams, and the new N license was met with great interest,' *reports **Lutz Heuschke** from the Amateur Radio Department of Germany's Federal Network Agency."*

Put a note in your diary: next year's HamRadio in Friedrichshafen will be held from Friday 27 to Sunday 29 June.

www.hamradio-friedrichshafen.com

More on 'SuperFox'

In last month's *HF Highlights* there was an introduction to the new WSJT-X FT8 'SuperFox' mode. SuperFox was used for the first time during the K8R operation from American Samoa in mid-July. This was a recce trip by members of the N5J Jarvis Island DXpedition (**Fig. 2**), scheduled for the first two weeks of August, which is when SuperFox will make its 'official' debut. The 26 August to 5 September CY9C St Paul Island DXpedition also plans to use SuperFox.

The N5J website provides a lot more information about SuperFox, including several sample screenshots, such as that shown in **Fig. 3**. The website is well worth reading if you plan to call any DXpedition using SuperFox. See:

jarvisisland2024.com/operating/super-fox-mode

(and see also this month's *Data Modes* column)

UK – NZ centenary

In the July *HF Highlights* **Don Beattie G3BJ** wrote about the centenary of the first trans-global two-way communications between UK and New Zealand, which took place in October 1924 between 2SZ at Mill Hill School in London and 4AA on the South Island of New Zealand.

To celebrate the centenary, four special event stations will be active, two in the UK and two in New Zealand. Between 29 September and 26 October GB2NZ will be on the air from various locations around the UK and ZM100DX will be operated from locations around New Zealand. For four days, culminating in the exact anniversary on 18 October, G2SZ will be operated from Mill Hill School and ZL4AA will be on the air from Shag Valley, New Zealand. It is hoped that these two stations will be able to make a 3.5MHz two-way CW contact, exactly 100 years after the first trans-global contact took place.

LoTW update

In last month's *HF Highlights* we reported that the ARRL's Logbook of The World (LoTW) system was taken offline in mid-May due to *"a sophisticated network attack by a malicious international cyber group"*. On 9 July the ARRL reported that *"Logbook of The World® (LoTW®) returned to service on Monday, July 1, 2024. As anticipated, there was a significant rise in use to catch up on processing logs following the outage. It took 4 days for normal processing times to return... The online DXCC® application is unavailable at this time and DXCC awards are not able to be processed. Work continues to return the DXCC systems to service. All DXCC data is secure."*

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

The month on the air

Marek FT4GL from the Glorioso Islands (see last month's *HF Highlights*) was on the air from 24 May until 18 June, making a total of 61,118 QSOs.

Also mentioned last month, in June **Elvira IV3FSG** was active as 5U5K from Niger. She was expected to stay until the 20th but was actually active until the 23rd, making over 46,000 QSOs. Elvira operated CW, SSB and – quite unusual these days on a DXpedition – RTTY in addition to FT8 and FT4 when on datamodes.

Well-known DXpeditioner **Yuris YL2GM** was active as VK9LA from Lord Howe Island between 14 and 24 June, making over 20,000 QSOs. He then moved on to American Samoa between 28 June and 9 July, from where he operated as K8K. Yuris uses FT8, CW and SSB.

lral.lv/vk9la/index.html

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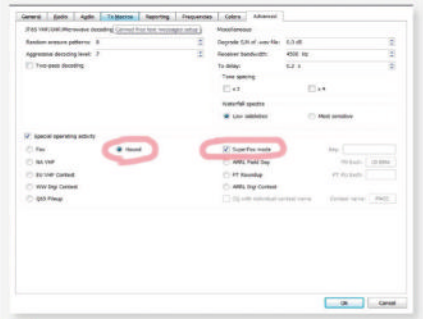
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Fig. 1: The K4 transceiver and KPA500 amplifier were demonstrated on the Elecraft stand (Photo Copyright Messe Friedrichshafen). Fig. 2: The N5J DXpedition logo emphasising their use of the new SuperFox mode. Fig. 3: SuperFox set-up screen (Image: jarvisisland2024.com). Fig. 4: Palm Island in the Grenadines, IOTA NA-025 (Photo: GW4DVB / J88PI). Fig. 5: The M0PHO/P operating location, while Mo M6MQD takes it easy!

What to look for in September

Brian Price GW4DVB will again be on his annual 'vacation DXpedition' to Palm Island, **Fig. 4**, in St Vincent and the Grenadines (IOTA NA-025) between 12 and 21 September. As J88PI he will be active on 40, 20, 17, 15 and 10m SSB, CW and FT8 using a Yaesu FT-991A at 100W to a 28MHz vertical and a fan dipole. Brian asks for all QSLs to be sent direct only to PO Box 20:20, Llanharan, Pontyclun CF72 9ZA. The Palm Island Resort is a private 135-acre hideaway on one of the southernmost islands of the Grenadines, about a mile from Union Island.

www.g4dvb.co.uk

DXpeditioner extraordinaire **Vlad OK2WX** will be on the air from Mafia Island (IOTA AF-054), Tanzania, as 5H1WX from 18 September to 6 October using CW, SSB and FT8 on all bands from 3.5 to 28MHz. Vlad will be using high power to a Spiderbeam and a vertical antenna.

mdxc.support/5h1wx

Bill Rothwell G0VDE plans to operate at VP6WR from Pitcairn Island between approximately 5 to 15 September. He plans to operate on SSB, FT8 and some RTTY on 10 to 40m and perhaps also 80m.

After Pitcairn Bill will be staying on Mangareva Island (IOTA OC-063) in French Polynesia between 17 and 21 September and should be active as FO/G0VDE.

vp6wr.com

Readers' news

A warm welcome back to the column after a long break to **Rhodri Morgan M0RHO**, who wrote that he and his wife **Mo M6MQD** *"spent a lovely week in Dorset with some lovely weather to accompany us* (see **Fig. 5**)*... 20m was active with a great opening into Spain and Southern Europe. I must compliment one operator, **Roger HB9GHR** who paused all QSOs to bring in weak QRP stations and spent much time and patience working with these lower power stations. Roger handled all these and more with ease and is to be commended on setting a high, but relaxed, standard for amateur radio operations."* Rhodri used 30W of SSB from a battery-operated Yaesu FT-891 (**Fig. 6**) to a 7m-high resonant dipole for 14MHz on the beach. Some of his QSOs are shown in 'Band highlights' below.

Our regular contributor **Owen Williams G0PHY** gives a good account of the excitement of working a rare DX station, quite an achievement as he has a modest station using only a dipole antenna: *"The highlight this month was working FT4GL. As I mentioned in the last report I heard the chaotic start on 14MHz SSB. During the month I heard him again on 14MHz working G stations but decided that the odds of getting through were too long, so did not bother to call. On the evening of 15 June I saw he was spotted on* DXheat *on 14MHz. I turned the rig on and heard him at a reasonable strength working an OK or an OM. The next problem was how far up to call. **Laurie G3UML** had posted that he had worked him 20kHz up and I had seen other spots mentioning 20 up, so 20 up it was. I hit the button on the FT-2000 that transits my callsign and was staggered to hear 'Papa Hotel Yankee' come back. I gave my callsign, signal report and 73 and that was it, all over in a matter of seconds: almost too good to be true. On the following morning I saw that his log had been updated on Club Log but I decided to wait before checking. In the evening, suitably relaxed and with bated breath, I checked the log and the QSO was genuine. I am truly amazed at*

how easy it was to work the seventh Most Wanted on Club Log. The icing on the cake was finding the QSO confirmed on ARRL's Logbook of The World a few days ago. After that anything else was a bit of an anti-climax, but there was a QSO with VI60IOTA and various VEs in the RAC Canada Contest."

Another of our regular contributors, **Carl Gorse 2E0HPI**, wrote that he had purchased a 'Mad Dog Coil' from Australia. This is a loading coil which can be used with a vertical antenna to operate on all bands from 3.5 to 28MHz. Carl has been using it on FT8 and FT4 from South Pier Hartlepool, **Fig. 7**, where he has spent several evenings operating portable during the last month. Carl has also operated from Fulford Ings in the City of York, Parks On The Air reference SSSI GB-1299.

Etienne Vrebos OS8D has been less active than usual this month as he was involved with other activities. Nevertheless, he made 1200 QSOs in total: about 350 QSOs from his home station using an Icom IC-7610 and Acom 1500 amplifier to a 7m high Hexbeam, and 850 QSOs as OS8D/P, **Fig. 8**, using 70W from a Yaesu FT-710 and 40m dipole. This despite the fact that Etienne said: *"HF conditions were often bad and sometimes even 40m was empty... Some days I couldn't find DX stations. I'm happy that Russian stations are very active in difficult parts of Siberia and the Caucasus: great to catch them on 14, 18 and 21MHz. They all work /M with 100W, the huge advantage of the Western boycott is that there are only a few Western stations that call them, which makes the job easier for me... The nicest part of ham radio is the friendship and relationships that can be made between world-wide peoples, on SSB and CW."*

Tim Kirby GW4VXE writes that he had the use of the First Class Operators' Club callsign G4FOC during June. Operating on CW only as GW4FOC was good fun and attracted a few different callers. Conditions could definitely be categorised as 'summertime', even if the weather outside the window could not. Generally the bands perked up in the evenings, with some nice openings to the USA and Canada – often to the west coast – especially on 15m. During the day, 14MHz was often very quiet and 18MHz was a good choice to make some daytime contacts. A nice 15m CW contact was with **Joe 9H1CG**, who Tim had met on Gozo island while on a VHF expedition in the 1980s! It was clear that both of us still very much enjoyed amateur radio across all the bands and modes.

Tim added that he had his first FT8 'SuperFox' QSO when working K8R on 15m. *"The SuperFox mode seems to work well. It sounds quite odd and it reminds me of the sound of the Hellschreiber mode,"* he said.

28MHz beacons

Neil Clarke G0CAS reports on the 28MHz beacons logged during the month of June. Normally this month is considered to be the peak of the summer Sporadic E season but June 2024 was certainly well down on the number and frequency of beacons heard when compared with last year. For example, last June there were 12 days when more than 20 European beacons were heard as opposed to only four days this year. Even though openings took place every day, most were of a semi-local nature and short-lived. It was only on the 23rd when an opening covered the whole of Europe and lasted all day.

The two most heard beacons were IQ8BB 28260 and ED4YBA 28263, both logged on 21 days. There was very little good news for beacons from outside Europe, with many paths also down on last month. 4X6TU 28200 was logged on only 19 days, probably due a lack of double-hop Sporadic E in that direction. Beacons from the Pacific, Far East and Russia were logged only occasionally. The only glimmer of good news was from the United States where 4U1UN 28200 was heard on three days, the 16th, 18th and 24th. On the 13th beacons in US call areas 3, 4, 5 and 9 were logged. Paths to South America were reasonable when LU2DT 28193 and PY4MAP were heard on 27 and 16 days respectively.


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Fig. 6: Battery-operated Yaesu FT-891 at M0RHO/P. Fig. 7: A stunning sunset at the 2E0HPI/P operating location on the South Pier in Hartlepool. Fig. 8: Etienne operating as OS8D/P from his car..

Band highlights

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

Rhodri M0RHO/P (MS): 14MHz SSB: DL3SEZ/P, DL2024O, ED2X, EE5A, EH5LGBT, EI0CT, HB9GHR, PC0A, OE5OBO/P, TM57JO, TM63JO, US1VQ.

Owen G0PHY (HS): 14MHz SSB: FT4GL, VA7RR, VE5RAC, VE6CQ, VE7NA, VI60IOTA, VY2RAC.

Carl 2E0HPI/P (MS): 14MHz FT8: 3W6A, CX4BAN, JA6FIO, PY2GIG, V31DL, VK3AUX, VK7AC. **21MHz FT8:** HI98RCD, HK3FJ. **21MHz FT4:** JA5JFB, JA6ATL, JO1LVZ, JR4OZR. **28MHz FT8:** 7Q6M, 7Q9JN.

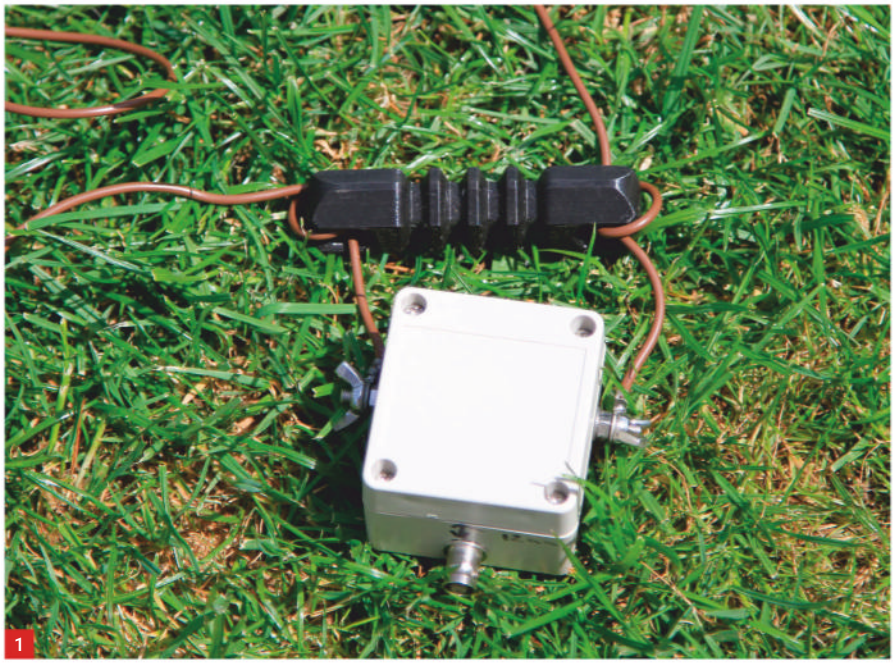
Etienne OS8D (HB): 14MHz SSB: 4L2IK, YB2MVD, YB0AR. **18MHz SSB:** TI2JS. **21MHz SSB:** 5K0LR, 9M1Z.

Tim Kirby GW4VXE / GW4FOC (MS): 10MHz CW: TF3EO, VK2BJ. **14MHz CW:** HB0/G4BWP, HB0/GU4YOX, TM74JO (Olympic Flame), VK2GR. **18MHz CW:** HB0/G3XAQ, KW7Q (CO), OX3XR, TM74JO, V31XX, XQ6CF. **21MHz CW:** 8E1YB, A61Q, CX5FK, LU7YZ, S01WS.

Signing off

Thanks to all contributors. Please send all input for this column to teleniuslowe@gmail.com by the 11th of each month. For the October issue the deadline is 11 August. Photos of your station, antennas or you in the shack are always welcome. 73, Steve G4JVG. **PW**

Keith Rawlings G4MIU
keith.g4miu@gmail.com



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Off Centre Fed Dipole Continued

Keith Rawlings G4MIU deals with the practical challenges of installing a new antenna!

Last month I started to describe an Off Centre Fed Dipole (OCFD) based on a design by **Richard Formato** (who then used the call K1POO), which I would use at my home QTH

I chose this design as the 'offset split' was 17%/83% resulting in dipole legs of 12/57ft (3.65/17.37m). Quite often OCFD are seen with a 33.3/66.6% split (1/3+2/3). The K1POO configuration brings the feedpoint closer to the short end of the dipole. This suited me as it brought the feedline closer to the shack. The feedpoint impedance will be close to 200Ω requiring just a simple 4:1 matching transformer although it is recommended that a common mode choke (CMC) is placed directly at the feedpoint to choke off currents flowing along the outside of the coaxial line feeding the antenna.

I covered the transformer last month but it is constructed using an FT140-3 core with seven turns of 18SWG enamel copper wire, which is built into a polycarbonate box. A BNC socket has been fitted to take the coax feeder and two M5 stainless steel studs mounted on the sides for connecting the dipole legs to, which are made from 1.5mm PVC coated cable.

To take the strain off the transformer box and also the connections, I tied the wire to an insulator that I 3D printed that matches the width of the box. This way the terminals now only have to worry about taking the weight of the box and associated feeder. The wires were crimped and then soldered to 5mm solder tags and insulators were then tied onto the dipole ends. See **Fig. 1**.

Hopefully the antenna would give me a good match on 40-20-15-10m and possibly 6m.

I modelled the antenna in AN-SOF and things looked good. I had everything I needed to make the antenna.

Tucked away in my garage was a substantial ex-military fibreglass mast, complete with guys, stakes, took kit, etc. This could be erected to 40ft (12m) if needed, but in this case I was going to split it to provide two 20ft (6m) poles to string the dipole between.

So, with everything in hand what could possibly go wrong?

