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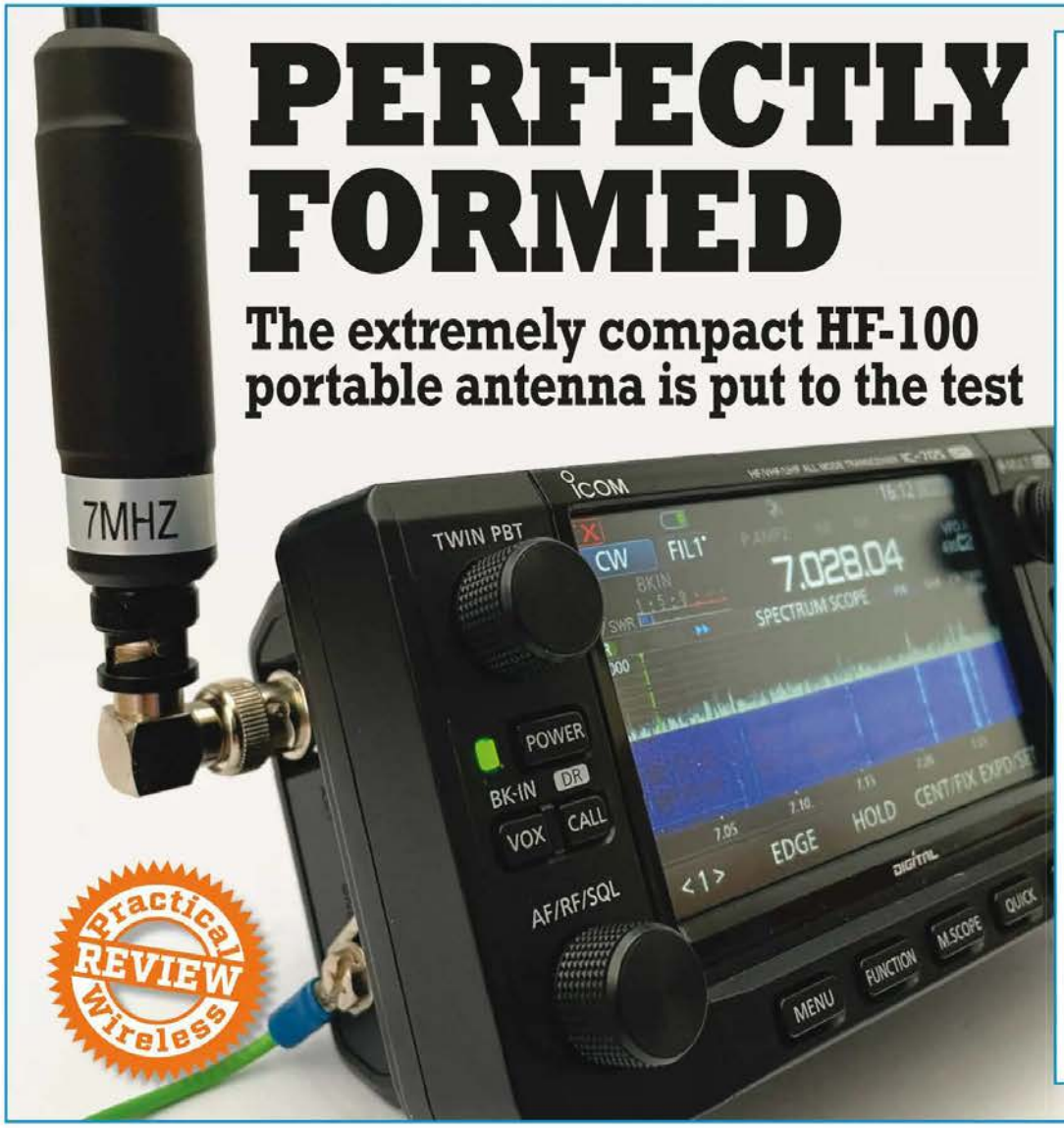

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73, Peter G3OJV

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PRACTICAL WIRELESS
Incorporating RadioUser

May 2024 Vol. 100 No. 5
On sale: 11th April 2024
Next issue on sale: 9th May 2024

ISSN 0141-0857

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

Keylines

For me it's been a quiet month as far as radio is concerned. Apart from taking part in the RSGB 80m Club Championship (CW leg) and a handful of QSOs on 80m FT8, I haven't been on the air at all. But we all go through ups and downs in our activity, of course. And when we are not actually on the air, we can attend club meetings (see my note below regarding club activities), do some constructional work (we have some great projects again this month), improve our antenna systems, get out and about for some portable operations and so on. Amateur radio really is a hobby that has something for everyone, a message that we really need to get out to a younger generation although I realise how difficult that can be.

Noise levels

When we first moved to South Oxfordshire, in late 1984, local noise levels were very low. I remember being surprised at what I could hear on the 160m band, despite not having a dedicated receive antenna. Sadly, over the course of the next 30+ years, noise levels crept up gradually, so that by the time we eventually moved away, some four and a half years ago, they were considerably higher. That said, some of the noises I had had to contend with had come and gone – plasma TVs were largely a thing of the past and a serious noise that I had faced for a couple of winters finally disappeared completely. Almost certainly a dodgy central heating thermostat that was eventually replaced. VDSL was a problem on some amateur bands – whether that's still the case now that fibre broadband is becoming more widespread I don't know.

But as our antenna columnist **Keith G4MIU** says this month, the problem can be that there are so many neighbours with noisy equipment, it becomes impossible to chase down every source. The good news, as Keith explains, is that it is often possible to null out the worst sources of interference by using a noise cancelling device. I feel sure that the design offered by Keith this month will prove popular with many readers.

As for me, I have been lucky with my new location. Despite electricity and phone coming in on overhead lines, I have very low noise levels and the same is true at my son's place, ten minutes away, where I have a second station. That said, we did have a QRM problem at my son's location when I first set up there, but that, fortunately, went away after a while – we think it was a badly installed electrical spur to an outbuilding at a neighbouring farm that was eventually replaced. Electric fences are also an occasional problem too although my son's own electric fence (one of his fields is used by a local farmer from time to time for sheep) has never generated any noise at all.

What has your club been doing?

Although we don't have space to list every forthcoming club meeting, I'm always pleased to hear about significant events that are planned or receive reports about them after the event. I'm pleased this month to have a few such items for our *News* pages but let's hear from some of the clubs that don't usually contribute – you never know, you might get some new members as a result. That said, I was sorry to receive the *News* item this month about the demise of the Bristol RSGB Group, a group with a long and illustrious history. As you will read, with no one volunteering to take over the reins, they had little option but to call it a day. A shame but almost certainly the right decision in the circumstances – nothing is for ever. The good news is that new clubs do start from time to time, often with a younger generation of amateurs who have new ideas and interests – if you are one of those do, as I said above, let us know who you are and what you have planned.

Rally photos wanted

While some rallies have failed to get going again post-Covid, there are still plenty of successful rallies being run around the country as demonstrated in our monthly Rallies listing. We'd love to have some photos of these events to make our monthly listing more interesting. Do send us some.

Don Field G3XTT
Editor, *Practical Wireless* Magazine

Contents

18

3 Keylines
Don discusses noise levels along with club activities.

6 News
PW's monthly roundup of news from the UK and internationally, including new products, club news and recent events.

9 Book Review
David Harris reviews a book about the Marconi beam stations, as point-to-point radio moved to short waves.

10 Buying Second-hand
Gary Clark G0BKR gets his hands on a Kenwood R-820, a rare but excellent receiver.

14 Power Supplies, Part 3
Dr Samuel Ritchie EI9FZB wraps up his three-part series looking at reusing various types of fixed power supply.

18 HF-100 Antenna kit
Richard Constantine G3UGF investigates another compact antenna, but this time a little different.

20 The G3RJV SCD QRP Transceiver Revisited, Part II
Steve Hartley G0FUW continues with the project by describing the VFO build.

24 The Faces behind the Calls
Roger Dowling G3NKH meets G4BIP, G0SOI and M7DHR

28 Data Modes
Mike Richards G4WNC covers a brand-new release of VarAC, a few tricks to help run popular software on a Pi 5, and a useful bench clock oscillator from SV1AFN.

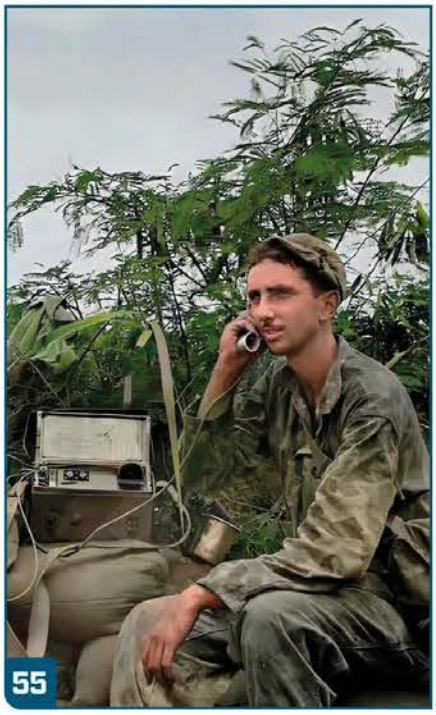
52

34 A beginner's guide to the Arduino IDE culminating in a single-band WSPR beacon, Part 1
Colin Campbell MM5AGM takes readers through the design and build of an Arduino-based WSPR beacon.

38 HF Highlights
Steve Telenius-Lowe PJ4DX/G4JVG starts with news of two Silent Keys, both of whom will be sadly missed.

41 Antennas
Keith Rawlings G4MIU runs through some problems he has regarding local QRM and describes the construction of a cheap eBay QRM eliminator kit.

44 Junk to Joy
Billy McFarland GM6DX describes how to construct a simple ARDF antenna.


55

46 Radio in the British Isles in December
Chris Burger ZS6EZ says *"DXFC ruined my life!"*

50 Vintage Television & Radio
Keith Hamer and **Garry Smith** continue the special series looking back at the BBC's coverage of Coronations since 1937. Also featured this month: a vintage 1953 Coronation television advertisement; more unique details about **Roland Pièce**; the early years of BBC-2; and a continuation of the series about the development of Swiss Radio and Television since 1922. The authors also say farewell to BBC Long-Wave!

52 The World of VHF
Tim Kirby GW4VXE considers how recent licence changes benefit VHF operators.

55 Portable military radio communications of WWII
In the last of the series on collecting Second World War portable military communication equipment, **Graham Caldwell** looks at those used by Imperial Japan and the Soviet Union.

61 Readers' Letters
This month's *Letters* cover radio equipment of WW2, observing the universe, Ali Express and dealing with SMDs.

62 Rallies
Locate a rally or event near you; we have our usual comprehensive list.

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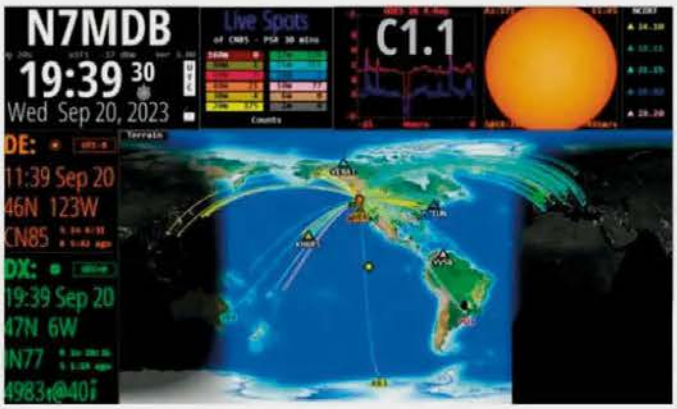


Moonraker News

The Quadra PC bundle featuring the fantastic HamClock gives you everything you need to run HamClock (3.04 currently, but will always auto-update to the latest) on a 1080p or higher resolution TV or monitor. Includes the Quadra PC, a mini wireless keyboarad/trackpad, HDMI cable, ham-friendly USB power adapter, custom stand, our quiet fan with a short cable, and a USB hub for a neat, small-footprint and cooler-running installation.

On first boot, the inovato Quadra PC will ask if you want to start up HamClock on boot, and if you'd like it to run full screen (no black borders on the sides). It will do all the configuration for you so no need to create or edit startup files, change resolutions, etc.

Our HamClock Setup automatically enables HamClock's 'Live Spots' feature so you can see where bands are currently active at your location. All you have to do is enter your callsign and location on first run and everything else will just work. And once set up you can view your HamClock in a browser on any PC , tablet, phone or smart TV in your local network.

All our standard Ham software is also installed, so simply pressing ALT-F11 will take HamClock out of full screen mode so you can run other apps such as WSJT-X, flDigi, JS8Call, or Pat Winlink. And our Ham apps installer is always ready to install more or update already installed apps.

£69.95 from Moonraker:
https://tinyurl.com/559euyjj

YASME EXCELLENCE AWARD: Established in 2008 by the Yasme Foundation (www.yasme.org), the Excellence Award is presented to individuals and groups who, through their own service, creativity, effort and dedication have made a significant contribution to amateur radio.

The contribution may be in recognition of technical, operating or organisational achievement, as all three are necessary for amateur radio to grow and prosper. The Yasme Excellence Award is in the form of a cash grant and an individually-engraved crystal globe. The latest recipients, announced on 8 March, are:

• Philip Gladstone N1DQ: The Gladstone Signal Spotting Challenge is named for Philip, the creator and maintainer of the PSKReporter.info website, also known as the Digimode Automatic Propagation Reporter. Philip has made a tremendous contribution to Amateur Radio operating, citizen-science, and ionospheric research through the data ('spots'), which are collected and stored on **PSKReporter.info**.

* Paul Schreier HB9DST (AA1MI): Mr. Schreier serves as a Board member of the Helvetia Telegraphy Club and is very active in the Summits On The Air program. Paul is always available when it comes to organising events (e.g. World High Speed Telegraphy Championships in 2012 in Switzerland) or to introduce newcomers in the wonderful world of CW and SOTA.

YASME FOUNDATION GRANTS: The Board of Directors of the Yasme Foundation has announced that it has made grants of $5,000 each to the Foundation for Amateur Radio (FAR) and the ARRL Foundation scholarship programs; YOTA/Ham Radio 2.0 and HamSCI group activities at Dayton Hamvention; Contest University (CTU) Dayton; Merzuke Gediktas TA7YLY for the Czech Republic YL Event.

MALTBY & DISTRICT AMATEUR RADIO SOCIETY WEDNESDAY MORNING MEET-UPS: Back in February Maltby and District Amateur Radio Society started a series of Morning Meet Ups at a local Country Park. These are open to anyone interested in radio, not just Radio Society members.

They have proved so popular that we have included them as a regular weekly activity. We chose Thrybergh Country Park near Rotherham, South Yorkshire as it was close to our home, and it has a cafe, which is an added attraction to our members. People meet up to have a chat both on and off Air, it has been great for some of our older members.

We have also taken part in other activities such as Parks on the Air as this is a POTA Site.

In addition, we enjoyed a walk around the reservoir in the Country Park, which is 2.7km and has some wonderful views. The Country Park is also a great spot for fishing and birdwatching and is home to foxes, rabbits, butterflies and insects. Not forgetting it's a great spot for radio, we have been able to make many radio contacts on the 2m band from this location.

For further information contact: **Paul Archer** Tel. 01909 774106 / 07890 626684
pjaway63@gmail.com

INTERNATIONAL MARCONI DAY 2024: This year, International Marconi Day (IMD) is on 27 April. Italian inventor and electrical engineer Guglielmo Giovanni Maria Marconi was born on 25 April 1874, and is credited with inventing the radiotelegraph system, creating Marconi's law, and sending the first wireless transmission over the open sea.

IMD was created to honour Marconi and is hosted annually by the Cornish Radio Amateur Club, GX4CRC. The purpose of the day is for amateur radio enthusiasts around the world to contact historic Marconi sites using communication techniques similar to those that he would have used.

The 24-hour event will operate from 0000 to 2359UTC, and registration is required. Participants can register at GX4CRC's registration web page:

https://gx4crc.com/imd/imd-registration

Stations in the United States, including Marconi Cape Cod Radio Club, KM1CC, in Massachusetts, are already registering for the event. KM1CC hosts several on-air events each year to keep the accomplishments and story of Marconi and his wireless station site in South Wellfleet alive. In 1975, the Wellfleet station was listed as a National Historic Landmark on the National Register of Historic Places and is now part of Cape Cod National Seashore, a unit of the National Park Service. When possible, KM1CC sets up a temporary radio station inside the park.

Cornish Radio Amateur Club:

http://gx4crc.com

KM1CC (Facebook):

www.facebook.com/KM1CC

GB0MMH - MEN'S MENTAL HEALTH SPECIAL EVENTS: The Humber Fortress DX Amateur Radio Club (www.hfdxarc.com) are once again supporting the International Men's Mental Health month and as such helping to raise the profile of Men's Mental Health 2024 throughout the international amateur radio community.

We will be operating from our club headquarters at Patrington Haven East Yorkshire throughout the weekends of 17 - 19 May and 14 - 16 June, using the Special Call of GB0MMH across all the HF bands.

For further information please visit: the website or see our YouTube channel where we are also going to live stream the event:

www.qrz.com/db/GB0MMH

www.youtube.com/watch?v=MP5QW8v7h24

GERMANY'S N-CLASS LICENCE HOLDERS TO GET 'DN9' CALLSIGNS: The German regulator has announced that the callsign designation for the new, entry-level 'N' class licence that takes effect on 21 June will be DN9, which adds a numeral to the previously announced 'DN' prefix.

This is expected to have a capacity of more than 18,000 callsign assignments available.

The first examinations the 'N' class licence will take place on the weekend of 28 June at Ham Radio Friedrichshafen. The licence conforms to CEPT specifications for an entry-level licence.

ESSEX INTERNATIONAL JAMBOREE : From 27 July to 3 August 2024 the Essex International Jamboree will be welcoming around 10,000 Scouts and Guides, including 2,000 supporting volunteers, from around the world, to Boyton Cross near Chelmsford.

As part of the programme there will be an amateur radio station GB24EIJ running a wide range of communications and electronics activities for the young people.

The organising team intends the station to be active on HF, VHF, UHF (including EME) and Echolink, in various modes.

SCOTTISH CASTLES ON THE AIR: Ayr Amateur Radio Group (AARG) will be activating Dundonald Castle on Sunday 26 May 9am-5pm to celebrate the Stewart Dynasty and to restart Scottish Castles on the Air. Post code KA29HD. Callsign GB5DC.
All welcome, contact GM4VKI or AARG Club Secretary
rkavampsev@aol.com
derek.secaarg@gmail.com

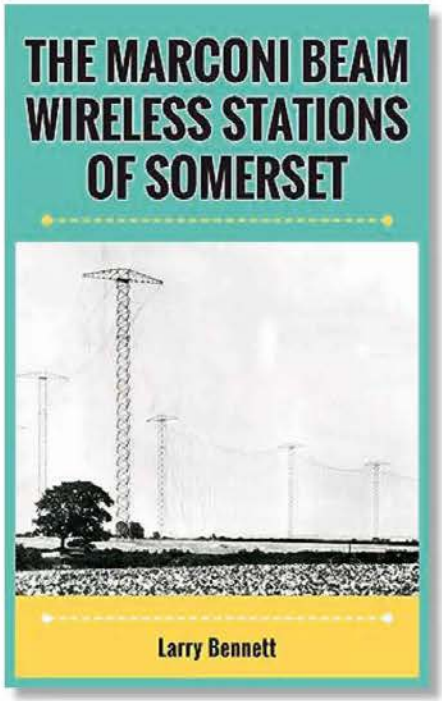
UPDATED BEACON LIST: The RSGB's Propagation Studies Committee has released a new HF beacon list, with the 10m listings completely revamped. The old list, which was started by Martin Harrison G3USF (SK), had been added to over the years but was getting out of date, and the only way to make it more accurate was to start again.
The PSC made use of the Reverse Beacon Network, which wasn't available when the list was originally created, plus listeners' contributions from around the world. The new beacon list can be found at:
rsgb.org/beacons

CLOSURE OF THE BRISTOL RSGB GROUP:
Over a hundred years of amateur radio meetings have come to an end with the closure of the Bristol RSGB Group G6YB on 29 February. The story is probably a familiar one, with an ageing group unable to attract younger members to whom to 'pass the baton'. When the existing secretary of the group stepped down, no replacement could be found, despite several months of trying. The other existing committee members had also been in post for a long time. Rather than fizzling out, the group has decided to formally close, with a sense of pride and thankfulness for the past.
Bristol RSGB Group traces its origins back to 1913 when it was called 'The Bristol Wireless Society'. Gilbert Tonkin, a Bristol resident, was granted a licence as TBX in 1910 – he had already built a receiver using a Branly Coherer and transmitting apparatus, which produced a quarter-inch spark; his first contact being across his kitchen table. Tonkin later became G5RQ after WW1. The spark transmitter is still held within the group's archives (see photo).
Bristol first entered CW NFD in 1933 and came equal first using the call G6RB/P. Another call from that era was G6YA and in later years a combination of the calls was used to form the current Bristol Contest Group's callsign, G6YB. As G2IK/P – another old Bristol call – the group won CW Field day for three years running in 1952, 1953 and 1954. To commemorate the triple-win the Bristol Trophy, a replica of the Bristol Suspension Bridge, was donated to the RSGB and is still awarded for CW Field Day today. It was to be 1999 before the Bristol Group (as G6YB/P) won it back again!
Between the years 1998-2017 the G6YB group won RSGB SSB Field Day on 14 occasions and between 2008-2014, the Islands on the Air contest five times (as GJ6YB) – a record probably difficult to beat!
The Longleat mobile rally was run by the Bristol group for 45 years and became one of the biggest rallies in the country attracting many thousands of visitors.
The longest serving member of the Group is Roy Emery G3FYX, who was made a life-member some time ago in recognition of his service. Roy is now in his nineties and the group was delighted that he was able to attend the final meeting, assisted by his son Jim. (Roy appears front/centre of the other photo). Roy has a long record of experimental work on the amateur microwave bands and as a keen CW operator.
The archives of the Group's website are being curated by the Shirehampton Amateur Radio Club (and is accessible at https://**g6yb.com**) as these constitute an important record of amateur radio activity in the South West of England.
The final meeting decided to distribute its residual assets to registered charities, with the principal beneficiary being the Radio Communications Foundation (RCF), which was set up by, but is independent of, the RSGB. Details of the RCF can be found at:
https://commsfoundation.org

Marconi Beam Stations

David Harris reviews a book about the Marconi beam stations, as point-to-point radio moved to short waves.

David Harris
mydogisfinn@gmail.com



The Marconi Beam Wireless Stations of Somerset by Larry Bennett.
New Generation Publishing. 2023.
418 pp. Pbk. £15.99 ISBN 9781803697857
www.newgeneration-publishing.com

Larry Bennett G4HLN spent his whole working life in radio communications at Portishead Radio and later with the UK Hydrographic Office where he was editor of the *Admiralty List of Radio Signals*. He has already written two books on the history of maritime communications: *Portishead Radio* (2020) reviewed in *Radio User* Aug. 2020 and *All Ships, All Ships* (2021) reviewed in *RadioUser* Dec 2021. *Marconi Beam Wireless Stations* will also appeal to those who enjoyed reading: *Point to Point: A History of International Telecommunications During the Radio Years* by **Paul Hawkins** (2017) reviewed in *RadioUser* June 2018 and *Marconi's Wireless Telegraph Stations In Essex* by **Paul Hawkins** and **Paul Reyland** (2022) reviewed in *RadioUser* in Nov 2022.

The focus of the book is on the beam stations located at Huntworth, near Bridgwater (1926 - 1940); Somerton, between Yeovil and Glastonbury (1927 - 2000), and Chedzoy, near Bridgwater (1923 - 1927). Larry also includes shorter chapters on Bodmin transmitting station (1926 - 2002) and Dorchester transmitting station (1927 - 1979). Dorchester is covered in great depth in Paul Hawkin's book, *Point to Point*.

Larry makes the point that it was experimental work by radio amateurs that pioneered the use of high frequency shortwave bands in long distance communications (see *Gerald Eugen Marcuse G2NM Pioneer of Radio* by **David Fry** (2023) reviewed in *PW* Oct 2023. The new beam wireless stations that were constructed in the 1920s used massive highly directional aerial systems to facilitate high speed telegraphy and telephony links between the UK, Canada and South Africa. These stations were part of a network of Imperial wireless stations designed to link the UK with the countries of the British Empire.

The beam aerials were designed by Marconi engineer **Charles Franklin** (1879 - 1964). The aerials had a 30° beam and were massive structures. The masts were 287ft high with cross arms of 90ft. One of the advantages of shortwave was that it needed transmitters of around 20kW as opposed to the 700kW transmitters that were used for long distance Longwave communication. In 1926 it cost £15 per minute to make a telephone call from London to New York. That would be the equivalent of over £1000 today. The price of calls began to fall as the stations came into use. The cost of building a station was in the region of £100,000 (£7.5 million today). Larry makes extensive use of Parish Council minutes and local newspaper reports in painting a picture of how these structures were built in rural areas such as Bridgwater. One presumes that there was little in the way of formal planning processes in those days. One simply acquired the land, notified the local authority and got on with the work. The book is well illustrated with many rare photos of equipment, masts, buildings and some of the people involved in running the stations.

Larry devotes a chapter to the short lived (1923 -1927) experimental radiotelephone station at Chedzoy near Bridgwater. The work here was carried out in great secrecy and on 8 February 1925, the daughter of the farmer who owned the site was able to make the first ever transatlantic telephone call. The station used a seven-mile-long aerial suspended from telegraph poles. Chedzoy carried out tests at all times of the day and night throughout the year to ascertain the best times and frequencies to use for trans-Atlantic HF communication.

Chedzoy did the pioneering work that led to the construction of the Bridgwater station, which was built at Copse Farm, Huntworth, near North Petherton. This was a receiving station linked to Bodmin, which was the main transmitting station. The author reproduces a long article from *Wireless World* November 1926, which gives a very detailed account of the buildings, generators, battery rooms, aerials and receivers. The station was designed to receive signals from Canada that were transmitted on 26m (11,530kHz). The aerial was aligned at right angles to the transmitting station in Canada.

In 1929 the beam stations were leased by the Post Office to Imperial and International Communications for £250,000 p.a. ((about £20 million today) and in 1938 ownership was transferred to Cable and Wireless. In 1938 the Huntworth station was mothballed and its buildings used for storage by a local farm. In the 1980s there were plans to build a hotel and marina at the site, which is close to the Bridgwater and Taunton Canal. Today the site is occupied by a double glazing firm and there are holiday cottages nearby.

The author also provides a useful chapter on the Bodmin transmitting station, which had a similar configuration to Huntworth. It opened in October 1926 and was used by the military during the Second World War. After the war it became used for Royal Naval communications until it finally closed in 2002. The site is now a plant hire depot whose address is The Old Radio Station, Lanivet, Bodmin.

The other Somerset station was at Somerton. This station opened in 1927 and was operating point-to-point services until 1990. It finally closed in 2000 when BT ended their HF Maritime services. The author writes about how Somerton pioneered high speed facsimile services between the UK and the USA from 1928. These services were mainly used by newspapers to send photographs across the Atlantic. The book concludes with a brief chapter on the Dorchester transmitting station, which opened in 1927 and finally closed in 1979.

Larry is to be congratulated on his research into the history of Somerset Beam Wireless Stations. The book will be of interest to any radio enthusiast who wants to learn more about the early days of HF radio and how point-to-point telephony and data communications were carried out in the pre-satellite era. **PW**

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1

The Kenwood R-820

Gary Clark G0BKR gets his hands on this rare but excellent receiver.

Kenwood first started building communications products in 1955 and entered the amateur radio market in 1958. Products were sold under both the 'Kenwood' and 'Trio' brand names. Their hybrid HF transceivers were popular from the mid-1970s to the 1980s and many are still in use today. Kenwood (Trio) also sold standalone receivers designed for the amateur radio and short-wave listener markets such as the early valve 9R-59RS, JR500 models and the later solid-state receivers such as the R600, R1000 and R5000. Many of these sets still command reasonable prices on the second-hand market. One Kenwood receiver that is less well known and about which there is limited information to be found on the internet, is the R-820, **Fig. 1**. It may be less well known because it was not in production for very long but it's still a very good receiver.

First advertised in the UK market by Lowe Electronics in 1979, the advert on the front page of *Short Wave Magazine* in March that year, **Fig. 2**, describes the R-820 as *"The Ultimate Receiver for the fortunate few"*. I have also read a number of online reviews, which describe it as *"possibly the finest receiver ever built for amateur use"*. Both of these descriptions make it sound really quite impressive but one thing that certainly was exceptional was its price. The R-820 was first listed in 1979 at £841, that's about £4000 in today's money allowing for inflation, and makes it more expensive than the full TS-820 transceiver, which Kenwood sold at the same time for £759. The R-820 receiver was more expensive than virtually all amateur radio transceivers on sale at that time but it was only on the market for about 18 months. So, for some years I have wondered what was so special about this receiver? Why was it in production for such a short period of time and what was its intended market?

I had been looking for a Kenwood R-820 for some considerable time as they don't seem to come up for sale very often. Then earlier this year in a brief moment of indulgence I took a chance and bought a 'job lot' of untested vintage Kenwood radio parts from the usual auction website and for a very modest price. I could see from the photo that one of them looked like an R-820 but it was being sold with a very rusty TS-820. It was literally a garage sale of untested boxes from a Silent Key and I thought that there might be some useful spare parts if nothing else. When I got my purchase home I found that I had acquired a rather sad-looking TS-820 hybrid transceiver, a TV-520 2m transverter and finally an R-820 receiver along with some interesting interconnecting cables.

Description

The R-820 is a relatively unusual product. It is not a general coverage receiver but neither is it just an amateur band receiver. It covers all the usual amateur bands available in its day, 160m to 10m (not WARC), but it also has a switchable built-in converter stage, which provides coverage for the popular shortwave broadcast bands. These bands are 49m (5.9 - 6.4MHz), 21m (9.4 - 9.9 MHz), 25m (11.5 - 12.0 MHz) and 16m (17.7 - 18.2MHz). There are also four crystal sockets internally providing the facility to add additional fixed frequencies selectable from the front panel.

The receiver is fully solid-state and is a triple conversion superhet with the first IF 8.83MHz, second 455kHz and final IF frequency of 50kHz. The third IF of 50kHz is unusual for 1970. It has some quite advanced features for its day such as IF shift, a notch filter, a range of selectable IF filters at different stages and fully variable bandpass tuning (VBT). It supports SSB, RTTY and AM reception and has very good stability. It's very quiet and the quality of the audio is quite exceptional. The IF stages have provision for five optional filters in the first two IFs providing a very wide range of selectivity options. It has all the features of the receiver in the later TS-830, plus triple conversion. It weighs in like a Kenwood hybrid transceiver at 12kg, built as solidly as one could ever want. **Fig. 3** shows the internal construction. Each subsection is contained in its own screened can, not standard for the day and providing exceptional screening between stages. The set is extremely robust.

Testing and fault finding

After getting the R820 home I soon found a copy of the manual and circuit online and, following a quick read, embarked on testing the receiver. Power is supplied by a 4-pin Jones connector on the rear and from the manual I found that this same socket is for either 12V DC or mains power. Unfortunately, the purchase didn't include the power lead but I was lucky to find a suitable connector in my trusty 'spares box' – one of those rally purchases made ten years or more ago on the grounds that it might just be useful! So, I started with testing it using the DC supply by connecting it to a variable DC power supply and carefully turned the voltage


VOL. XXXVII MARCH 1979 NUMBER 1
FOR THE FORTUNATE FEW — THE ULTIMATE RECEIVER
TRIO R 820
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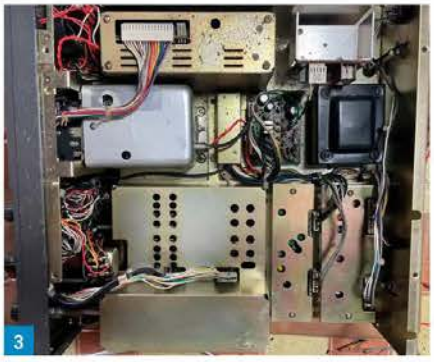
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up to see if anything worked. I was encouraged to find that at 12V it was drawing about 1.6A, which matched the supply current documented in the manual. There is no internal speaker so I connected an external speaker and antenna wire and was delighted to find that the receiver seemed to work to some extent.

On further testing I found the receiver to be quite deaf so I attempted an alignment of the pre-selector and RF stages but that didn't seem to make much difference. I tried tracing a signal from the antenna socket through the stages to see if I could find a fault. After some investigations and tests I found that the very first RF stage was not providing any amplification and bypassing it resulted in much stronger signals. Looking at the circuit and making some more measurements I discovered that the signal from the antenna came into a small 'TOKO' type RF matching transformer, L1, and the primary winding of this was open circuit. I expect an input overload, or maybe a lightning discharge, burned it out as there is no other protection on the front end. I removed the transformer from the PCB, opened the can up and replaced the primary winding very carefully, which restored the set to full sensitivity.

The second problem I found was with the variable selectivity control not working. The knob on the front panel is coupled to a variable resistor with a small plastic coupling connector with grub screws. The plastic had split and it could not be tightened onto the spindles so as the knob was turned the potentiometer was not. I managed to find a suitable replacement coupler on the internet, albeit it is a metal type but the shaft of the potentiometer is plastic.

The final fault I found was in the mains power supply. When I tried powering the radio by AC mains it failed to work and the dial lights were very dim. I checked the mains transformer and diodes in the rectifier, then replaced the capacitors in the smoothing circuit. No improvement. Then I discovered that the DC voltage leaving the power supply board was higher than the DC voltage reaching the circuits on the receiver. The fault was very dirty high resistive connectors, which carried the power from the rectifier board to the rest of the boards. Cleaning these connectors and replacing one of the wires brought the radio to life on AC, and the DC voltages all checked out correctly. While I had my DeoxIT spray can out I cleaned all the other connectors and realigned the receiver RF and IF sections using the signal from the onboard calibrator.

Receiver performance and usability

Once repaired and aligned I found the receiver's performance to be quite excellent and it easily matches that of more modern sets in terms of

4

Fig. 1: The Kenwood R-820 Receiver. Fig. 2: Original Advert from Short Wave magazine. Fig. 3: Internal Construction. Fig. 4: IF Board showing optional filters. Fig. 5: Analogue and Digital Tuning Display.

sensitivity and selectivity. The quality of the audio is also very impressive. The radio is very flexible in terms of filters and IF shift, while the notch filter is very effective. The original *QST* magazine product review in July 1979 had measured the noise floor at -138dBm; blocking dynamic range 115dB and two-tone 3rd order IMD 85dB, which was excellent for its day.

The variable selectivity is of particular interest. Firstly, selectivity is switchable between 6, 2.4, 0.5 and 0.25kHz steps (depending on IF filter options fitted). It can also be continuously variable between set limits much like on modern receivers with variable bandwidth implemented in DSP. With the additional IF shift feature it is possible to tune out moderate adjacent channel interference by shifting the IF passband up or down such that the interference is outside of the passband, another feature that first appeared on the R-820. The IF board is shown in **Fig. 4**. The optional 2.4kHz filter option is fitted to this receiver and optional AM 6kHz and CW 500Hz or 250Hz filters can also be fitted on the IF board.

The S-meter is rather unique in that it not only provides the standard S scale, but also dB/μV too. A five-position attenuator is also included in 10dB steps from zero to 40dB. The combination of the two enables signal strength to be measured on the S-meter in microvolts and quite accurate comparisons of signal strength can be obtained compared easier than with just a regular S-meter.

The receiver has quite a complex analogue frequency readout with three moving dials, **Fig. 5**, that work together to display the frequency in addition to the digital readout. The upper analogue dial shows the position on the frequency band with approx 200kHz spread, the lower analogue dial approx 20kHz bandspread and if you look carefully, the first digit of the

5

lower analogue display changes as the dial rotates each 100kHz segment. It's a joy to see although a bit fiddly to adjust and service.

On the front panel, in the lower right corner, there is the power switch and a switch for switching between standalone receiver operation and operation in conjunction with a transmitter.

Right next to it are the two band selector switches. The broadcast bands from 49 to 16m are selected using the right-hand one. In position NORM, the left switch selects the amateur radio bands, in position WWV the frequency standard for calibration.

Full transceiver operation

So why did Kenwood develop and sell such an expensive receiver, more expensive than the matching transceiver at the time? Well, the Kenwood R-820 receiver was designed as a stand-alone communications receiver but also to be an enhanced receiver to partner with the Kenwood TS-820 transceiver or other Kenwood hybrids. When connected to the TS-820 it also gives you all the split frequency features of a second VFO and even diversity reception is possible.

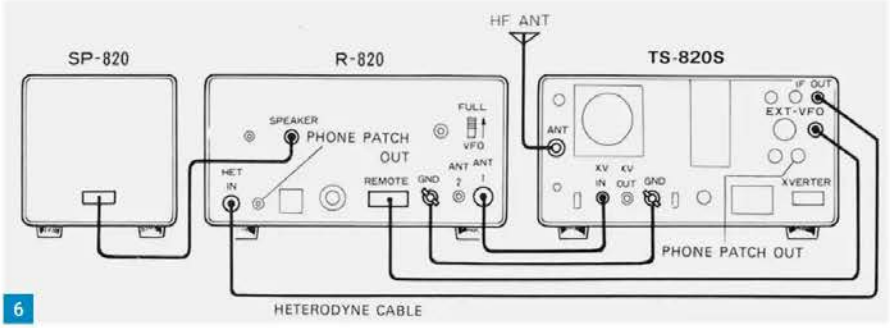

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Fig. 6: R-820 and TS-820 connections for full transceiver operation. Fig. 7: The R-820 Receiver (bottom) and TS-820 Transceiver (top).

In order to partner it with the TS-820 for transceiver operation the owner is required to conduct some internal circuit modifications to the TS-820. Yes, this was the late 1970s. I don't think a manufacturer would get away with that these days! Detailed instructions of these modifications are available in the references. Also, you need a special TS-820/R-820 interconnect cable if you wish to run the station in transceive mode and Kenwood uses an unusual rectangular connector that I have never seen before. Fortunately, one such cable was included in eBay 'job lot'. The previous owner at some time must have used this configuration. **Fig. 6** shows the interconnection cables between the two sets for full transceiver operation.

Fig. 7 shows the R-820 with my TS-820 transceiver. As can be seen, the R-820 receiver matches the TS-820S in looks, most likely sharing the same case and front panel metal work. When connected, the transmit and receive signals are controlled by the VFO's of the R-820 and TS-820 and you can then:

- transmit on the transceiver VFO, receive on the receiver VFO;
- or transmit on the receiver VFO, receive on the transceiver VFO;
- or transceive on the receiver VFO;
- or operate the two units completely independently.

The above options are switchable using the switch to the right of the digital display on the R-820. The combination can be switched back to separate units using the R-820 switch on the bottom right of the front panel labeled 'TRCV/SEP' for transceiver or separate mode.

When the two units are operated separately, the receiver can be tuned to a different frequency on the same band or any other band without affecting the operation of the transceiver. The R-820 will remain connected to the same antenna that is attached to the transceiver unless the user provides external antenna switching. The R-820 contains relays for switching the antenna path.

Conclusions

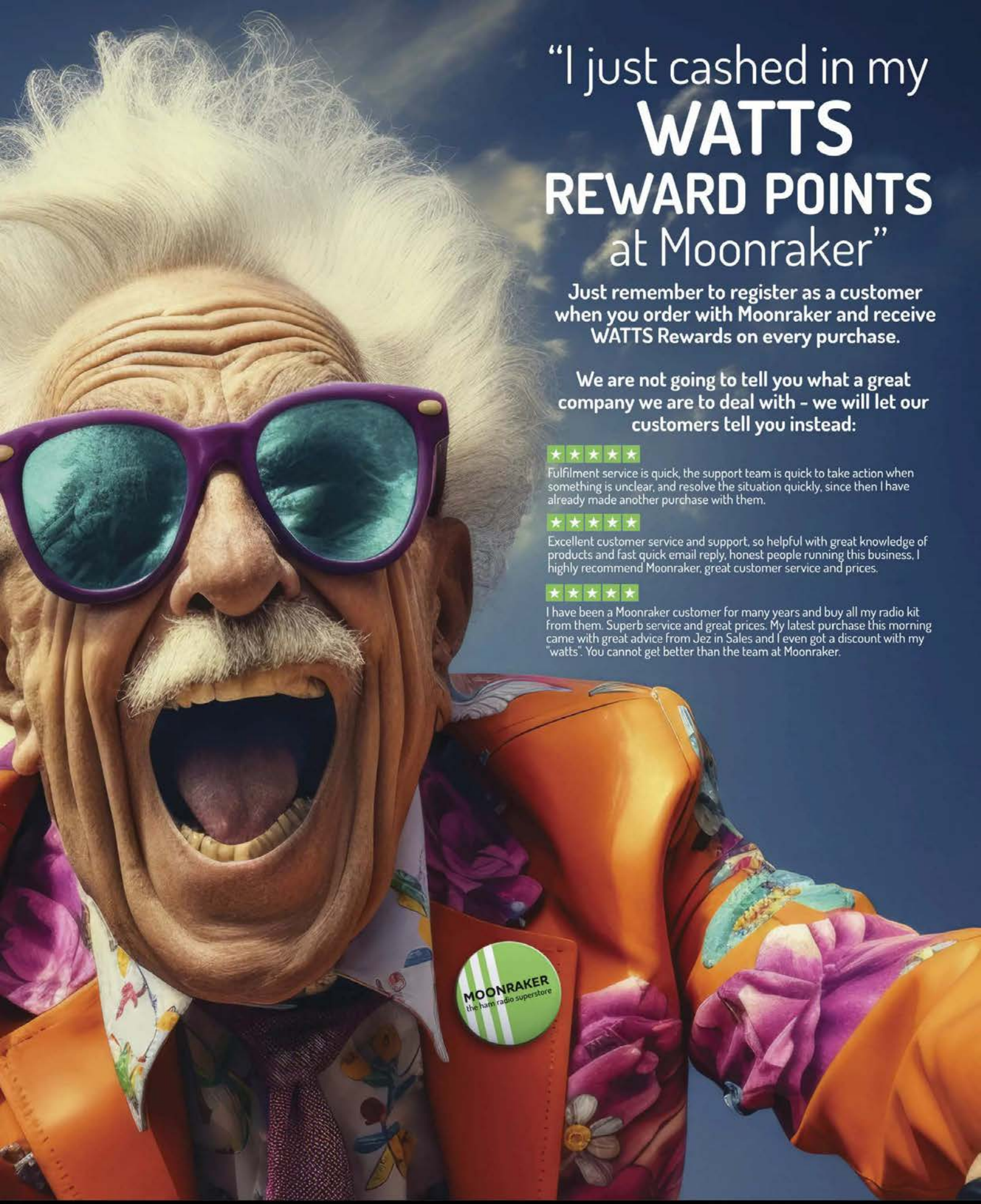
Kenwood's design team seems to have been given a free hand to innovate and try new features without being constrained by a set price point. Many Kenwood innovative features, such as triple conversion, variable bandwidth selectivity and IF shift implemented first on the R-820 would become mainstream over the next decade on the later Kenwood transceivers. Many of these features became incorporated several years later into the famous TS-830S so in a way the R-820 receiver seems like a prototype test bed for that very successful transceiver.

I do wonder how many of these radios were actually built? Looking through the archives or *Short Wave Magazine*, the set only seemed to be marketed for about a year. With continuous coverage of the entire shortwave spectrum, the receiver would probably have been even more successful. I expect the high price meant that the market was very limited and the age of separate transmitter and receiver was passing quickly. Indeed, if you bought the TS820 transceiver and the R-820 receiver to use them together, the price would have been about £7600 in today's money, allowing for inflation. However, when teamed with a TS-820 in a full transceive configuration, it arguably produces one of the finest analogue amateur radio transmitter/receiver combinations ever devised.

The Kenwood R-820 is a fantastic receiver. The audio quality is exceptional and even though I don't have the full complement of filters fitted, the selectivity options are very good. It's currently my main receiver in the shack. The provision of AM, variable selectivity IF filtering and broadcast bands is all very useful. I can only say that it's one of the best vintage receivers I have ever used and I have tried quite a few.

References

Original advert:
http://tinyurl.com/yckb8tbn
Review of the R820, QST Magazine July 1979, p43. online here:
http://tinyurl.com/3k4h78r6
K4EAA's website with useful Kenwood information including the R-820:
https://www.k4eaa.com/r820info.htm



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1

Using those fixed power supplies (Pt III)

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

In this article I am going to look at a professional fixed power supply and at a circuit to increase the utility of these supplies by adding a variable voltage option.

The professional power supply

This power supply, shown in **Fig. 1**, an Advance PMG-24-3 is still heavier than the semi-professional power supply I wrote about last month, weighing in at more than 5kg. The specifications are a fixed output voltage of 24V DC with a maximum continuous current supply of 3A. These 24V DC fixed power supplies are found in many industries where a 24V bus has been standardised and from which all other DC voltages are derived.

These power supplies are built with high-quality components, large electrolytic capacitors, bridge rectifiers and the use of large external heatsinks. In terms of area occupied, the heatsinks are double the size of those found on the semi-professional unit. When operating with a load of 3A and after 30 minutes of operation the external heatsinks never go above 50°C and reflecting the quality of the transformer the temperature of the transformer stays below 40°C.

To further help to keep the circuitry cool these units have more vents than enclosure. This is the reason they are often called cage power supplies. Voltage regulation is accomplished by the well-known LM723 IC, which has a temperature compensated Zener diode, voltage reference amplifier and error amplifier on-board the silicon. A number of 0.1% resistors are used in critical areas and the range of adjustment that is possible is small, from 23.4 to 24.4V. The pass element is made up of two NPN Darlington power transistors. Intended for continuous operation there is no power switch or LED indicating power-on. These units are very rugged even with the open frame construction and I have seen them operating after a decade of laying on the floor, covered in dirt and getting splashed with water each time the facility cleaning crew wash the floors. The 220V AC input is applied to a set of terminals that should be shielded by a clear plastic cover to prevent inadvertent touching. If you do not have the cover, then please make a cover so that you do not regret it one day.

Measuring the ripple and noise when loaded at 3A showed the 50Hz ripple was about 2mV and while I could see higher frequency spikes these were below 8mV and at these low voltages I could not get my oscilloscope to trigger reliably. Once the current load approaches 3.2A the power supply drops the output voltage and reduces the current to 1.2A until the connected load has either been completely removed or falls below 1.2A, at which point the voltage output recovers.

These fixed power supplies have provision for voltage sensing to compensate for the circumstance where you use long supply leads, which cause enough voltage drop to affect the voltage supplied to the load. To overcome this problem a four-wire arrangement is used to connect the load, two wires supplying the load current and the other two wires used to sense the voltage at the load. This can be seen on the right-hand side of Fig. 1 where the connector is marked (from top down) as +S, +, - and –S with the capital S signifying a sensing terminal. You see that on my unit a bar connects +S to + and another bar connects – to –S.

To use a two-core cable these bars need to be in place (implementing two-wire operation) but to allow sensing at the end of a long cable these bars are removed and the load is connected as shown in **Fig. 2**, enabling four-wire operation. I detail this difference in case you have one of these power supplies where these bars or shorting straps are missing and if you intend not to use sensing (as I have done), then you need to short +S to + and short – to –S.

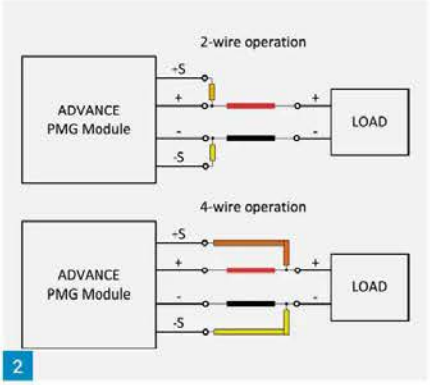
A voltage variable power supply with current limiting

These fixed 24V DC power supplies are ideal as a base around which to build a variable power supply so that we can adjust the output voltage as required and then with a little more circuitry provide current limiting to protect the connected circuitry.

The schematic for the variable power supply add on is shown in **Fig. 3**. My implementation works with 24V on the input and caters for a maximum current load of 2A at 20V. It is not clear who created the original design, which is available on the internet and on which my work is based. I have changed some values of components and selected different transistors to freely available parts.

The 24V DC fixed power supply is connected at H1, through a protection diode (D1) to a PTC resettable fuse (F1) in case of catastrophic failure. To supply a steady voltage for the op-amp (U4) and to set the voltage and current; U1, R1 and R2 established a stable +V supply of 10.7V. Provision is made for an LED and a limiting resistor (R41) to show that the power supply is on and could be taken to the front panel, left on the PCB or left out.

For U4 I use a LM324 quad operational amplifier. These are available in a 14-pin dual-in-line package (DIP), are designed to be used with a single power supply, have short circuit protected outputs, ESD clamps on the inputs, are internally compensated and are a good general-purpose



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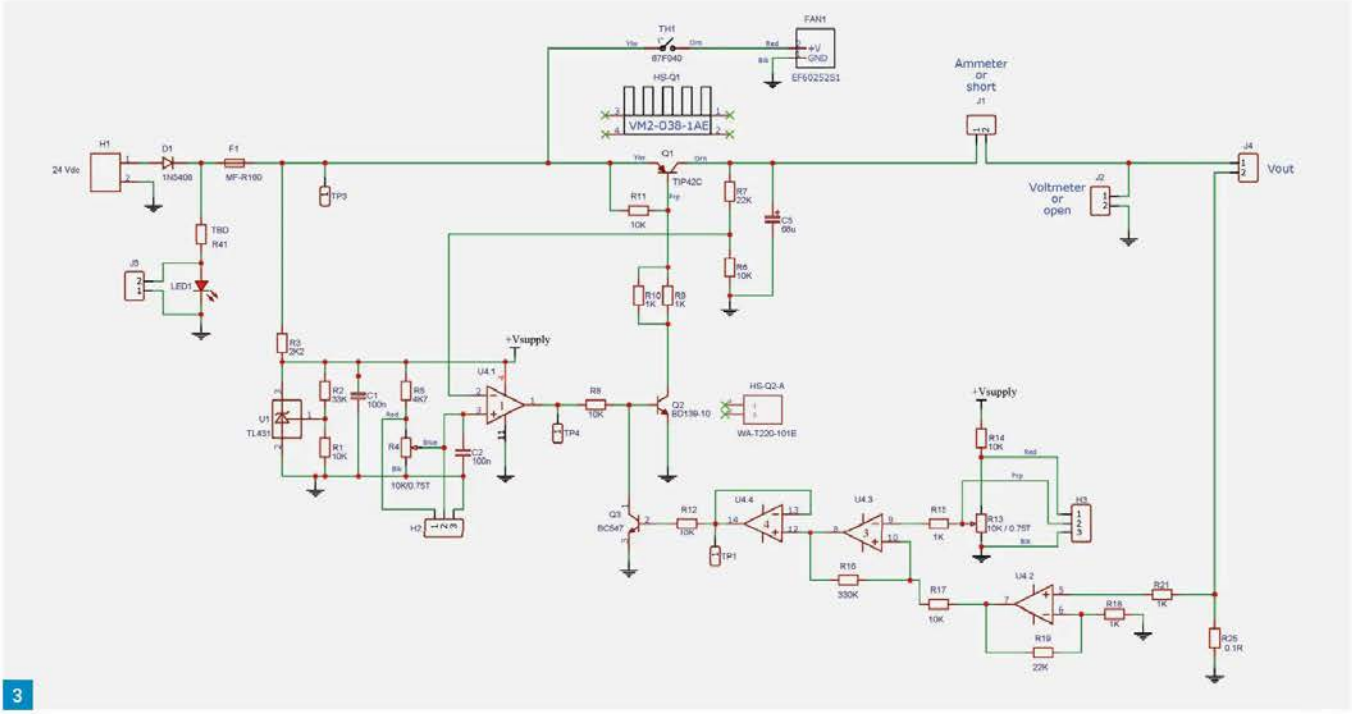

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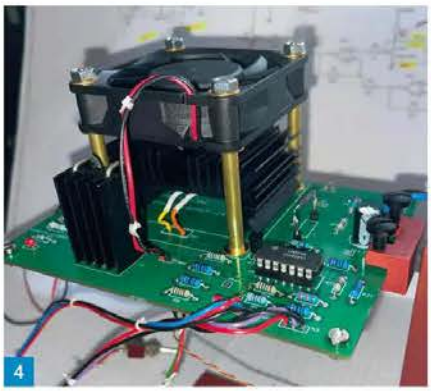

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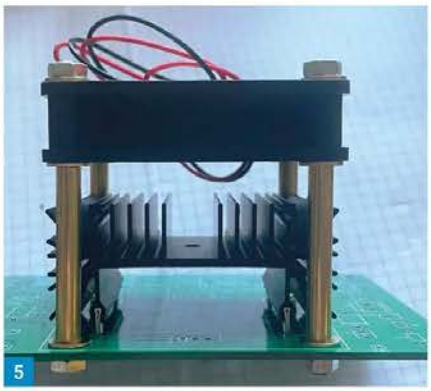

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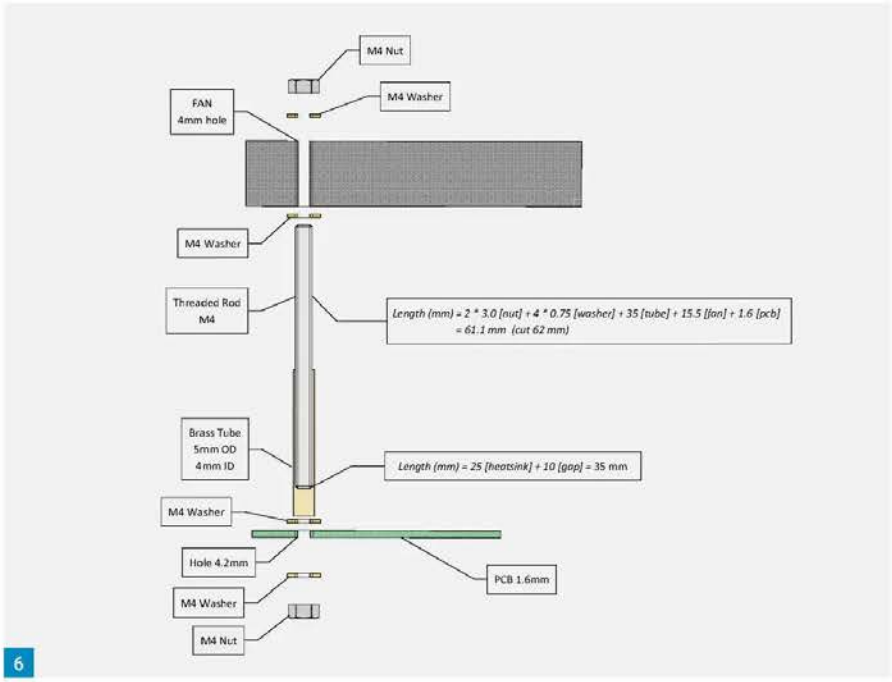

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Fig. 1: Advance PMG-24-3 power supply.
Fig. 2: 2-wire and 4-wire operation.
Fig. 3: Circuit diagram of variable power supply add on. Fig. 4: Assembled PCB with heatsink fan.
Fig. 5: Assembly of the fan above the heatsink.
Fig. 6: Details of the four pillars.

op-amp.

The pass transistor (Q1) is a PNP TIP42 transistor that determines the voltage on the output at J4. The voltage on the collector of Q1 is divided by 3.2 in the resistor network R7 and R6. This proxy for the output voltage is compared in U4.1 against the voltage setting potentiometer (R4) to control the output of Q1 through R8, Q2 and R9/R10. Don't forget to short out J1 or no voltage will reach the output terminals on J4.

The amount of current that flows through the load to ground is measured by R25, which is a 0.1Ω resistor. With a 2A load the power rating of the resistor must be at least 0.4W and I use a 2W resistor here. The voltage developed across R25 goes to a non-inverting amplifier (U4.2), which multiplies the voltage across R25 by 23. This amplified voltage, which is our proxy for the amount of current flowing to ground, is applied to a comparator with hysteresis (U4.3) where it is compared to the voltage on R13, which sets the current limiting value. R14 sets the maximum current limit that R13 can be adjusted to. With a value of 10kΩ for R14 my circuit limits the maximum current to 2.3A. The output of U4.3 is one of two states, either as close to the ground rail as the op-amp can achieve or as close to the +V supply rail as the op-amp can achieve. U4.4 is a non-inverting buffer (often called a unity follower), protects the operation of the comparator and has

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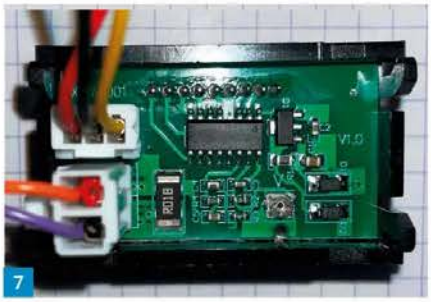
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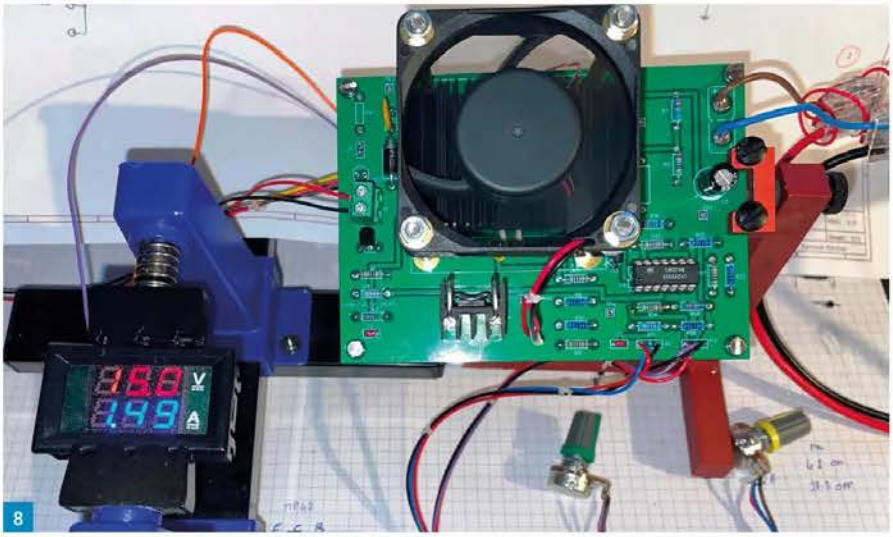
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a low output impedance to drive Q3 via R12. When the current drawn exceeds the limit set by R13, Q3 acts to drain away the current on the base of Q2 to in turn stop Q1 from operating which reduces the output voltage and current drawn to zero.