Ready to go (not!)

With everything ready it was time to fight my way into the garage to retrieve the mast kit, which, I'm afraid, has not seen the light of days for a few years. I am lucky to have a reasonable size double garage which I recognised, even before moving in, was crying out for a floor to be added above the joists. This I did, and also the main attic of the house and the smaller attic that is over the utility room. This was of course a mistake, the more room I have the more junk I collect and I am now facing a huge task sorting in all out!

Anyway, the mast is stored in this area above the garage. In the said garage is a Landrover Discovery that rarely moves. It has been there for years while I decide what to do with it. It can move, just, but the brakes have a habit of seizing on. It can't be pushed but it does move under its own power. In my infinite wisdom I made stepladder access to the upper floor in the far corner, on the same side as where the vehicle is so it has to be moved to put the ladder out so I can gain access.

No worries, start the vehicle, let it run a bit to get the oil up and move it forward, retrieve the mast, reverse it back in again.

As usual the car started OK but while it was idling, the exhaust fumes began to smell odd; then, it started coughing and promptly stopped. It wouldn't re-start; looking at the fuel gauge it was showing empty, which was odd as it had been showing half a tank. Checking the 30A fuel pump fuse I found it had blown, could I be lucky with a new fuse, no, the replacement blew immediately. The short of it is (Pun intended) that the fuel pump has packed up. A decent replacement will be about £300 (I won't put a cheap one in it) so that will have to wait. It won't be an easy job, the pump is at the back, the vehicle is backed up against the garage wall and it is nigh on immovable.

This presented me with a problem; I can't get to the mast. The only alternative I could use was a set of fibreglass 'Insulated Operating Poles' that I have. These are poles that come in 4ft (1.2m) sections and clip together; they are hollow and about 40mm in diameter and were used for working on overhead power lines. Six of them may be seen in **Fig. 2**. I have eight of them in total so I could put up a couple of temporary masts at 16ft (4.8m) in height. I had no way to guy them and the antenna would be horribly low. With no immediate prospect of anything better I would go with this for the time being.

I tied one pole to a small tree and the other was temporarily bungee strapped to the down pipe from the gutter on the corner of the house! (The poles are very light.)

I strung the OCFD between the two poles and it was plain that they were struggling with the weight. Due to this I didn't use the CMC at the feedpoint and just connected the 18ft (5.5m) run of RG58 I was using to the transformer on the antenna.

Checking it out

To check the antenna I used the Chelegance VNA3G and as anticipated a VSWR sweep between 6-60MHz was disappointing. It was resonating very low in frequency with the 7MHz plot not even showing on the sweep. I had to increase this from 4MHz to 60MHz to find the 7MHz 'dip'.

I was reluctant to trim the antenna as I was certain the figures would improve with it mounted higher but as this would not be possible for some while and as it was, after all, just a piece of wire which I have plenty of, I started to prune the elements. This proved to be a tad tedious and, as others have reported, an analyser of some sort is very

Fig. 1: Transformer and insulator. Fig. 2: Operating poles. Fig. 3: VNA-3G VSWR plot. Fig. 4: OCFD at a non-lofty 16ft! Fig. 5: AN-SOF Feedline tab. Fig. 6: AN-SOF-Tuner tab.

desirable when tuning an OCFD. This is because the VNA presents a sweep over the entire anticipated frequency range of the antenna making it is easy to see how pruning affects tuning of each band.

Try as I might however, it was not possible to get the antenna to present a decent match on 40m. I could see the other bands creeping up in frequency but the 40m plot stayed stubbornly at 4.8MHz. From the information I have read this has been caused by my omission of a CMC at the feedpoint.

I stopped at the point where the 20m VSWR climbed to 14.3MHz and 15m was at 21.3MHz. VSWR at 28.3 was 3:1 (the lowest point was nearer 27.5MHz). To get these figures 6% was removed from the original length. See **Fig. 3**.

While clearly disappointing, and not unexpected, that is how it is. I doubt raising the antenna to 20ft will improve matters that much either. See **Fig. 4**.

I did run another AN-SOF simulation but this time with the antenna at 16ft (4.8m) and found the resonance points were still 'in band' but the VSWR levels were a little higher. As a sanity check I also ran an EZNEC model using the NEC/4 engine and it closely agreed with AN-SOF, so while very accurate results may be obtained from simulations, real antennas may behave differently! Both packages also agreed that at this height most of my signal was going, in the main, upwards!

In operation the inbuilt matching unit on my FT-990 coped well. It managed to match on 40m and even gave me a 1:1 match on the bands the antenna was not designed for. Without the CMC at the feedpoint there was indeed a level of RF on the coax so one was added at the transceiver, which improved things immensely (Virtually turning the antenna into a Carolina Windom).

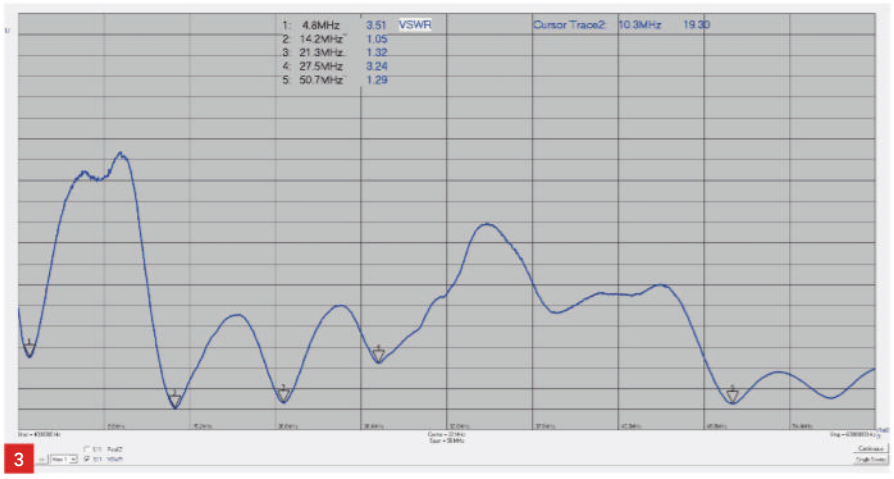
Without the use of Noise Cancelling background hash levels on the antenna were around S8, so normal for here.

I have achieved my goal of having the feeder away from the area in the garden where people may be and also the need for an external matcher, albeit I have no 'tuner' in circuit on receive. So, presently, I am continuing to use the antenna as is and it is making contacts. These have been mainly on 20m where I have had good reports from most of Europe. I've only had a couple of contacts using it on 40m but judging by the strength of inter-G stations I've heard it is working well as an NVIS antenna, although clearly this was unintentional!

As well as height, I am paying a price on 40m for the missing the CMC at the feedpoint.

Even at its low height it is EMF compliant at 100W.

It *will* need putting up higher and the CMC adding, so I will be working towards doing that; also, as the supports are rather 'delicate' I have been letting the antenna down when not in use.



Modelling feeder calculation.

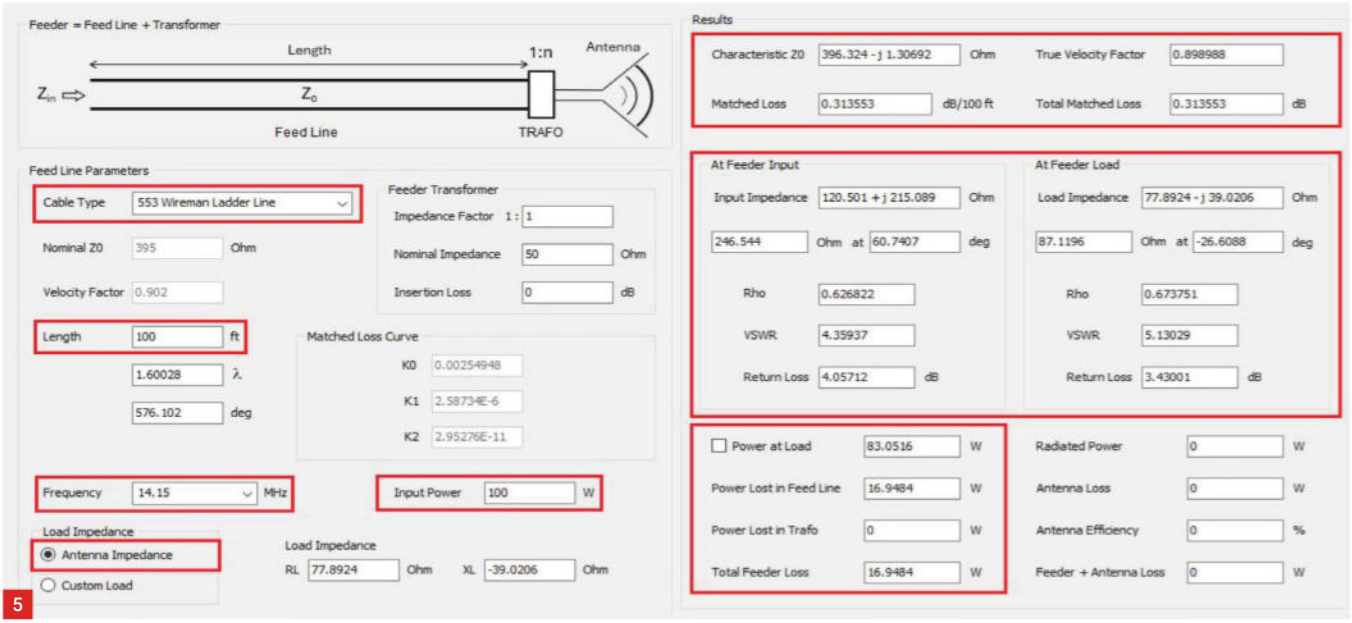
While modelling the OCFD in AN-SOF I experimented with the recently introduced features to the software that allow for the addition of transformers (baluns/ununs) to a design. These additions permit the comprehensive modelling of the entire antenna system, including feeders and tuners. This includes calculating the power supplied by the transmitter, the impedance matching, the feedline, any necessary transformers, and the antenna itself.

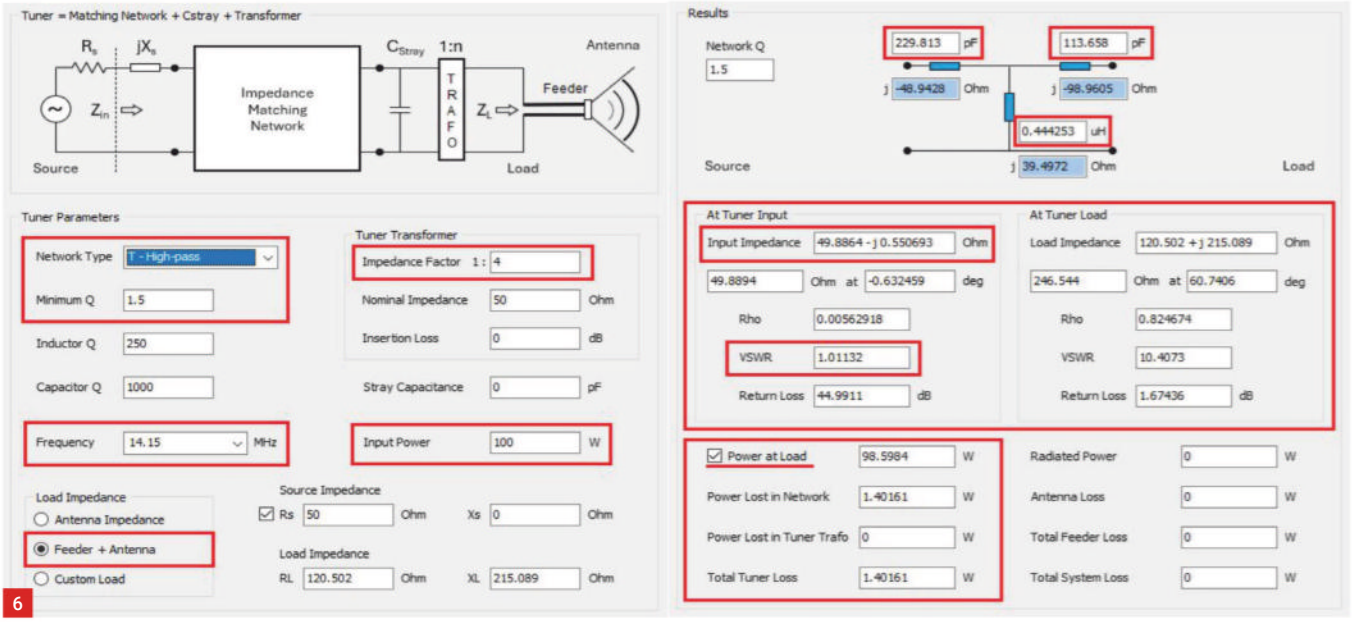
I was pleased to see that a tutorial or 'Work Flow' for doing this has now been added to the AN-SOF website, which takes users through the procedure of modelling the feeder system for a horizontal half-wave dipole above real ground in the form of the common '20m Back Yard dipole', a ready-made model of which is available for download.

Firstly, the tutorial guides the user through the procedure of setting up and building the antenna model itself and, once done, the feeder can be added. For this particular tutorial Ladder Line has been used. AN-SOF has a comprehensive library of feeders in its database and in this case 100ft of 553 Wire Line has been used. This has a nominal impedance of 450Ω.

The techniques used to add and set up the feedline parameters are then covered, this includes setting the design frequency, length of the feeder, input power and so on. See 'Feeder Line Parameter Tab left side of **Fig. 5**.

To the right of this tab is the 'Results' box. This





includes a vast amount of information. The calculated Input Impedance at the Feeder and Load are displayed; similarly, Rho, VSWR, Return Loss. The power at load is calculated, power lost in the feedline, Radiated Power, Antenna Loss, Antenna Efficiency and Feeder+ Antenna Loss.

It can be seen in Fig. 5 that the modelled VSWR levels are still high so the next stage in the tutorial adds a Transformer and Impedance Matching Network, **Fig. 6**. Here the type of Network used for the tuner, *Q*, the Design Frequency, the Impedance Ratio of the Transformer (i.e. 4:1), Input Power, Source Impedance and so on are entered as seen in the left-hand side of Fig. 6. Once these parameters have been set the results may be viewed as seen in right-hand side of the image.

Next, the AN-SOF Plots Tab is used to view the Impedance changes using the 'Zin' box. The modelled Radiation performance (Gain Directivity) can be viewed in the normal way via the Results menu. After computing the far-field of the model, going back to the Tuner Results Tab, the user will see the Power metrics displayed in the bottom right corner of the 'Tuner', including radiated power, antenna losses, feeder losses, and total system loss.

When all the results have been compiled the tutorial goes on to explain how, by using the Power Budget feature, the figures may be used to specify the estimated EIRP (Effective Isotropic Radiated Power) as a function of frequency and this may be used for evaluating Electromagnetic Field (EMF) Compliance. The tutorial is very detailed and too comprehensive to fully describe here.

For those interested, the full workflow may be found here:
https://tinyurl.com/2satvjkw

Some news on MultiPSK

Readers may be aware of this digital decoding package from **Patrick Lindecker F6CTE**. It is a Swiss Army Knife of digital decoders and has just been updated with a new feature that may be interest to antenna experimenters and this is the addition of a NCDXF beacon monitoring mode.

Real time signals of monitored beacons in the network may be received and fed into MultiPSK where the signal levels are displayed via a graph over time.

This is useful as a propagation monitoring tool and possibly as a method of comparing antenna performance. I've not tried it yet but if I find it useful for evaluating antennas I'll report back.

http://f6cte.free.fr/index_anglais.htm
https://tinyurl.com/3yb63fmx

That's it! See you next month. **PW**

BBC coronations Pt XVII

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Garry405625.gs@gmail.com

Keith Hamer and **Garry Smith** continue looking back at the BBC's coverage of Coronations since 1937. Also featured is a Coronation vintage television advertisement, more about the Swiss radio pioneer Roland Pièce, the rise and fall of BBC 198kHz, the series marking 60 years of BBC-2, and the development of Swiss Radio and Television since 1922.

Throughout the morning and afternoon on Coronation Day, two sets of equipment made telerecordings of the Coronation broadcast. The first set was used to broadcast an edited version of the Westminster Abbey ceremony at 8.00pm. The two-hour telerecording was also transmitted the same evening in Canada, the USA, and several European countries.

The second set of equipment recorded the whole outside broadcast for archive purposes. There were three special editions of *Television Newsreel* during the week. The first half-hour edition was broadcast on Monday 1 June and showed last-minute preparations in London. On Coronation Day itself, 2 June 1953, there was a one-hour edition with pictures of the crowds 'bedding down' for the night on the pavements. There were also shots of the procession.