The assembled PCB is shown in **Fig. 4**. Looking closely, you may notice that R25, the 0.1Ω current measuring resistor, is mounted on two pins. This was not done to help dissipate heat but rather to help connect test probes while evaluating the circuitry.

I have added an Ohmite model WA-T220-101E heatsink to Q2. This turns out not be absolutely necessary and just fixing the Q2 flat against the PCB would have been adequate. Q1, however, does need a heatsink and an efficient one at that. Consider the situation where the input voltage is 24V, the output has been set to 12V and the load is drawing 2A. In this circumstance Q1 needs to dissipate 24W of heat. This is calculated from the voltage drop across Q1 (24V-12V=12V multiplied by the current (12V × 2A = 24W). I discussed in the previous article in this series the use of a fan for cooling heatsinks and further developed that technique into what you see in this design. In this design the fan is blowing air down across the heatsink fins.

Fig. 5 is a close-up view of the heatsink mounted to the PCB with a fan mounted 10mm above the heatsink on four pillars. The PCB is made for an Ohmite heatsink model VM2-038-1AE, which mounts with four pins into slots and four M4 holes are provided for the pillars. **Fig. 6** is a diagram of the construction of each pillar and how the parts fit together. Each pillar needs two M4 nuts, four M4 washers, a 35mm length of brass tube with an outside diameter of 5mm and an inside diameter of 4mm and a 62mm length of M4 threaded bar.

With reference to Fig. 3 the fan (FAN1) is connected to the 24V input through a thermostatic switch (TH1). The thermostatic switch is in a TO-220 package and is mounted on the heatsink (HS-Q1) on the opposite side to the TIP42 (Q1). These two devices share the same M3 machine screw and nut to mount them on the heatsink. As long as the temperature is below 40°C the thermostatic switch is open circuit and the fan is not running. Once the heatsink gets to 40°C the switch closes and the fan operates until the switch opens again at 27°C. The connection of this switch to the PCB is revealed in Fig. 4 by the orange and yellow wires coming out from the bottom of the large heatsink.

This design has proven to work very well. When dissipating 6W from a cold start the fan comes on at 40°C after 180 seconds and cools to 27°C after 45 seconds of fan operation. The process then repeats with 130 seconds off and 45 seconds on. When dissipating 12W the fan switches on, with a cold start, after 60 seconds but cannot cool the heatsink to 27°C but rather maintains the heatsink at 30°C. When dissipating 18W the fan switches on, with a cold start, after 60 seconds but cannot cool the heatsink to 27°C but rather maintains the heatsink at 35°C. Finally, when dissipating 24W the fan switches on, with a cold start, after 40 seconds and maintains the heatsink indefinitely at 40°C. All of these measurements were done with the PCB in the open air, sitting on my workbench and later I discuss how these values change once sealed in an enclosure.

Adding a voltmeter and ammeter

You can utilise your multimeter to measure the output voltage and current but this is not very convenient for a variable power supply so I turned my attention to adding a voltmeter and ammeter to the design. It is possible to buy very nice moving coil meters or even digital meters but I chose to use a dual digital volt/amp meter that can be purchased off Amazon or a from a large variety of sellers based in the UK for less than €10 each.

These devices are rectangular, fit in a panel hole of 25 x 35mm and operate from a DC power supply between 4 and 30V, perfect for our 24V fixed power supplies. The maximum voltage that can be measured is 100V and the maximum current is 10A. There are two LED displays, one above the other, with the top display marked V and the bottom display marked A.

To help you identify the meter used and the connections I show the front and rear of the display in **Fig. 7**. The black wire connects to the ground of the circuit and I soldered this wire onto the bottom of H1 on pin 2. The red power supply wire is soldered to the junction of D1 and F1, which is one diode junction voltage less than 24V. The yellow wire, the voltage sensing wire is connected to pin1 of J2 where it can measure the output voltage.

If you use a separate ammeter meter, then I

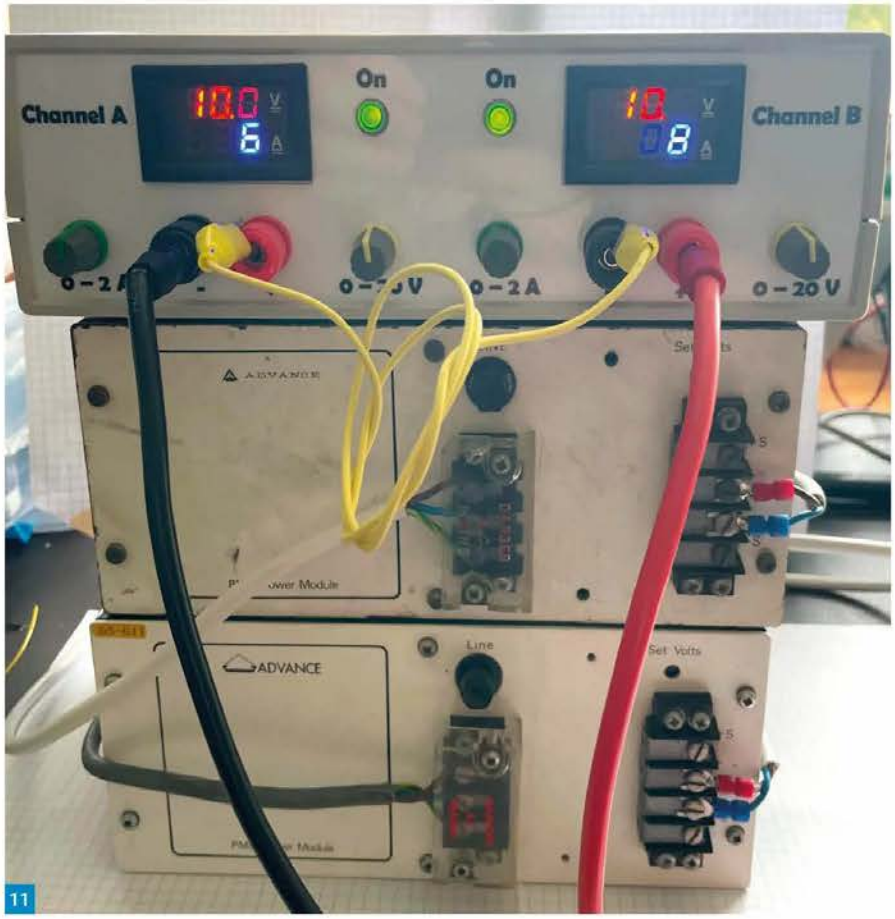

Fig. 7: Front and back view of dual voltmeter and ammeter. Fig. 8: Dual voltmeter/ammeter connected. Fig. 9: Two power supplies in an enclosure. Fig. 10: View of front and back panels. Fig. 11: Showing the two fixed supplies and the variable supply connected for split power supply operation.

provided J1 from which you remove the short and place your ammeter in its place. The digital ammeter we are using does not work in this manner and needs to be in the ground leg of the power supply output. To achieve this you need to remove R25 and solder the orange wire to the junction of R25 that connects to R21 and the purple wire to the other R25 hole, which is ground. The meter connected and operating is shown in **Fig. 8**. There is a small potentiometer on the display PCB that allows you to adjust the voltage reading and I have found that the voltage readings are fairly accurate in the range 0 – 24V. However, there is no adjustment for the current measurement and the accuracy suffers – typically, around 1A the display measures 10% high.

What about a dual power or split power supply?

Fig. 9 shows two identical power supplies, each running off its own 24V fixed power supply, mounted in an enclosure with the displays, potentiometers, banana jacks and LEDs all mounted on the front panel and wired to the PCBs. **Fig. 10** is a view of the front and back panels of the enclosure with those two power supplies. I drilled a grid of holes on the back panel to get air in and out and you can see the two grommets where the inputs from the fixed 24V DC power supplies come in. For the front panel I made a decal using the services of Signomatic.com. It is difficult to take a photo of a multiplex display hence the two LCD displays do not show everything that the eye sees. In this case each display is showing 10V at 1A.

Using the same principle as demonstrated in the previous article you generate a split power supply as shown in **Fig. 11** where either end of the yellow lead becomes the ground. This figure also shows the two fixed power supplies used. In my case these two fixed power supplies sit on a shelf under my workbench with the control unit on a shelf above my workbench where I can connect and adjust as required.

One thing to note is that the two power supplies are not tracking each other, that is one voltage control is not controlling both power supplies, so you need to set the output voltage and current limiting of each power supply individually.

Once I had the PCBs in their enclosure and the lid sealed I redid my temperature measurements. Having the PCBs in an enclosure so that the fan is pushing the air from inside the enclosure and airflow being limited by the grid of holes on the back panel makes a difference when a larger amount of heat needs to be dissipated. There is no difference in final temperatures when dissipating 6W or 12W although the cooling cycle does take longer. When dissipating 18W the fan maintains the heatsink at 48°C, which is 13°C higher than when operated in the open air. Finally, when dissipating 24W the fan maintains the heatsink indefinitely at 55°C, which is 15°C higher than when operated in the open air. One method to counteract this would be to drill a grid of holes directly above the heatsinks in the top lid so that cold air is drawn in from the top, blown across the heatsinks and then flows out of the box via the grid of holes on the back panel. However, as 55°C is the worst case I did not take up this option.

End note

If you do not have a 24V power supply brick, then you can, as demonstrated last month, add two 13.8V fixed power supplies in series to get 27.6V on the input of one of these circuits. But you will have to reduce the voltage applied to the fan (perhaps using a few diodes in series) as the recommended voltage on the device I have specified is 24V DC although the specifications suggest 26.4V is the maximum that should be allowed.

In the previous article I used a 78XX voltage regulator to select the output voltage, which limits you to a voltage that is available in the 78XX range. I have one of the PCBs with fan, as described in this article, in a vented enclosure with 10-turn PCB mounted potentiometers in place of R4 and R13. I set the output voltage and current limiting using my multimeter and now have the freedom to select whatever fixed output voltage I want.

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

www.samuelritchie.com

As usual there are higher resolution graphics and photos and details on some of the components used and where I got them from. For example, I give the link to where I bought the brass tubing and threaded rod off Amazon, information on the fan, the thermostatic switch and the enclosure with supplier order numbers. I also make available the Visio© file I used to make the front panel decal if you want to replicate or modify what I have done.

I have no financial interest in OHMITE, EasyEDA, Amazon or Signomatic. **PW**

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A very different Selection Box

Richard Constantine G3UGF investigates another compact antenna, but this time a little different.

I've tried and tested quite a wide range of portable, mobile and otherwise compact antenna kits in my time but never one quite like this. It arrived at Christmas but not quite in my stocking. I assumed it was yet another incarnation of the base-loaded whip idea from China. I was half right but had the country of origin wrong – it's a neat idea from Taiwan.

Neat is the word as the box contained seven well finished BNC terminated, very shiny black moulded coils approximately 1.8cm diameter and 8.5cm long from threaded shank to BNC tip. Six of the HF loading coils ranged from 2.63µH at 28MHz to 41.24µH at 7.00MHz. Each inductor designed and labelled for a single amateur band ranging from 10MHz - 50MHz.

With a bit of judicious tweaking the 50MHz element with an inductance of less than 0.9µH and a resistance of less than 2Ω looked as though it could be made to function on 144MHz, simply by playing around with the whip length (and perhaps 70MHz too).

There was an eighth coil for 7.00MHz. This was matt finished, being heatshrink sleeved and slightly heavier at 44 grams.

The box included a ten section 1.26m (49.5in) telescopic whip that when closed down measured just 18cm. (7in approx.) Not much longer than a new pencil and very pocketable.

I could see the immediate appeal for ultra-portable being lightweight and easy to carry. Pick a couple of favourite or likely active bands according to the time of day plus a compact radio and as our US cousins would say, 'hit the trail'.

Nice idea in theory but was it going to be quite that simple and how much RF and mismatch would the inductors handle before the nice shiny mouldings melted? The answer to that was on the single sheet of paper included in the box – '50 watts SSB'.

Well, 50 watts peak power is good enough if you have a decent location and a reasonably good match. Doubling the power handling to 100 watts simply doesn't make much difference, especially to a compact antenna. In any case only an S-point or less maybe at the receiving end.

What counts is location, band conditions and making the most of what you have available. The only way to find out was going to be to get practical hands-on experience.

The BNC connector was an obvious gift to connect directly to the three most popular portable radios: FT-817/8 for which I think the kit may have originally been designed, plus the Elecraft KX2/3 and the Icom IC-705 with, of course, the addition of a right-angle BNC connector (not included).

The instruction sheet contained a list of frequencies and lengths for the telescopic antenna so it was going to be very easy to check using the front-mounted BNC socket on a Yaesu FT-818ND.

Early findings proved interesting. Every band produced very acceptable results on receive, within reason. A great idea for some casual listening and something the majority of amateurs seem to do a lot of these days while the minority talk or tap keyboards.

Attempts to check the VSWR for transmit capability were as I readily predicted not acceptable. Four blocks on the Yaesu's internal VSWR indicator. Although the instructions gave no clue, I readily concluded that the suggested whip lengths must have been determined over some form of ground plane.

Simply connecting an earth/counterpoise lead to the radios case sorted the problem. In common with the Yaesu, the Icom's IC-705 had the same outcome. The Elecraft KX3 produced the magic 1:1 VSWR, without a counterpoise. I wasn't at all surprised to see that as the KX3's internal auto-tuner has a reputation for matching everything and anything, wet string included. Of course, that isn't the full story as matching doesn't necessarily mean maximum efficiency and I wasn't rushing to run higher power without attaching an earth lead.

These early experiments made me curious to find out what might happen with, say, a magnetic or gutter clip mount. The drawback was obviously going to be that a telescopic antenna isn't suitable for actual mobile use but stationary, or attached to a simple ground spike fabrication maybe.

Many readily available magnetic mounts have SO239 sockets as standard but those with a BNC socket are not so common. They are out there if you look and reasonably cheap to buy. I knew I had one somewhere but couldn't find it as I have far too much 'stuff.' For test purposes I compromised by simply screwing a PL259-to-BNC adaptor on to the first SO239 base that I could actually find.

I must point out that while this worked there was a drawback. The BNC plug on each coil does move. The construction of the SO239/BNC adapter that was to hand also rotated but more freely and become a bit of a nuisance trying to grip it for quick coil changes. When I eventually found the magnetic mount with the BNC socket the issue all but disappeared.

Photo 1: The antenna and loading coils. Photo 2: using a mag mount with the FT-818nd. Photo 3: Attached to a gutter mount – an easy swap between VHF and HF. Photo 4: Using the KX3 on 21MHz. Photo 5: Using the IC-705 on 7MHz, suitably earthed. Photo 6: 28MHz and -MHz inductors.

To the hills

As expected in January the weather was freezing, the wind blowing hard with occasional snow flurries. Nevertheless, for the benefit of *PW* readers I sallied forth, with some surprising and counterintuitive results.

While for personal preference I favour CW I thought it only right to see what 4.5 watts of SSB and no speech processing from the FT-818ND running on its internal battery would do. To my extreme surprise QRP produced SSB contacts with Greece, Alaska and Boston on 10m with very little effort.

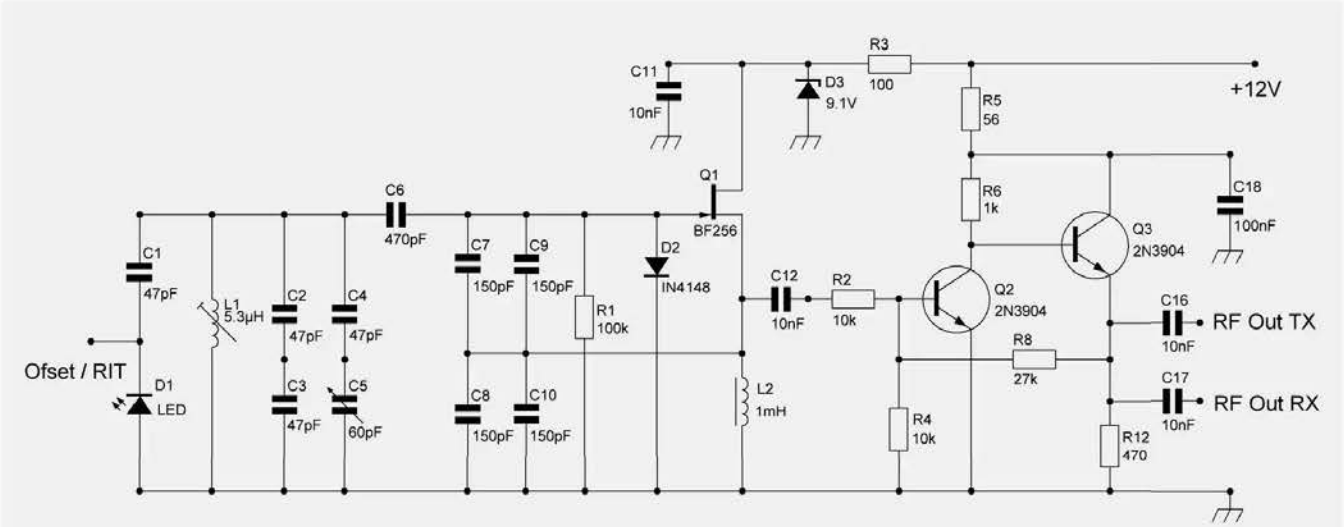
Realistically, the antenna is closer in size to that of a quarter wave than it is on any other HF band. Results on 40m proved poor despite the receiving performance being quite acceptable in late afternoon, only to be expected. During the dark hours propagation improved. Resorting to CW got some results with reasonably low signal reports using the KX3.

Among my armoury of mini-portable antennas I have the Comet HFJ-350M, known as the 'Toy Box' and reviewed in *PW* October 2021. It's one of those long, tapped coil devices with a shorting fly lead plus a telescopic whip, of which there are many varieties out there.

It's coil and whip sections are of a slightly larger diameter while the telescopic whip is the same length as the HF-100. Having played with both I really can't tell much difference in performance as both are base loaded in standard form. That said, the Comet is longer when packed, heavier and doesn't fit in your jacket pocket.

In conclusion...

The HF-100 is indeed a neat idea, nicely made and well presented. In common with all base-loaded designs not the most efficient form of vertical, it can still be effective given the right conditions and you don't expect miracles. Great for some casual listening and very easy to carry. Providing you're not expecting to bust a DX pile up, take care with the VSWR match and it can still produce some surprising results, as I discovered. One final bonus is that unlike the other selection box I received at Christmas that only lasted a day, I still have this one. **PW**



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The G3RJV SCD QRP Transceiver Revisited (Pt II)

Steve Hartley G0FUW continues with the project by describing the VFO build.

This project was introduced last month and we are starting the construction with the VFO as it is 'the beating heart' of any transceiver. *"Why not use a crystal oscillator like the original?"*, I hear you say. Well, crystal oscillators are very reliable but being stuck on one frequency can be hugely frustrating, especially when the station you want to work is just off that frequency. A VFO provides some frequency agility and so increases your chances of hearing other stations and making contacts.

VFO circuit description

The **Rev. George Dobbs G3RJV** used the same VFO circuit, or variations of it, in many of his projects over the years and often referred to it as his 'Sunday Best' VFO. This version uses the same circuit updated in that it uses currently available components and is configured for the 5MHz band. Changing the band is just a matter of using a few different components (see later).

The earliest version of George's favourite VFO that I have found was in the May 1981 edition of *Short Wave Magazine*; it was the 'deluxe' follow up on the original 1980 SCD transceiver project.

The 'deluxe' VFO circuit later reappeared as part of the 1983 *PW Severn* (where I came in), and it had many more outings. George gave credit for its design to **Doug DeMaw W1FB** and **Wes Heyward W7ZOI** and they, in turn, pointed to the original *QST* article by W2YM in the December 1966 edition. There is no doubt, this is a tried and tested circuit!

At the heart of the circuit, **Fig. 1**, is a JFET transistor in a Colpitts or Seiler oscillator followed by a two-stage buffer amplifier. In this version the main tuning is achieved by a G-QRP Club polyvaricon capacitor and a Spectrum Electronics 10mm coil. Voltage regulation for the oscillator JFET is achieved using a Zener diode.

The buffer amplifiers use bipolar transistors to provide plenty of RF output to drive the receiver and transmitter boards without any sign of instability, which is exactly what a buffer amplifier should do.

There is space on the PCB for an off-set circuit, formed by an LED and a capacitor. This is used to move the VFO off the transmit frequency if you are using a separate receiver, or to facilitate Receiver Independent Tuning (RIT) in a transceiver. If you are just going to build the VFO and receiver board, it provides a 'fine tune' control. We'll come back to that later.

There was some coverage of different approaches to the PCB in Part 1. A MeSquare version was made by simply laying out the components as they appear in the circuit diagram (see photo, **Fig. 2**). It matters not whether you are using a crude MeSquare PCB or a fancy commercial one, they all work. That said, you do need to make sure the thing is built in a study fashion; we don't want components waving around and causing avoidable changes in frequency!

Traditional VFOs, such as this one, have gained a bad reputation for drifting off frequency. That reputation is not without good reason. However, careful selection of components CAN produce rock solid results, honest. At the G-QRP Club Convention in 2019, **Fig. 3**, some 20 of these VFOs were built and the drift on some was very low indeed (the most stable had drifted just 400Hz after five minutes), others turned the Buildathon into a Driftathon (two joint winners managed to drift 13.4kHz after five minutes). The lessons learned from that event have been applied here so your VFO should be pretty stable.

Building instructions

The generic parts list appears as **Table 1** and band-specific parts are shown in **Table 2**.

The 5u3 'High Spec' coil from Spectrum Communications works well enough, but if you see any Toko KANK3334 coils at a rally, grab one; they really are very good in this application. The more experienced constructor may choose to wind their own coils using their own tried and tested methods; iron dust toroid cores can give very good results. For example, 18 turns of 26swg enamelled copper wire on a T-50-7 toroid worked rather well on 10MHz.

The BF256 FETs can be replaced by 2N3819, MPF102 or J111, and the 2N3904 BJTs can be replaced by 2N2222 or MPSH10. No matter what transistors you use, you must check the pin configurations. You can do that by obtaining

Fig. 1: Circuit diagram of VFO.
Fig. 2: A MeSquare VFO with a toroidal inductor being tested on 10MHz. Fig. 3: The 2019 VFO buildathon in full swing. Fig. 4: The completed VFO on a commercial PCB. Fig. 5: An air-spaced capacitor with reduction drive.

the datasheet for the device you plan to use. Most component suppliers will provide the appropriate datasheet or you can use one of the free online datasheet libraries such as:
www.datasheetcatalog.com

I remember building one of G3RJV's projects early in my QRP days and being totally puzzled as to why it was not working. The great man himself advised me to check the pin configuration and to my amazement, the very same device was made by two different companies with two completely different pin configurations. The FETs were swapped around and the circuit worked as expected. I have always been very careful to check since then!

Some of you may be wondering why we are using a number of capacitors in series or parallel, rather than a single capacitor, in some parts of the circuit. One reason is to allow flexibility in band selection, but it also allows different capacitors to be used, which can help with creating non-standard values and it helps to minimise drift.

The best results have been had using polystyrene capacitors, but these are getting harder to find. Ceramic NP0 types are easier to track down and these give fairly good results.

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

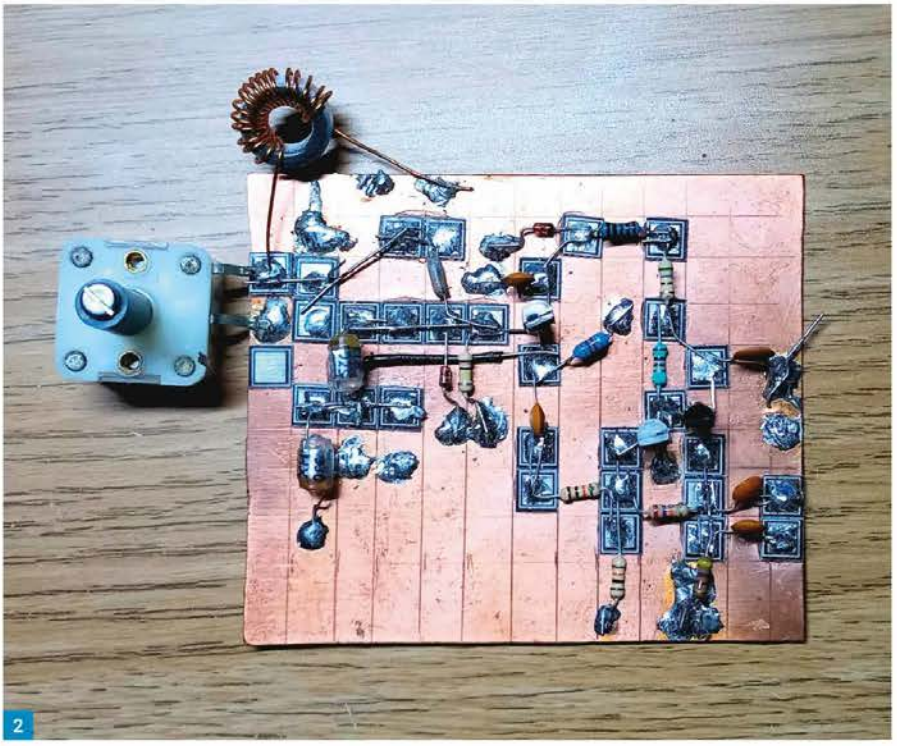
Let's melt some solder!

I am a great advocate of building a bit, testing it before building some more. That way you can narrow down any issues to the section you built since the last successful test. Unfortunately, this VFO does not lend itself to that kind of approach so it is best to simply work your way through the parts list and tick them off as you go.

It is worth pausing after all the resistors are in place and again after all the capacitors are in place, to compare your board with the photo of the finished board, **Fig. 4**, and correct any misplaced parts before moving on.

Note: *The off-set components, C1 and D1, are not fitted at this stage.*

I cannot stress enough the need to check, check and check again, that you have the right part in the right place before you solder it; it is so much easier to make changes before soldering!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All parts should sit on, or just above the surface of the printed circuit board. My technique is to put the parts into position and bend the legs back a little to prevent them falling out. I then make the solder joints and trim off any excess lead with a pair of sidecutters. Some prefer to trim first and then solder; both techniques work.

If anyone is unsure about how to solder, there are many video tutorials on YouTube but the best way to learn is to get stuck in and have a go.

Many newcomers ask about which solder to use. I have always used lead-based solder. I have tried the modern lead-free variety but I find it does not flow as well and it is harder to spot dry joints. Good old 60/40 is still available and is legal to use for hobby purposes. I would therefore recommend it unless you are used to using lead-free solder.

Which soldering iron is best? Anything rated at more than 15W should serve you well in this kind of work. I have an old Antex 18W iron and a newer temperature-controlled iron rated at 60W. I use whichever one is at hand for this kind of project.

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

Initial testing

It is awfully tempting just to apply power once the parts are all in place but I recommend using a multimeter set to read DC Current (Amps) when connecting up for the first time. That will show if the board is drawing too much current, indicating a short circuit, or about the right amount, indicating that all is well.

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

With your multimeter set to read DC Amps (some meters require you to change the red lead over to a separate socket) connect the red lead to the positive terminal of your battery or power supply and the black lead to the V+ point on the PCB. It is also worth noting that the exact measurements will be affected by the power supply voltage, which may be between 12 and 13.8 volts. Similarly, the exact multimeter being used can cause some variation in the measurements. The measurements provided in **Table 3** are therefore 'ballpark' figures.

If you get a reading more than 0.2A you probably have a solder bridge or a faulty component. Re-check your soldering before continuing.

Assuming your reading is in the mA range, you can drop to a lower range (typically 200mA) and check the exact value, which should be in the region of 40-60mA. You may need to swap your meter leads again.

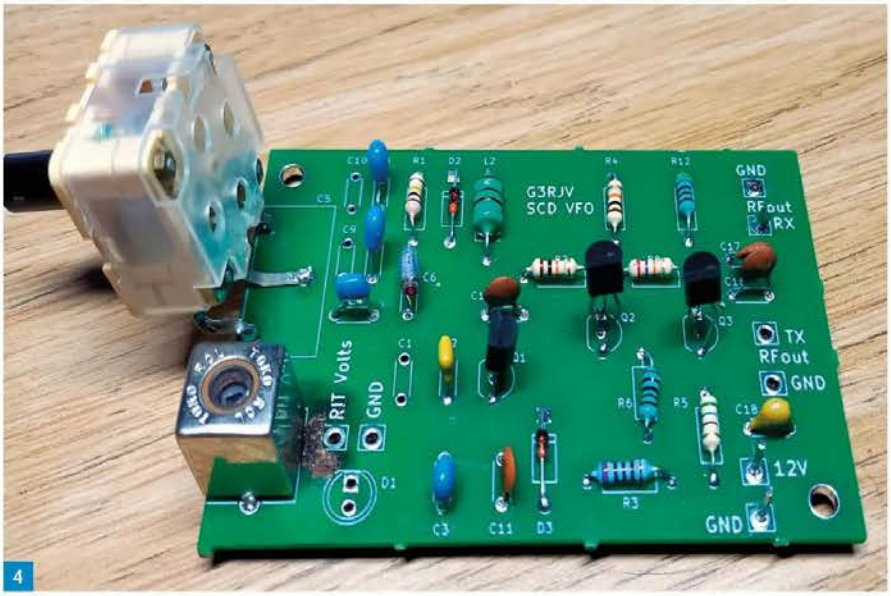
If all is well, replace the meter with another supply lead and prepare to measure some voltages. To prevent confusion, I would recommend sticking to the 'red is positive, black is negative' convention. Set you meter to read at least 13V DC (typically a 20V max range).