Vintage coronation television equipment

This month's wend through vintage copies of ragged newspapers and magazines has divulged an advertisement by *Kolster-Brandes* for their 'New Queen' Coronation television receiver, **Fig. 1.** The advertisement dates from 13 March 1953. The text has been left in its original format to reflect the spelling, grammar and punctuation of the time.

This is the full description of the *New K-B "Queen" 14" Table Model* television receiver.

The advertisement included simple nautical graphics with the legends *Queen Mary* (3 funnels), *Queen Elizabeth* (with 2) and *Caronia*. The latter, single-funnel vessel, was a *Cunard* 'tourist class' ship, launched on 30 October 1947. It met its fate in Apra Harbour, Guam, in 1974 when it ended up as a wreck! The hand-drawn graphics on the television screen in the advertisement depicts, appropriately enough, the two-funnel ship, *The Queen Elizabeth*.

The frame frequency for television receivers was originally set at 25 frames per second. However, this rate was not sufficiently high enough to keep the human eye from perceiving picture flicker. This annoying problem could have been solved by increasing the rate to 50 frames per second, but this would require the video signal bandwidth to be doubled. A process was developed to trick the human eye into assuming that the rate was 50fps. This system was called *Interlaced Scanning*.

In a 405-line picture, the 'odd' set of lines are scanned in the first 1/50th of a second. The 'even' lines are traced in the second 1/50th interval. The two sets are then interleaved.

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Big Picture 30% Brighter with the new K-B "Queen" 14" Table Model 73 Gns.
Special 'interlace' giving far better definition. 20 valves and 12kV. for extra performance. Electro-magnetic focusing for better control definition. Extra valves for relentless interference suppression. Commanding cabinet-work in high-gloss, two-tone walnut.
Other models in the K-B range:
12" Table Model, 67 Gns. 14" Console, 88 Gns. 17" Console with full-length doors, 120 Gns.
POST THIS COUPON TODAY
Please send me your illustrated Television leaflets.
KOLSTER-BRANDES LTD., FOOTSCRAY, SIDCUP, KENT AN STC ASSOCIATE

The field-frequency is 50Hz, while the frame-frequency is 25Hz. With the human eye's natural 'persistence of vision', this illusion is sufficient to convince the viewer that there are 50 pictures per second instead of only 25 full frames.

Modern wireless

Les Rix G3XJW has written from Leicestershire about a fascinating vintage book which he has just discovered. Les writes: *"I have recently downloaded a 160-page book called 'Modern Wireless'. It's a Christmas Special, published in 1924. The text is compelling and the period adverts are just superb – in fact so good that I've had the file printed and bound.*

"Incidentally, my first job was with the BBC in the early 70's, so your coverage of the 'early years' of radio and television is fascinating. Keep up the good work!"

Thanks for sending details about *Modern Wireless*, Les. It's certainly a very interesting book and the Christmas design on the front cover is definitely typical of festive artwork produced during that era **Fig. 2**.

The rise and fall of 198kHz: Part X

Under the *Luzern Plan* discussed in the previous column, the extra number of high-power stations to be accommodated was much in excess of the actual number of extra channels available. The additional channels could only be achieved by broadcasters either sharing frequencies, or in some situations, reducing the separation between stations. Eventually, both these methods were adopted.

The main advantage of the Luzern Plan (which was an offshoot of the *Madrid Conference*) was that several countries benefitted compared with the earlier *Prague Plan*. At the same time however, many others had to make sacrifices. Regarding the latter group, it was envisaged that a valuable advantage would be obtained if the Plan was put into operation as a universally agreed system. This applied particularly to the United Kingdom where the broadcasting service was regarded as being, quote, "*comparatively highly developed*".

60 Years of BBC-2: Part VI

Facilities for the new service began to expand rapidly. Three additional main studios were brought into service by re-equipping and restoring two *BBC Riverside* installations (which had been held in reserve for nearly three years), and by upgrading *Studio 1*. The latter was the largest of the studios at Television Centre and the fifth to be brought into service. Two smaller studios were provided for *News* and *Presentation*.

For *Outside Broadcasts*, four mobile units were added. For filming purposes, almost another 50 cameras were brought into service. These were the basic programme-making resources. However, it soon became apparent that a huge amount of additional equipment would be necessary, such as recording and reproducing equipment (both film and

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Fig. 1: An advertisement by *Kolster-Brandes* for their "New Queen" Coronation television receiver, dated 13 March 1953. Fig. 2: The front cover graphics used by Modern Wireless for their Christmas 1924 edition and recently downloaded by Les Rix G3XJW. Fig. 3: The Swiss teletext service was launched in 1984. Fig. 4: A rare

tape, fixed and mobile), film processing departments (including editing, cutting and dubbing), O.B. radio links, network control rooms, maintenance workshops, and many other supporting facilities. For flexibility in programme planning and deployment of resources, it was necessary to arrange for all the electronic cameras and other equipment to be readily switchable to either 405 or 625 lines. All the cameras installed at the *BBC Television Centre* (*EMI 201*, *EMI 203* and *Marconi Mk 4* types) were switchable between 405, 625 and 525 lines. At around the same time, most of the BBC-2 apparatus and all circuits were made capable of handling colour television.

Service information, Switzerland: Part XIX

On 19 December 1983, the *Swiss Federal Council* issued the broadcast licence for *Teletext*. *Schweizer Fernsehen DRS* launched its teletext service in 1984, **Fig. 3**. The service arrived in French-speaking Switzerland in 1985, and in the Ticino during 1986.

In 1984, *SRG-SSR* joined forces with Germany's *ZDF* and the Austrian national broadcaster, *ORF*, to establish the specialist arts and culture channel, *3sat*, which is currently broadcast via satellite.

The pan-European broadcaster, *arte*, began operations in 1992. SRG-SSR became a partner of the new channel, which currently broadcasts bilingual programmes to households throughout Europe.

The fourth *Radio Suisse Romande* station, *Option Musique*, often referred to as *«La chaîne de la chanson»* ("the song station"), began broadcasting in 1995.

Schweizer Radio DRS launched *Musigwälle 531* (*Music Wave 531*) in 1996. The station, which focuses on Swiss folk music and 'easy listening', is still on-air via satellite and the Internet, but it is now called *Musikwelle*.

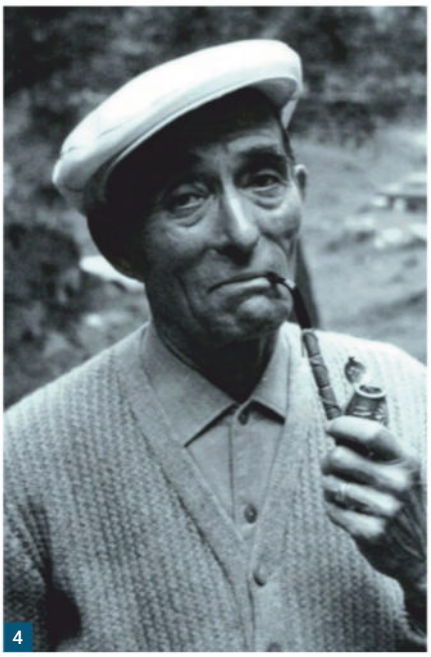
Roland Pièce archives: Part XI

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.

Born in Bex on 15 February 1897, Roland Pièce had been interested in radio from a very early age. In 1914, he conducted several experiments to find out which was the most distant transmitter he could receive. He was rewarded with reception of the time signals radiated from the transmitter atop the Eiffel Tower in Paris.

The French company, *Compagnie des Grands Express Aériens*, began regular flights between the airfields at *La Blécherette* (near Lausanne) and *Le Bourget* (approximately 13km north-east of Paris) in 1921. The 13-seat aircraft was a *Farman F.60 Goliath*. The hangar, which had a swinging door weighing about 40 tonnes, was designed by a company founded by **Gustave Eiffel**. The hangar is still visible at Lausanne-Blécherette airport.

On 14 February 1922, the Swiss authorities granted permission for radio communication facilities to be installed at the Blécherette airport in order to exchange meteorological information required for the flights.



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Roland Pièce, then an electrical engineering student, was asked to manage the construction of the radio station. He devoted himself entirely to this task. In the autumn of 1922, he built the transmitting and receiving station at *Champ de l'Air*, about 3km south-east of the Blécherette airport in what is now known as the *Vallon/Béthusy* district, to the east of Lausanne. A rare photograph of Roland Pièce in his later years is shown in **Fig. 4**.

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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1

The CR100

Philip Moss M0PBM takes us through the design of this classic along with fault-finding and possible modifications.

The Marconi CR100 HF communications receiver, also known as the B28, was ubiquitous in shacks for many years. Looking back through old *Short Wave Magazines* it often featured. Nowadays while the RCA AR88 and the HRO Senior are still talked about the CR100 is almost forgotten. The three sets are electrically quite similar, although very different in appearance.

This set, **Fig. 1**, came with a photocopy of the manual. **Fig. 2** shows the top of chassis, with the lid lifted, and **Fig. 3** the underside. As ever, the circuit would take up too much space here, but the full manual is available from the VMARS website, kindly made available to all, free:

www.vmarsmanuals.co.uk

It is also available in *Wireless for the Warrior, Vol 3, Reception Sets*, by **Louis Meulstee**. You will have noticed it isn't just that they don't make sets like this anymore, but if you do look at either reference, they don't write handbooks like they did. Now that it is so cheap and easy to produce really good drawings, specially prepared for use in servicing, one gets thinner and thinner volumes for more and more complex equipment, not written in what most of us would call English, and with reducing information. This manual is comprehensive, including some guidance on using the receiver, technical description, layout diagrams, specifications and alignment procedures. It also includes the sensitivity figures, which are worth quoting. There are two sets, the typical and the minimum acceptance figure. Using the latter, they vary from 2μV over most of the range to 5μV at 11Mc/s at the bottom end of band 6; 11 to 30Mc/s, though at the top of the band 5, 4 to 11Mc/s it is back to 2μV. The typical figures are significantly better. These are quoted as those required to obtain 20dB signal-to-noise for an unmodulated carrier, or a 40% modulated tone at 400c/s. The bandwidth is 3kc/s, as one would use to receive AM in the presence of interfering signals, the usual case on the short-waves.

Design and valve line up

The layout is two tuned RF amplifiers, a hexode mixer, separate local oscillator, a triode-connected pentode, three IF amplifiers, detector and AF preamplifier, and power stage. A BFO injects a signal at the detector, and in the narrowest bandwidth position, an LC audio filter of high *Q* is switched in between AF stages.

The set covers 60kc/s to 30.5Mc/s almost continuously as follows: Band 1: 60-160kc/s, band 2: 160-420kc/s, band 3: 500-1400kc/s, band 4: 1.4-4Mc/s, band 5: 4-11Mc/s, band 6: 11-30.5Mc/s.

The valve line-up is, with International Octal equivalents to the Marconi types in brackets: RF amplifiers, 2, KTW63 (6K7G). Mixer: X63 (6K8G). LO KTW63. IF amplifiers, x3, KTW63. Detector/AGC/audio pre-amp: DH63 (6Q7G), AF power KT63 (6F6 or 6V6), Rectifier U50 (5Z4, which is also indirectly heated).

There is an option (fitted to most sets, including both of mine) of a noise-limiter, with either a front-panel on/off switch or an internal one. There were two designs, very similar and both using a CV1054 /VR54 diode, the latter being dated 1959, which seems rather late. The stated reason for fitting Noise Limiter No. 1, pattern 56703, is to limit radar interference. No reference is made to other noise sources. Radar interference was clearly a major problem, probably because although one always thinks of the CR100 as an Admiralty receiver, it was used by other services, the blue front panel of these suggesting RAF. At airfields, they would be subject to high levels of radar pulses. Two other modifications were available to suppress this: an external filter to go in the antenna system, and an R.I.S. input, which I assume stands for radar interference suppression. This consists of a connector in the top LH corner of the front-panel, leading to an audio frequency transformer. Actually, by its marking intended for anode to push-pull grid drive, and a potentiometer to feed a variable amount of signal to the suppressor grid of the first RF valve, thus applying a pulse to desensitise the valve synchronously with the radar's pulse.

There were a number of other slight modifications, mainly concerning the type of connectors on the rear panel. Some sets had an output available via a break-jack from the cathode of the third IF amplifier. Where this was done the bypass capacitor was disconnected. The output was DC-coupled. The reason for this was not stated. A number of audio output configurations exist, by impedance and whether the headphone jacks disconnect the speaker. 100V line was also available. Surprisingly there is a tap on the primary of the output transformer, which is not used on any of the variations. It could be used to make the output stage ultra-linear, but it is not easy to modify the wiring, so I have not. Another version, the /2, had a sidetone input socket and internal sidetone potentiometer. With this set it is important to short the sidetone sockets together or the set will be muted. The purpose is to allow muting when a transmitter is keyed, with the potentiometer allowing it to be set so that the operator could hear their signal at the required level.

There are five bandwidths, 6kc/s, 3kc/s, 1200c/s, 300c/s and 100c/s. The first two are selected by varying the degree of coupling in the IF. The 1200c/s is selected by introducing a single crystal, and the 300c/s by using this crystal with a phase control capacitor. To achieve the variable IF bandwidths requires very considerable complexity compared with a normal IF arrangement. Only the final IF transformer, IFT5, has no switching involved, but even here both primary and secondary are tapped windings, with the tuning capacitor across the whole winding to maximise *Q*, but the anode current flowing in only part of the primary, and even on the secondary side the detector diode is tapped

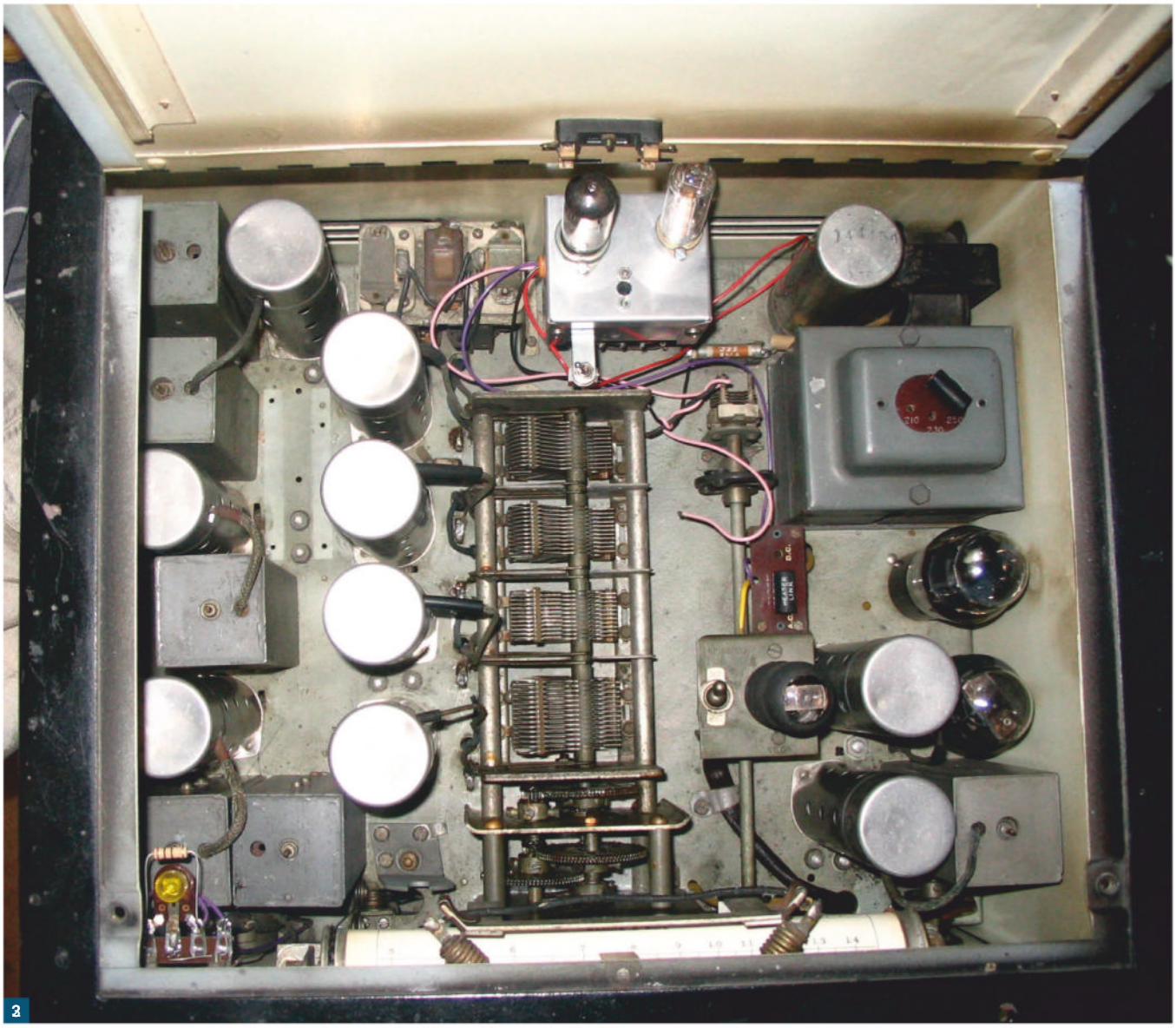


Fig. 1: Front view of set.
Fig. 2: The top of chassis, with the lid lifted.
Fig. 3: The underside.

down the winding (the AGC being taken from the anode to reduce loading). All the IF control grids are tapped down, and all IF amplifier anodes also, but the arrangement is different for the frequency changer's anode. The untapped anode winding in IFT1 is coupled via a link winding and the switching to IFT2. This is a single winding, coupled either by the crystal as mentioned, or by the link-winding. The maximum selectivity is introduced therefore after the mixer, and before the first IF amplifier, as one would expect.

The great problem with receivers with low IF frequencies is image reception: because the image frequency is too close to the wanted signal to be adequately suppressed by the RF tuning, unless more than one stage is used, hence the use of three tuned stages and two amplifiers before the mixer as standard in most high quality receivers of this vintage, before the use of high first IFs was introduced to make image reception a thing of the past.

Clearly it is very expensive to have all those ganged tuned circuits, switching and coils. This set has 24 HF transformers before the IF. Another reason to have two amplifiers is because the mixer is by far the noisiest stage in the set and the more electrodes the worse it is. It is unclear why a more expensive triode hexode was used here and not another pentode, which would also have reduced the inventory requirement by one valve type. The HRO uses a pentode, for example. Apart from image rejection, therefore, the use of amplifiers before the mixer improves the signal-to-noise ratio by increasing the wanted signal's level such that mixer noise is no longer important. There is however one more advantage to high pre-mixer selectivity: suppression of spurious responses. It must be remembered that any two signals which when mixed produce a frequency in the IF bandwidth will be reproduced at the receiver's output. These can include the mixed product of two strong unwanted signals then mixing with another signal, not necessarily the local oscillator, or signals mixing with the oscillator's harmonics. Regrettably, the RF stages can themselves act as mixers for unwanted signals, which is why they have fallen out of favour in modern designs, and why excessive pre-mixer gain should be avoided.

The image performance of the CR100 varies greatly with frequency: from >100dB at 1.4Mc/s and below, falling to a mere 30dB typically at 28Mc/s. In linear terms that is a voltage ratio of >100,000 down to 18:1.

The noise performance of the valves is such that up to 11Mc/s the noise of the tuned circuits predominates, above that the valve noise. No mention is made of sky noise, but one assumes that only above 20Mc/s would the valve noise be worse than the sky.

Investigating the set

The set is predictably heavy at 87lbs (39kg) though less than the AR 88. It is made of standard car-body steel of 1/16in. It has a novel tuning scale in the form of a drum, which rotates to display the required band. This gives a narrow window, plastic not glass, in a set where there is no room for any bigger display. Below this scale, which does not allow accurate determination of frequency, there are two logging scales which allow very accurate resetting. It gives the equivalent of 18ft of scale with 1250 divisions, visually dividable into 4. Unlike the main scale these are driven by gears off the tuning capacitor, and therefore backlash is not a problem.

The set featured had broken stringing, which had been replaced by some ordinary thin string. This was stretchable, and hopeless in operation. I have used thick cotton, two lines wrapped together. This is not as quaint as it may appear: the original looks as though it was cotton, but thicker and very strong: except where it had failed. The procedure was complicated and took several attempts. It is to be sincerely hoped that it does not need doing again. To even get at it requires considerable stripping down: the front panel and case have to come off.

I bought the set for the princely sum of £5. On entering the shack, a suspicious smell was noted. Was that just warm transformer? Regrettably no. This set had a burnt-out mains transformer. There is evidence of some corrosion, so it has not always been dry.

With a transformer extracted from another CR100 I bought at the same time but which was butchered, the set was tried and came to life. The old rubber cables are variable in condition. I decided not to replace them except where imminent failure seemed likely, but with the mains live from socket to switch and back to transformer it was another matter. This was replaced with PVC, and a fuse added under the chassis in an in-line holder, with the transformer lead forming one of its connections. There is a mains fuse in in the body of the voltage adjuster, but its nature is not known, so a cartridge fuse is the better option. The other transformer lead goes directly to the socket for the neutral connection. C110 and C111 directly from mains to chassis were disconnected. There is nothing wrong with them but 60-year-old capacitors used as Class Y components were deemed inappropriate, especially as they come before the mains switch. Too risky. The three 8µF capacitors on the HT did not warm up at all. It is interesting to note that the manual says they must have a resistance of 200kΩ per section. All three in parallel after 60 years are almost exactly that. The mains cable was non-original rubber, and perished. Replace, there being no proper cable-grip, this had to be improvised with tie-wraps.

The smoothing arrangement is interesting: there are two chokes, 8H/120mA, and three small capacitors. The result is a hum-free HT without using a large choke or large capacitors. There is a facility to power from batteries, the HT directly connecting from other pins in the mains plug, and the heater wire from this plug going to a pluggable link inside, which must be moved to connect the relevant supply. This link proved a little problematic. It has a link wire through it and the pins were loose, due to the body cracking. I soldered it. To save power it is suggested only 160V HT is used, and the output valve be changed to an L63 (6J5) triode if only headphones are used.

The second fault was severe audio distortion, and a warm smell. Checking the voltages around the output valve revealed the control grid to be positive – the predictable leaky coupling capacitor. This was a can-type, and I decided to keep the can for authenticity, so drilled it out, and fitted a newer capacitor in the can, then sealed it in with silicone rubber, no it does not look like the original bitumen, but better than nothing. The cathode resistor looked as though it had been hot a long time, but the stage now worked. The decoupling capacitor had not blown. The audio was now much better, though the 6V6 GT/G fitted seemed weak. It should be a KT63. Comparison of characteristics shows the 6V6 is the better valve all round. I fitted an EL35 which was to hand. Also, the rectifier fitted was a directly heated type U50 which is the original, and was replaced with a 5Z4G, as the indirectly heated valve protects the set from premature application of HT before the valves are hot enough to draw current.

A bit embarrassing to admit, but it was not until I came to write this that I checked the resistance across the loudspeaker terminals, 106Ω, clearly a line output. Rewiring to the only low resistance secondary gave proper speaker operation, and the old 6V6 was restored.

The next problem was interesting. The set was running fine, but while looking at the underside, there was a flickering light. Very odd. This was traced after some time to reflection of light emitting from behind a resistor decoupling the second RF amplifier's HT. The voltage across it was excessive, though the value of the resistor was OK. I had noted a glistening waxed-paper capacitor. It was leaking and getting hot. So was the one for the other RF stage. Most of the capacitors are can types, mounted onto the chassis. They were no problem except C82 as above. Initially I just cut the lead to the offending capacitors. The set went on working with no apparent difference. While leaving it and not going in for the considerable effort of dismantling the coil boxes was tempting, especially as I feared damaging the wafer switches, they were dismantled shortly afterwards. To do this one releases the switch-shaft and pulls it out through a hole in the rear of the set – gently! Then one unscrews the compartments, and finally unsolders the wires, some of which were replaced. Not only were the two HT decoupling capacitors replaced but also the two AGC line decoupling capacitors. The damping resistors across the oscillator coils on the two top ranges were checked for value and found to be reasonably accurate. Many resistors were checked on their tag-strips, and none found to have drifted far: a surprising outcome. Clearly these old rod resistors are incomparably more reliable than the later ceramic-tubed carbon-composition types, which fail even with no power dissipation at less than half the age of these.

The set now worked fairly well, but on band 6, 11 to 30Mc/s, the audio was very distorted. This was cured by using the manual HF gain control. It depended on how the antenna was connected. It only happened when using the transformer input, with one side earthed. The input is floating at the back panel to allow balanced antennas to be used. Checking through the stages it was found there was no negative bias to the first RF amplifier grid, because there was a short between primary and secondary of the RF transformer L27 & L6. This was caused because the thin primary wire ran under the tag for the secondary winding, and the pressure had caused the enamel to fail. It was easy to repair, just slightly lift the tag. The alternative input was to the transformer secondaries via a small capacitor.

The tuning knob kept sticking, and regrettably I embarked on a strip-down of the mechanism in the belief it needed regreasing. This involved much fun with the gearbox, but the outcome was that there was a ball bearing missing from the bearing for the main tuning shaft, so someone had been here before, though I found no evidence. After all my efforts the solution was to lift the knobs and then they run fine for a long time. The two knobs drive concentric shafts. The inner is coupled to the outer by three ball bearings, which run through holes in the outer shaft and then run against the static body of the tuning capacitor. The inner shaft is waisted to take the balls, and these in turn hold the shaft in place once the assembly is done up. There is a small spring and T-piece that press on the inner shaft, tensioning it in the outward direction. The drive, missing ball notwithstanding, runs very smoothly, with the outer large knob having a 25:1 ratio, the inner 170:1. The missing ball is from the bearing for the outer shaft.

At low frequencies, tuning is generally by turning the main knob, quickly. However, at the high end of range 6 especially, the tuning is too coarse, and a 250:1 ratio would be an advantage. The tuning is highly non-linear: it is increasingly compressed at the high frequency end of each range.

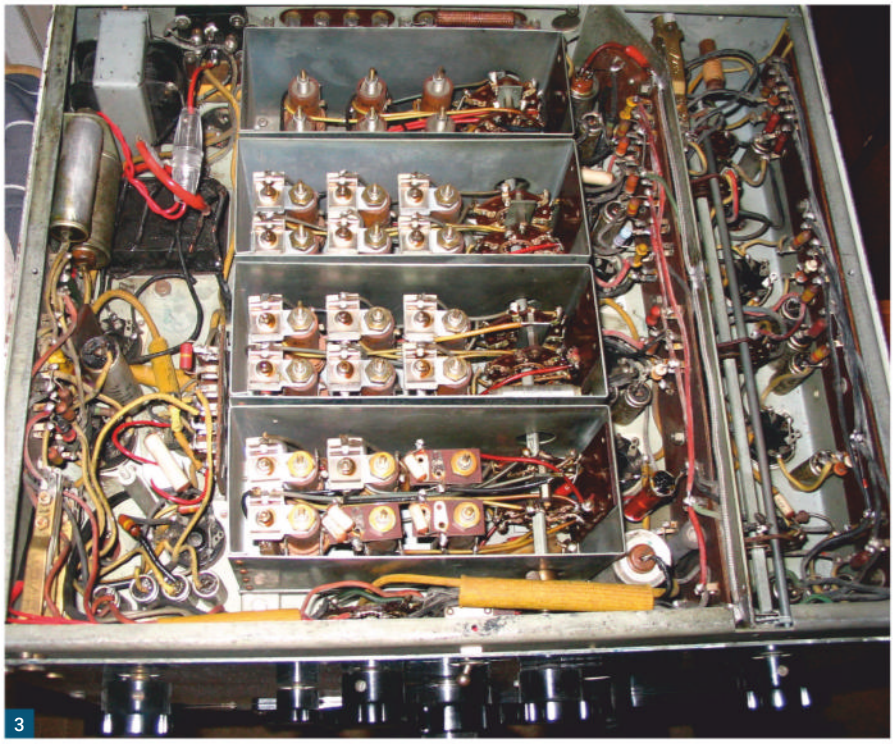
Alignment

Regrettably a point comes where one has to face all those adjustments! The trouble is that there is a call for special equipment. So it's about adapting, and hoping. To quickly review what the man-

ual says – there are three methods, laboratory, workshop, and emergency. The trouble is due to the crystal-gate. One is advised that the proper gear is essential to set this up. As it happens my crystal is duff, and attempts to revive it by cleaning did not work. It can be taken out of its screwed together case. The IF is determined by the crystal within a small range. Mine is 464.91kc/s, as marked in pencil on the side of an IF can.

Before any alignment was attempted, though, it seemed reasonable to check the set's performance, and also to mechanically align the tuning drum as it had moved during the re-stringing. The actual frequency the set tuned to at the band-edges was noted, and then the drum moved along, the RH side needing to be packed with a washer to take up the free play. It was also found that at 30Mc/s the set could not be used switched to 1200c/s or less because it motor-boated, so it seems there is some subtle fault, not noted when working on-air. After investigation, mainly in adding parallel decoupling capacitors, it was decided this may not be a fault at all. The manual specifically states it is better to align the 30Mc/s end on noise not signal, because of local oscillator pulling. This does seem very odd to me. It would be logical though. As the LO is pulled, the signal goes off frequency, the level drops, and the AGC voltage drops too, increasing gain, then the cycle repeats. The signal must be kept very low so as not to cause a problem, suggesting a gain below the AGC threshold, but that is not very convenient to work with.

Next it seemed reasonable to note the performance before alignment: starting at 4Mc/s, 1µV 40% modulation at 400c/s. The SNR was very good, and checking at 11 & 30Mc/s again gave good SNR. I did not actually set it up and do a proper measurement – listening demonstrated it was more than good enough. At 11Mc/s top of band 5, 0.1µV was clearly perceivable, below noise, with 1µV being damn loud! This compares rather well with the Redifon R 551, which I used to work on when a test engineer at Redifon. It had an SNR of 10dB at 0.1µV, but that was into a narrow bandwidth on CW, and often only just in spec. I find the comparison with an 'obsolete' old set such as the CR100 interesting. My conclusion was that there was no justification in realignment, unless I should find a new crystal, and be able to properly restore the functions. Actually, I found the results so good I suspected that my TF 2002B had a defective attenuator, and at first tried to repeat the tests using a TF 144, but although it set up OK, it actually did have a duff attenuator, give no output and reading open circuit across the output terminals. I then checked the 2002B by using the manual gain turned far down on the CR100, and checking each step on the attenuators actually worked, all the way from 1V to 0.1µV. At each step I could discern a reduction of level. When rechecking the poor results originally obtained on bands 1 & 2 and at 30Mc/s, I found them much better: I suspect that in the morning there was much less in the way of extraneous signals getting in. Obviously, I used a screened cable from the genny to set, with only a couple of inches of wire to the terminals, but no one reading this magazine will be unfamiliar with the ability of radio signals to get where they are not supposed to. I had tried adjusting the RF stages alignment, but they made no difference – 60 years of virtual zero drift!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Modifications

Others made include the ubiquitous adding of a signal meter. No version of the set had one. I have used the usual method – to measure the reduction of current in the AGC controlled valves. This can be done in the anode circuit, or in the joint cathode circuits where they go to the manual gain pot. This is conveniently situated, and the slider contact is disconnected. The wire to the cathodes extended and taken to a 10Ω resistor across which a pre-set resistor is connected. The lower common wire goes to meter -Ve and back to the pot. The meter +Ve goes to the pre-set slider. The meter is mounted upside-down, so that the needle swings to the RH side as expected for a strong signal, even though the number indicated reduces. I used a 10mA meter as sensitivity is not required, and a 470Ω pre-set. The strongest signal causes an indication of 3, on a scale of ten. As the total current available is high, one should start the setup procedure with the meter set to minimum sensitivity, and then adjust for full-scale deflection (FSD) when the set has warmed up for a few minutes, with no signal received. The stability of the FSD point is not that good I find.

There is a well-known fault with these sets, but not a well-known answer. Till now! The AGC line is found to be positive, until a reasonable signal is received. If one manually turns down the RF gain, the voltage increases. Looks like leakage in a valve but pulling them out makes no difference. Then looks like leakage in an IF transformer but isn't. Eventually I found the cause in another set. The AGC decoupling resistors are next to the HT decouplers on the tag-board. The boards leak. My solution was to use blown ceramic fuses as stand-off insulators soldered to the tags, and hang the AGC resistors and wiring on that for the RF stages. Note these fuses are good for 3kV when blown!

Looking at the picture into the top of the set, a small chassis with two valves can be seen at the rear centre. This is a crystal calibrator giving 100kc/s points. The heater is always on, and the HT is operated by the switch in front of the box. The coupling is by wrapping the output wire around the wire to the aerial trimmer. And yes, the wiring is intended to be neatened up at some time! Adding five self-adhesive rubber feet to the bottom of the case stops it scratching worktops with its bare metal feet.