Switch on the power supply and connect the black meter lead to ground. Now touch the red meter lead on each of the transistor pins, taking care not to short out two or more.

Knowing the voltages are correct is always very reassuring. If the results are very different to the above (more than 10% out), it is worth re-checking all the parts are the correct values and in the right places and that there are no solder bridges or unsoldered joints. In the 1980s, *PW* ran a series called *'Are the Voltages Correct?'*, and later made it available as a stand-alone booklet. That ethos has always stuck with me.

Assuming the voltages are correct, the next test is to check if the VFO is oscillating and producing RF. There are a few different ways to do this. The easiest is to hook up a frequency counter or oscilloscope to the RF output.

If you don't have either of these, and I recognise that many do not, then it is worth making an RF probe (see previous part of this series).



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The other method of testing is to simply listen for the oscillator's signal on an SSB receiver covering the intended frequency. If you attached an 'aerial' wire about 30cm long to the VFO's RF output, you should be able to hear the radiated signal using a nearby receiver. You won't be able to measure the RF volts using this method but it does allow you to set the frequency range, and calibrate the VFO.

If you don't have a means of verifying the frequency at this stage, don't worry, we can look at some other methods of frequency calibration later when the receiver PCB is completed.

Table 4 gives an idea of the test results you should expect to see.

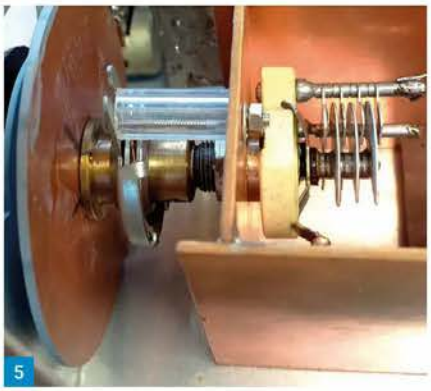
Stability road test

If you have the means to check the frequency you can, and should check how stable, or free from drift, your VFO is. Connect your VFO to a good power supply and frequency counter, or listen on a stable receiver with a good frequency read out. Set the VFO frequency to 5.262MHz; the QRP Centre of Activity frequency on 60m, then check and record the frequency every minute for five minutes, then every five minutes for 15 or 20 minutes.

You should find that the VFO drifts for a few minutes and then settles. Your tests will show how long yours needs before it is stable. In use, you can use the 'warming up' period to listen around the band, see who is working who and which frequencies are in use.

If your VFO is oscillating on the right frequency and is stable, then your work on this stage of the project is done and you can get ready for the next stage.

*(**Note**: The UK 60m Band is 5.2585MHz to 5.4065MHz but take care when transmitting; coverage is not continuous! Check out the RSGB Band Plan for more details.)*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What next?

If you want to move your VFO up to the 'Sunday Best' category, the polyvaricon capacitor can be replaced by a good air-spaced variable capacitor with a reduction drive, **Fig. 5.** These are mechanical devices that means you have to rotate the knob three times to make the capacitor swing from minimum to maximum value, making it much easier to tune to other stations. These are still available to buy new but they are not very common and can be very expensive. You can pick up very nice examples at most radio rallies at very reasonable prices. Suppliers like Birketts of Lincoln often have surplus stocks for sale; check out their adverts or give them a call. Like many things, you can often find pre-used examples at radio rallies; it is sometimes worth buying what looks like a piece of junk just to salvage the air-spaced capacitors and reduction drives.

If you don't relish the challenges of the analogue VFO, we have a digital VFO lined up for a 'bonus' article at the end of this series. That removes the need for any slow motion drives and has zero perceptible drift. However, the next part of the project will be along soon and it will cover the receiver board so you can hook it up to your VFO and start listening. **PW**

Resistors (0.25W)	QTY	Part Numbers
56 Ω	1	R5
100 Ω	1	R3
470 Ω	1	R12
1K Ω	1	R6
10k Ω	2	R2, R4
27K Ω	1	R8
100K Ω	1	R1
Capacitors		
47 pF *	3	C1, C2, C3, C4
150 pF *	4	C7, C8, C9, C10
470 pF *	1	C6
10 nF	4	C11, C12, C16, C17
100 nF	1	C18
6-60 pF polyvaricon = 1	1	C5
Semi-conductors		
2N3904 NPN BJT transistor	2	Q2, Q3
BF256 FET transistor	1	Q1
9.1V Zenner diode	1	D3
1N4148 diode	1	D2
5mm red LED	1	D1
Miscellaneous		
Printed Circuit Board	1	*See Part 1 for PCB options*
Spectrum 'High Spec' 10mm Coil 5u3 *	1	
1mH pre-wound RFC	1	
Knob	1	

Note: *parts shown in red and marked * are band specific. See table 2.*

Table 1: Generic parts list.

Part	3.5MHz	5MHz	7MHz	10MHz	14MHz
C2	220pF	47pF	47pF	120pF	47pF
C3	220pF	47pF	47pF	wire link	wire link
C4	wire link	47pF	33pF	4.7pF	6.8pF
C6	560pF	470pF	270pF	82pF	82pF
C7	1nF	150pF	470pF	100pF	68pF
C8	1nF	150pF	470pF	100pF	68pF
C9	not used	150pF	not used	100pF	150pF
C10	not used	150pF	not used	100pF	150pF
L1	5.3uH	5.3uH	2.6uH	1.2uH	1.2uH

Table 2: Band-specific parts.

Operation / Test	Expected Result (Assuming 13.8v DC Supply)
Volts on TR1 pins	Drain 9.1V Gate 0.1V Source 0V
Volts on TR2 pins	Collector 5.0V Base 0.75V Emitter 0V
Volts on TR3 pins	Collector 12.5V Base 5.0V Emitter 4.25V

Table 3: DC tests and expected results.

Operation / Test	Expected Result (Assuming 13.8v DC Supply)
RF volts out	With no load expect about 2 to 3V peak-to-peak
RF frequency out and range*	Set VC fully counter-clockwise and adjust L1 for output at about 5.10MHz using a plastic adjustment tool; ***DO NOT use a metal screwdriver as it will damage the inductor core!*** With VC fully clockwise expect output at about 5.45MHz

Table 4: RF tests and expected results.

Triple bill: a family hobby

Roger Dowling G3NKH meets G4BIP, G0SOI and M7DHR

Roger Dowling G3NKH
practicalwireless@warnersgroup.co.uk

What do antennas like the G5RV, folded dipoles, magnetic loops and the like have in common? They are all reminders of the undeniable fact that that the UK is a small country and that many of us have smaller gardens than we would really like in order to exploit our hobby to the full.

But at a recent field day event I was delighted to meet **Brian Hardy G4BIP** who has no such problems, as the event took place on his farm-holding near Northampton where my eye was quickly drawn to an array that even included a lofty full-size top band dipole. When I learned that Brian's wife **Hilary** held the call **G0SOI** and that their son **Dan** was **M7DHR**, I felt sure that readers might like to know more about this amateur radio family, **Figs. 1** and **2**.

Brian's early memories

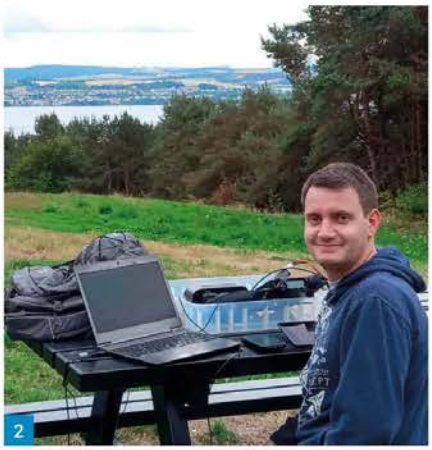
Dundee-born Brian was always technically minded, even as a youngster. It was therefore not entirely bad news when, having failed his 11-plus, he found himself in the technical stream at Dundee High School. The best present his parents ever gave him, he recalls, was a Philips electronic engineering kit. *"I remember building a two-transistor radio when I was in my early teens so I could listen on the medium wave in bed when I should have been asleep"*, he told me with a smile.

Brian's early interest in electronics stood him in good stead. From Dundee High School he went on to Dundee University where in due course he took a degree in electronic engineering. *"The university had close links with Aberdeen's oil industry in those days"*, said Brian. *"It had its own weather station and we used to track the National Oceanic and Atmospheric Administration (NOAA) weather satellites and send weather pictures to the oil people in Aberdeen"*.

Amateur radio

Brian's involvement in amateur radio came about by accident. A family holiday in 1979 took him, as a teenager, up to John O'Groats in the north of Scotland. There they happened to park their car next to a car sporting a bunch of aerials (as they were invariably known in those days) and a mobile transmitter. The owner turned out to be G3TIH and Brian has retained his QSL card as a happy reminder. His interest sparked, Brian became a keen *Practical Wireless* reader and joined the welcoming local Kingsway Technical College amateur radio club (still active today as Dundee Amateur Radio Club).

Brian passed his Radio Amateur Exam (RAE) in December 1971. His father obligingly



learned CW, enabling him to pass his Morse test at Stonehaven ship-to-shore station soon afterwards, and Brian became the proud owner of the call G4BIP in 1972.

Finding a job...

Brian recalls that there were 'dozens' of job opportunities when he left Dundee University with an honours degree in Electronics in 1977. In the event, he moved south to join Honeywell's computing division in Hemel Hempstead, designing interfaces between their minicomputers and a wide range of electromechanical devices.

Taking up the story, Hilary told me that it was Hemel Hempstead Amateur Operatic and Dramatic Society that led to her involvement in amateur radio. She had been a member since she was 16, following in the footsteps of her father who had long been involved in the society. Coincidentally, Brian shared lodgings

with a member of the society, as a result of which Brian soon became involved in helping out with the lighting, stage work and other technical aspects. *"Brian had a transceiver in his Renault 4"*, recalled Hilary, *"and I remember my first experience of amateur radio in the form of a QSO with a station in Sheffield!"* Adopting a policy *"If you can't beat 'em, join 'em"* she took her RAE with the help of Brian, who was already teaching at the local technical college, and in due course became G7SOI.

Hilary modestly described herself to me as a 'jack of all trades and master of none' – but the evidence would suggest otherwise. Her work over the years has included work for an optical/scientific company and she subsequently took a Higher National Diploma in hospitality management and worked in a golf and country club and an hotel. For a time she was an administrator with Age Concern. Then, quite by chance, she found herself 'helping out' at a local video company where in due course she became account manager, producer and director. *"It was wonderful time"*, said Hilary. *"We made a lot of corporate videos, particularly at Heathrow and Gatwick for the construction industry. I even employed Brian for a time!"*

An American link – and more callsigns

While still at Honeywell, Brian and Hilary had the opportunity to visit the USA and meet fellow employee **Michael Raisbeck K1TWF** who for many years was vice-director of the ARRL It led to a close ongoing friendship, and in the course of the next few years successive visits resulted in Brian acquiring his own American call W1TE and Hilary also becoming N1QBV.

"One highlight of our visits to the USA was taking part in an American field day organised by the Concord (New Hampshire) radio club who agreed to use my call W1TE for the day", recalled Brian. *"It was a massive event, with a park-full of mobile generators, catering and so on. It was the first time I encountered a full-length two-element beam on topband!"* Hilary was also called upon to play her part, as the club was keen to get a woman's voice on the air. *"We accumulated over 5,500 QSOs over the weekend"*, she told me.

A change of job

By 2003, the electronics element of Brian's work at Honeywell was declining and the opportunity arose for a change of direction. He had already become involved in the local hospital radio in Hemel Hempstead so it was fortuitous that the BBC were at that time seeking specialist software engineers at Broadcasting House in London. Built in 1932, 'BH' was in the throes of major change to transform it into a broadcast centre for the 21st century – not an easy task in a physically restrained Grade II listed building, **Fig. 3**. Gone were the analogue mixing desks tape machines and splicing tape that had been in use for decades, to be replaced by wholly digital systems, **Fig. 4**. Brian became one of the project team working on this challenging task, as a result of which the Broadcasting House production process today is fully digital from beginning to end. *"It was a great time to be there"*, said Brian, *"particularly for someone like me coming into broadcasting with an IT background"*.

Fig. 1: Brian G4BIP and Hilary G0SOI in their shack near Northampton. Fig. 2: Dan M7DHR enjoying portable operations in Scotland. Fig. 3: Broadcasting House today. The extension to the right was completed in 2011 and a piazza was formed between the two buildings. (Photo: Nick Garrod) Fig. 4: A Calrec digital sound desk in the BBC Radio Theatre is typical of the modern mixers that has made broadcasting fully digital from beginning to end. (Photo: Nick Garrod). Fig, 5: Brian and Hilary's eco-home.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Although Brian's work was essentially behind the scenes it was pleasing to learn that his amateur radio background did come in useful on at least one occasion. *"One of the production team asked if we had a beeper that could be used to simulate Morse code in a children's programme"*, he told me. *"However, he accepted that one couldn't really get away with random beeps so I ended up recording some proper CW, which is what they used in the final broadcast. They even gave me a credit at the end of the programme!"*

Fig. 6: The main mast supports a three-element beam for 6m, a two-element Tribander for 20m, 15m and 10m, and other wire antennas. Fig. 7: A drone's-eye view of the beams. The shack can be seen in the distance below. (Photo: Nick Garrod). Fig. 8: The shack and veranda. The dish and Yagis are for satellite work and the solar panel in the foreground provides a 12V supply for ancillaries. Fig. 9: Dan finds his 3D printer ideal for manufacturing small antenna accessories.

A move to the country

A change of circumstances around 2018 led to a major decision to move house: Brian was attracted, like most radio amateurs, by the thought of more space for antennas and Hilary by the prospect of more space in which to enjoy her love of gardening and the outdoors. This led to a 60-mile move to their present farm in a very tiny hamlet in rural Northamptonshire, which came complete with half an acre of land, subsequently extended by a further three acres, and a barn with outline planning permission for conversion into a family home, **Fig. 5**.

The building work was a major but very fulfilling three-year challenge. While the building work was taking place they had to live in very basic style in their canal boat moored nearby. Brian and Hilary were keen to make the house as eco-friendly as possible. While the basic structure and appearance of the barn was retained to meet planning requirements, the walls were rebuilt using structurally insulated panels (SIPs) rather than traditional bricks and mortar. Under-floor heating is provided by an air-source heat pump, and the house, which is virtually air-tight, is ventilated by means of mechanical ventilation with a heat recovery (MVHR) heat exchanger, which pre-warms the incoming fresh air with the stale air being expelled.

The G4BIP/G0SOI antennas and shack

Not surprisingly, an impressive array of antennas takes full advantage of the space available. The main mast carries a three-element beam for 6m and a two-element Tribander for 20m, 15m and 10m, **Figs 6** and **7**. Other guyed masts support an array of wire antennas, including a dipole for topband, a trap dipole for 80m and 40m, a second trap dipole for 60m and 30m, and a general-purpose G5RV. A spacious and well-equipped cabin with veranda, **Fig. 8**, is located some distance from the main house. The main radio gear includes a Kenwood TS-950SDX HF-WARC transceiver with monitor-scope, a Heathkit SB1000 linear, a Yaesu FT-991A and an Icom R9000 HF/VHF/UHF receiver/scanner. Adjacent to the shack is a dish and a cross-Yagi for 2m and 70cm satellite work.

Dan'sstory

Dan lives only a few miles away from Brian and Hilary in Luton. Although he had always taken an interest in his Dad's amateur radio activities, we have Covid to thank for providing the time and motivation for Dan's acquisition of his own amateur radio licence. This provided the time and opportunity to enrol on an Essex Ham online course, thanks to which he passed his Foundation exam in August 2021 and became M7DHR.

Dan is particularly keen on portable operation. His present gear includes a Yaesu FT-857D and FT-818 HF/VHF/UHF transceivers, an FRG-7700 HF receiver and an FT-290. He already has over 200 logged contacts (71 confirmed) QSOs across 42 countries, including the Faroe Islands on SSB. His wide range of antennas include a Diamond X-30 in his loft, homebrew 5/8th wave 2m and 70cm groundplanes, a 10m vertical coax antenna, an 8-element 2m Yagi and homebrew 20m and 40m dipoles.

A useful accessory for antenna construction is his Prusa 3D printer, which enables him to design and manufacture all manner of insulators and dipole centres, **Fig. 9**

9

Retirement—and afterwards

By 2020 and still working part-time at the BBC, Brian began to feel that the 80-mile commute was starting to become too time-consuming and expensive, and retirement was starting to beckon. Not only did he want to devote time to other interests, but he also became a volunteer at the RSGB flagship National Radio Centre GB3RS at Bletchley Park – a role he finds deeply satisfying.

There are many ways of enjoying amateur radio: some of us like to be lone operators, some like to join a club and others enjoy giving talks around the country. I was delighted to meet Brian, Hilary and Dan, who have, quite simply, made their love of our hobby into something of a 'family' concern. **PW**

Mike Richards G4WNC
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If you're looking for a speaker at your local club, I can provide a range of talks free of charge. For up to 30 miles from Ringwood, I'll come to you, and for those further away, I have a Zoom account available that we can use at no cost. Here's a list of the talks currently available:

- **SDRs without the maths**: An illustrated look at the principles that support the SDRs we all use without delving into the maths.
- **VarAC - Chat Reinvented:** A detailed look at the VarAC data mode, where I show you how to set it up and use recorded QSOs to show you how the system operates.
- **Data Modes Introduction:** An illustrated introduction to the popular data modes showing how to get started.

Si5351 bench clock generator

The Si5351 Clock oscillator chip has significantly impacted amateur radio projects and test equipment. It can produce three independently adjustable and buffered square wave outputs in its simplest form. The larger version of the Si5351 can expand that to eight outputs. Each output frequency can be separately configured, while a single reference oscillator controls the frequency accuracy. The reference can be an onboard crystal oscillator or, for ultimate accuracy, an external GPS-tempered oscillator. The original purpose of the chip was to replace the multiple clock oscillators often found in computer systems. While the chip has done well in that application, it also has great appeal as a variable frequency oscillator, where its frequency range of 8kHz to 160MHz makes it ideal for use in amateur QRP rigs. Although a square wave is often not ideal in these applications, it is straightforward to produce a sinewave with some simple lowpass filtering.

My attention returned to this chip when I purchased an Si5351 breakout board and Nano-based controller from **Makis SV1AFN**. Makis has been in the business of producing interesting modules for radio amateurs for many years. Makis usually starts with the manufacturer's design notes and always uses good-quality components. This ensures predictable performance and avoids the perils of buying sub-standard Chinese modules from online marketplaces!

I've shown a photo of the completed clock oscillator module in **Fig. 1**. Here, you can see that the three output SI5351 daughter board sits on the controller board, complete with an Arduino Nano clone microcontroller. If you look carefully, you will also see that all the

1

A bench clock generator and more

This month, there is plenty to cover with a brand-new release of VarAC, a few tricks to help run popular software on a Pi 5, and a useful bench clock oscillator from SV1AFN. But **Mike Richards G4WNC** starts with a quick advert for his free club talks.

Nano pins have been extended to breakout pads, making it easy to extend the design with an OLED display, buttons, and a rotary encoder. There are plenty of Arduino sketches for the Si5351, so this module can be used in many applications, from a three-output fixed oscillator to a three-output VFO covering 8kHz to 160MHz with 1Hz steps.

For my application as a bench clock generator, I wanted to keep it simple and use it as a programmable oscillator to help during the development or testing of projects. A simple Arduino sketch using the Si5351 library developed and shared by **Jason Milldrum NT7S**, can achieve that requirement. I've shown my sketch in **Fig. 2**. As you can see, it's suitably short and here's a line-by-line description of how it works:

Lines 2-4: Here, we're importing the Arduino libraries that do all the hard work

Lines 6-25: All the Si5351 configuration happens in these lines

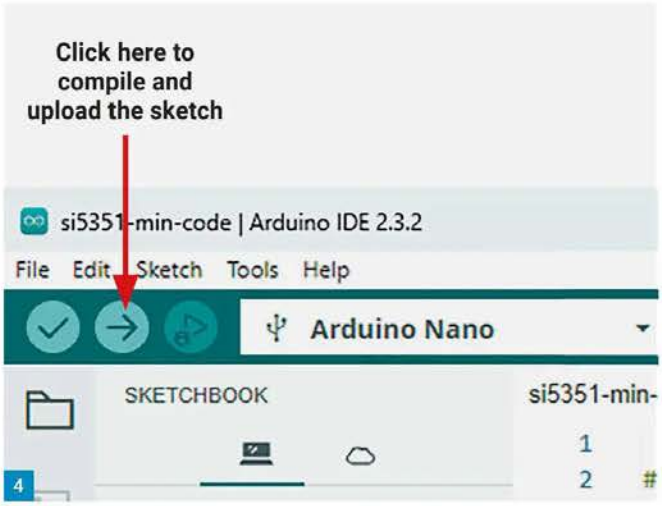
Line 9: This enters the details of the onboard reference crystal

Lines 11-13: These are the important lines where you set the frequency of each oscillator, CLK0, CLK1 & CLK2. You must enter the frequency to 1/100th Hz, but without adding a decimal point. For example,10kHz is entered as 1000000ULL

Lines 16-18: These set the output drive level, which can be 2mA, 4mA or 8mA

```
#include "si5351.h"
#include "Wire.h"
Si5351 si5351;

void setup()
{
  // Initialize the Si5351
  si5351.init(SI5351_CRYSTAL_LOAD_8PF, 27000000UL, 0);

  si5351.set_freq(100000000ULL, SI5351_CLK0); // set clock 0 to 10MHz
  si5351.set_freq(500000000ULL, SI5351_CLK1); //set clock 1 to 5MHz
  si5351.set_freq(10000000ULL, SI5351_CLK2); // set clock 2 to 100kHz

  //SET OUTPUT STRENGTH FOR OUTPUTS
  si5351.drive_strength(SI5351_CLK0, SI5351_DRIVE_2MA);
  si5351.drive_strength(SI5351_CLK1, SI5351_DRIVE_2MA);
  si5351.drive_strength(SI5351_CLK2, SI5351_DRIVE_2MA);
  //ENABLE OR DISABLE OUTPUTS
  si5351.output_enable(SI5351_CLK0, 1);
  si5351.output_enable(SI5351_CLK1, 1);
  si5351.output_enable(SI5351_CLK2, 1);
  si5351.update_status();
  delay(500);
}

void loop()
{
// Nothing to do here repeatedly
}
```

2



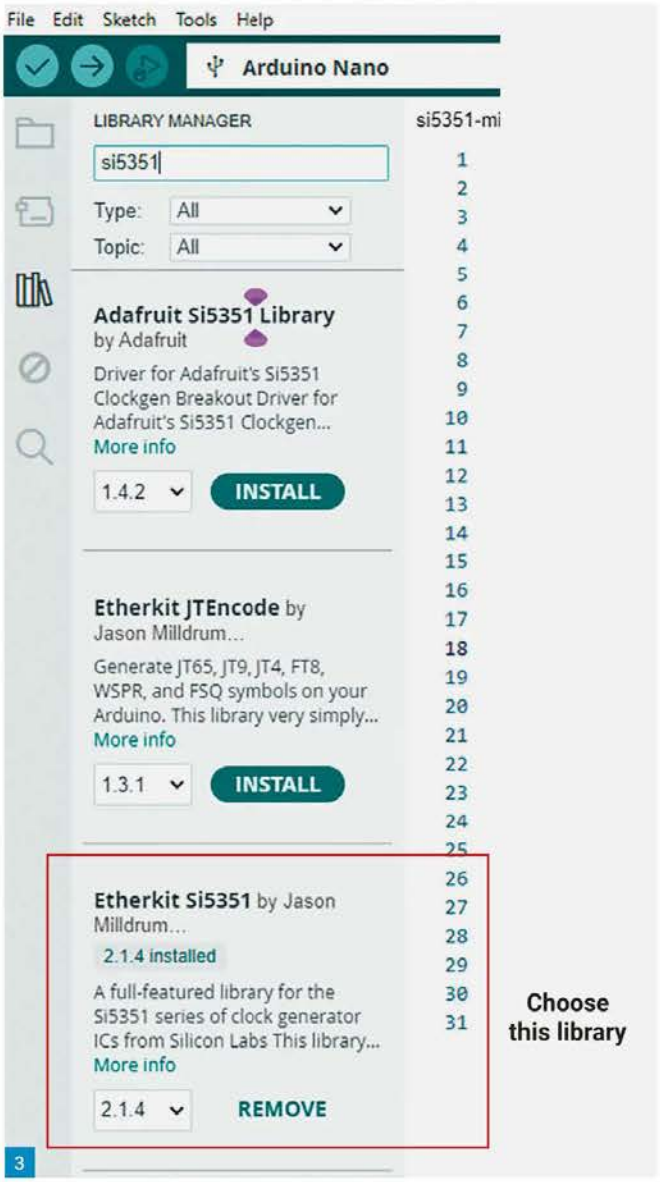


Fig. 1: SV1AFN – Si5351 clock oscillator & controller. Fig. 2: Simple Arduino Sketch for the bench oscillator. Fig. 3: Selecting the correct Si5351 library. Fig. 4: Arduino Upload button.

Lines 20-22: These activate/enable each output. Set to 1 to activate and 0 to turn off or deactivate

Line 23: This forces the Si5351 to load our settings

Line 24: This is a half second delay to allow the Si5351 to settle

Lines 27-30: This is an infinite loop. Once we've configured the Si5351, we don't need the Nano microcontroller, so we send it into an endless loop!

To save you hand-typing and possibly adding the odd typo, I've uploaded this sketch to my GitHub site, and you can find it here: **https://tinyurl.com/vmk9mww7**

Uploading the sketch

The free Arduino IDE (Integrated Development Environment) makes programming Arduino-compatible chips a breeze, but those new to the system can have problems getting started. To help, I've produced a step-by-step guide to programming the Arduino Nano clone on the Si5351 controller board.

Begin by downloading the Arduino IDE from this link:

https://www.arduino.cc/en/software

Double-click on the .exe file to start the installation once the download is complete.

Follow the prompts to complete the installation

Start the Arduino IDE, if it's not already running

Download the .ino file from my GitHub site or enter the code

If you've downloaded the code from GitHub, go to File – Open and navigate to the .ino file to load it into the IDE

The next step is to install Jason Mildrum's Si5351 library

Go to Sketch – Include Library – Manage Libraries

In the search box, enter Si5351. Select the library titled 'Etherkit Si5351' and click the INSTALL button, **Fig. 3**.

Those steps ensure you have the Arduino IDE with the library installed and the program loaded. We need a few more steps to finish the process as follows:

Use a USB cable to connect your Arduino Nano to your PC

Open Device Manager, choose 'Ports (COM & LPT)' and make a note of the COM port used by your Nano. It's typically called USB Serial Port (COM__). If you're unsure which one it's using, note all the COM ports and disconnect the Nano USB cable. The one that disappears is the one you want! Plug the Nano back in and

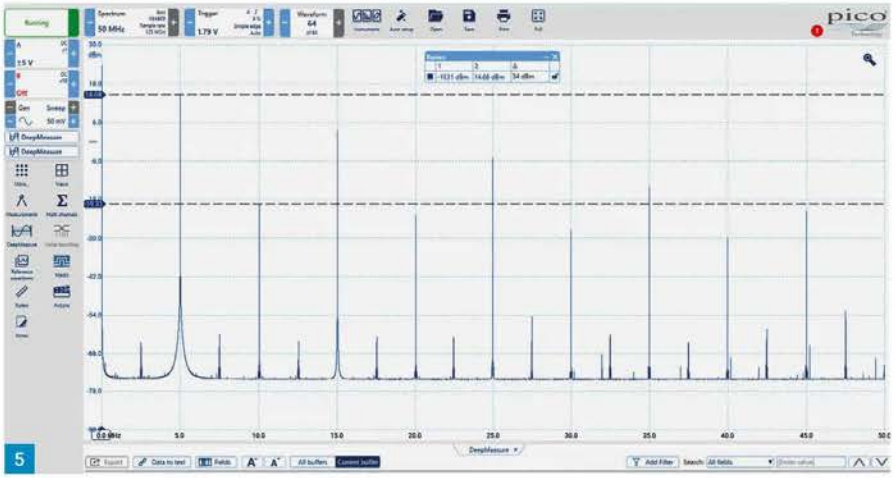


Fig. 5: Si5351 Spectrum analyser trace showing the 2nd and 3rd harmonics.
Fig. 6: VarAC new settings panel.

return to the Arduino IDE.

Go Tools – Board – Arduino AVR boards – Arduino Nano

Go to Tools – Port and select the COM port you noted earlier. If all is well, you should see a note on the bottom-right status bar saying Arduino Nano on COM

The final step is to choose the correct bootloader for this clone board and set the programmer. Go to Tools – Processor and select ATmega328P (Old Bootloader) also, Tools – Programmer – AVR ISP

That completes the configuration. You'll be pleased to hear that you only have to do that once!