Conclusion

This old set still gives hours of entertainment finding distant stations, and vast numbers of UK local AM stations. For all the CR100 seems forgotten, it still represents a capable receiver available cheaply, and it's British. For its age it did not have a lot wrong with it. Will it go in the lounge or dining room? I doubt it, but then the HRO and AR 88 probably won't be welcome there either. **PW**

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1

The 2024 Es season (so far)

Despite rumours to the contrary, there have been some great VHF conditions this month, as **Tim Kirby GW4VXE** reports.

I mentioned last month that there had been a late start to the Es season this year. Since then, things have picked up somewhat, but it's a noticeably poorer season this year than in recent years, on all bands, 6m up to 2m. It's not that there haven't been openings, there certainly have and one or two openings, on two metres especially have actually been quite lengthy – it's just that openings seem to have been much less frequent this year. And, at the time of writing, in mid-July, some people are starting to think that the Es season is over and done with. Hopefully that's not the case and we'll continue to see some interesting Es propagation over the next few weeks.

Reading this back, after compiling the column, despite our complaints, there's plenty of DX having been worked on 6m, in particular. Although none of us reported these contacts, I'm aware that VK8 stations have been worked from the UK this month on 6m as well as a number of openings to Japan, China and the Far East.

Why have things been different this year? Certainly, I'm sure that the solar cycle, being close to its peak, has something to do with it. We've seen that before. If you're in the UK, you can't help but have noticed that the weather has not exactly been great, settled, summer weather. This too, I'm sure has been a factor. That's interesting too because, I think when I was first licensed and getting interested in VHF propagation, people used to tell me that Es was best in the first week of June, as I mentioned last month, but also typically, openings would occur on hot, sunny, cloudless days. I'm not sure whether I entirely believed that last bit, but it's certainly true that settled, good weather, seems to bring more Es propagation than the rather unsettled weather we have experienced this year. What, I wonder, does climate change hold in store for Es propagation (quite apart from any of the rather more pressing questions around this topic)?

Will a vertical work DX on 6m?

With this summer's Es propagation being more of the single or double hop type rather than the longer distances that we have seen in recent years, I've spent more time monitoring the band using my vertical antenna. That's resulted in a number of new European grids being worked, which has been fun. I've occasionally been surprised where I've been heard too – when using the vertical. I was particularly surprised when W4SO (EL98) heard me on the vertical one lunchtime. I did switch over to the beam (and amplifier) to complete the QSO, but it was interesting nonetheless and I've seen signals from the US and Canada as well as having been spotted there and in the Caribbean several times using the vertical.

I mention this because, although of course, a beam antenna is preferable on 6m – it's not the case that you won't work any DX if you don't have a beam. Someone was 'spouting' on a Facebook group the other day that you MUST have a beam to work any DX on 6m. They didn't like it much when I pointed out that in that very week, I'd worked both the USA and Egypt using the vertical. I've always tried to encourage readers of this column to use the best antenna they can for any band. That might be a beam or it might be a vertical or an HF dipole! Try it out and if conditions are right, you'll almost certainly make a QSO or two. The only antenna that doesn't work at all is the one that you don't have up!

Duplicate QSOs on FT8

I've mentioned this before, but **Tony G4NBS** raised the topic of people who refuse to work duplicate QSOs when using FT8. Tony recently called someone on 6m who he hadn't worked since 2021 and the station refused to work him – although he did at least acknowledge him. You call some stations and you're pretty sure that they must be hearing you and yet there's no acknowledgement or reply. I think that's a shame. If I see someone calling CQ at a good strength and getting no replies, I'll very often call them just to let them know that the path is there, they're getting out well and to persevere with calling! After all, it takes barely any time to have a FT8

Fig. 1: The 2m amplifier at the KA1W/KA1EME EME station. KA1EME has been worked on 6m from the UK this month. Fig. 2: The Bolton Wireless Club using a venerable FT290 Mk II during the Museums on the Air event from Turton Tower, as GB1TT. Fig. 3: Endaf N6UTC operating through one of the Tevel satellites from the Arizona/Utah state line.

QSO! Of course, we're all entitled to operate using whatever etiquette we wish, but in general terms, if someone calls me, I like to answer them. You never know what test of antenna, transmitter, software, computer etc that someone might be doing.

The 8m band

If you've been reading this column for a little while, you'll have seen **Roger Lapthorn G3XBM** mentioning the possibility of transmitting in the 40MHz band, using ISM level power, which is 10mW EIRP – Roger reports that his conversations with OFCOM suggest that they are quite happy with this idea. Well, I'm happy to report that some FT8 QSOs have been made on 40MHz using this extremely low power level! **Franz Van Velzen OE3FVU** used 10mW into a dipole and was able to work SV1DH and EI7HBB on 29 June. Franz was very keen to point out that he absolutely had stuck to the letter of the regulations because he did not wish to prejudice any chances that Austrian amateurs have of getting an allocation at 40MHz. I told Roger G3XBM about these QSOs and he said that he wished more people would give it a try!

Roger has used his 2.5W Innovation and Trials licence from OFCOM to work a couple of Spanish stations.

The 6m band

Jef VanRaepenbusch ON8NT (Aalter) listed the highlights of his log including: 3 June 5B4AAB (KM64), OY1DZ (IP62); 8 June CU2AP (HM77), CU2DX (HM77); 12th June EA8BFK (IL38), EA9QD (IM75), EA8SG (IL18), EA8AO (IL18), CN8NS (IM75); 13 June 4L7ZS (LN21); 25 June EA9ABC (IM75); 26 June EA8BS (IL18); 28 June EA8JF (IL38), EA9QD (IM75); 29 June JY4CH (KM71), OD5KU (KM73), 4Z5TK (KM72), 4L7ZS (LN21), CT3MD (IM13), EA8AIN (IL18).

Don G3XTT has found the band fairly poor, although there have been occasional highlights, such as copying ZS4TX/6 briefly on 9 July as well as working some Caribbean stations, including FS. Don notes that there have been relatively few US stations worked this year compared with recent years. And this month, despite some minor openings to Japan, nothing like the 'big one' last month. But Don does mention that there have been several very strong openings into TF.

Roger G3XBM says he has been spotted across Europe with his 2.5W of FT8 to the V-2000 vertical.


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Phil Oakley G0BVD (Great Torrington) says that his best days were 21, 22 and 23 June when he worked into the USA and got five new squares on FT8. Highlights in Phil's log include SU1SK, KA1EME and W1HNZ. KA1EME is operated by **David KA1W** and if you look on QRZ.COM there are some great pictures of his station, including some of his home constructed amplifiers, **Fig. 1**.

Steve Macdonald G4AQB (Bolton) says that he has managed to work lots of European stations on FT8, but feels that conditions aren't as good as last year.

Ian Bontoft G4ELW (Bridgwater) has found conditions a bit disappointing too. Ian uses an HB9CV in the loft with 25W and his best DX so far this year has been VE1PZ (FN85) on 21 June. Ian says that there are plenty of European stations around but he can't help remembering working into the Central and Eastern USA with the same power and a V-2000 vertical, just a year or two ago.

Tony Collett G4NBS (Cambridge) says he seems to have managed to miss a fair few openings but includes the highlights of his log which are impressive. On 13 June there was Es all afternoon towards the East, but Tony worked VE1SKY (FN74) at 1330z, along with OD5KU (KM73) and E7/PE2M (JN82) a little later with ER3BN (KN37) worked at 1734UTC. The UKAC in the evening coincided with good Es towards OH/SM for Tony. On 15 June he worked VO1FOG (GN37) at 1816 on 50.110 – Tony's sole SSB QSO across the pond so far this year. Next day on the 16th there was some Es, mainly towards OE, OK, SP, YO and YU – a mix of SSB and CW in the Trophy contest. While waiting for SSB and Es activity to perk up, Tony operated FT8 from 0430 to 0800UTC working six Ukrainian stations in KO50, a couple in KO40 along with KO30 and KN69. RW5C (KO85) was worked along with CN8NS (IM75). After the contest finished, at 1712, Tony worked CN8NY (IM75). On 18 June, the highlights were TF3JB (HP94), N0TB (EN34), AB1OC (FN42), K1BX (FN43), OD5VB (KM73), AC4TO (EM70), AC2PB (FN21), K8YFM (FM17), W8UV (FM28), W4MW (EM96) and K4LAZ (FM07). The 19th was another good day with 7X2RF (JM16), 9K2YM (LL48), HI3T (FK49), HI8GSP (FK58), HI8SDR (FK58) and HI8T (FK58). Next day, Tony worked T77C (JN63), FG8OJ (FK96) and 4X1YS (KM71). On 21 June, Tony caught an opening to the North Eastern USA around 2100-2200UTC. 7Z1SJ (LL25) was worked on 22nd with the CW contest on 23 June being fairly devoid of Es; GM4DIJ/P (IO74) and GM3POI (IO88) were two nice contacts though and C37AC (JN02) was worked later on FT8 at 2147. A highlight of the month was working FS/W8HC (FK88) at 2042 on 30 June. Tony says it was a lucky QSO – just coming out of the noise occasionally. On 11 July, Tony was late to get on the band, but he worked KA1R (FN22) at 1332. Things went quiet and then propagation moved west, allowing Tony to work W9XX (EN63), KA9CFD (EN40), K9IMM (EN52) and W9EWZ (EN52).

Highlights of the **GW4VXE** (Goodwick) log are 17 June W4SO (EL98), NN4X (EL98); 18 June WW1L (FN54), K1TOL (FN44), K2KA (FN42), NE1B (FN42), K1TEO (FN31), W3UR (FM19), W3FJ (FN11), K3MM (FM19) and N3AAA (EN90). SU1SK (KM50) was a new DXCC on 19 June as was FS/K9EL (FK88). There was another reasonable opening to the North Eastern USA on 21 June. Then, S01WS (IL46) was worked on 23 June at around 1500UTC and I was very pleased to work CT1DHM (IN61) for my last square in Spain and Portugal. On the evening of 30 June I worked 9Y4D (FK90), NN4X (EL98) and FS/W8HC and then another quick opening to the Caribbean was around 2015 on 3 July when WP4G (FK68) popped up for long enough to be worked and then vanished again. There was an opening to the North Eastern USA on 10 July around 1430 with an outlier of K5CM (EM25) in Oklahoma. More North Eastern USA around lunchtime on the 11 July with KA1EME (FN31) and a number of others being worked.

In spite of us all complaining about the conditions, there's quite a lot of DX in there!

The 4m band

Jef ON8NT runs 10W to a Diamond V-2000 triband vertical and worked 8 June EA7KBX (IM87), GM8IEM (IO78) and on 29 June LZ1AG (KN22).

Here at GW4VXE, I caught an Es opening to DL on 13 June around 1300UTC and then on 23 June worked DK2DB (JN48) and S52OR (JN76) around 1930. On 24 June, either side of the 2m opening, I worked CT7ASY (IM58) at 1500 and EA6SX (JM19) and EA4LO (IN80) around 1800. All my QSOs were on FT8 with a bodge system of a rather deaf FT-847, 10W or so and a V-2000 vertical.

The 2m band

Jef ON8NT worked G0LTG/P (IO81) on SSB during the Activity Contest session on 4 June. During the FT8 Activity period on 5 June he worked GW4HDF (IO81), G8EEM (IO93) and G8LY (IO82). During some tropo on 23 June Jef worked EI3KD (IO51), G7KTP (IO82), F6EQD (IN88) and GU6EFB (IN89). Jef was active during the Es opening on 24 June and worked CT7JBG (IM75) but was spotted by various stations in Southern Spain as well as in Morocco.

Steve G4AQB writes, "*Over the last month members of the Bolton Wireless Club were asked to dig out their vintage 2m equipment to take part in a 2m FM net and later 2m SSB Net. It was amazing how much equipment was aired from the 1970s and 80s during the nets. I used my Liner 2 and DL6HA transceivers for SSB and my Trio TR2200G and Icom IC-24G (with the thumbwheel switches) for FM. Other members used a variety of older equipment, including Yaesu FT-290s, Icom IC-260 and Kenwood TS-720 along with Microwave Modules equipment. All putting out nice signals! One of the Yaesu FT-290s was used by members during Museums on the Air at Turton Tower near Bolton operating GB1TT, a great workhorse!*" I can see the FT-290 used at Turton Tower was a Mark II, **Fig. 2**. I had one of those rigs and always regret selling it! They were very satisfying to use and had CTCSS, which the original FT-290 did not have. What a great idea to get these lovely old rigs back on the air. Are any other clubs doing the same thing?

Ian G4ELW caught a good Es opening on 24 June when he worked EA5EX (IM98), 7X2HF (JM16), 7X2RF (JM16), EA6VQ (JM19), EA6SX (JM19). Ian says that he runs a modest 15W of FT8 to a low 5-element on the Somerset levels, but that made it even more special when the 7X and EA6 stations called him!

Tony G4NBS caught the Es opening on 21 June making a good number of QSOs, all on FT8, to I7, I8, IT9 and I0. IZ7BAS (JN81) was worked on SSB. Tony found some tropo to the east and northeast on 23 and 24 June, working SA6BUN (JO78), PD0KH (JO33), OZ/DF1HC (JO47), SM7VUK (JO66), SA6FOL (JO67), LA9DM (JO59) and LA3PL (JO59). Tony is the only person to report an aurora on 28 June around 1430UTC when he worked LA3EQ (JO28) and GM4YXI (IO87) on CW. There was some tropo later on, when Tony worked F6IFX (JN08), F6EGD (IN88) and DK5IR (JN49) all on FT8.

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At GW4VXE I missed the best of the propagation, but caught a little local tropo on 23 June working MI0LPO (IO64), F6DBI (IN88) and GW0WZL (IO73). I missed most of the Es on 24 June, but worked EA6SX and EA6VQ (JM19). I didn't see the 7X stations, but missed a CN8. All contacts made with 50W of FT8 to a vertical

The 70cm band

Tony G4NBS is the only person to mention the band, working some tropo to the east and northeast on 24 June; DH2UAK (JO71), OK1VUM (JN79), PE2TV (JO32), PE9RX (JO22) and SM6CEN (JO67).

FM DX

Simon Evans (Twyning) writes that in keeping with the weather, the tropo conditions have been rather poor. There's been some FM tropo but no DAB DX whatsoever. Simon noticed both tropo and Es to Spain on 24 June. Simon says that on Band II, including the OIRT channels (66-74MHz as used in Eastern Europe), he has received up to 36 countries this year, with the Azores and Greece being the most distant. The distance to the Greek stations that Simon heard was around 2400km.

Satellites

Patrick Stoddard WD9EWK (Phoenix) writes, *"**Endaf N6UTC/MW1BQO** and I traveled to the HamCon:Zion convention in St. George, in the southwestern corner of the state of Utah. This was also the 2024 ARRL Rocky Mountain Division Convention. A nice event, even with the excessive heat during the weekend. At one point that weekend, the temperature in St. George reached 123°F/50.6°C! On the way to and from the convention, I operated from locations in northwestern Arizona and Las Vegas in Nevada. N6UTC and I operated from the convention in grid DM37, as well as a TEVEL pass from the DM36/DM37 grid line a few miles south of the convention (**Fig. 3**). The grid line runs a couple of meters south of the Arizona/Utah border, and there was a freeway exit next to where we operated on the grid line. N6UTC and I had separate stations set up for a TEVEL-3 pass where we worked each other with both of our stations on the grid line. We also worked a couple of other stations that showed up.*

"AO-91 is still making occasional appearances. When it is on and in the higher part of its orbit overhead, it is still very popular and allowing long-distance QSOs. It is a shame its onboard batteries are in bad shape, but at least it is occasionally on and showing what it has been doing for satellite operators over the past few years.

"GreenCube is still working, continuing to make satellite operators happy with the DX that can be worked. It has been nice to see the activity in the past few months after the possibility of having the digipeater switched off.