To upload the sketch to the Nano controller board and program the Si5351, click the green circle with the right-facing arrow, **Fig. 4**. This will compile the sketch into the correct format and upload it to the processor. You will see the RX and TX LEDs on the Nano flicker during the upload. Once the upload is complete, the Si5351 will produce the programmed outputs, and you can close the IDE. The board needs only to be connected to a 5V power source for normal operation. That could be from a USB port or a USB power pack. You could also supply the board from an external 5V supply using the +5V and ground pins on the controller board.

Si5351 performance

As mentioned, the SI5351 produces a square wave output rich in harmonics, as shown in the spectrum analyser trace in Fig. 5. As is typical of square waves, the output has strong third-order harmonics, but the second-order harmonics are much lower. Taking measurements from the trace in Fig. 5, the 2nd harmonic is -34dBc, while the 3rd harmonic is -13dBc. This natural suppression of the second harmonic makes filtering much simpler. There are also three output level options for the Si5351, namely 2mA, 4mA and 8mA. These are the drive currents available at each output. While this is common terminology for computer systems, dBm is more appropriate for RF use. I've shown the approximate conversions in Table 1. Each measurement used an HP34401A True RMS Digital Multimeter with a 50Ω termination and the Si5351 set for a test frequency of 15kHz.

Raspberry Pi 5 data modes tips

As the Pi 5 is now widely available, I suspect many of you may have tried to run some of the popular data modes software. While WSJT-X works well, some of the other software, such as FLDIGI, struggles. There are a couple of reasons for this. To support the Pi 5, the Raspberry Pi Foundation introduced the Bookworm OS (Operating System). Bundled with this release was a change to the Wayland window manager. Although the Pi runs Linux, you view and operate software in separate windows. Wayland is the new software that manages those windows. Previously, the windows were handled by the OpenBox X11 backend. This change in window management has caused significant problems for some software, causing odd graphic effects and program hangs. Fortunately, the Pi team recognised the potential for problems and included an easy switch back to X11. Here's a step-by-step guide:

Open a terminal session (Ctl-Alt-T)

Enter: sudo raspi-config

Choose option 6 Advanced Options

Choose option A6 Wayland

Choose W1 X11

Press the Tab key to navigate to the OK button and press Enter

Press Enter again on the next screen choose Finish and Reboot

Another common problem arises from changes to the memory page size. The Linux kernel deals with memory allocation in pages; for a long time the standard page size has been 4k. However, in Bookworm's 64-bit Pi 5 version, the page size has changed to 16k. This change increases the speed of the Pi 5 by up to 7%. However, many older software programs can't handle this fundamental change and suffer from memory allocation problems. As with the windows problem, switching back to 4k page size is simple, as shown here:

Open a terminal session (Ctl-Alt-T)

Enter: sudo nano /boot/firmware/config.txt

At the bottom of the displayed file add or amend the following:

[pi5]

kernel=kernel8.img

Once complete, press Ctl-x then Y then Enter to save and close the file. Now reboot the Pi so the changes take effect.

I am working on a Pi 5 version of my pre-programmed Data Modes card. Most of the vital software is installed and running well. I have been trying to get VarAC running under Wine, but it's taking some time to get right.

Si5351 output drive	Level in dBm (50Ω)
2mA	-0.7dBm
4mA	+5.3dBm
8mA	+11.1dBm

NB: Results are approximate and apply to my test model.

Table 1: Si5351 output levels in dBm

VarAC new release

I'll look closer at this new release next month, but **Irad's** team has added more useful features to this rapidly developing software. The V8.6.2 release includes multilingual interface support, so languages other than English are included. The settings panel, which has always looked a bit intimidating, has been simplified by showing the different sections in tabs, **Fig. 6**. The useful broadcast mode has been improved by using lower speeds through the VARA modem when SNR levels are poor. CQ calls can now be customised to include custom elements, ie, QRP, DX, etc. Finally, Vmail notifications will be shown in the beacons list. All in all, that sounds like a valuable boost to an already excellent package. **PW**

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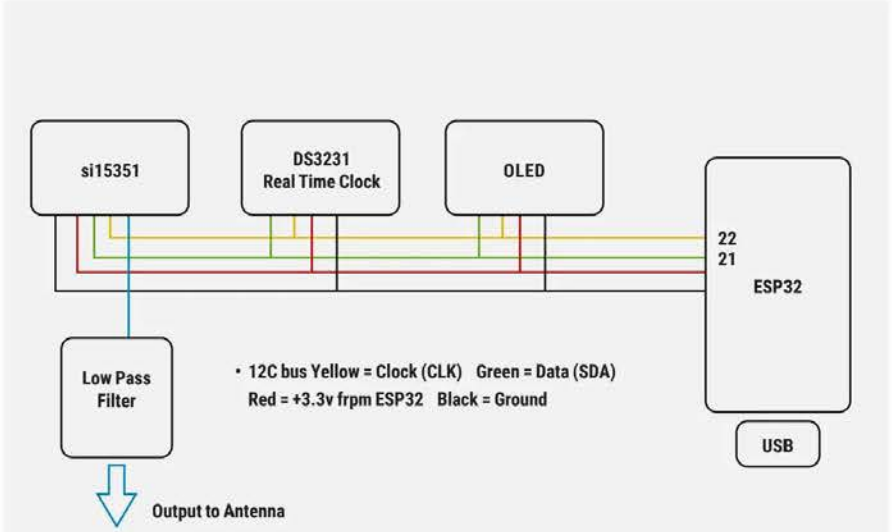


1

A beginner's guide to the Arduino IDE culminating in a single-band WSPR beacon (Pt I)

Colin Campbell MM5AGM takes readers through the design and build of an Arduino-based WSPR beacon.

This article will show you how you can make a single-band WSPR beacon with a power output of 10dBm, 0.01Watt, using the Arduino IDE, five components, and a phone charger power supply. The single band WSPR beacon only requires an ESP32 microprocessor, an si5351 function generator, a real time clock, a lowpass filter, and an OLED display but if your eyesight is like mine, you will also need a magnifying glass to read the display. **Fig. 1** is a block diagram of the complete circuit, and yes, there are only seven wires plus the power. Total cost should be less than £50.

Why Espressif ESP32?

The ESP32 has built-in Wi-Fi to connect to your router and get to the internet. It is also very fast and has a lot of memory and input/output pins. The problem with them is that there are lots of different varieties and the input/output pins can be in different positions. Just to make things even more awkward, they come as 30 pins as well as 38 pins and they are not breadboard friendly. If you want to use them on a breadboard, you need to put two breadboards together and span the ESP32 across the boards but it's now possible to get holders for them and these make things a lot easier. If you haven't bought a specific ESP32, like one of the Adafruit versions, you probably won't get documentation.

To identify them they normally have some marking on them so you can select the one you have in the boards manager. If there is no marking and the seller didn't tell you what one it is, you'll just need to guess. If you get it wrong, the program will probably run very slowly or not at all, it won't damage the chip. My 38 pin ESP32 says 'Node MCU ESP-32S', my 30 pin has no markings but worked with "DOIT ESP32 DEVKIT V1". When I tried it with "NodeMCU-32S" it sometimes worked very slowly and sometimes not at all.

The ESP32 is static sensitive but the easiest way to kill it is to attach, or disconnect, something to it while it is powered on so always disconnect power before adding, or taking away, anything to the circuit. Espressif, the makers of the chips, have excellent documentation at: **https://tinyurl.com/4b9n3n2m**

Install Arduino and upload a sketch

If you are new to the Arduino, this project might seem rather daunting but stick with it because, once completed, you will be able to take advantage of the many other projects available on the internet. This step will show how to upload a program, or as the Arduino calls it a sketch, add your ESP32 to the IDE, upload a sketch and add libraries. Libraries are extremely useful collections of routines that other people have written. As an example, the Network Time Protocol, NTP, library that we will use allows acquiring the date and time with one line of code.

I'm not going to delve too deeply into the actual programming because that isn't necessary. The sketches have all been tested so all you need to do is upload them. I will, however, explain some bits of the more obscure notation at the end of this article. My intention is not to teach you how to program, but how to use the Arduino with a microprocessor. The programs are functional but experts will find fault because I haven't used best programming practice. One aspect of best practice is a minimum of global variables, variables that can be seen anywhere in the sketch, and instead passing variables between functions. If this series of articles whets your appetite, you will find lots of information, and free books, on the internet that will teach you how to program. The programs in my GitHub repository only require you to change a few entries in each program to get them working. For most of the sketches you only need to enter your Wi-Fi ssid and password.

Thanks to Arduino it's now easier to develop software and transfer it to microprocessors. We can connect other hardware to the microprocessor to do useful things, like switch things on and off, or display readings from probes, temperature and humidity for example. The Arduino doesn't only connect to Arduino boards, it can connect to other manufacturers' boards as well. By the end of this section, you will be able to load the source code, a program written in "C/C++", onto an Espressif ESP32 device and get the date and time from a network time protocol, NTP, server.

Now you're probably wondering what this has to do with radio. Well, if you're a licensed radio amateur, and stick to the end, you will have a single-band WSPR transmitter that will cost you less than £50 for all the hardware and software. WSPR needs an accurate time source and that's where the NTP server comes in. Be aware, however, that due to latency on your network, the time reported may be slightly out. It should be out by less than a second though and that's fine for WSPR.

I'll start by programming a bare ESP32 and then add parts one by one until the WSPR transmitter is complete. By doing it this way, we can test each module and if it doesn't produce the required result, you only need to check the last bit that you added. I'll show you how to get the Arduino IDE up and running and then use that to upload a sketch, the "C/C++" code, to an ESP32

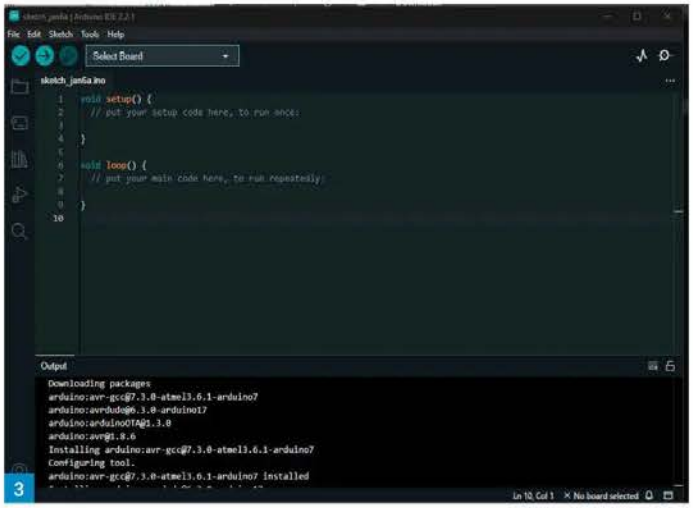


Fig. 1: Block diagram of complete circuit.
Fig. 2: Screenshot after initial installation.
Fig. 3: The opening screen allowing code to be written. Fig. 4: Windows device manager.

microprocessor. If you haven't used the Arduino integrated development environment, IDE, before it can be quite a steep learning curve. The WSPR version I currently run is a multiband version that adds switching lowpass filters for extra bands and different bands before and after sunset. The number of bands is only limited to the number of lowpass filters available. You won't need to learn how to code, just how to download the code from my GitHub repository (URL below) and upload it to the ESP32. Construction is easy because the devices only need power, supplied by the ESP32 from a phone charger, not the best filtered I know, and another two wires connected to the I2C bus. The I2C bus can be thought of as a road with houses. Just as each house has a different house number, devices on the I2C bus have different addresses associated with them. The ESP32 sends and receives individual instructions to each device via this bus.

https://github.com/mm5agm

Download the Arduino IDE

The first thing we need to do is download the Arduino IDE. You can do this from:

https://www.arduino.cc/en/software

You will be asked if you want to contribute a sum of money for development costs but you can download it for free. My computer's operating system is Windows 11, so I downloaded "Windows Win 10 and newer, 64 bits". I don't have a Linux or macOS computer so, if you have, you may need to alter some of the instructions in this article. Once you've downloaded the program, run it and just select all the defaults. You should end up with the screen shown in **Fig. 2**. Tick "Run Arduino IDE" and click Finish. This will give you the Arduino IDE screen.

Setup the Arduino IDE

The IDE will probably install some default Libraries. At the top of the Arduino screen, **Fig. 3**, you will see the sketch name you're working on. In my case sketch_jan6a. The next line shows the top-level menu items, "File, Edit, Sketch, Tools, and Help". Under each of these options there are other menus. The next line shows a tick, an arrow, a weird symbol, a box showing what device is connected and at the far right, a shortcut to the serial plotter and a shortcut to the serial monitor. The tick means get the compiler, a program inside the IDE that produces machine code from the text sketch, to check the sketch is ok and will produce machine code for the ESP32. The arrow is to compile and upload the sketch to your device, the serial plotter creates a graph of what's arriving at the serial port and the serial monitor allows you to see what information is coming back from your device. You can use the serial monitor to print the values of variables as your sketch runs.

So as not to fill this article with screenshots I'll use the convention "Top Level Menu/Sub Menu1/Sub Menu2" to tell you where to go. As an example, to get to the "Blink" example mentioned later, I would use "File/Examples/01. Basics/Blink". You will notice that, at the bottom right of the screen it says "No board selected". We need to tell the IDE what board we are using and what serial communication port it is on. Move your mouse pointer out of the IDE and open windows "Device Manager" by right clicking the windows start symbol at the bottom left of the windows toolbar and selecting it. Plug your ESP32 into a USB port. In Device Manager, **Fig. 4**, expand the "Ports (Com and LPT)".

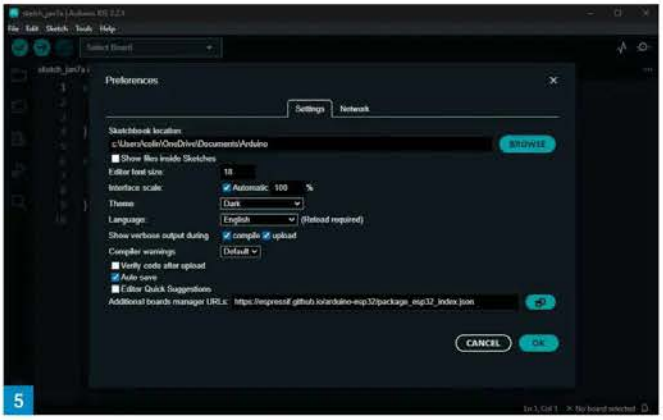
You can see that my ESP32 is connected to COM3. If you have lots of devices and can't work out what port your ESP32 is connected to, just unplug it, one of the ports will disappear, and then plug it in again. Device Manager will rescan the ports and put it back in. Now go back to the Arduino IDE and open the "Preferences" option,

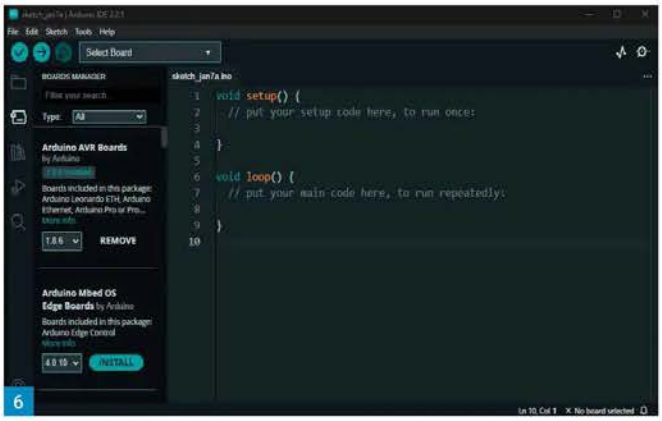
Fig. 5, "File/Preferences".

Fill in the fields for Font size etc. Take a note of where the Sketchbook location is because any libraries you add will be in Sketchbook location/libraries. You will see that I have selected the "Dark" theme. That's the one I prefer because it gives me a better contrast for the text. To get the ESP32 microprocessor boards into the IDE, you need to fill in the "Additional boards manager URLs" with:

https://tinyurl.com/m8cc3v3y

Compiler warnings can generate a lot that we're not interested in so just set it to "Default". If you set warnings to "More" or "All", the compiler will also report what it thinks are errors from the libraries and will not compile. Click "OK". Then "File/Save" then "File/Quit". The next time you start the IDE it will allow you to add the ESP32.





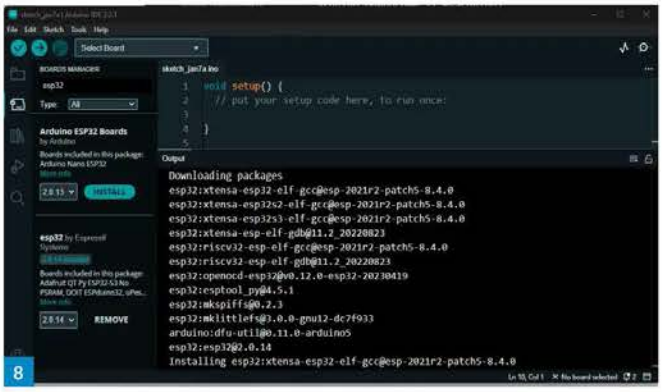


Fig. 5: Setting preferences. Fig. 6: Filtering the boards. Fig. 7: Getting the ESP32 boards. Fig. 8: The relevant packages being downloaded. Fig. 9: Select your board. Fig. 10: Using the upload facility. Fig. 11: The author's download page. Fig. 12: Possible warning message.

Installing the ESP32 into the Arduino IDE

Restart Arduino IDE and select "Tools/Boards Manager". In the "Filter your search" box, put ESP32. The next screenshot, **Fig. 6**, shows the screen before filling in the search box. I put it in because it can be quite difficult to see where the search box is, it's the bit that says "Filter your sketch".

Put ESP32 in the search box as in **Fig. 7** and select "Install" for the option "esp32 by Espressif Systems".

The "Output" box at the bottom of the IDE, **Fig. 8**, will show that packages are being downloaded.

You will know that the boards have been installed when "INSTALL" changes to "REMOVE". Now that we have the boards installed, we can go to "Select Board", **Fig. 9**, and click the small down arrow. At "Select other board and port…". in the search box I typed "node" as I know my ESP32 is a NodeMCU-32S, and selected "NodeMCU-32S" in the drop-down list. Tick your ESP32 and tick the serial port it is on.

Save and close the Arduino IDE. You will be glad to know that your setup is complete.

Initial Test of Sketch and ESP32

Open the Arduino IDE, go to "File/Examples/01 Basic/Blink" and open it. This sketch blinks the built in ESP32 LED once a second. To get it onto the ESP32 we need to compile it and upload. To do that we'll use the upload button, **Fig. 10**, the right pointing arrow. The upload button both compiles and uploads. At the start of the sketch, you will see "/*". This tells the compiler to ignore everything until it gets to the symbols "*/". It's a handy way to put lines of comments in. Another way to put comments in is to put "//" in a line and the compiler will ignore everything else on that line only. Open the serial monitor "Tools/Serial Monitor" so you can get feedback from your ESP32. Go to the extreme right of the Serial Monitor portion and check that the baud rate selected is 9600, the same as in the sketch. Click the upload button, the right pointing arrow, and when you see "Connecting…." in the output monitor, press and hold the "Boot" button, for a second or two. The "Boot" button is on the right-hand side of the USB port, when the USB port is at the bottom. This operation can be a bit pernickety, sometimes you don't need to press boot and sometimes it takes a couple of presses.

If you get

Connecting…….

A fatal error occurred: Failed to connect to ESP32: Wrong boot mode detected (0x13)! The chip needs to be in download mode.

For troubleshooting steps visit: https://docs.espressif.com/projects/esptool/en/latest/troubleshooting.html

Failed uploading: uploading error: exit status 2

Then check your ESP32 is on the serial port you have selected. Keep trying till it loads. If your ESP32 built-in LED blinks, you've proved the setup is OK. If it doesn't, you've probably got an ESP32 with a faulty built-in LED. I have one of these. You'll find out if you're ESP32 is connected correctly when you load the next sketch.

Anatomy of a Sketch

When you write a new sketch the IDE gives you a standard template.

```
void setup(){
 // put your setup code here, to run once:
void loop(){
 // put your main code here, to run repeatedly:
}
```

Void means that this function doesn't send anything back to the function that called it. Function code starts at the "{" and ends at the "}". The "setup" function only runs once when your sketch starts and is used to tell the compiler what input/output pins you're going to use, maybe to initialise some devices, connect to the internet for example. The "loop ()" function runs continuously and when it gets to the end of the loop it starts again. You don't want any function to be large as it gets difficult to maintain so the

trick is to break it into smaller logical units. The setup() in my multiband version has initialiseGPIOpins(); initialiseDisplay(); initialiseWiFi(); initialiseRTC(); initialseSun(); all functions that do 1 thing only and this saves setup() from being huge.

Using functions means you only need to write code once. You just call the function when needed. A function can return nothing, void, or a result. Now these microprocessors run very fast, the ESP32 can be set to run at 240MHz, which means 240 million clock cycles a second, so sometimes you need to put a delay to slow things down so you can read the serial monitor. "Delay(1000)" will stop the process for 1000ms, one second. The Arduino only needs one clock cycle to add two small whole numbers, designated integers, but can take several hundred to add two big numbers with decimal points, designated a float. Listed above "setup()" is where we declare what libraries we are going to use and any global variables. A global variable can be seen at any part of the sketch so it's handy in some respects but not in others.

If you want a counter inside a function, it's best to declare it there. That way the counter is only seen inside the function and it's discarded when you leave the function. A common counter to use is "int i". This is a throwback to old mathematicians who used i and j to denote rows and columns in an array. Because it's used all through the program you may think it should be global, but if it was, it would hold its value so if you have a function that uses it and changes its value, and it calls another function that uses it, you'd need to be extremely careful as to what value it has when it moves between functions. Far easier to make it local so that when the other function uses it, we're sure of its starting value.

Download the GitHub sketches

Let's get started on a program, or in Arduino language, a sketch, that we can build on to get a working WSPR transmitter. Go to my repository (**Fig. 11**, URL below) and download the code as a zip file.

https://github.com/mm5agm/WSPR

Click on the <> Code and select "Download ZIP", then save as WSPR_Examples.zip in your sketches folder. Unzip this into your sketches folder. It will call the folder WSPR-master so rename that folder WSPR_Examples. Inside WSPR_Examples you will get the License agreement for use of the code as well as the programs/sketches. I've used GPL V3.0 license, which basically means that it's free to use but if you use any of the code in a project that project must also be under the GPL. This "copyleft" approach guarantees that the software, and any derivatives of it, remain free for all users. It's a way to ensure that the community benefits from improvements and that projects remain a collective endeavour. I also say that the programs come without any warranty; without even the implied warranty of merchantability or fitness for a particular purpose. This is so I can't be sued no matter what happens. Open up the Arduino IDE, go to "File/Open" and navigate to where you unzipped WSPR_Examples and select "WSPR_Examples/ NTP_Basic /NTP_Basic.ino" If you get this message shown in **Fig. 12** when you open it, just click on OK. When you're back at the IDE, select your board and port as before.

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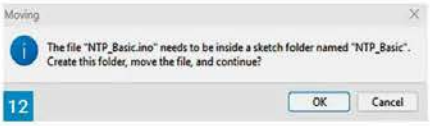
10



12

Now before we attempt to compile the sketch, we need to download an NTP library because there are functions that are in that library that the sketch needs to access. The one I use works with the ESP32, they don't all, so in your browser, go to:

https://github.com/SensorsIot/NTPtimeESP

and download the zip file just as you did in my GitHub repository. Rename it NTPtimeESP.zip, in other words get rid of the -master. I always edit the folder names to get rid of the -master. Don't unzip it, the IDE wants an actual zip file. You can put it anywhere, just remember where it is. In the IDE open the menu "Sketch/Include Library/ Add .zip library", it's second top, and navigate to the folder where you saved the download. Select the zip file and click open. You will get a message in the IDE Output saying "Library installed". If you go to you sketches folder, you will see a new folder called "libraries" and inside that there will be a folder called "NTPtimeESP". If it has -master and like me you think that's untidy, you can rename it without the -master. Now, in the IDE, navigate to where you unzipped WSPR_Examples and select "WSPR_Examples/NTP_Basic/ NTP_Basic.ino", upload "NTP_Basic.ino" to your ESP32 the same way you uploaded the "Blink" sketch, right arrow symbol and hold the "boot" switch down momentarily. Click on "Tools" "Serial Monitor" so you will be able to see what's happening. If the serial monitor displays gobbledygook, you've probably got it set to the wrong baud rate, set it to what's used in the sketch, 9600. In the serial monitor you will see that your ESP32 keeps attempting to connect to your Wi-Fi but gives up. The message eventually says

Attempts to connect = 61
attempts = 61
Are you sure you have the correct ssid and password?

If you didn't get a chance to see the message press the "En", enable key on the left-hand side of the USB connector and your ESP32 will restart. Now go into the code and change the ssid and password to yours. Keep the quote marks around them. Now when you upload the sketch it should run and you should get something like

Connecting to Wi-Fi
Using ssid "Your SSID" Password "Your Password"
Attempts to connect = 1
Attempts to connect = 2
- Connected to: Your SSID
- IP address: 192.168.0.79
8/1/2024 16:33:56
8/1/2024 16:34:9

If you're seeing the correct time and date, everything is working. Note that there are no leading zeros and the time only updates every ten seconds. Attempts to connect will give you an indication of how easy it is to connect to your router/hub. You've now connected to the internet, you've queried an NTP server, and you've printed the date and time. If it didn't work for you maybe you're in a dead spot for your home Wi-Fi. If your home Wi-Fi is OK, have a look at the error messages. Typical faults are wrong SSID, wrong Password – the sketch will tell you – or using an NTP server that doesn't exist. If you're in the UK, check that you have the line

const char NTP_Server = "uk.pool.ntp.org"; // pick an ntp server in your area*

char* means this is a pointer – it points to a memory location. NTP_Server is a variable and it's equal to "uk.pool.ntp.org" and "//" tells the compiler to ignore what's after "//" as it's just a comment."

If you're not in the UK, go to the URL below and you will find a server near you.

https://tinyurl.com/5dr8v29s

Steve Telenius-Lowe PJ4DX
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ZB2GI and K9EID SKs

Steve Telenius-Lowe PJ4DX/G4JVG starts with news of two Silent Keys, both of whom will be sadly missed.

We start this month with the very sad news that our regular contributor **Kevin Hewitt ZB2GI** has become a Silent Key. I received his contribution for this column on 7 March, only to discover four days later that he had died suddenly at home after a short illness. Kev was one of the most active amateurs in Gibraltar over the last ten years, operating Phone (SSB and 10m FM), FT8 and occasionally SSTV from a small flat using low power and a simple wire antenna. He also frequently operated the Gibraltar Amateur Radio Society's HQ station as well as portable from 'the Top of the Rock', often with **John King ZB2JK**. His absence from the bands will be much missed.

And more sad news: well-known radio amateur **Bob Heil K9EID**, **Fig. 1**, became a Silent Key on 28 February at the age of 83. In the 1970s Bob's company, Heil Sound, created stadium sound systems for rock bands such as the James Gang (whose guitarist was **Joe Walsh WB6ACU**, famously later with The Eagles) and The Who. Bob also founded Heil Ham Radio and most present-day HF SSB operators will be familiar with Heil headsets and microphones (indeed, I have used a Heil headset and HC-5 microphone for decades).

On 21 February, Ofcom released their *General notice of decision to vary amateur radio licences*, stating *"From today, amateur radio enthusiasts will enjoy greater operating freedoms under amateur radio licensing changes announced by Ofcom"*. As expected, there were no major last-minute changes made to their earlier Statement, issued on 11 December last year, and therefore (for HF operators) the main changes are those noted in last month's *HF Highlights*. In practice this means that UK stations may now be heard using unusual suffixes after their callsign, some stations located in England are using the GE or ME prefix instead of simply 'G' or 'M', and all licence classes are permitted to use higher power levels (subject to some frequency restrictions).

The above is only 'phase 1' of the changes Ofcom will be implementing. Phase 2, which includes the issuing of M8 and M9 Intermediate callsigns, will take place later this year and phase 3 in the financial year 2024-25. Full details of the changes implemented on 21 February can be found at:

tinyurl.com/3wj3bvk6

The solar flux briefly rose above 200 on 13 February and, the following weekend, radio amateurs in the USA and around the world were commenting on the superb propagation during the ARRL DX CW contest. Many noted that 14MHz remained open all night between USA and Europe for example and – unusually when propagation is good on the high bands – 1.8 and 3.5MHz were also in great shape, leading to some new record scores for this contest.


1

The month on the air

Three callsigns were in use from different locations on Robinson Crusoe Island (IOTA SA-005), **Fig. 2**, in the Juan Fernandez group between 11 and 24 February: CB0ZA, CB0ZW and CB0ZEW. CB0ZA and CB0ZW were activated by operators physically on the island, while CB0ZEW QSOs were made by remote operators around the world. While all three stations count for DXCC, CB0ZEW QSOs do not count for IOTA due to IOTA Rules B3.6 to B3.9 concerning remote operation:

tinyurl.com/mrjetckz

A team of four operators, all in their early or mid-20s, operated as 8R7X from Guyana from 13 to 25 February. **Fig. 3** shows **Jamie M0SDV** and **Philipp DK6SP**, two members of the team which together made more than 73,000 QSOs, well over twice their original target. Those doom-mongers who say that amateur radio is dying out should have confidence that HF DXing, DXpeditioning and contesting are all in safe hands with this team!