*"Some news about the TEVEL satellites... there are reports that the eight TEVEL satellites are within a few weeks of re-entry, ending their mission that has run for over two years. Orbits for some of the TEVEL satellites are now under 300km. **David Greenberg 4X1DG**, in a post on the AMSAT-BB mailing list, mentioned that a new TEVEL mission is being put together now. The new TEVEL mission will have nine satellites."*

That's it for this month. Thanks to everyone who has been in touch and I look forward to being back with you again next time. **PW**

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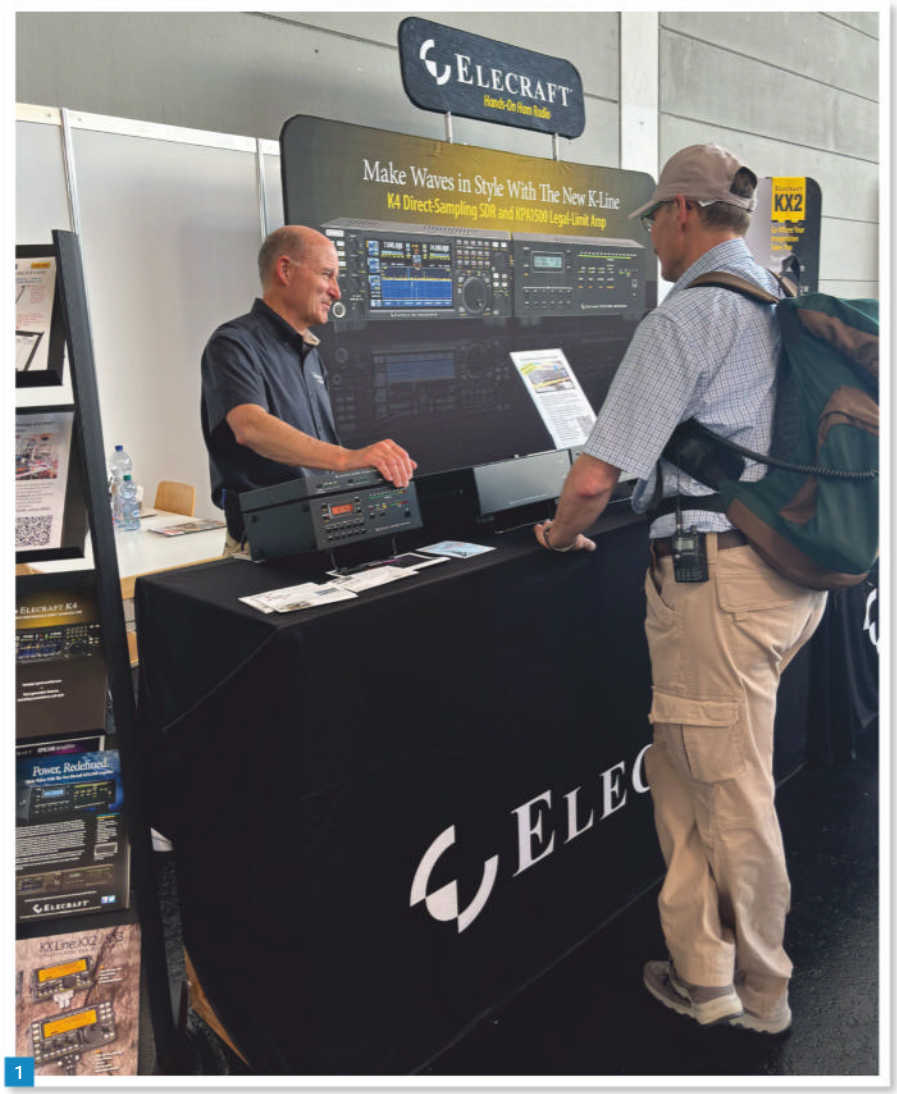

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Friedrichshafen 2024

Joe Chester M1MWD returns with his very personal take on this year's Ham Radio event at Friedrichshafen, Germany

The gang's all here. Well three of us anyway. But it already feels like a crowd, over 700 miles from home. **Simon GM0SCA** wins the prize for travelling furthest (unless I activate my Irish callsign!). But it's not a game show. And the other pair clearly won, having got to the beer before me. *"Nor is it a beerfest, so kindly get to the point"*, yes, dear editor!

Friedrichshafen is at its best, with wall-to-wall sunshine over the flat calm lake. Which is a surprise, because last night's forecast (I was in Ulm, three hours away) was for the opposite. So a choice has to be made – beer drinking or unwinding after the race across the continent. The beer loses out. Tomorrow will be a long day.

But to warm things up, OK bad metaphor in 30° of heat. I set up a pair of hotspots at the hotel, and immediately made contact with **Dan N4XDG** in North Carolina on REF001C. No packet loss, 59+ both ways. Try doing that on HF! Dan told me that the BER was a bit high at times today on D-STAR. Mine was showing 0.0, but Dan's comment might explain why I didn't make contact with W5ABQ and 4Z1TL at the time. And my FT-70, on the other hotspot, brought loads of activity from Hubnet on DMR. I hope to be a pedestrian mobile at the show tomorrow. And I have another project in mind as well.

What to expect

What to expect? Another 20 DARC stands for sure, and Icom, Yaesu and Elecraft are here, and there are two halls of bring-and-buy, plus hours of lecture content (but 90% of this is in German). And, of course, the club stands. My direct requirements are small. I am looking for hotspots which use VHF rather than the usual UHF (tell you why in a minute), and, as usual, looking for a supplier of a QO100 station in a box (sorry, the pain some of my friends are going through building theirs is just too much to bear). And a bendy antenna. And to meet friends.

The show itself

Friday dawns with blue sky and 25° over a crystal clear flat calm lake. The ferries are already underway, bringing boat loads of amateurs from across the lake. As I said earlier, the gang are all here. **Eric WA6HHQ** of Elecraft, **Fig. 1**, and of course Simon GM0SCA, moonlighting from the NRC (National Radio Centre) net, **Steve M1ACB** and **Mark M1MPA**, and his lovely wife, from the RSGB, and **Sabine OE5SLE** and **Hilda**, and many thousands more. So the question is why were you not here? Admission is very well managed, so there is no queue. But we couldn't find a floor plan – online we were told. But it's not important. Breakfast at one of the deli's is, so that's half an hour gone already. One of the great things about Friedrichshafen is that there is plenty of seating, indoor and outdoor, and a choice of several cafes/bars. On the way into Hall A we passed the QSL card wall, **Fig. 2**, which fascinated a potential recruit to the hobby!

And immediately there is an SRHF10, **Fig. 3**, sitting on the stand in front of me. Not easy to get in the UK, so I was tempted to buy a dozen to bring home. This little stub antenna has two very interesting and useful features. It bends, in any direction, without any risk of breaking. And range tests show that it frequently exceeds the performance of the supplied rubber duck on handhelds, and on occasion even matches that of the longer Nagoya. Onto my ID-50, switch on, wait for the hotspot, and on air. I linked to the UK Hubnet just for demonstration purposes, which was fun.

I dropped by the Icom stand, and had a brief chat with a couple of staff. I like the look of that ID-5100E, **Fig. 4**, with its big removable screen. Need to check that out more fully later. And I finally found the Tx power setting on the ID-50, with thanks to a couple of Icom representatives, who initially were as bemused as I was about its location.

Then onto my next goal. It's 1030 UK time, and I was hoping to find a station at the show actually operating. I found a few FT8 stations, and Eric was operating his home station back in California remotely, but that was a bit too far away for what I wanted. Then I saw the truck – the Airbus truck, **Fig. 5**. It was on one of the DARC stands, and the owner immediately agreed to let me climb inside and switch on the Icom 781 on board, **Fig. 6**.

A quick check of the SWR, and I listen out on

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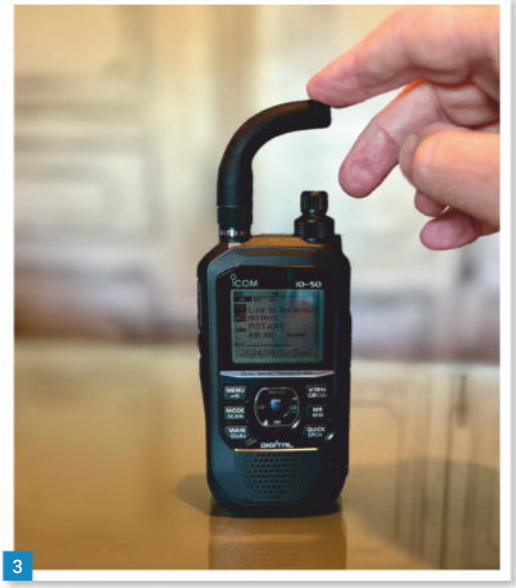

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Fig. 1: Eric Swartz WA6HHQ on the Elecraft stand. Fig. 2: The QSL wall.
Fig. 3: The SRHF10 'bendy' antenna.
Fig. 4: The IC-5100. Fig. 5: The Airbus truck.

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the usual frequencies on 40m for the NRC net. Much QRM and QSB, but there they are on 7127 – clearly audible. I cheated a little by sending a message to **Roger G8VLR**, and I heard him call me to join the net. Signals with me are as low as 33 in the QSB, but **Ed G3ZLX** gave me a 54! With better propagation we could have done more, but the German operators looking on were quite pleased. And that DL/M1MWD logged into the NRC net.

Back on the RSGB stand, Steve offered congrats on getting that to work, which was nice. But the cup of tea was even nicer – pity about the biscuits, which had unsurprisingly vanished by then. I introduced a potential new member to Steve and Mark, and to Simon, as she clutched her new copy of the Foundation handbook! *"You have until September"*, Mark said helpfully (?). No pressure then.

I called by the large Brandmeister stand, and tried to start a conversation, but my German and their English weren't up to it. An impressive array of handhelds all logged into BM Germany was amusing. I thought the point of the digital world was that it didn't matter where you logged into the system.

Which brings me to lunch, and Sabine. *"May I ask a question"*, I ask? *"Why did you get a radio licence?"* I climb mountains, she told us, and I like doing SOTA. She showed us a quite beautiful little Baofeng, with a shiny keyboard, which she uses for DMR. Her QRZ page is really interesting too. But Hilda, from Sweden (not her real name) had a different story. *"I look after the children, and the house, and I like to spend time with my grandchildren"*, she told us. *"I just have no time, and one radio person in the house is enough"*. A small and unrepresentative sample, one lady amateur, one lady too busy, and one lady studying for the exam – make of it what you will.

Yaesu had quite a big stand, and I liked the small footprint of the FT-710 AESS, **Fig. 7**. 1.8-50MHz, plus 70MHz for UK operators, and 100W output. But what I really liked was the tablet sized panadapter on its stand. I tried to get a photograph for you, but the reflections in the hall made it difficult. I noticed no price listed, and the representative I spoke with didn't understand my rudimentary German. And so to Elecraft. I really don't know how Eric stands there for hours answering questions from everyone who has one to ask. So I just say thank you for my KX3 station, and leave him to get on with it. But my eyes are out on stilts drooling at that K4D, and its associated remote operating environment. And then there is that KPA500 500W amp and KAT500 tuner on the stand as well. That would make a big difference on the Net. Altogether, that's an easy £10k, including discounts, gone from the annual household budget. Application pending. Then to Hall 3, and 4. And the hotspot search.

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Fig. 6: The IC-781 inside the truck.
Fig. 7: The Yaesu FT-710.
Fig. 8: Part of the bring and buy area.
Fig. 9: Tyre pressure sensor working on 433.92MHz.

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A pair of aircraft (Zeppelin?) hangers full to bursting with components, old radio kit and even a modern version of the Enigma machine, kit or assembled, **Fig. 8**. And I saw notes being handed over too, so some sales were being made. But my sense of it was clouded by a wall of Collins gear down the middle aisle. Incredible to think that these were once the pinnacle of amateur radio equipment. These halls are all components and old radios. *"Did Noah use some of this in the Ark?"*, the impromptu biblical scholar standing beside me asks. Hi Hi. So a few laps in search of hotspots surplus to someone's requirement drew a blank. I was looking for a hotspot to run on VHF because I bought a new car recently, which, to comply with regulations, has electronic tyre pressure sensors fitted. But I found that these were 'unreliable', triggering type pressure warnings frequently. A trip to the dealer found the problem quite quickly. The readout said 'radio interference'. It seems that the tyre pressure sensors, **Fig. 9**, are operating on the 400MHz band, and my ID-50 was tripping them! Who knew this? But getting the output power down to a tenth of a milliwatt should cure the problem. We'll see. Worth checking if you have these fitted in your car.

Impressions

Overall impression, and confirmed by many, not as busy as it used to be. But it's Friday, maybe Saturday will be busier.

Later that evening, we went to a bar. Well, restaurant actually. It's quite famous in these parts, family run, and serving the best steaks in the region. On opening the door my wife instantly says 'men only club', and I couldn't but agree. Every table is occupied by obvious radio amateurs. All male. Which brings me to my message from Friedrichshafen. How much longer can we as a hobbyists continue to ignore the other 50% of the population 'who hold up the sky with us'? WE DO NOT DO NEARLY ENOUGH. There it's said. Now do something about it. **PW**

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Colin Redwood G6MXL
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The 16th Annual Practical Wireless 70MHz Contest

Colin Redwood G6MXL invites readers to participate in the Practical Wireless 70MHz Contest.

The 16th Annual *Practical Wireless* 70MHz Contest takes place on Sunday 22 September 2024 from 1300 to 1600UTC.

The contest is split into two sections. The low-power section with a power output limit of 10W enables Foundation Licence holders to compete on an equal basis with other low power stations. The high-power section allows stations to run up to the full power permitted by their licence.

You may operate from a fixed or portable location. For those new to the 4m band, the *PW* 70MHz contest is a great introduction to the friendly nature of contesting found on the band.

Equipment

The choice of equipment at 70MHz (4m) continues to improve.

For SSB and CW operation, Yaesu's FTdx10, Kenwood's TS-890, Icom's IC-7100 and IC 7300 transceivers all offer the 4m band in addition to the traditional HF and 6m bands. The UK version of the older Yaesu FT-847 also covers 4m and can often be found second-hand.

Transverters are still used by some 4m operators and are available from a number of sources. Most use an intermediate frequency (IF) of either 28MHz or 144MHz, taking the 28MHz output from a transceiver and mixing with a local oscillator to give 70MHz for transmit and vice versa on receive. Transverters usually require drive levels much lower than the full output power of most HF and VHF transceivers, sometimes as little as a few milliwatts. You may need an attenuator unless your main transceiver has a low-power output to suit your transverter.

A number of FM transceivers for 4m are available from several manufacturers including Anytone, MyDEL and Wouxon.

Antennas

Many stations will perhaps be using nothing more than a simple dipole or quarter-wave vertical. Stations with Yagi antennas are likely to have fewer than six elements. A number of suppliers now offer commercial 4m Yagis and Moxons.

Vertically polarised antennas are generally used for FM and AM operation. For SSB and CW, most stations use horizontally polarised antennas. For those who like building antennas, there are a number of designs for the 4m band on the *PW Antenna Collection Archive Disc*.

Operating

I'd suggest spending some time on FM and AM in addition to SSB and CW. If you are unfamiliar with the 4m band, you could be surprised at just how many stations are using these modes.

In recent years there has been increasing activity from the continent in addition to activity from almost all parts of the British Isles, including a number of EI stations. It is easy to miss out on contacts simply by not rotating directional antennas in all directions. Don't forget that slow QSB (fading) is a common occurrence on the 4m band, so you may miss a station altogether if you don't rotate a directional antenna a number of times during the contest. The QSB can cause stations to disappear for a minute or two and then re-appear.

Entries

Don't forget to submit your entry after the contest. Although electronic entries via email are preferred and make the task of the adjudicator much easier, legible paper entries continue to be welcome. The email address for logs is **entries@pwcontest.org.uk**

Do make a note in your diary now. The 16th *Practical Wireless* 70MHz Contest takes place on **Sunday 22 September 2024**. If you plan to use batteries, don't forget to charge them a day or two before.

Remember to put a reminder in your diary to submit your entry to be received by **Tuesday 8 October 2024**. Let's hope for some good weather and propagation on the day so that we can all have a really enjoyable time.

The 16th Practical Wireless 70MHz Contest Rules
www.pwcontest.org.uk

1. General: The contest is open to all licensed radio amateurs, fixed stations or portable, using SSB, CW, AM or FM in the 4m (70MHz) band. Entries may be from individuals or from groups, clubs and similar organisations**.** There are just two entry categories: Low and High Power. The duration will be from 1300 to 1600UTC on 22 September 2024.
All stations must operate within the terms of their licence and only transmit within the 4m licensed allocation.
Stations using transverters are reminded to be careful not to transmit out of band.
Subject to licence conditions, split frequency operation is permitted for the purpose of working stations in countries with different 4m allocations. Cross-band contacts where either station is not operating between 69.0 and 71.0MHz will not count for points.
Entrants must observe the bandplan for their country and keep clear of normal calling frequencies such as 70.200MHz. Entrants must avoid using any frequency that is obviously in use for non-contest purposes. **The 4m band is not an exclusive amateur band in many countries. Contest stations must allow all other users (including non-amateur users) of the band to carry out their activities without hindrance.**
The station must use the same callsign throughout the contest and may not change its location. Entrants not operating as a fixed station must use the /P callsign suffix.