Sylvia ('Sysa') OM4AYL and **Lubo OM5ZW** were active as 5H4AYL from Pemba Island (IOTA AF-063) in Tanzania from 18 to 28 February.

Stan LZ1GC (**Fig. 4**) and **Ted LZ5QZ** were QRV as FW8GC and TX8GC from Wallis and Futuna from 19 February until 8 March on all bands CW, SSB and digi modes (FT8, FT4 and RTTY).

The long-awaited H40WA DXpedition from Temotu Province (of the Solomon Islands) was on the air from 25 February to 5 March, making around 60,000 contacts. 'Long-awaited', because it was originally scheduled for last year but transportation issues postponed it until February.

The ARRL DX Phone contest took place over the weekend of 2 – 3 March, with excellent propagation particularly between North America and Europe. I was one of six operators at the PJ4G station, **Fig. 5**, here on Bonaire.

TY5C from Benin was on the air using the bands from 5.3 to 28MHz between 3 and 29 March.

Six Belgian operators were active as J38R from Grenada from 4 to 16 March. They had three high-power HF stations plus a low-power station for use on FT8 and RTTY. See:

https://rockall.be

Nobby G0VJG (who actually put Rockall on the air last summer: see *PW*, August 2013) was operating as 5H3VJG from the somewhat larger and more comfortable island of Zanzibar (IOTA AF-032) from 8 to 20 March. He mainly used SSB, with some FT8.

Finally, I was lucky enough to have operated as XU7DXX (**Fig. 6**) from Cambodia a couple of times in 2007, when **Eva PJ4EVA** and I were living in the Far East. However, in recent years there have been reports that it had become difficult to get an XU licence, so Eva and I were interested to read that **Tom DL7BO** would be active as XU7GNY from 27 February until mid-March. At over 17,000km, Cambodia is one of the most difficult parts of the world to contact from PJ4 but, after four evenings of calling on 10MHz, Eva eventually made an FT8 contact. A few days later we both also made QSOs on 14MHz FT8: our last QSOs from PJ4 before going QRT from here. XU was an 'ATNO' (All Time New One) for Eva and a new one on digi modes for me: my last contact with Cambodia was with XU7TZG (SK) back in 2015. It was a good way for us to finish!

What to look for in April-May

TO60CSG is a special event station commemorating 60 years of Europe's Spaceport near Kourou in French Guiana. The callsign is scheduled to be on the air over the weekends of 14/15 and 21/22 April, as well as 5/6 and 12/13 May. See:

www.qrz.com/db/TO60CSG

K5WE and W5CCP will be active as TX7W from Raivavae in the Austral islands between 16 and 30 April on all HF bands SSB, CW, FT8, FT4 and also RTTY. They will have four stations with amplifiers, beams and verticals.

Four Norwegian operators are planning a DXpedition to Market Reef, OJ0T, between 27 April and 4 May. Look for them on all HF bands on SSB, CW, FT8 and FT4.

Fig. 1: Bob Heil K9EID, SK (photo: Wikipedia). Fig. 2: Robinson Crusoe Island as seen from the Landsat satellite (photo: NASA Earth Observatory). Fig. 3: Jamie M0SDV and Philipp DK6SP enjoy time off during an earlier DXpedition. Fig. 4: Stan LZ1GC (right) with your columnist at Friedrichshafen a few years ago. Fig. 5: Kristen K6WX and Bill AC0W operating at PJ4G in the ARRL DX contest. Fig. 6: Much rarer now than it was in 2007, when Steve PJ4DX operated from Cambodia as XU7DXX.

Readers' news

Jim Bovill PA3FDR reckoned that *"With a few exceptions February has been rather unremarkable for DX reception. The highlight of the month was my QSO with PJ5/SP9FIH on the 7th of the month, operating from the Caribbean island of Saint Eustatius. I freely admit that until then I had never heard of the island and had to look it up in Google... Other contacts worth mentioning included RM0F and UA0FO from Sakhalin island, off the eastern coast of Asiatic Russia, FG5FI (Guadeloupe) and 4S7KKG (Sri Lanka). The month finished well with a good opening to the western USA on the afternoon of the penultimate day, yielding several good QSOs from the region."*

Tim Kirby GW4VXE, who operates as **GW4MM** on CW, wrote that he noticed propagation changing away from winter conditions since the beginning of March: the higher bands are staying open much later into the evenings. Although the 21MHz CW sub-band is often quiet, a clue is the 'spike' on 21.074, the main 21MHz FT8 frequency, on the panadapter. If the spike is a reasonable size, Tim often tries a CQ on CW and has been pleasantly surprised by the strength of some of the signals coming back. There's been some good propagation on 7MHz too, as Tim noted: *"During the ARRL CW event, I was playing on 7MHz well into the morning and was delighted to be able to work **VE3EJ** at around 1115UTC (**John's** beam wasn't even on Europe!) Just a little further up the band, I could hear KH6LC coming through at good strength. Although the afternoon long path in winter to California is well known on 7MHz, perhaps it isn't as well known on 14MHz. I had an interesting QSO one afternoon with **Jim K6AR** who was beaming south on the long path. Jim says that most of the people he works during that opening are using verticals or wires, as people with beams tend not to try long path at that time!"*

Owen Williams G0PHY reckoned *"There was plenty of activity this month chasing **Janusz PJ5/SP9FIH** and 8R7X and also activity in the* Coupe de France *and ARRL DX contests. PJ5/SP9FIH was worked on all bands from 7MHz to 24MHz. [Although] we are now able to run up to a kilowatt I went the other way in the ARRL DX contest, using only 10 watts. The best DX was K5TR in Austin, Texas, on 14MHz and I also had a contact with XL3T in Toronto on 7MHz. I don't think there was any particular skill on my part but most of the contacts in the ARRL contest were with well-known contest stations."*

Owen also mused: *"It's a funny old world: earlier in the month Janusz PJ5/SP9FIH was complaining on his website of a lack of callers on SSB and [he] was very easy to work. In contrast, the pile-ups for 8R7X and the current DXpedition to Grenada, J38R, are wide and deep. According to* Club Log *8R is 96 on the most wanted list with PJ5 and J3 being 151 and 153 respectively. It may be due to the fact that Janusz has been to PJ5 at least three times and his signals have not been that strong, whereas the other two DXpeditions have been at a good strength."*

Carl Mason GW0VSW sent a short note to say he had not been so active the past few weeks but he used his Xiegu G90 transceiver at 1W or 5W output into an 'inverted' G5RV to work a few stations, particularly in the RSGB Commonwealth Contest (see 'Band highlights' section below).

Etienne Vrebos OS8D said it has been cold and wet in Belgium for six months, *"but nevertheless I'm very radio-active as OS8D/P and made a lot of new castle activities this month, making a lot of chasers happy. I can hear it in their voices when talking briefly to most of them. It seems a bit of a habit of mine, and as the rules of good DX often repeat 'be short', but even in a huge pile-up I can't avoid saying something more than '5/9'. When a chaser/hunter tells me he's from Grantown-on-Spey (Scotland) I want to add I spent so many nice years in that little town 50 years ago to learn real English. I know it's not done when tens of people are waiting to catch you and your castle, I have to*

Fig. 7: OS8D/P, with mobile whip on the car roof, adjacent to the Royal Palace in the centre of Brussels. Fig. 8: ZB2TEN 10m WSPR reception on 11 February.

improve myself in activations and just give a 5/9; I'll try but it's difficult." **Fig. 7** shows the OS8D/P station at what Etienne described as *"the ultimate activation of the Royal Palace in Brussels centre"*, which he said was *"a little bit sensitive"*!

The final report from **Kev Hewitt ZB2GI (SK)** commented on the variability of band conditions, saying that he *"operated portable with **John King ZB2JK**, quay-side at Coaling Island, only to find the band dead. Operating from the club later, I started calling CQ on 12m and although the band was quiet, I soon had a pile up!"* Kev also sent in **Fig. 8**, which shows the ZB2TEN WSPR signal reception on 28MHz on 11 February. At the time ZB2TEN was operating from the top of the Rock using just a 5m wire connected via a 9:1 balun.

28MHz beacons

Our regular report on the 28MHz beacons, compiled by **Neil Clarke G0CAS**, this month starts with news of a new beacon located near Cape Town in South Africa. Neil says that ZS1TEN on 28222 is providing an excellent indicator of propagation to that part of the world. He also reports that paths to North America during the last week of February were very good, with all the US call areas heard on most days. On 28200 4X6TU was heard every day except the 12th. Staying on 28200, VK6RBP was logged on 23 days with ZL6B heard on 17 days.

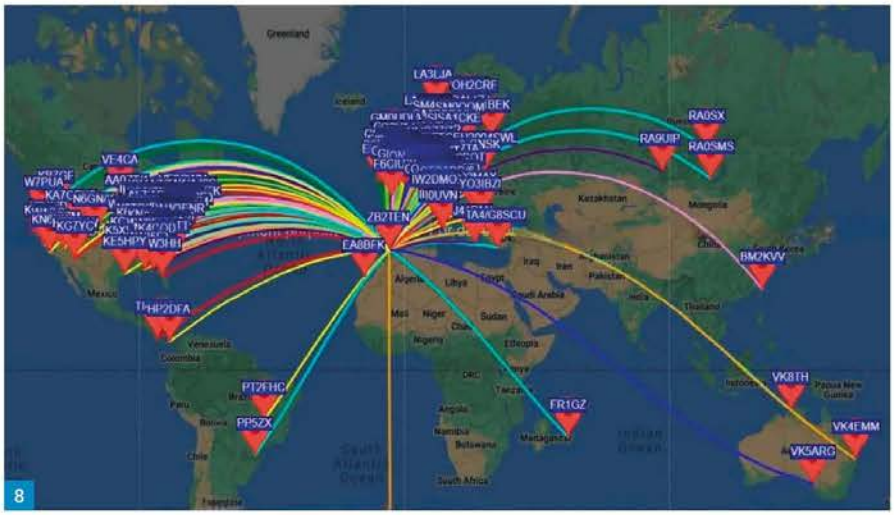
Neil also recommends an online list of 410 world-wide short-wave beacons. Each beacon entry includes callsign, frequency, QTH locator and QTH. Also included is information on the CW message which can include the length of the message, the length of the carrier, speed of keying, date of last time heard, output power and antenna. See:

dl8wx.de/bake_kw

Band highlights

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

Jim PA3FDR (MS): 10 MHz FT8: PJ5/SP9FIH, R0AX, UN7AM. **14MHz FT4:** BG8TFN, WB6UNG. **14MHz FT8:** R9WXK, VK2IR, ZL4AS. **18MHz FT4:** JF3FSK, K7TBM. **18MHz FT8:** FG5FI, JA8LJL, KN4JX, UN7AM, VA2QR, VK2OZI. **21MHz FT4:** JH5TWQ, UA0FO, WP3A. **21MHz FT8:** BG4UCZ, JE7MQV, PP2RON, UA0ACZ, UN7JO, VA3BXG, W7CT, YB3DI. **24MHz FT4:** JA4FKX, RG0S, VE5SF. **24MHz FT8:** 4S7KKG, A61R, A71AE, JA8IZP, K0BLT, TC6EQ, UA9TO. **28MHz FT4:** 7K3QPL, 7Q6M, 9K2YD, DS5TOS, JG1IPZ, N7EZQ, UN6T. **28MHz FT8:** 4L4DX, 7X3WPL, 8Z3FD, BH4SCF, DS4AOW, JA1WSX, K7PTC, PY2ZZ, RM0F, VE4ZIM.



Tim GW4VXE (MS): 14MHz FT8: 3B8/OK6DJ, HP3/N9LTA, VK3AUX, VK6AS, YF3AWZ. **21MHz FT8:** PJ5/SP9FIH. **28MHz FT8:** 8R7X, EL2BG.

And, as **GW4MM (HS): 3.5MHz CW:** G4SGX/6Y, VE3EJ, VO2AC. **7MHz CW:** 5Z4VJ, 6Y6I, G4SGX/6Y, N6AA, PJ5/DK7PE/P, VK2BJ, VK4M, VK6T, VK7BO, ZF2CA, ZL4TT. **10MHz CW:** DK7PE/C6A, PJ5/DK7PE/P, VP5/WT3K. **14MHz CW:** CB0ZA, OX3XR, P44W, V31XX, VK7BO, VP5/WT3K, ZD7BG. **18MHz CW:** PJ5/DK7PE/P, TO4A. **21MHz CW:** FM/VE3DZ, P44W, PJ2/VE3CX, TI5/N3KS, V26CV, V31XX, VK6T. **24MHz CW:** TI5/VA3RA. **28MHz CW:** 4K6FO, 5R8IC, 5Z4VJ, A61Q, G4SGX/6Y, J38R, PJ2/NF9V, VP2MKG.

Owen G0PHY (MS): 7MHz SSB: FM5BH, FY5KE, K3LR, PJ5/SP9FIH, XL3T. **14MHz SSB:** 9Y24C, PJ5/SP9FIH, K5TR, VY2TT. **18MHz SSB:** PJ5/SP9FIH. **21MHz SSB:** FY5KE, PJ5/SP9FIH, XL3T. **24MHz SSB:** PJ5/SP9FIH. **28MHz SSB:** 8R7X, VA3AAA, W6PNG.

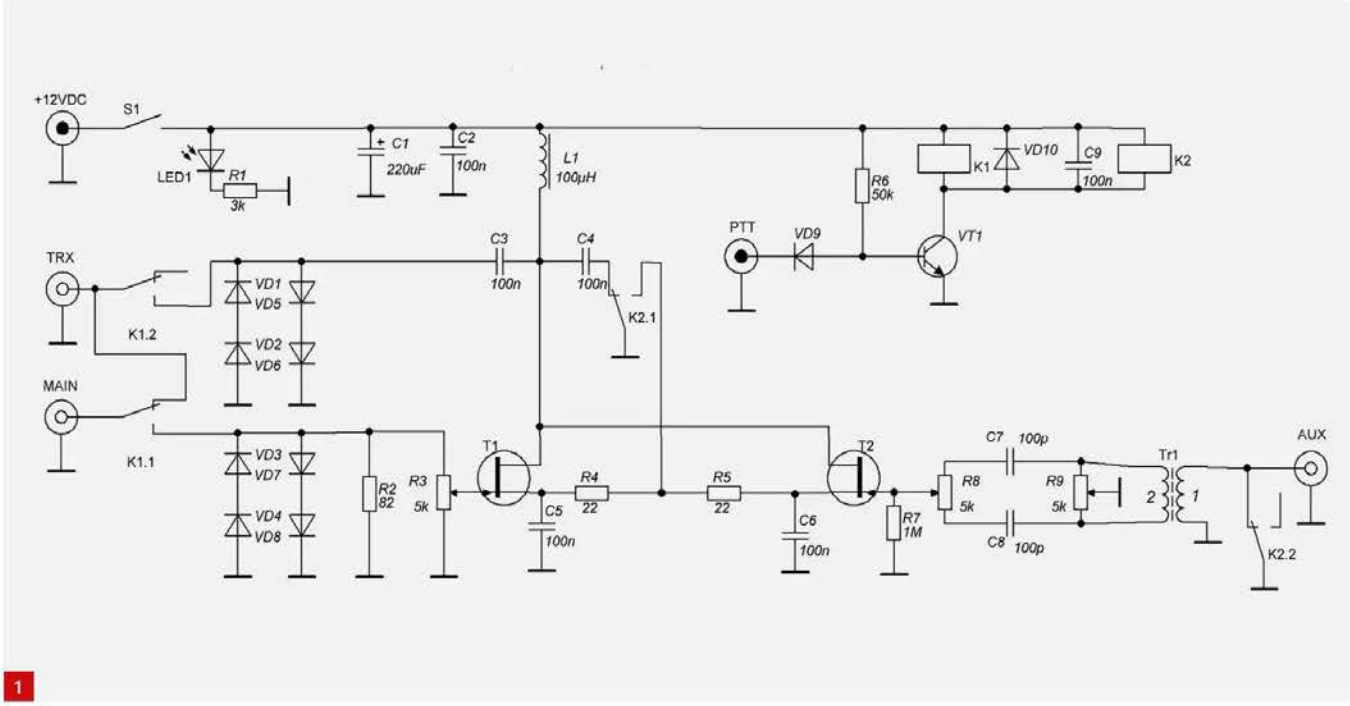
Carl GW0VSW (QS): 3.5MHz CW: VA3RAC. **7MHz CW:** 9H6A, G4SGC/6Y, VE3EJ, ZF2CA. **14MHz CW:** 5B4WN, 5Z4VJ, VA2RAC, VK7BO, ZL4TT. **21MHz CW:** VA2RAC. **28MHz CW:** 5Z4VJ, 9H1CG.

Etienne OS8D (HB): 14MHz SSB: 3D2AG, 4UNR, EP3ISF. **18MHz SSB:** 0X7AKT. **21MHz SSB:** 5H4AYL, 6W7/ON4AVT, 8R7X (ATNO), J52EC, YS1/F4IXC. **24MHz SSB:** BG8KVC, FK8IK, PZ5DX, XV9T, ZB2JK. **28MHz SSB:** 5H4AYL, A71/ON5UR, DP1POL, J38R, JR6CSY, PJ7PH, TY2AA, UN/OH7O, XV9T, YB3RPS, YS1/F4IXC, ZP6RAI, ZS6MSM, ZW2FF.

Kev ZB2GI, SK (MS): 24MHz SSB: KC9JML, TI2SD, VE3AD, WP3AV. **28MHz SSB:** 6Y5HM, CA4WLD, K6EB, KF7F, LU9DNR, PY9AZZ, VE7JER. **28MHz FT8:** AC7GL (+ many W7 stations), HK3O, K6DSP, LU2BR, PP5CF (+ many PY stations), VA7AQ, XE1EE. **28MHz SSTV:** KP2XX, W5ZR. **29MHz FM:** AA2EC, EA4MR, KQ2H (repeater), VE3MMX (repeater).

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



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Keith Rawlings G4MIU
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QRM

This month **Keith Rawlings G4MIU** runs through some problems he has regarding local QRM and describes the construction of a cheap eBay QRM eliminator kit (which he views as part of his antenna system).

The first thing to do when investigating a source of QRM is to make sure your own station is clean. Switch off all of your household circuit breakers and using a battery powered receiver see if the noise is still there. If it is, then the offending device is not likely to be in your household although be aware of battery devices such as burglar alarms etc.

If the noise disappears while your power is off, then switch each breaker back on, in turn, and see if/when the QRM returns. This should allow you to isolate what circuit the device(s) are on.

Next, turn any items on the circuit on and off and hopefully the culprit may be found. An alternative approach would be to use something like a TinySA with a suitable probe to sniff out the offender. Being 'in house' you should be able to remedy the situation.

Naturally if the QRM does not go off, then the source of QRM is external to your premises. In this case you may want to trace the source and attempt to cure the problem. In my case I have now given up with this latter approach as there are just too many houses around me and people tend to get fed up when you report to them, yet again, that they have bought another QRM generating device, which, in their eyes, works perfectly.

The types of QRM you may encounter will vary greatly. Here I presently have a noise floor of over S7 on HF, on a good day. There are buzzes and crackles all over the spectrum. VDSL QRM was quite bad on 8.5MHz although this has subsided in recent months. A continuous crackling has been traced to a recent development where each dwelling has Solar Panels and of course there is Power Line Technology (PLT).

One PLT source is a continual popping, which sounds very much like ignition interference, mainly on the bands above 11MHz, and another comes in the form of 'bursts' where the noise floor across HF rises to around S9. In both cases notches in the amateur bands can clearly be seen.

Another couple of recent issues have been identified as in house. The first is a new PSU on my 3D printer that wipes out the 2m band. The original PSU was a Meanwell supply that caused no QRM to my station at all. I found plenty of replacements for it online but being wary of buying a fake and the possible interference issues that may come with them I spent an extra £20 and bought one from RS. That worked out well!

The other issue came with some grow lights my wife bought to use in the utility room to bring along her garden plants/seeds. These are 'USB' powered and come with a USB Wall Wart PSU, which is causing a problem on HF. The work around is to not listen on 2m while the 3D printer is running and to use a power bank or another PSU for the grow lights. I anticipate the use of the grow lights will stop soon anyway as I've told her the drug squad could be knocking on the door at any time!

A bit of history

When I first moved to this QTH some 22 years ago the HF noise floor was found to be high but passable. Things stayed this way for a number of years and while I heard of fellow amateurs beginning to suffer from PLT it seemed that I was dodging this particular bullet, at least for the time being.

Of course, I realised I was living on borrowed time but when the QRM curse hit me it was not from PLT but a plasma TV, and when I say hit that is an understatement. Quite literally, overnight the whole of the HF bands were swamped with buzzing noises that reached levels of +60dB in places and no lower than +40dB everywhere else.

I will spare you the long story but it turned out that the TV had been acquired by a neighbour off a relative and was already old. Attempts were made to 'repair' it by the manufacturer but the results were minimal. I was, at this point, ready to give up HF operation, which was my main interest.

Through a conversation on the UKQRM group I acquired a non-working MFJ1026 QRM eliminator free of charge, a kind donation from another group member. It needed a bit of work, the PTT circuit was blown as was the 2N5109 transistor in the cancelling circuit. As I had all the components for the repair in the proverbial junk box I thought I would fix it and give it a go.

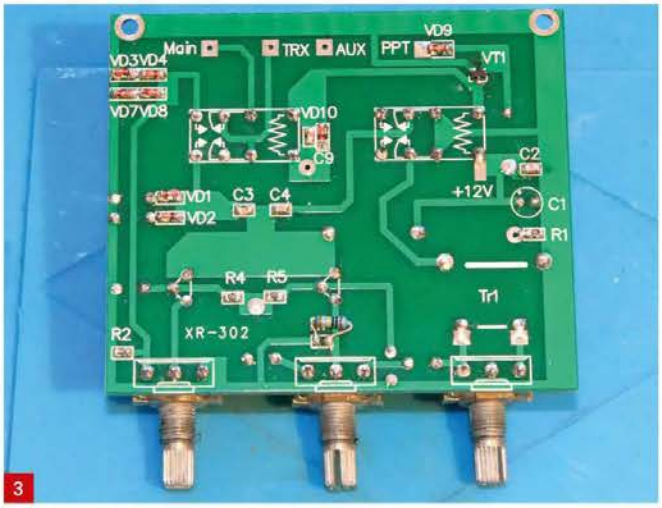


Fig. 1: Circuit taken from the eBay page.
Fig. 2: Completed board topside.
Fig. 3: Completed board underside.
Fig. 4: Assembled eliminator in box.
Fig. 5: Assembled and awaiting labels.
Fig. 6: Adventist World Radio 15710kHz suffering noise on the left and eliminated to the right.
Fig. 7: VDSL QRM top, eliminated at bottom with around 1 S-Point wanted signal loss.

I'm glad I did because it saved the day and got me back on the HF bands. While researching the MFJ it became apparent that a sense antenna was needed and that it might be a bit hit or miss as to how effective the unit's cancelling would be. It was clear that some experimentation would be required.

If I remember correctly at the time, I was using a G5RV as my main antenna and this was very close to the house where the plasma TV was located. I tried a number of different sense antennas and one that worked was a simple wire just running along the back fence near the TV. It took some practice to find the sweet spot on the MFJ where the QRM was nulled, but it was possible and when done correctly, was capable of reducing the plasma QRM to a minimum and in many cases, eliminate it completely.

My HF setup at the time was an FT-990, FC-707 ATU, MFJ748B DSP Noise Filter, and the MFJ1026, all of which still survive today. Despite the age of the setup I am still reluctant to spend a lot of money on a modern radio just in case QRM comes along that my setup can't cope with, even though a modern DSP radio will probably cope better than the venerable FT-990.

This was fine for my transmit station but I have a number of receivers set up in my office and I needed something for them. The MFJ1026 is quite expensive, even second hand, so I did some Googling and found the circuit of the SEM QRM Eliminator. This design (presently known colloquially as the X-Phaser it seems) is simple enough so I built a copy specifically for use with a receiver, omitting the PTT circuitry. This worked wonderfully well so I built another three, all combined within one case, to serve three other receivers. I then bought a damaged SEM QRM Eliminator off eBay for not a lot, repaired it, and added it to another receiver.

The original antenna set-up consisted of an M0AYF active loop in my front garden, well away from the plasma TV, and an active whip as a sense antenna. This worked like a charm, the active whip had plenty of gain as the sense antenna and the loop could be rotated to minimise the QRM as well.

To the present

The plasma TV is history, assigned to the fires of hell I hope, but PLT is now here among the general background of electronic smog that is HF in built up areas. As reported, my HF station is little changed but my receiver setup now uses a 66ft inverted-L end-fed and an active loop in the form of a 'Wellgood' version of the Wellbrook loop in the back garden. These two antennas can be switched to reverse which is the main or sense antenna.

With another couple of receivers soon to enter back into service again after waiting long term repair I wanted each to have its own QRM eliminator. Rather than collect the parts needed, I bought a couple of 'kits' off of eBay from the Far East. I went for cheapest kit I could find at £16.42 inclusive for the two. They were delivered in about ten days and on inspection I found the kits an odd mix of SMT (Surface Mount) and through-hole construction. The switching transistor of the PTT circuit uses a single SMD device while the two J310's for the phasing are TO92 through hole.

Checking the components I found two through-hole 100pF capacitors, C7-C8, were missing and there were four 100nF through-hole supplied where just three were needed. Perhaps the person picking the components for the kit mixed up their 101's and 104's! Of the ten IN4148 diodes needed eight were supplied as SMT and two through-hole, but one of the latter was missing! Resistors are SMT except for R6, which again was through-hole, and two were supplied where one was needed. Also missing was R7 1MΩ. Just to put the icing on the cake there were no nuts supplied on the 5kΩ potentiometers. Whoever put the bits together must have had a really bad day as this applied to both kits.

Constructing the kit is simple enough, the board is clearly marked and I used the circuit and photos from the eBay listing to reference where the components were fitted. The circuit is shown at **Fig. 1** while the top and bottom of the PCB are shown in **Figs 2** and **3**.

The transformer is pre-wound on a binocular

core of unknown grade. There is no information provided on which winding is which but a quick check of the inductance of the windings showed that the end of the core with the eight-turn winding, which goes across R9, is marked with a white dot. I fitted the first kit into a case I had 3D printed (along with suitable nuts for the pots!), see **Figs 4** and **5**.

All my previous units have been in metal cases and I did wonder if there may be any issues with hand interaction. Well there were. Each time I tuned and then moved my hand away the eliminator setting changed. I circumvented this by running a ground wire soldered onto the metal cases of the potentiometers and this completely cured the issue. However, a metal case would be preferable. For the price of just over £8 each, including postage, the kits are not too bad.

The simplicity of the X-Phaser circuit should make me say that this kit is suitable for a novice. However, the mix of component mounting and missing components of this particular kit makes me say that it is a kit for a builder with access to a component junk box!

It worked!

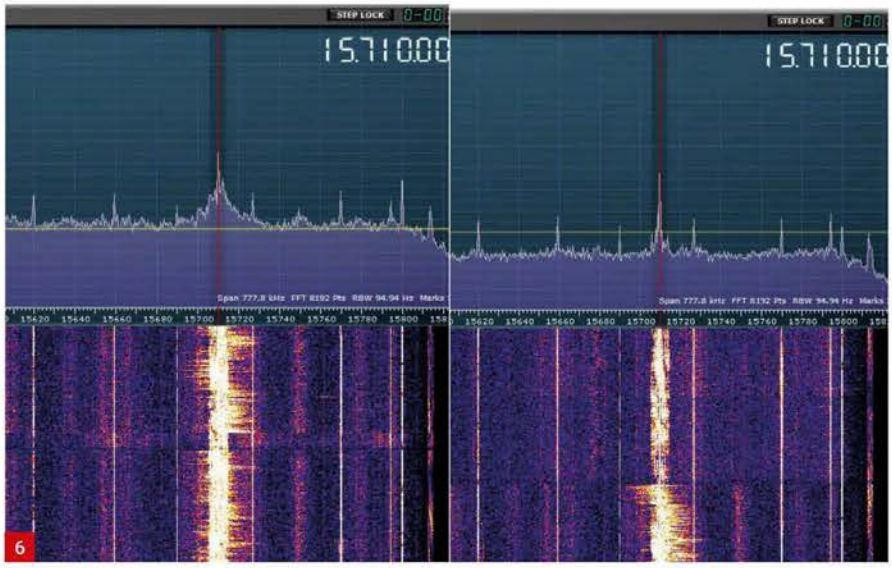
I wired the kit up to a receiver, added a couple of antennas, 12V DC, and tuned to the 19m broadcast band where the 'ignition noise' PLT is quite bad. To my delight the unit worked first time and very well too, the QRM was indeed eliminated although tuning was sharp, so it was ready to be put into service, see **Figs 6** and **7**.