2. Contacts: Contacts will consist of the exchange of the following minimum information:
(i) callsigns of both stations (**including any /P suffix**)
(ii) signal report, standard RS(T) system
(iii) serial number: a 3-digit number incremented by one for each contact and starting at 001 for the first contact
(iv) locator (i.e. full 6-character IARU Universal Location for the location of the station).
Information must be sent to and received from each station individually and contacts may not be established with more than one station at a time. Simultaneous transmission on more than one frequency is not permitted.
If a non-competing station is worked and is unable to send his full universal locator, his location may be logged instead. However, for a square to count as a multiplier (see rule 4), a full 6-character locator must have been received in at least one contact with a station in the square.
Contacts via repeaters or satellites or using any digital voice modes (including D-STAR, Fusion and DMR) and data modes or machine generated modes, such as FT4, FT8, JT65, PSK31 and RTTY, are not permitted. The use of the DXCluster, ON4KST chat or similar is limited to setting up contacts and not for requesting or passing reports, serial numbers or locators, which must only be exchanged on the 70MHz band.

3. Power: In the low-power section, the output power of the **transmitter** or **transverter** final stage must not exceed 10W PEP. If the equipment in use is capable of a higher power, the power shall be reduced and measured by satisfactory means. Stations cannot rely on feeder loss to meet the 10W power limit. In the open section, stations may use whatever power they are permitted to use by their licence conditions.

4. Scoring: Each contact will score one point. The total number of points gained during the contest will then be multiplied by the number of different locator squares in which contacts were made (a square here is the area defined by the first four characters of the universal locator).
Example: 52 stations worked in IO81, IO90, IO91, IO92 and JO01 squares; final score = 52 × 5 = 260.
Only one contact with a given station will count as a scoring contact, even if it has changed its location, e.g. gone /M or /P. If a duplicate contact is inadvertently made, it must still be recorded in the log and clearly marked as a duplicate (not necessary in computer logs submitted by e-mail).

5. The Log: Logs must contain the following information for each contact:
(i) time (**UTC – NOT BST**)
(ii) callsign of the station worked (**including any /P suffix**)
(iii) report sent
(iv) serial number sent
(v) report received
(vi) serial number received
(vii) locator received (or location).
The preferred form of a log is a computer file in REG1TEST, .log, adi or .edi formats sent by e-mail. This may be generated by contest logging software such as MINOS or EI5DI's SDV, provided it contains all the information listed above. Alternatively, a file in any other suitable format (such as the spreadsheet available on the contest website www.pwcontest.org.uk) or in plain text provided each of the items above is separated by a separating character such as a comma or tab are acceptable. Give the file a name including the station call sign (e.g. g6mxl-p.log), and send as a standard e-mail attachment to **entries@pwcontest.org.uk**
email entries will be acknowledged within eight days. If there is any problem with your entry, you will be contacted by email.
Log sheets and covering information sheets for paper-based entries are available for downloading from the contest website: **www.pwcontest.org.uk**

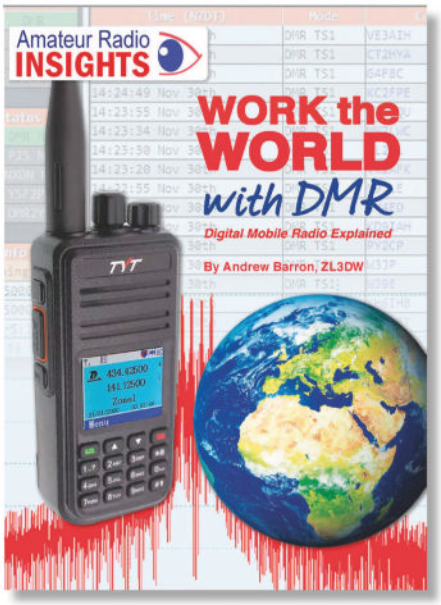
6. Entries: The covering information listed below must be provided with each entry. The preferred method of submitting this is by the use of the online facility on the website. Alternatively, the information may be written in the e-mail message to which the log file is attached. For entries sent by post, it should be written on a separate sheet of A4-sized paper.
The information required for every entry is:
(i) name of the entrant (or of a club etc. in a group entry as it is to appear in the results table and on the certificate
(ii) callsign used during the contest **including any /P suffix** (e.g. G6MXL/P)
(iii) name and address for correspondence
(iv) location of the station during the contest
(v) full 6-character locator as sent during the contest
(vi) whether single or multi-operator (a single-operator is an individual who received no assistance from any person in operating the station, which is either his/her permanent home station or a portable station established solely by him/her); if multi-operator, include a list of operators' names and callsigns
(vii) a full description of the equipment used, including transmitted PEP output power
(viii) if you are entering the low-power section and the transmitting equipment (including any transverter employed) is capable of more than 10W PEP output, a description of the methods used (a) to **reduce** and (b) **measure** the output power
(ix) antenna used and the approximate station height in metres above sea level (ASL)
(x) if you receive or send a report of poor-quality signals (e.g. wide/splattering), full details of the complaint, including time, callsign, nature of complaint and actions taken **during** the contest to investigate and resolve
(xi) the following declaration must be included in the e-mail text or written and signed by the entrant: "I confirm that the station was operated within the rules and spirit of the event and that the information provided is correct".
Failure to supply the required information may lead to loss of points or disqualification.

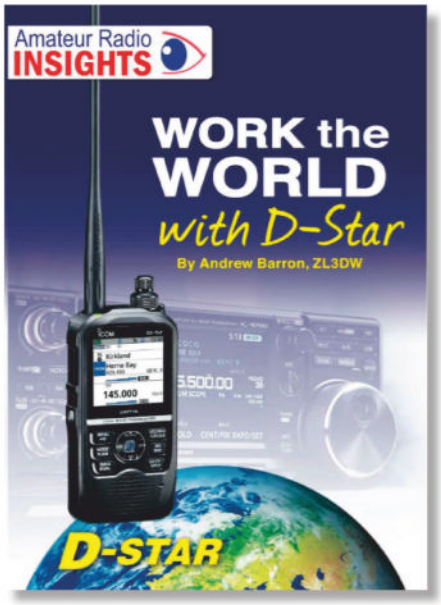
Entries & Other Information
Entries by e-mail must be sent to **entries@pwcontest.org.uk**
Paper entries should be sent to: Practical Wireless Contest, c/o Colin Redwood G6MXL, 53 Woodpecker Drive, Poole BH17 7SB.
Entries must be received not later than Tuesday 8 October 2024. Late entries will be disallowed.
Any other general comments about the station, the contest and conditions during it are welcome. Photographs relating to the operation may also be sent by email. They may be used for publication in *Practical Wireless* or on the contest website.
You will be asked, with your entry, to agree to the holding and processing of your log and to the publication of the results.

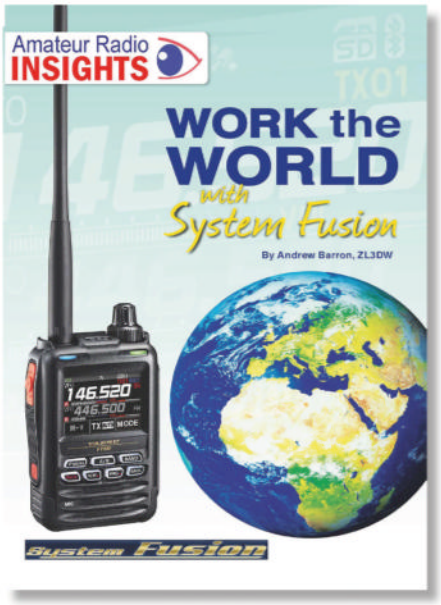
7. Miscellaneous: When operating portable, obtain permission from the owner of the land before using the site. In particular observe any restrictions on access. Always leave the site clean and tidy, removing all litter. Observe the Country Code.

8. Poor Signals: Make sure that your transmitting equipment is properly adjusted and is not radiating a broad or poor-quality signal, e.g. by over-driving, excessive speech compression or low voltage supply. On the other hand, be aware that your receiver may experience problems due to the numerous strong signals it will have to handle and that this may lead you to believe that another station is radiating a poor signal. Before reaching this conclusion, try heavy attenuation at the received input. The use of a high-gain RF pre-amplifier is likely to worsen strong-signal problems so if you do use one, it is best to be able to switch it off when necessary.
If after making the checks above, you are certain that another station participating in the *PW* 70MHz contest is radiating poor quality signals, please call the station, giving your callsign, and tell them about the problem. You cannot expect a station with a poor signal to do something about it if they are unaware!
If you receive or send a report of poor-quality signals (e.g. wide/splattering), you must record on the cover sheet full details of the complaint including time, callsigns of stations involved, nature of complaint and actions taken **during** the contest to investigate and resolve.

9. Adjudication: Points will be deducted for errors in the information sent or received as shown by the logs. Unmarked duplicate contacts in paper-based logs will carry a heavy points penalty. Failure to supply the complete information required in rule 6 may also lead to deduction of points. A breach of these rules may lead to disqualification. In the case of any dispute, the decision of the adjudicator will be final.







Don Field G3XTT
practicalwireless@warnersgroup.co.uk

Work the World!

Don reviews some of the excellent books available from the RSGB.

A while back the RSGB sent me some of their current publications for review and I have been remiss in sitting on them, but I did want to catch up with great book reviews we have been receiving from **David Harris**.

Anyway, to business. The first three books I am looking at are all by **Andrew Barron ZL3DW**. Andrew came to the attention of UK radio amateurs a few years ago when he started writing about various transceivers and his books became very popular – more readable and informative in many ways than the manuals provided by the manufacturers. Since then, Andrew has branched out into other areas of the hobby.

These three books have a common theme. They are all entitled *'Work the World'* and cover, respectively, D-STAR, DMR and System Fusion. DMR was the first, published in 2022, the other two were published last year.

Work the World with DMR

Let's begin, then, with *Work the World with DMR*. Andrew starts by explaining what DMR is and then goes on to look at the Brandmeister, DMR+ and TGIF networks. As Andrew explains early on, and most *PW* readers will be aware, the main problem (challenge!) with DMR is that it started life as a commercial system and has had to be adapted for amateur radio use, but can be somewhat complex to deal with, at least when setting up your nice shiny new or ex-commercial DMR set. Part of the challenge is understanding the various terms used in DMR such as codeplugs, talk groups and various worldwide DMR networks. So inevitably the first chapter focuses on explaining these various terms in order to understand what follows.

After discussing the various networks, Andrew then goes on to explain how to program your Radioddity or Anytone radio, these two being similar as are some other radios which are also based on the D878 template (don't ask!). He then goes on to programming TYT radios, which require a different approach. This is followed by a short section on using EditCP (written by **Dale Farnsworth**) for programming a whole range of DMR radios.

Once the software is loaded, you need to set up the radio, so this comes next. Then Andrew goes on to describe how to find network information, such as repeaters and hotspots, again for the various (Brandmeister, DMR+ and TGIF) networks. He finishes by describing how you can set up and use your own hotspot, either by purchasing one of the commercially available models such as the SharkRF OpenSpot or, and he devotes quite some space to this, building your own around a Raspberry Pi and the Pi-Star software.

The book finishes with a Troubleshooting section – no doubt useful if you've inadvertently misunderstood something in the setup process – and a list of useful internet sites and videos to visit if you need further help and advice.

"I would suggest this book is an invaluable companion to anyone contemplating jumping into DMR."

All in all, and while I'm no expert I have learned quite a lot about DMR in my time editing this magazine, I would suggest this book is an invaluable companion to anyone contemplating jumping into DMR, which, it has to be said, has become a very popular digital voice mode, offering truly global communication capabilities.

Work the World with DMR is available from the RSGB bookshop at £16.99 for non-members and £14.44 for members:
https://www.rsgbshop.org

Work the World with D-STAR

D-DTAR (Digital Smart Technology for Amateur Radio) is quite an old technology nowadays, having been developed in the late 1990s by the Japan Amateur Radio League (JARL) specifically for amateur radio use. Icom was an early adopter and is generally the company associated with D-STAR although it doesn't own the D-STAR format, which can be used by any manufacturer.

Andrew Barron starts this book, again, with a description of the mode and a comparison between the various digital voice offerings. His advice (indeed, in all these books) is that your choice of which digital voice mode to adopt will largely be dictated by what your amateur radio friends are using.

Given that there is one D-STAR network, unlike the three for DMR, Andrew gets straight into registering your radio and getting started on using it. He goes on to talk about reflectors, gateways and modules (yes, each system

has its own terminology!) and, again, using hotspots, either remote or your own. Because, as I said earlier, D-STAR is primarily supported by Icom, Andrew describes throughout the differences in using various D-STAR functions across the Icom radios that support the mode, from handhelds through to base stations such as the IC-705 and IC-9700.

A section discusses the apps that are available for both Android and Apple devices to control DR mode linking and unlinking of reflector or gateway calls. This also leads into the D-STAR picture mode, which allows you, for example, to take photos on your phone and share them over the D-STAR network.

There is quite a long section on configuration software, which simplifies programming your D-STAR radio compared with having to do so via the keypad.

Then a section of using GPS data, for example, for D-PRS, Icom's digital equivalent of APRS (automatic packet reporting system).

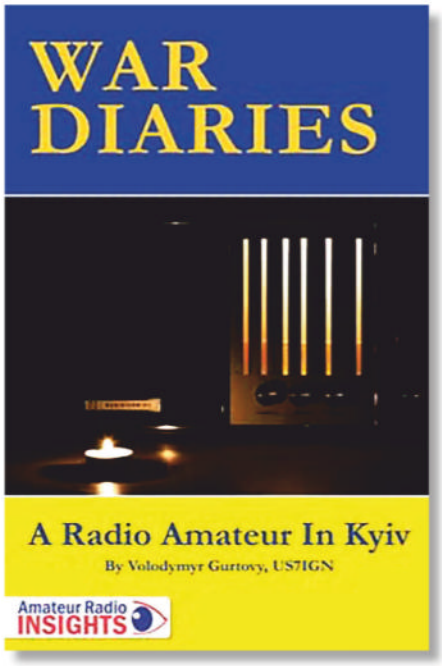
Again, there is a section on setting up your own hotspot, including one that is Pi-Star based. And again, he finishes with a section on troubleshooting and a list of internet resources, including helpful videos.

Work the World with D-STAR is available from the RSGB bookshop, again at £16.99 for non-members and £14.44 for members:

Work the World with System Fusion

System Fusion is the newest of the digital modes and proprietary to Yaesu. Andrew starts by talking about the various Yaesu radios that support System Fusion and also discusses the confusion, not helped by Yaesu themselves, over terminology – some radios are labelled as C4FM (the modulation method Yaesu uses) without mentioning Fusion at all. Some mention Wires-X, some don't, but Wires-X is the Yaesu owned and operated internet-based reflector system – Wide coverage Internet Repeater Enhancement System. He talks about Rooms and Reflectors (terminology again!), their use and the etiquette involved. The radios come ready to use (unlike the programming involved in DMR) but Andrew explains how to update the firmware as and when, and also goes into some detail about the technicalities of the C4FM modulation system.

He then talks about how to use YSF, FCS and YCS reflectors, all independent of Wires-X although interconnected with the Wires-X network. Then onto using Wires-X itself. Following this is an explanation of how to use the PDN (portable digital node) and HRI modes by connecting compatible radios via a USB cable to your computer. This leads on to a discussion of BlueDV and Peanut. BlueDV by PA7LIM works with all the digital voice modes to allow access without a radio (although it needs a DV dongle). Peanut is similar, also by PA7LIM, but works with an Android phone or a Windows PC.



The following section discusses available programming software, GPS locator services (similar functionality to D-STAR) and setting up a Fusion hotspot (again, talking at some length about using Pi-Star).

Then to finish, as in the other books, a troubleshooting section, and a list of useful internet resources.

And you won't be surprised to learn that the book is available from the RSGB at the same price as the other two.

My thanks to the RSGB for access to these publications for review. I already had a few of Andrew's books (including those covering my two main transceivers – the Icom IC-7300 and IC-7610) and have found them an invaluable resource. He writes well and has obviously worked through the subject matter extensively in his own shack, wrestling with the challenges of getting things to work! If you are into digital voice or contemplating doing so, I can certainly recommend these books as a readable introduction. The DMR book runs to 220 pages, the others rather shorter as the subject matter is somewhat more straightforward.