There are a couple of trains of thought on how to adjust the eliminator. The original SEM instruction is to set the GAIN control at maximum and reduce the QRM by adjusting the two PHASE controls, tweaking the GAIN control in turn until minimum interference is noted. Another follows along the lines of the MFJ1026 and recommends to firstly Tune GAIN to Zero. Then, importantly, adjust both PHASE 1 and PHASE 2 for MAXIMUM NOISE. This noise level, whatever it is, must be noted. Now remove the AUX antenna. Adjust GAIN (Main antenna) for about the same level on you previously noted. Now re-connect the AUX antenna and adjust phase 1 and phase 2 for MINIMUM noise. Finally adjust GAIN again for MINIMUM noise and that should be it. I tend to use the SEM method.

Important! It is best if the AUX antenna only receives the local QRM and at a level higher than the main antenna. The eliminator effectively steers the two antennas electronically. Indeed, with the correct antennas it may also be used as a signal enhancer. I have found this to be effective on the medium wave band.

Shorting the PTT input (RCA jack in my case) bypasses the unit on transmit as does powering it off.

These units do work but can take some experimentation to get set up correctly. They usually only null QRM from one direction and expect to lose some of the wanted signal too.



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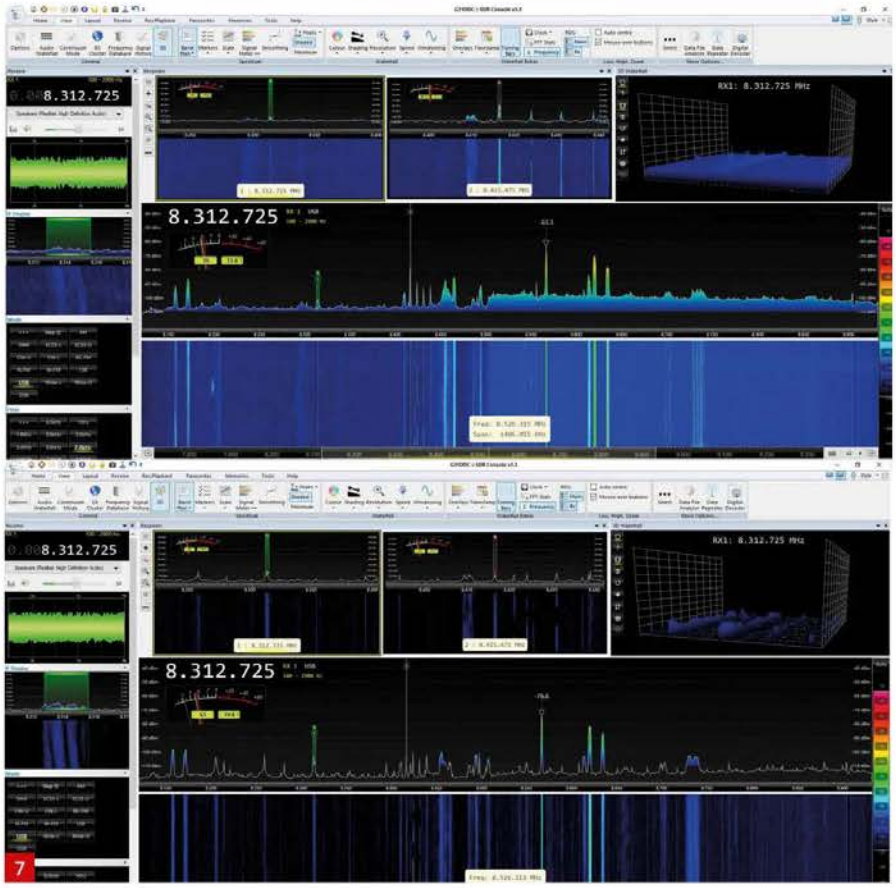

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Internal DSP filtering inside the radio can work well but in my view stopping the QRM before it gets into the receiver is better!

The unit appears to handle a power rating of 100W and you will have to supply RF connectors, PTT socket, on/off switch, DC connector, hook-up wire, knobs, LED and case. Oh, and any missing components too!

References

Original SEM manual:
https://tinyurl.com/3p2pvw3t
eBay listings for kits and readymade units:
https://tinyurl.com/ypc2249k
Amazon listing for same:
https://tinyurl.com/522vy7vh
MFJ 1026 at ML&S:
https://tinyurl.com/4bbcm2n5
Timewave ANC-4:
https://timewave.com/support/ANC-4/anc4.html

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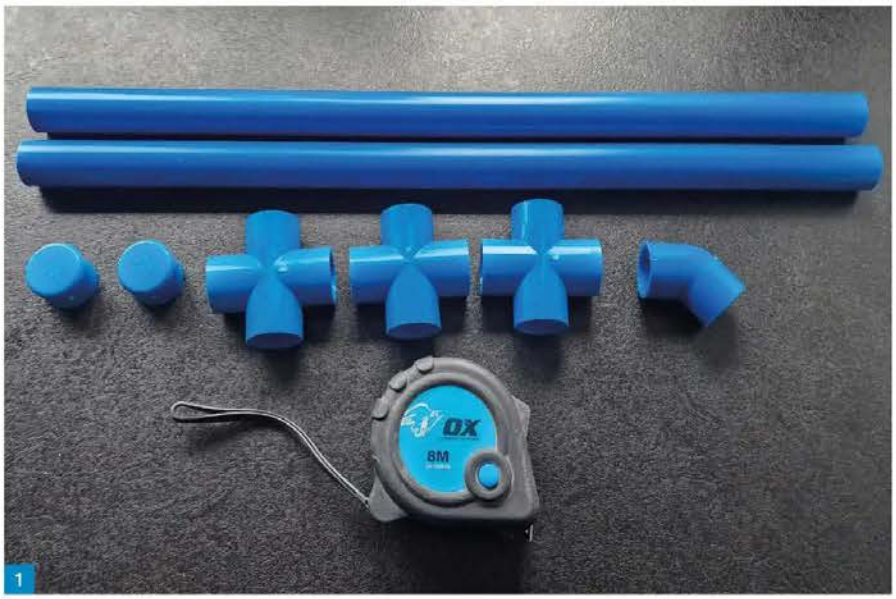

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Junk to Joy

Billy McFarland GM6DX describes how to construct a simple ARDF antenna.

While I await the lovely 20°C of Scottish weather to appear (joke), I thought it best to put my time to good use and make that 145MHz lightweight portable Yagi that I need for some ARDF joy. I went into the shed where I keep the bits and bobs that I refuse to throw in the bin, or as my wife calls it, the junk pile. I pulled out some short lengths of 20mm diameter blue PVC pipe with end caps, an old tape measure and a strip of RG-58U coax that was left over from some homemade traps. These materials are the basis of the antenna that I decided to make and all of these parts can be seen in **Fig. 1**. I looked online and came across a few designs. I decided to make a slight variation of the ones which I came across but the overall design can be seen in **Fig. 2**. This three element Yagi design has a Reflector element length of 1060mm, Driven element (each side) length of 461mm and a Director length of 895mm. All elements are made from the tape measure, flexible coated metal.

So, before we get started you will need the following items;

- About 1.2m length of 20mm diameter (or whatever you have) of PVC pipe
- 1 x end cap (or two if you want to be fancy)
- 3 x pipe cross pieces
- 1 x 3m tape measure
- 6 x hose clamps to fit over the tape and your cross pieces
- Length of RG-58U coax

This antenna is purely for practical use. Aesthetics doesn't really come into it so don't worry about how it looks. As long as it is lightweight and it works that's all that really matters.

Construction

The first step in construction was to cut and assemble the boom section. Working from the end of the PVC pipe, I glued in place a cross-piece member (I used plumbers cement glue). Once that piece was glued in place, I then cut a short section of pipe and fitted an end cap. This was just to finish off the end of the antenna, which can be seen in **Fig. 3**.

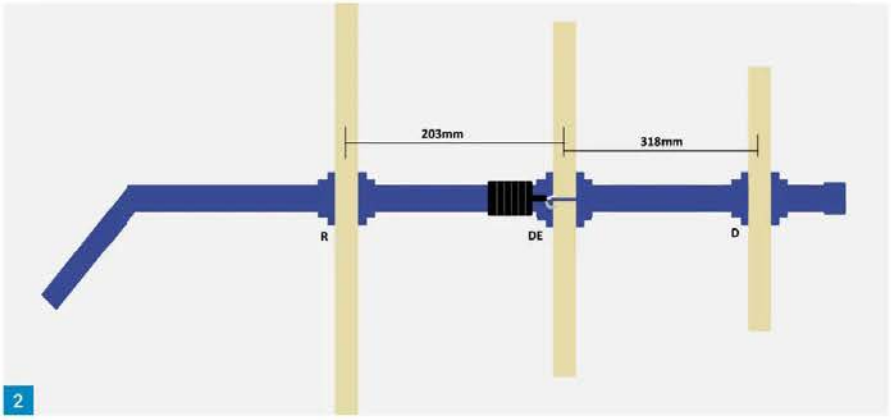
The next step is to sit the cross pieces beside the long PVC pipe and mark the pipe for cutting. Once you have done this you should have short pieces of pipe that will fit into your cross pieces and make up the overall shape of the antenna. Double check the sizes and then glue the remaining cross pieces in place. **Fig. 4** shows the gluing process where you can see that I double checked the spacing of the cross pieces while gluing. Follow this process until the boom is complete as per the drawing in Fig. 2. If you want to add a handle, then do so. I used a 45° angle piece and added a short handle for ease of use where you can see my finished boom in **Fig. 5**.

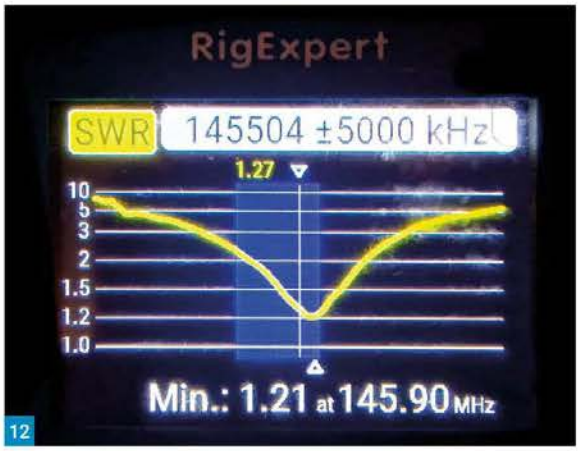
Once your boom is complete it is time to bore a 6mm hole in it and feed the RG-58U through. Now, I bored a hole just down from the cross section on the Driven element, fed the coax through and wrapped the coax five times around the PVC pipe to form a Balun. I taped up the coax to keep the coils tight and in situ on the boom. **Figs 6** and **7** show the Balun at the feedpoint. So, we have the boom assembly complete with coax attached and it is time to cut the elements. Open up the tape measure (be careful as they are sprung loaded and will pop out) and take a sharp pair of scissors or snips. Cut the tape measure into the four pieces that are needed – one for the reflector, two for the driven element and one for the director.

I cut off the end of the tape measure so the first measurement shown was the 100mm mark. That way it made it easy to count out the lengths before cutting, so no need for another tape measure to measure the tape measure. This can be seen in **Fig. 8**. The ends of the tape measure are sharp so add some tape or heatshrink as seen in **Fig. 9**. Take the elements and sit them onto the cross sections of the pipe. Slide over the two hose clamps and tighten the elements onto the cross members. Make sure the element is centred on the boom when doing this, as seen in **Fig. 10.** When it comes to the driven element it is slightly different. Make sure you have a 15mm space between the two pieces of tape measure and clamp in place. Scrape some paint off the two ends of the driven element, apply some heat and add some solder. Don't worry if you melt the PVC tube slightly. Once the elements are tinned connect the coax to each end.

We are not quite finished with the driven element yet. Take a piece of 90mm long wire, I used car wire that was 2mm in diameter, and make a U shape with it. Solder this wire across the connection points of the coax and tape as this forms a matching section and raises the impedance of the antenna. **Fig. 11** shows this connection assembly in detail.

That is the main construction of the antenna complete, just the final step of connecting the antenna to the analyser and scanning it. **Fig. 12** shows the scan of my antenna and you can see it is slightly short although the match works well as the SWR is 1.2:1. This will still be fine for receive only. However, if you want to transmit with it, then you can leave the driven elements slightly long and trim to your desired frequency. Apply some hot glue across the connection point to prevent movement and water ingress. The fished antenna, with folded elements for storage, can be seen in **Fig. 13**. This is a very simple and cheap project but worthwhile for ARDF use. As always, any questions drop me an email at **gm6dx@outlook.com**





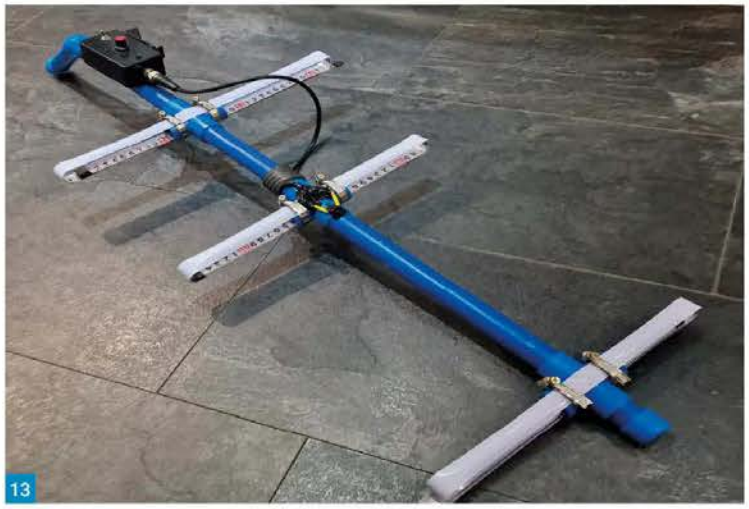


Fig. 1: Parts used for the project. Fig. 2: Overall design. Fig. 3: Fitting the end cap. Fig. 4: Glue on the remaining cross pieces. Fig. 5: The finished boom. Figs 6 & 7: The balun at the feedpoint. Fig. 8: Cutting the tape measure to size. Fig. 9: Add tape or heatshrink to protect the ends. Fig. 10: Centre the element on the boom. Fig. 11: The matching section fitted to the feedpoint. Fig. 12: Checking resonance. Fig. 13: The finished product.

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1

Radio in the British Isles in December

Chris Burger ZS6EZ says "DXFC ruined my life!"

The DX Foot Club, created and run by **Stewart Cooper G4AFF** – formerly GM4AFF – is to travel what DXCC is to DXing. Visit as many countries as you can, mark them off on the list and marvel at others' achievements. I've been participating since 2006, but the thrill of planning and travelling to new places has not waned.

As **Doug Grant K1DG** and I both gradually crept up the list, we regularly discussed doing a trip around the British Isles. Seven DXCC entities are to be had. Doug had seen four and I only two. DXFC separately tracks places you have been on the air from (QRVs). I had only activated England, and Doug only England and Ireland.

I was once a regular visitor to Britain. The punitive visa charges from 2009 and the inexorably deteriorating exchange rate made the UK prohibitively expensive. Somehow, our joint plans never made it to the top of our lists.

During 2023, Doug informed me that he and **Karen** would cruise the Northern Lights in January, preceded by a short trip to several of the smaller UK 'countries'. Was I joining them?

I had been stuck at 98 for four years, since before The Flu, while Doug had gradually crept up to a similar number. Here we could finally pass that century mark. I soon decided. I would take full advantage of my year-end break, adding a few days of leave to make it a full fortnight. I would not be able to tour with them, but we could overlap somewhat. Wary of the weather, I resolved to start in the north, returning to the south as soon as possible to minimise the risk of getting stuck.

Apart from collecting countries, I had other priorities: I wanted to fly in several countries and I wanted to do several Parkruns. I needed one with a 'Q' and one with a 'Y', both unavailable in South Africa. I would also visit the manufacturer of my hot air balloon in Bristol. Finally, I wanted to catch up with some old friends.

Unfortunately, a distraction soon emerged. I entered for the Marathon marathon in November, with the ulterior motive of accumulating some new countries in the Balkans. I've told that story in March's *PW*. In short: I obtained a suitable portable radio and antenna. I already had a small paddle made by **ZS1AL**. These comfortably fitted into my computer bag with my tablet and paperwork.

I learned several lessons in the Balkans. Firstly, it is difficult to attract CW contacts with a QRP radio. Secondly, the Xiegu's receiver is not great, with harsh synthesiser noise and an assortment of snaps, crackles and pops as you tune across the band. However, it could put a signal on the air, and its internal battery provided about an hour of operating before needing a refill. Thirdly, operating from a local station is definitely preferred!

I returned home in November with ten new countries in the bag, pushing my DXFC total to 108 and 41 QRVs. I was under considerable pressure at work due to my previous absence, so my itinerary was somewhat iffy by the time I departed. The cheap direct flights had sold out. I had to buy tickets via Addis Ababa, turning the out and return trips into tests of endurance. Also, I went for my visa interview exactly three weeks before departure. I sorely hoped they would keep to the promised three-week turnaround. They did – I received my visa a day before departure.

England

My first stop was southern England. I did not anticipate the extent to which everything closes down for Christmas on these islands. I had some difficulty organising a rental car. I also discovered that I had forgotten my feedline. Radios and antennas are not very useful without it.

Don Field G3XTT told me about a radio shop in Bristol. I unsuccessfully tried to phone them. Eventually, I drove there. I was told that The technician had left until new year. He did not respond to phone calls and messages.

It soon became evident that travel is painfully slow here. In most countries, I travel at an average of 100km/h. In Britain, it is hard to maintain half that. I would have to scale down my travel plans. I shelved my plans to look up friends in Cornwall, heading for Don's house instead.

Don was surprised to see me. Clearly, I had not communicated as well as I had thought. Still, he

Photo 1: York Minster from the wrong side. The right side was closed. Photo 2: The general outlook near my Estate. Photo 3: The MM/ZS6EZ operating position near Lamancha. Photo 4: Some of the many antennas at EI7FJ.

was able to spare some time and we caught up on the happenings of the past 15 years over a pub meal. Don also helped me with a feedline, solving a major logistical impasse.

My next stop was York. After completing the York Parkrun, I wanted to continue further north. It was not to be. There were several days with no bus service and no trains. I was stuck. In a rather seedy hostel. In a town where everything was closed for Christmas. At least I managed to buy a good umbrella, for use in Scotland and Ireland. I also allocated some time to my Greek studies, using Duolingo. This system is good for language coaching, but it also has competitive leagues that can become a horrible distraction!

I eventually managed to escape aboard a solitary bus to Leeds, where I could find other options. I had a 14-hour layover, during which I learned that **VK4MA** had surpassed my DXFC score of 108. At least I had the prospect of regaining the southern hemisphere's top slot in the following week. I caught the Edinburgh bus at 02:55.

Scotland

I had another reason for visiting Scotland: to view my estate.

I am constantly made aware that I command no respect. I was therefore very interested to read last year that owning land in Scotland legally entitles one to be called 'Lord' (or 'Lady', for those identify that way). I soon pressed my credit card into service and bought a piece of land. The title deed and a fancy certificate testifying to my right to be called 'Lord Chris' soon arrived. The piece of land will definitely not accommodate a Beverage, not even for VHF. However, that's beside the point. The land is southwest of Edinburgh, near Lamancha. Those of you with a cultural bent will understand the great pleasure in dubbing myself Lord Chris of Lamancha. The locals clearly get it, as there is a nearby shooting range called Don Coyote.

I again had trouble finding a rental car. When I did, it was a fully-electric Fiat 500. I enjoyed trying out an electric vehicle, although there is an element of humiliation in spending five minutes staring at the buttons before being able to make the thing move. I never did manage to change channels on the radio, and it took several minutes to shut up the radio on shutdown. I eventually got the hang of it, and confined myself to only one rocket-like acceleration, to conserve the battery.

The hills were clad in white. I ploughed through the mud and snow for a while and took some pictures. It wasn't much fun.

All my attempts to find a Scottish station to operate from had come to naught. Scotland was firmly closed for the holidays. The obvious place to build my own station was Lamancha – where else? A wire in some trees led to some contacts

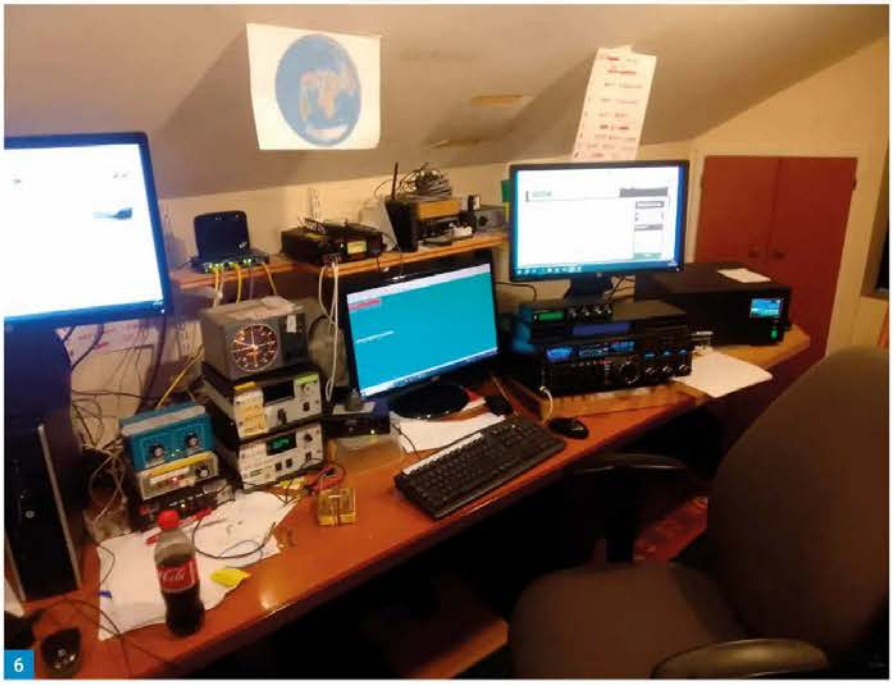


Photo 5: Billy EI7FJ, Janet and Paul EI5DI at the breakfast table. Photo 6: ZS6EZ's seat at the EI80MB station. Photo 7: Doug K1DG, Karen and Bob MD0CCE in Bob's station. Photo 8: Glyn Jones GW0ANA in his station (GW0ANA photo).

from the car into Scandinavia and Germany on 20 and 30m CW. Interestingly, the Reverse Beacon Network thought MM/ZS6EZ was in South Africa. My QRV from Scotland was in the bag. I was pleased; it was less effort than some of the Balkan stops! On the other hand, I had light sniffles, probably from antenna building in the drizzle at freezing temperatures.

I made several phone calls to arrange some flying. Unfortunately, the bad weather extended to all the accessible schools. At this point, my Lyca Mobile phone stopped working. I had paid for unlimited calls and not made more than two dozen, but they kept telling me that I was out of credit and had to pay money. Finding accommodation was going to be difficult. Lyca magnanimously offered to sort out my problem within 24 hours. That would be a long time in this weather!

I drove to Dunfermline and found a pleasant B&B (without breakfast). A few Greek lessons and some furious story-writing later, and I went to sleep early to try and conquer the sniffles.

Ireland

At Edinburgh airport, I finally managed to get in touch with **Billy McLoughlin EI7FJ**. The EI9E contest group operates from his station, for which he supplies the mechanical skills. They were planning a commemorative operation the next day, so he sounded positively enthused to have me there. I would take the Wexford bus as soon as I landed.

Billy picked me up from the bus stop. At Billy's house, I met **Janet Alcock**. Janet seems to be the resident chef at EI9E. Janet is a linguist and long-time chorister, so we had a lot to talk about – and we did. Janet is a guide at the South Foreland lighthouse in Kent. Marconi made his first international contact from there in 1899. She jokingly claims GB2SFL as her personal callsign.

The special event commemorated the 80th anniversary of the Kerlogue rescue. On 29 December 1943, the *MV Kerlogue* was en route from Spain to Ireland with a load of oranges. They rescued 168 German sailors from the Bay of Biscay, treating them to warm orange juice while taking them to neutral Ireland for the remainder of the war. Kerlogue's callsign was EIMB; the commemorative callsign was EI80MB.

Through the evening, the crew kept arriving. The crew included **Paul O'Kane EI5DI**, **David Sherwood EI5KG**, **Aidan McGrath EI8CE** and **Declan Lennon EI9HQ**.

I did some troubleshooting and made a few contacts as EI/ZS6EZ before going to bed. I wanted to catch the Friday sunrise opening on 80m. Now this is my kind of sunrise opening. At home, you have to get up at an ungodly hour. Here, I set the alarm clock for 0800. I was hoping for a band awash with signals, but it was not to be. I called and called and called, with only two contacts resulting. Now in case you think that I had missed the sunrise, let me mention that one contact was in New Zealand, almost exactly antipodal to us. I moved to other bands and operated for many hours, resulting in some 400 contacts. My QRV from Ireland was firmly in the bag.

Now choosing between a handful of contacts and pneumonia on the one hand, and a warm reception with great company and great food in the lap of luxury with 400 contacts on the other, I'd go for the latter option every time.

I also had a successful Parkrun and an unsuccessful attempt to fly in Ireland. Billy provided the transport. Driving around with Billy was a lot of fun. He is a curious mixture of handyman and thinker. He was a coal deliveryman for his entire career, but he completed mathematics and engineering studies. He makes great company.

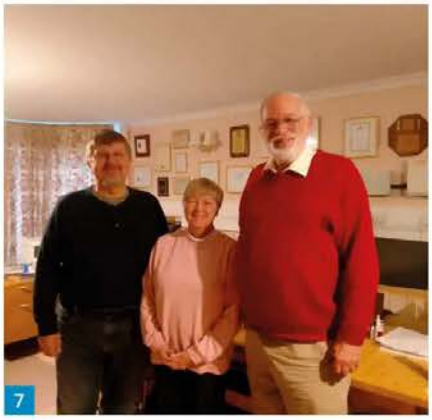
I also managed to find time for my Greek lessons. I was surprised to open up a significant lead in Duolingo's Diamond league. Given its reputation, I was expecting a fight.

Northern Ireland

Northern Ireland constituted my 111th DXFC country. I was now back in the DXFC lead for the southern hemisphere. VK4MA seems to be mostly retired, younger than me and with enough money, so I'm not holding out much hope for the long run, but I will enjoy it while it lasts.

This hostel was even rougher than the previous one. In the morning, I found my way to the airport for a rental car. Making some phone calls, I found a flight school that could help. I met **Kevin** around mid-day and flew around. It was my 200th aircraft model and the 49th country I've flown in.

Near the Irish border, I drove around the Ring of Gullion AONB for a while. I parked the car by a hedge next to a picket fence and started antenna building. An old codger emerged from the yard and berated me for trespassing on private land. I had assumed the space between the fence and the road was public land. He vehemently disagreed. Though deeply sceptical, I profusely apologised and started packing up. Just out of interest, I asked him why he was so opposed to me sitting there. He indicated that his wife looked after that sidewalk and that I should be able to see that it is so much better than all the other sidewalks in the area. I didn't



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have the heart to tell him.

I soon found another suitable stop on a ridgeline. Unfortunately, it was now dark and raining. I strung the antenna in a hedge. From the car, MI/ZS6EZ worked Hungary, England, France and Spain on CW and SSB, on 20, 30 and 40m. This radio thing really is magic.

After a morning Parkrun, I caught my flight to the Isle of Man – or at least tried to. I thought I had plenty of time, but security had other plans. My baggage was sent back twice, once because of the Morse paddle. Despite my pleas to the screener, each time my bag returned to the back of the queue. I was greatly relieved when a fellow passenger pointed out that my flight was delayed. I'd never before been so grateful for a flight delay.

Isle of Man

My introduction to the island was unpleasant. My phone didn't connect to the network, so I couldn't call my local contacts. The information desk explained that many British networks don't work, including EE and Virgin. So much for the fancy Lyca SIM! I had no choice but to fork out another £10 for a local SIM.

I was even less impressed when I discovered later that this fancy SIM had no internet access. Without online search capability, I ended up in a grossly overpriced and decidedly seedy hotel. Some girls in the foyer wore dresses that I initially mistook for belts.

After yet another unsuccessful attempt to arrange some flying, I took the bus to Ramsey. **Bob Barden MD0CCE** is not only a very active DXer, with most mainstream awards on his wall and over 350,000 QSOs in the log, but also a published author and a successful retired businessman – not to mention a DXFC score of 93. We'd never met, but like with many DXers and contesters, we have many friends in common. We had a lot to talk about.

Late afternoon, Bob showed me the lighthouse at the northern tip of the island where he had operated some Field Days. Shopping was an adventure, as the ferry had not run for several days and groceries were in short supply. Bob hadn't seen the likes in 18 years on the island.

Wednesday, I finally went flying. Unfortunately, our flight was cut short by Air Traffic Control, apparently due to instrument calibration. I spent several hours in a pub doing lunch and writing, awaiting the arrival of our guests.

I hadn't seen Doug and Karen since their visit to my homeland and my trip to WRTC a decade ago. We had a lot of catching up to do. When the jet lag overwhelmed them, Bob helped me to fire up on 40m CW using a simple dipole. **K1AR** (Doug's brother-in-law) soon called me. I suspected that some 'non-amateur means' might have been used to attract his attention. Propagation sounded disturbed, but MD/ZS6EZ managed to work a string of stations in the eastern USA and all over Europe.

Unfortunately, I had to abandon my trip to the Channel Islands (GJ and GU). The ferry had been unreliable due to the storms and flights were simply too expensive. Instead, I would concentrate on putting Wales on the air. I also wanted to do the Bushy Park Parkrun and visit the Cameron balloon factory. I would have my work cut out to make it all happen.