War Diaries, A Radio Amateur in Kyiv

This book is something quite out of the ordinary by way of an amateur radio publication. Written by **Volodymyr Gurtovy US7IGN**, it is a day-by-day diary of his experiences as a radio amateur living in Kyiv during the first six months following the Russian invasion. Having left the Crimea with his family after the earlier 2014 invasion of that part of the country and relocated in Kyiv, having had to abandon their house and most of their possessions, Volodymyr was once again faced with living in a war zone. He quickly found himself alone, his wife and family escaping to Poland, but although radio amateurs in the Ukraine were closed down the day before the Russian invasion (now restored to the air waves), he retained his equipment and was able to listen not just to amateur radio frequencies but to the whole panoply of radio, including not just the local emergency services but also, perhaps surprisingly, to Russian military aircraft, communicating in plain language as they came in on bombing raids and like the.

"The author's amateur radio contacts around the world are also a source of support and friendship, both to him and to his family exiled in Poland."

These *War Diaries* started out not so much as a book, but as a series of internet posts, mainly on qrz.com, to answer questions that were coming in from around the world, particularly from fellow radio amateurs concerned to know what was going on, and also concerned for his safety.

The book is very much a tale of the hardships faced by the author and the Ukrainian people in general. He finds himself without work but uses his skills in electronics to repair radios and amplifiers for friends. His amateur radio contacts around the world are also a source of support and friendship, both to him and to his family exiled in Poland.

Late in 2022 the BBC released a podcast featuring the author and **Thomas K4SWL**, talking about the war and the role of amateur radio. Sadly it's no longer available on the BBC website.

Although in diary form, I found the narrative compelling. This is a relatively short book (140 pages) and I read it at one sitting. I rather suspect when the author agreed to its publication, he was fully expecting the war to finish late in 2022. Of course, we now know that not to be the case and see from his qrz.com page that the author has now released a second volume entitled *War Diaries, Stalemate*, which I rather suspect is very much more downbeat in its expectations of a positive outcome. Time will tell.

War Diaries, A Radio Amateur in Kyiv is available from the RSGB for £9.99 or £8.49 to RSGB members. **PW**

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Classified Adverts

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REPAIRS TO RECEIVERS, TRANSMITTERS ETC.
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Your Letters

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

Home Construction

Dear Don,

Thanks for an excellent magazine and thanks also to **Steve G0FUW** for the construction articles based around G3RJV's SCD QRP Tranceiver.

I'm currently putting this project together and can't wait to get it all boxed and on the air!

I think *PW* has a good range of interesting articles for most amateurs, but I am particularly keen on constructional stuff and am very pleased to see quite a lot of this in recent issues.

Brilliant read, keep up the good work!

Guy Howard M0ISK
Kettering, Northamptonshire

*(**Editor's comment**: Thanks Guy, very good luck with making the QRP rig work. It can be hard for us to find decent constructional projects nowadays, so I am very grateful for Steve G0FUW putting this one together. He is experienced, uses readily available components, writes well and generally the project should be very buildable (if there is such a word!). Too often constructors, understandably, throw something together from their 'junk box' and although it might be a great addition to their shack, is not in any way repeatable. For those who are thinking of offering a construction project – keep notes, use components that can be sourced easily, take photographs as the project progresses and, ideally, have PCBs available or at least Gerber files so readers can source their own. As for the writing, we can help if your notes are good enough.)*

2m Activity

Dear Don,

We are on our last full day of a week long holiday in North Devon. As I knew my wife and I would include a visit to Dartmoor National Park, I also chucked my Yaesu VX-6 into the rucksack. After getting to the top of Haytor rock I thought I'd give 2m a go.

Not surprisingly the take-off for VHF/UHF radio here is fantastic. Strangely, I heard absolutely nothing on the FM calling frequency and apart from APRS pings on 144.800MHz, absolutely nothing else.

I tried a few CQ calls and had a very brief chat with one fellow radio amateur and that was it. I've left the rig in the car switched on for the whole journey from Shrewsbury to North Devon, and switched on whilst driving around here for the last week. The only traffic I heard was a very brief, and I thought, bad tempered QSO on the calling channel in the Bristol area.

Back home I'm halfway through the considerable expense of installing a mast, rotator and antennas for VHF/UHF. Now I am seriously wondering why I'm bothering.

The modern mobile phone service really does have a lot to answer for, I suspect. It's an absolute godsend in many ways but I fear it's killed VHF/UHF simplex and repeater use stone dead.

I have also tried multiple CQ calls whilst out in the car, all to no avail. I really don't know if there's a 'quick fix' to this appalling lack of use. I appreciate the efforts made to keep interest going like the RSGB 2m contest each month and the efforts of 145 Alive.

Perhaps the RSGB can look at making this a major and vitally important issue before OFCOM succumb to commercial pressures and auction off our 2m allocation?

Richard White G6NFE
Shrewsbury

*(**Editor's comment**: Thanks Richard. Yes, the days of wall-to-wall 2m activity are, sadly, long gone. Any remaining day-to-day activity seems to be on FT8 (using just a single channel). As you say, 145 Alive is doing good work, but that's only occasional and, yes, the RSGB monthly 2m event attracts lots of interest so there are certainly folk out there with decent 2m setups. It's a pity there isn't more happening on the band – there seem to be lots of handhelds sold, so why aren't they being used?)*

CQ mag & bamboo cane antennas

Dear Don,

I guess like me, many other people (I stopped subscribing to *CQ* mag three or four years ago) may not have been overly surprised to learn that this once iconic US ham radio magazine could be ceasing publication.

Until I pulled the plug on *CQ* mag, I'd been reading it for about 40 years or so (I still have some ancient issues knocking about). I subscribed to it for about 15 years. Of course, *CQ* mag, was/is predominantly a radio sport (contesting) based magazine, catering for those who eat, sleep and drink radio sport activities. So, it was liberally sprinkled with who worked whom statistics. But because radio sport has never been one of my favourite go-to pastimes, for me, subscribing to a magazine that contains several pages filled with who worked whom info every month is definitely not my cup of tea. I'd rather sit in a tub filled with ice-cold water for a whole day, than wade through that. However, putting that criticism to one side, *CQ* mag did publish many other things that fulfilled my exacting expectations.

Sadly, in my opinion, during recent times the content in *CQ* began to lack a buzz. Far too much emphasis was placed on pleasing those with their ongoing aspirations of HF operating celebrity status. *QST* began a similar trajectory too. (Mentioning *QST*, I got the impression that this ham mag was on a mission to outdo everyone else within the ham radio publication arena with its sometimes outrageously written technical articles on this or that subject. I no longer wanted to subscribe to *QST* nor, to its ARRL narrative). I felt that it had gotten far too big for its boots. There were other editorial decisions I disliked as well. Consequently, I decided to dump that mag too.

So, as mentioned, it was no surprise to find out that *CQ* mag might be ceasing publication. I say might, as finance is apparently being sought to rescue it from oblivion? Hopefully, a saviour will be found. As **Don** points out, no wonder that the RSGB is being inundated with US ham subscriptions. What is more worrying, is why a country with such a large ham radio community as the US cannot, it seems, support another ham radio publication other than QST? So how lucky we are here in the UK to still have two. One available on a newsagent's shelf and one not, *Practical Wireless* and *RadCom*.

Oh, as I'm an unapologetic fan of using cheap bamboo poles for antennas, G4USI's Moxon beam was a mild revelation. Why I'd never thought about putting together a Moxon beam using bamboo poles is a mystery? When I get time, I'll sling one together. In passing, I knocked up a beam antenna for 10m a few weeks ago - yep, using bamboo poles. First contact was a bloke in Elora, Canada. The second, a lucky chap sat out on his sun laden veranda in Kissimmee, Florida. A third, a wintery outpost somewhere in the 49th state of America, Alaska.

Ray Howes G4OWY/G6AUW
Weymouth

*(**Editor's comment**: I guess the problem, Ray, is that most new amateurs are happy to source information from the internet. But in my view, there's still nothing like having a magazine offering a wide range of information and ideas, covering topics that the reader may never have thought of looking up, which can be both inspiring and entertaining. I suspect also, in CQ's case, that they spent far too long in expensive premises in New York and, reputedly, their admin often left something to desired.)*

Rallies & Events

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

18 August

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

RUGBY AMATEUR TRANSMITTING SOCIETY ANNUAL RADIO RALLY: Princethorpe College, Princethorpe, Rugby, CV23 9PY. Admission £4 Per Person. Pitches: pre-booked £15, on the day £20. NGR: SP395710, Lat/Long: 52.336N 01.421W, Open 10AM-4PM, 8:00 for sellers
Steve. G8LYB 9: 07956 855816
Email: rally@rugbyats.co.uk
www.rugbyats.co.uk

25 August

TORBAY ANNUAL COMMUNICATIONS FAIR: Newton Abbot Racecourse, TQ12 3AF. Doors open at 10am. Indoor event with free parking, bring and buy, RSGB book stall and catering on site.
Pete G4VTO: 018033864528
Mike G1TUU: 01803557941
Email: rally@tars.org.uk

1 September

TELFORD HAMFEST: Harper Adams University near Telford TF10 8NB. Doors open 10:15 am. Admission £5 (Children up to age 16 free). Easy travel access, unlimited free parking and catering on site and we have a new larger sports hall for the 2024 Hamfest – more room, more tables, more space between the tables and more tables outside. RSGB Bookstall, bring and buy and G-QRP Convention.
John, M0JZH: hamfest@tdars.org.uk
https://tdars.org.uk/telford-hamfest

8 September

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

21/22 September

EAST MIDLANDS HAM & ELECTRONICS RALLY: Beckingham Village Hall, Southfield Lane, Doncaster DN10 4FX. Although the venue has a Doncaster postcode, please note that it is in fact very close to Gainsborough and well connnected to road networks. We invite traders, special interest group exhibitors and visitors with an interest in any aspect of radio - whether amateur, CB, PMR, Meshtastic or in computers and electronics to attend and make this a fantastic weekend! As this will be a 2-day event, we are offering overnight camping on Friday (20th September) and Saturday (21st September), and a Saturday evening barbecue. Refreshments are available on both days. Strictly no dogs (except assistance dogs) allowed at this venue. Doors open for visitors: Saturday 9.30 am until 4 pm, disabled 9.15am; Sunday 9.30 am until 12 pm (noon) disabled 9.15am. Admission: £3 per person per day Doors open for traders: 7 am, floor and walkways to be clear by 9am; inside tables £10 per day per table; outside pitches £8 per day (boot sale, tables NOT supplied) Overnight camping is available Friday 2pm till Sunday 2pm, £10 per night, toilets and showers provided. There is an onsite bar which will be open for these times only: Friday 6pm -10pm (for overnight campers only), Saturday 2pm – 4pm (all visitors) and 6 pm -10 pm (for overnight campers only).
John or Chris: 07767 146574 / 07579 775717
http://www.g0raf.co.uk/rally

22 September

9TH RADIO & ELECTRONICS RALLY: The Campus Community Centre, Worle, Weston super Mare BS24 7DX. Organised by Weston-Super-Mare Radio Society. Admission: £3. Opening times: 10 am - 12.30 pm.
westonradiosociety@gmail.com

27/28 September

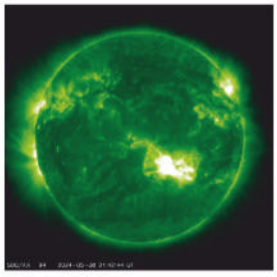
THE NATIONAL HAMFEST: Newark Showground. NG24 2NY. Main gate opens at 0930 for admission to the flea market and 1000 for the main hall. See also this month's News pages.
www.nationalhamfest.org.uk

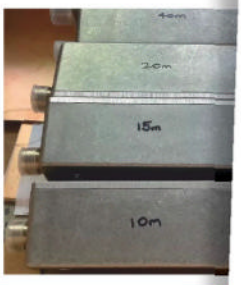
6 October

49TH WELSH RADIO RALLY: Llanwern High School. Hartridge Farm Rd, Newport NP18 2YE. Easy access from the M4 J24. Then follow the A48 to Newport. At 1st roundabout straight on, 2nd roundabout first off. Up a winding hill and take the first left to Llanwern High School.
https://www.gw6gw.co.uk

Next Month

in the UK's best & only independent amateur radio magazine...





RADIO AND MAPS – MAPPING RADIO: Georg Wiessala looks at the overlaps between mapping and radio.
IN THE EYE OF THE 'GANNON STORM': The magnetic storm that sent northern lights all the way down to North Africa from 10 May 2024. It also affected HF communications. Nils Schiffhauer DK8OK investigates.
ANOTHER TUTORIAL: Chris Murphy M0HLS brings back Jeff and Natalie to discuss electromagnetism.
REVIEWED, THE KSGER T12 SOLDERING IRON: Michael Jones GW7BBY/GB2MOP Takes a look at an example of a modern soldering iron.
BANDPASS FILTERS: Tony Jones G7ETW returns with a look at bandpass filters.
AMATEUR RADIO AND THE DISABLED: Geoff Theasby G8BMI discusses the sorts of aids that are available to enable radio amateurs to continue enjoying the hobby as they face the rigours of disability and old age.

There are your other regular columns too, including HF Highlights, World of VHF, Data Modes, Antennas, Reviews, What Next, The Morse Mode and Amateur Radio on a Budget plus your Letters and the latest News.

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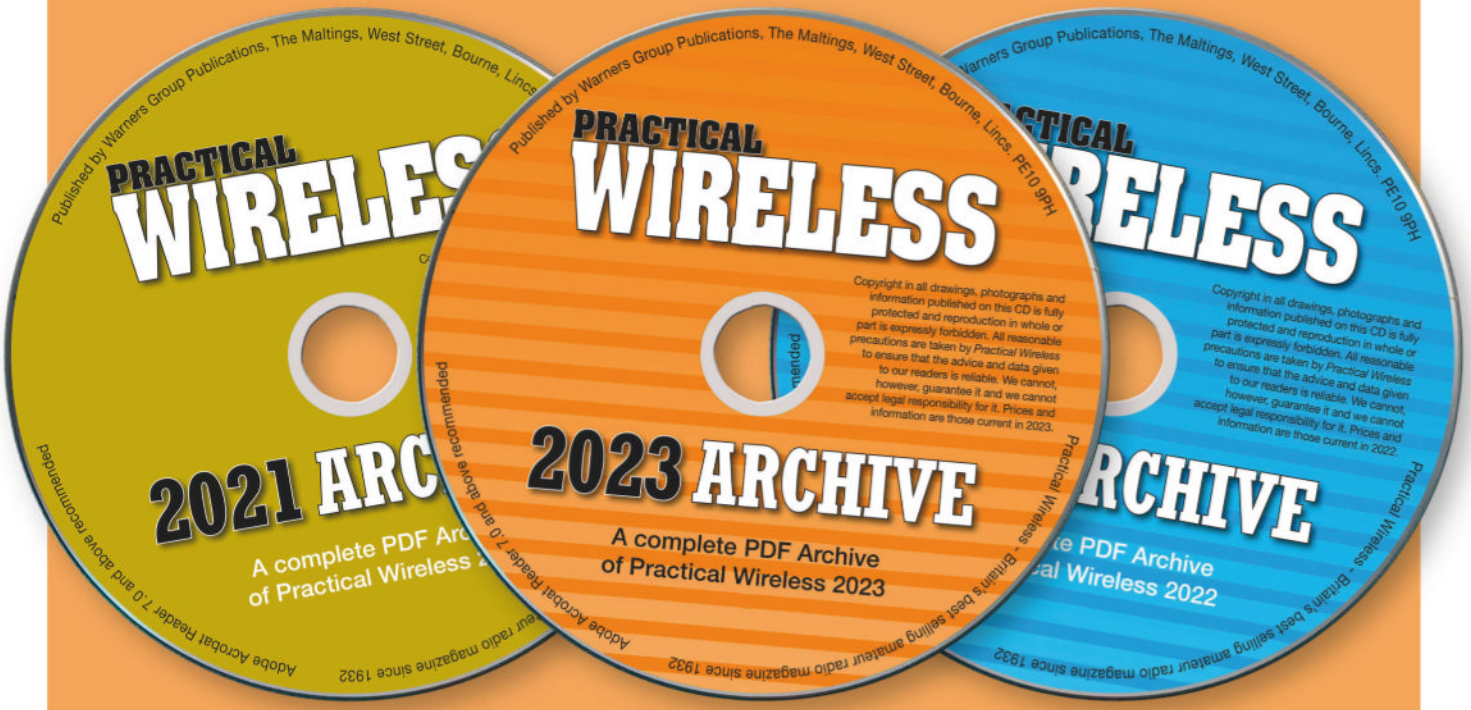

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* Photo shows the FT-710 AESS

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