The next day, we had a guided tour of the island. Bob enthusiastically shares his in-depth knowledge. I felt much better about the island. Late afternoon, after a detour to recover my reading glasses I'd forgotten at lunch, they dropped me off at the airport. I was sad to leave them behind.

Southern England and Wales

Because the ferry had not been running, I caught an Easyjet flight to Gatwick. There is something very wrong with having to pay more for your hand baggage than for your ticket. I was even less impressed when I had to spend over an hour looking for the rental car they had arranged for me, completely unable to obtain help from Easyjet. I eventually found a rental car in another terminal and headed out to Wales, arriving around 0100. The accommodation I had booked in Wales had evaporated, so I spent an uncomfortable night in the parking lot. The temperature was just above freezing.

That morning, I visited Cameron in Bristol before heading back into Wales. The flying school at Cardiff airport was unable to help me because of a runway closure. At nearby St Athan, the receptionist there was most helpful, but because of the good weather, they were fully booked. Opposite story, same result.

I pored over my list of Welsh DXFC participants. **GW0ANA** was only a few minutes away! I set off to find him. The address was rather unspecific, but a neighbour pointed me in the right direction. **Glyn** and **Midge Jones** received me warmly. We chatted about our travels and DX operations. Glyn invited me to operate his station. Using his barefoot radio and minibeam, I worked a string of Europeans and a solitary Californian. Glyn showed me mementos from his interaction with **Elettra Marconi**, the daughter of the radio pioneer. We sometimes forget how new this technology is!

I reluctantly left for the drive towards London. After being ripped off by the Travelodge in Reading, I completed the Bushy Park Parkrun before joining old friends at their house for the day. I managed to fly out of Fairoaks just after lunch, then returned home.

Decades ago, I had operated from England as ZS6EZ/G, but was tempted to try to add M/ZS6EZ to my collection. It was cold and wet and antenna building would not be fun. Still, my friends coaxed me into it, so I strung my antenna across the garden and made some contacts as M/ZS6EZ. Again, the RBN thought I was in South Africa.

Looking back

Travelling through Gatwick, I checked DXFC. Doug had finally added Number 100 in Northern Ireland. After decades of trying, we have finally made it! It would have been nicer to have spent more time together, but we did have two days of great conversation with a great host.

As I write this story, I am flying over Egypt on my way home. Doug and Karen are heading to the Channel Islands to cement his standings above the century mark. I anticipate a rough week or two ahead, having been absent for a fortnight. As I settle back into my routine, I will look back to this trip with great satisfaction. I've added four countries and five QRVs to DXFC. I've touched base with old friends. I've visited the Cameron factory. I've flown in two new countries. I've done five Parkruns. But above all, I've experienced the magic of radio yet again.

Arthur C Clarke said that technology at a sufficiently high level is indistinguishable from magic. Radio hardly counts as high technology these days, but the magic has not disappeared. Whether making hundreds of contacts operating a superstation or stringing a wire in a tree to plaintively call until I attracted attention, it really is all magic. **PW**

BBC coronations Pt XIII

Keith Hamer and **Garry Smith** continue the special series looking back at the BBC's coverage of Coronations since 1937. Also featured this month: a vintage 1953 Coronation television advertisement; more unique details about Roland Pièce from family archives supplied by his Grand-Nephew Pierre Yves-Pièce; the early years of BBC-2; and we continue the series about the development of Swiss Radio and Television since 1922. The authors also say farewell to BBC Long-Wave!

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Recordings of television broadcasts for the 1953 Coronation on 2 June included one of full length, lasting about seven hours, and a shorter version consisting of selected excerpts. The former recording was made by the standard BBC telerecording process in which the television picture was photographed onto cinematograph film. For the latter (which was shown to British viewers the same evening), similar film was employed, but the method used incorporated the *suppressed-frame process* specially developed by the BBC's *Engineering Research Department* for the occasion. The equipment was installed at Alexandra Palace. An early form of telerecording equipment used by the BBC is shown in **Fig. 2**.

The BBC estimated that in the UK, nearly twelve million people listened to the sound broadcast of the Coronation and over twenty million saw it on television. This was the first time that the television audience had exceeded that of sound. Some 23 million listeners tuned in to Her Majesty's broadcast at 9pm on Coronation Day. Approximately 200 million people overseas witnessed the Coronation via BBC broadcasts and recordings.

Vintage coronation television equipment

This month's trawl through vintage copies of desolate newspapers and magazines has uncovered an advertisement by *Thorn Electrical Industries Limited* for their Ferguson 16in television receiver, **Fig. 1**. The advertisement dates from 10 April 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 *Ferguson 'Full Range' 16-inch Model 990T Television Console*.

The *Ferroxdure* wide-angle focusing system mentioned in the Ferguson advertisement employed a special ceramic permanent-magnet material developed between 1950 and 1951 by Philips. By utilising the distinctive properties of Ferroxdure, it was possible to construct a simplified permanent-magnet lens for the focusing of the electron beam in television cathode-ray tubes. The lens produced a stray magnetic field along the axis, which was considerably less than that of permanent-magnet lenses of the conventional type.

The lens consisted of two axially magnetised rings of Ferroxdure, which were co-mounted with 'like' poles facing each other. The stray fields of the two rings then largely neutralised each other. The strength of the lens was adjusted by varying the mutual separation of the rings. Centring the on-screen picture was accomplished simply by moving a soft iron ring. Altering the lens' strength did not affect the adjustment of the ion-trap magnet. The adjustment of the ion-trap magnet, the lens itself, and the deflection coils, was very much simplified. As a result of the simple construction of the device and the low price of Ferroxdure, the new electron lens was also cheaper than existing lenses for this purpose.

Electronic Picture Stabilising was a method used to boost the image signal.

However, despite these hi-tech innovations in 1953, perhaps most prospective television set purchasers were more interested in the *elegant walnut cabinet* and the *full-length doors*!

Roland Pièce archives: Part VII

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

On Friday 13 October 1922, the eve of the official opening of Switzerland's first radio station, Roland Pièce carried out some further on-air tests to make sure that his surprise broadcast would be a success. He had previously installed a secret receiver and loudspeaker at the opening venue.

The test transmissions were heard and subsequently written about in a letter sent to him by the vicar, **Pierre Joseph Jacques Van de Voord**, professor of physics at the *Collège Notre-Dame de Tongres*. The vicar wrote: *"The piece of music with your old gramophone was very well received and, of course, you also announced a concert at 11.30am to be given by the symphony orchestra of the Hôtel Central and the singer who was awarded first prize at the Geneva Conservatory."*

The official banquet on Saturday 14 October 1922 marked the inauguration of the *Champ-de-l'Air* station near Lausanne. The installation of the transmitter was a joint venture between Switzerland and France. The celebrations were held at the *Hôtel Beau-Rivage Palace* in

1

See Ferguson first!
NEW "FULL RANGE" 16" T/V CONSOLE
New Ferguson features – 'Ferroxdure' wide angle focusing and Electronic Picture Stabilising - ensure top T/V entertainment, even under fringe area or 'difficult' conditions. Elegant walnut cabinet with full-length doors.
MODEL 990T 118 GNS Tax Paid
...fine sets these FERGUSON'S
POST THIS COUPON for full details of Model 990T and other Ferguson T/V models to Thorn Electrical Industries Ltd, 233 Shaftesbury Avenue, London WC2

Lausanne-Ouchy, **Fig. 3**.

While all the dignitaries were enjoying their meal, Roland Pièce remained at the Champ-de-l'Air transmitter, determined to surprise the guests. He took the transmitter's microphone and proudly announced: *"Ici station radiophonique de la ville de Lausanne."* Loosely translated, he said: *"This is the radio station from the city of Lausanne."* His announcement was followed at the banqueting venue by the singer, **Jeanne Roully**, and the *Central-Bellevue Orchestra*, which played the French *Marseillaise*, then the Swiss national anthem. This first 'live' broadcast featuring a vocal and instrumental concert marked the official beginning of radio broadcasting in Switzerland.

It isn't clear as to which Swiss national anthem was actually played. At that time there were two, *Rufst du, mein Vaterland* and *Schweizerpsalm*, although neither had been officially recognised by the Swiss *Federal Council*. Incidentally, 102 years after Roland Pièce's triumph with the Champ-de-l'Air transmitter and the celebrations at the Hôtel Beau-Rivage Palace, the five-star hotel continues to welcome guests with some rooms available this summer for a mere £1,917 per night, but that *does* include breakfast!

The Rise and Fall of 198kHz: Part VI

By the time this column appears, BBC long-wave transmissions will have been consigned to the history books. The world-famous long-wave transmitter, originally on 1500m (200kHz) and known affectionately by millions as *Droitwich*, has broadcast for the final time, together with the two BBC long-wave transmitters in Scotland. Droitwich was fully brought into service on 7 October 1934.

Several campaign groups requested the BBC to continue broadcasting from Droitwich, but to no avail. Trying to obtain any details about the exact closure date has been an uphill task for the authors. The last BBC press release, issued last September, simply stated that long-wave broadcasts would end at some unspecified time during March 2024.

One reason given for closing the three long-wave transmitters is that the aging valves are no longer manufactured and cannot be replaced if they fail. Some long-wave enthusiasts are wondering why, in this hi-tech digital age, a solid-state version of the elderly valves cannot be devised!

So, we say farewell to *BBC Long-Wave*. Our usual historical look at BBC long-wave broadcasting will resume next month.

60 years of BBC-2: Part II

Following publication of the report in 1960 by the *Pilkington Committee* on the future of television broadcasting in the UK, the participating

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Fig. 1: An advertisement for the *Ferguson Full-Range 16in Model 990T Television Console*. This appeared on Friday 10 April 1953. Fig. 2: An early form of telerecording equipment used by the BBC at Alexandra Palace in London. Fig. 3: The *Hôtel Beau-Rivage Palace* in Lausanne-Ouchy which hosted the official opening of the Champ-de-l'Air transmitter on Saturday 14 October 1922.

members had to decide who should operate the new service. At that time, ITV was in a very bad state and the committee had no hesitation in proposing that the BBC should be responsible for the first of the new channels. They recommended that the second proposed network should go to ITV, but only if, quote, *"their house was put in order"*.

In September 1955, when ITV began, the BBC had a very traumatic time with the new competition. In almost every programme area, the BBC found itself immensely disadvantaged. Compared to ITV, the BBC's performance at covering news was *"pathetic"*, according to **Michael Peacock** who was *Programming Chief BBC-2*, between 1963 and 1964.

Service information: Switzerland: Part XV

In the early hours of 21 July 1969, around one-million people in Switzerland tuned in for the 'live' broadcast of the first lunar landing. **Neil Armstrong** was the first person to walk on the Moon when he stepped off Apollo 11's *Lunar Module Eagle* at 0256UTC. A special SRG-SSR studio was designed for this historic programme. Meanwhile, the authors watched 'live' coverage of the Apollo 11 mission via DX-TV, courtesy of *Sporadic-E* propagation, from Norway's national television service, *Norsk Rikskringkasting* (*NRK*).

After more than 40 years, the era of Swiss radio news bulletins in French and German being provided by the *Schweizerische Depeschenagentur* (*SDA*) came to an end. In 1971, SRG-SSR were given permission to take over sole responsibility for news programming. *Radio svizzera di lingua italiana* continued to source their news coverage from the SDA until the end of 1975.

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**

Category	Definition	<5 Watts ERP	5-25 Watts ERP	>25 Watts ERP
Beacon	TX only	Any (Foundation, Inter, Full)	Full, Full Club	Full via NoV (E1)
Gateway	Tx/Rx on the same frequency	Any (Foundation, Inter, Full)	N/A	N/A
Repeater	Tx/Rx on different frequencies	Intermediate, Full	Full, Full Club	N/A
Data Station (Packet)	Tx/Rx data	Any (Foundation, Inter, Full)	Intermediate, Full, Full Club	N/A

1

Amateur licence changes

Tim Kirby GW4VXE considers how recent licence changes benefit VHF operators.

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Perhaps the most significant news for all UK amateurs this month is the revised licence conditions announced by OFCOM on 21 February. From my perspective the changes are positive, **Fig. 1**.

All licence holders are able to run more power than with their previous privileges. Although power is not everything, when you are looking at marginal paths, especially at VHF, good things happen when you are able to run more power. With Full licensees being able to run 1kW, this is good news for meteor scatter, EME and those really weak signals. Foundation and Intermediate licensees see their power limits increased to 25 and 100W respectively. This is really great news. One of my concerns with Foundation before was that a new licensee passed their exam, got their licence and then had a power limit of 10W. While there is certainly plenty you can do with 10W, it's not the most straightforward introduction to amateur radio (especially on HF!). A power limit of 25W should work better, especially on FT8, and hopefully serve as a good introduction to the hobby. With Intermediates able to run 100W, this will prove more than adequate for many people on both HF and VHF/UHF.

Regional Secondary Locators (RSLs) seem to have caused OFCOM more worry than they ever caused the amateur community. It seems that OFCOM were concerned that having to use an RSL might be considered discriminatory. I'd be surprised if any radio amateur had considered that possibility, but you never know! Either way, RSLs are now optional. I doubt any amateurs from Scotland, Wales, Northern Ireland, Isle of Man or the Channel Islands will be breathing a sigh of relief thinking, *"Thank goodness I can drop my RSL now!"* Certainly, for anyone interested in DX working, keeping the RSL is essential. Additionally, stations in England can now use a GE or ME prefix. I have heard and seen one or two English stations using these prefixes. It will be interesting to see if these are still in use once the novelty has worn off. I suspect, in practice, most of us will still use the prefixes we always have done.

The new licence changes give freedom for licensees to run beacons, gateways, repeaters and packet stations. If your beacon, gateway, repeater or packet digipeater will run less than 5W ERP, then you can do so with your own callsign, but OFCOM require that you need to obtain a Frequency Assignment Certificate from the RSGB's ETCC (you can do so here:
https://tinyurl.com/tw6wezwf

This allows some frequency coordination to be carried out. If you have a look on this page, you can learn more about what stations the different levels of licence can run. For example, all licensees can run a less than 5W ERP beacon, gateway or packet digipeater, but to run a less than 5W ERP repeater, you need to be an Intermediate or Full licensee. If you want to run a beacon, or repeater running between 5 and 25W, you'll need to apply for a callsign and you'll need to have a Full or Full Club licence. I understand that the Frequency Assignment Certificate process is already up and running, so if you have been looking forward to setting one of these stations up, you can apply now.

This is just a summary of some of the changes which seemed as if they might be more appropriate to amateurs interested in VHF/UHF, but there is plenty more in the document which you can read at:
https://tinyurl.com/nhk2k4t2

Kevin Hewitt ZB2GI

Just as we were going to press, I received the very sad news that regular contributor to *Practical Wireless*, **Kevin Hewitt ZB2GI**, **Fig. 2**, had passed away after a short illness. Kevin wrote to me most months and always had something interesting going on. He was responsible for a great deal of VHF/UHF/Satellite activity from Gibraltar both from his home station and from the Top of the Rock. **Ron Pincho ZB2B**, chair of the Gibraltar Amateur Radio Society told me, *"Kevin was in charge of keeping our club clean, setting up equipment and it was his second home. He was very shy but helped everyone, he was a person you could count on. He never liked a picture of him being taken, he was the one taking the photo"*. I know I am going to miss Kevin's emails and our on-air contacts. Travel well, Kev.

Need an introduction to DMR?

Many people say to me that they find getting started with Digital Mobile Radio (DMR) confusing and certainly there is a bit to get your head around. During some discussions about DMR in the Cheltenham Amateur Radio Association recently, **Graham G4FUJ** pointed me in the direction of a free course from the Tait Radio Academy, which covers the basics. You can find more about the course here:
https://tinyurl.com/5yckvps2

The 8m band

Roger Lapthorn G3XBM (Cambridge) says that he has taken the decision not to renew his Innovation and Trials licence, covering operation on the 40MHz (8m) band. Instead, he is going to try his luck using the ISM rules (10mW ERP) on WSPR. Roger is thinking of using the GE3XBM callsign on the band so he can easily see if he gets spotted. As Roger says, it may be a challenge! Nevertheless, I feel this is genuine experimentation and it will be amazing to see whether 40MHz can support such low power operation and over what distances. It's important to realise that anyone can do this – you don't even need to have an amateur licence – you just need to comply with the ISM regulations. Roger says that he needs to replace the 8m dipole, which is currently faulty. Probably the most fruitful time for these tests will be during the Es season.

The 6m band

Don G3XTT (Wells) reports that he heard 7Q6M at good strength for a good while around 1900UTC on 4 March, with V51JH coming in a little weaker. On 6 March, Don heard V51WW for a while. Don saw PY and LU on 7 March and then on the evening of 9 March, Don saw several PY stations and also CE3CT and CE3SX at good strength, although unfortunately Don was out of the shack at the time! Don also mentions having seen UK stations calling ZD7CTO. And on 10 March, Don copied UK and EI stations working into CE, CX, LU, PY and ZP during an extended evening opening.

Here at **GW4VXE** (Goodwick) I had been bemoaning that I hadn't seen any TEP at all, with the first proper opening noted here on 7 March (when I was out) but at least the computer copied

Fig. 1: A handy guide from the RSGB ETCC website, showing what different levels of licence can run with the new licence structure. Fig. 2: Kevin Hewitt ZB2GI. Fig. 3: Colin G8YIG erecting his new V2000 antenna in North Derbyshire. Fig. 4: Patrick WD9EWK has been using his new Kenwood TH-D75 for satellite operation. Fig. 5: Dave M0GIW received this SSTV picture from the SONATE-2 satellite.

a number of PY and LU stations, some at good strength. On the evening of 9 March, though, I was able to make a few QSOs, including LU1WFU (FE64) which, at around 12350km, is probably my best DX on the band so far. I was also pleased to work CX2ACB (GF15) along with PY3SOL (GG30), PY2XU (GG66), PY2JA (GG65), PP5AMP (GG52), PP5BK (GG51) and PU3MIP (GF49).

Roger G3XBM has spotted some South African stations on FT8 and says that his best DX with 2.5W of FT8 and the V-2000 omni is Sweden.

I had the chance to chat with **Trev EA5NW** on HF recently, Trev is a keen 6m operator who many will remember as G3ZYY from Cornwall. Trev was pleased to work the CB0ZA expedition to Juan Fernandes Island on the band recently – very nice indeed!

Stewart Cooper G4AFF (Norfolk) says that he has got two new winches fitted to his tower and once that was done, he erected his 6m/4m dual-band beam and since then has been focussing on 6m FT8. He said he was very pleased to work S57RR on his first day – not a big deal for some, he writes, but it was for him! An even bigger deal was working ZS6NJ! Stewart says that he has

heard some amazing DX, including V51JH and XV9T, but sometimes finds it hard to be heard (I think we all feel like that sometimes). Stewart has noted TEP every two to three days in the last week or two.

Steve Telenius-Lowe PJ4DX went QRT in March prior to moving back to England. He made over 135,000 QSOs in the ten years he was in Bonaire, mainly on HF but said *"Bonaire was my first experience of 6m and I really enjoyed it, working 157 DXCC entities in the last few years. The beam came down in February but I left up a 40m quarter-wave vertical, which also worked quite well on 6m. Indeed, I worked two 6m 'New Ones' on the vertical: CB0ZA on Juan Fernandez via a strong TEP opening on 12 February and, two days later, 8R7X in Guyana, which was confirmed on LoTW straight away! The only other station worked on 6m this month was S01WS on 28 February."* It's sad to see Steve and **Eva PJ4EVA** QRT from Bonaire, but I'm sure everyone who has enjoyed their activity will wish them well with their move back to the UK.

Tony Collett G4NBS (Cambridge) caught the aurora on 3 March and worked GM4VVX (IO78) around 1830UTC. He says it was an easy Q5 chat without a lot of distortion. Tony then worked GM4CXM on CW around 1850UTC.

Stewart Wilkinson G0LGS (Cheltenham) was also active during the aurora on 3 March. He and **Matt 2E0MDJ** worked GM4VVX (IO78). 2M1EUB (IO87) was also worked. Stewart says that at the same time, TZ4AM was being worked on 50.110 although he could not be heard in Cheltenham.

The 4m band

Just one report on the band this month, Matt 2E0MDJ (Cheltenham) worked GM4VVX (IO78) via the aurora on 3 March.

The 2m band

It's nice to hear from **Colin Fawcett G8YIG** who has moved from Manchester to North Derbyshire. He's been busy putting up a V2000 vertical, **Fig. 2**, as well as an end-fed for HF. I'm looking forward to hearing what you've been hearing and working, Colin!

Roger G3XBM came on for the UK Activity Contest (SSB) using 10W and his Big Wheel as well as for the local FM nets.

During the 2m FT8 Activity contest on 7 February, Tony G4NBS made 83 QSOs in 26 locators with a few more contacts after the event. QSOs over 400km were F5MLG (IN88), EI8KN (IO62), MI0IHH (IO74), GM0HBK (IO77), GM4JIB, GM8MJV (IO85), JO31(2), JO32 (7), DK0TR (JO40) and DG6YID (JO42). Tony was on for the March contest on 2/3 March and says that there was very little activity from Europe, with TM5R heard briefly, one station in JO31 worked and F8KID (JN38) being the only DX.

During the aurora on 3 March, Tony worked GI4KSO (IO64) with a couple of weak SM stations heard. G4DHF and G0LBK were very strong auroral signals but GM and SM were weak signals at the same time.

During the FT8 Activity contest on 6 March, Tony made 83 QSOs in 29 locators – although DL1DBR was worked after the contest making a total of 30 locators worked. Tony says he missed out with M0AFJ (IO70) but other QSOs over 400km were F8BON (IN86), EI8KN, MI0IHH, GM4JIB, GM8MJV, GM4JTJ, DL2FQ (JN49), JO31(7), JO32(4), DK0TR, DG6YID, OV3T & OZ1BEF (JO46).

The 70cm band

Roger G3XBM was active in the UK Activity Contest on the 432MHz (70cm) band.

Tony G4NBS took part in the AFS contest on 4 February, running 400W to a 23 element Yagi. Tony made 102 QSOs and says there was good participation from France and Germany, but only one station from the Netherlands (PE1EWR) and no ONs. Tony says that stations to the west worked well into France, but from JO02, all the QSOs were near the north coast. Tony was surprised to work GU3TUX while **Dave G7RAU** wasn't as strong as usual. Highlights were F1MKG (JN08), F4HOG (JN09), F6DKW (JN18), F5DMD (JN18), F4HRD (JO00), DF2VJ (JN39), DL1KFS (JO30), DK9TF (JO31) and DH3NAN best DX on CW (JO50).

During the UK activity contest on 13 February, Tony worked DF3VJ (JN39), DK0MM (JN49), EI8KN, GM4JTJ (IO86), MM0CEZ (IO75) and says that it took 15 minutes of CW at the end of the contest with GM4BYF (IO85) to get their serial numbers across!

During the FT8 Activity contest on 14 February, Tony made 70 contacts in 25 locators. He says, *"it started well with DH7IF/P, DL2FQ, DF4IAE and DF4ZL all in JN49 right at the start at 1900UTC but during the rest of the four hours only as far as JO3* line. OV3T (JO46) and OZ2OE (JO45) showed the benefit of using KST on FT8 to liaise as **Thomas** was barefoot and took a long time before his signal found the right plane"*. Other QSOs over 400km were GI4SNA, G7RAU, EI8KN, MI0IHH, MM0CEZ, GM0HBK, GM8MJV, DJ6TA (JO30), JO31(4), JO32(6).

During the contest on 2/3 March Tony had a quick look at the band at 2300 and there was no obvious activity from Europe. He did the last four hours on Sunday, still finding little out to the east, but worked a couple of stations in JO31 and DF0MU in JO32. F6KFH (JN39) was the best DX.

Jef Van Raepenbusch ON8NT (Aalter) took part in the FT8 Activity Contest on 14 February with his best DX being G4CBW (IO83).

Satellites

Patrick Stoddard WD9EWK (Phoenix) writes, *"Satellite operators still have GreenCube (IO-117) available. There has been no news from S5Lab or the Italian space agency on whether this satellite will continue to be available to radio amateurs, or if it will go silent.*

"Kenwood's new TH-D75 handheld radio (**Fig. 3**) *has finally appeared in stores here in the USA. The radio, which is a dual-band 2m/70cm radio in most of the world, also includes the 222MHz (1.25m) band in the Americas. Like with the previous TH-D74, the new TH-D75 has lots of functionality. It is not capable of cross-band full-duplex operations for satellites, but that has not kept the TH-D75 from being used on satellites in FM and also D-Star. The TH-D75's all-mode receiver is just like what we had in the TH-D74, capable of being a downlink receiver for the satellites in SSB and CW.*

"Over the past couple of weekends, I have been using my TH-D75 on the TEVEL satellites, making contacts in FM and D-Star. Five watts is sufficient for good D-Star transmissions through these satellites. The TH-D75 has an RX AFC function, which appears to be a big help in dealing with the Doppler effect on D-Star downlinks. The two stations I have worked through the TEVEL satellites using D-Star, ***Curt N0GVK*** *in Nebraska and* ***Endaf N6UTC*** *(also* ***MW1BQO****) in southern California, gave me good reports on my transmitted D-Star audio. The D-Star audio I heard from those two stations was also good.*

"I recently worked some JO-97 passes using the combination of a Yaesu FT-817ND for the uplink, and the TH-D75 for the downlink. Just like with the TH-D75's predecessor, the TH-D75's all-mode receiver is up to the task. For modes other than FM and D-Star, the TH-D75's fine tuning mode allows

5

for four tuning steps smaller than the 5kHz steps available for FM and D-Star (20, 100, 500, and 1000Hz steps). Like I have used with my TH-D74 and an Icom IC-R30 receiver, the 100Hz tuning step for SSB satellite downlinks works well for me. Where I might use a smaller RX filter for SSB on the HF bands, or for terrestrial VHF/UHF, the 3.0kHz SSB filter bandwidth is helpful when dealing with the Doppler effect".

Jef ON8NT monitored the ARISS QSO on 15 February as well as making two FT4 QSOs using the RS-44 satellite; AI4LL (EM97) and EA1GKZ (IN70).

Dave Ryan M0GIW/EI4HT received an SSTV image from the SONATE-2 satellite on the morning of 9 March, **Fig. 4**. Dave was controlling his station remotely from a ship in the Irish Sea.

FM and DAB DX

Adam Wisher (Cheltenham) writes, *"It's been fairly quiet recently for me on FM but I was away on the north east coast a couple of weeks back (Whitby, North Yorks), and got the chance to take my TEF6686 portable radio up to a good spot along the coast path, where the higher part of the cliffs blocks inland signals. It was fairly flat, but using some cheap rabbit ears, which seem to perform much better with the TEF than a simple telescopic antenna, I pulled in some weak but listenable stuff from Denmark (e.g Nova 103.9, Næstved, 796km), NW Germany (various stations from Bremen and Lower Saxony) and the Netherlands (NPO Klassiek 94.8, Hoogersmilde, 491km) on FM. No sign of Danish or Norwegian DAB, but I'm sure they'd be receivable there during a good lift. A map of location and all the catches is here:*
https://tinyurl.com/3yukdanz

"For a pretty flat February day I was pleased with that. I've been really impressed with the performance of the TEF radio"!

Simon Evans (Twyning) says that he has nothing to report on Broadcast FM or DAB and says, *"with all these Atlantic lows coming our way, there's no chance!"* Unfortunately, Simon says that his TEF radio has a problem with the frequency selector, so he has ordered a desktop version of the radio which is expected soon.

That's it for this month. Thanks to everyone who's been in touch. See you next time! **PW**

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1

Portable military radio communications of WWII

In the last of the series on collecting Second World War portable military communication equipment, **Graham Caldwell** looks at those used by Imperial Japan and the Soviet Union.

Imperial Japan

At the outbreak of the Pacific War in December 1941, Japanese radios were crude and obsolete compared with those of their Axis partners. Japanese equipment designations, for example, 'Type 94', is a two-digit number indicating the Japanese year when the equipment was adopted. The number in this case refers to the Western calendar of 1934, which was the Japanese calendar year 2594. Only AM mode (amplitude modulated) sets with simplified circuits and outdated vacuum tubes were available in 1941. The construction of these sets was mechanically inferior when compared to the robust castings and well-shielded modules of German radios, but unlike most of the other belligerents, Japan's advantage in using quartz crystals in their radios was due to having access to quartz from Indonesia. Japan made much greater use of CW (continuous wave telegraphy) for long distance communication than wireless, which meant greater reliance on the field telephone system with its miles of exposed wire susceptible to enemy interruption. Because the 1946-48 Allied disarmament program required the disposal of all Japanese war materiel, including stockpiles of Japanese military communication equipment, what surplus radios survived have since been acquired by private collectors, or military radio museums, leaving little available on the open market today.

Type 94-6: the army walkie-talkie. The Japanese developed the concept of single-tube miniature wireless sets in the 1930s for use at the infantry platoon/company level, one example being the Type 94-6 (6th modification). This was a small, lightweight transceiver measuring only 18 x 13 x 8cm, which primarily uses CW with an integral Morse key, in addition to AM (Voice) over short distances. The set operates on the VHF band divided over three frequency ranges: 24.7-34.1MHz; 29.5-41.2MHz and 35.0-50.5MHz. Although described as compact, the 94-6 power supply had to be housed separately in a backpack. 3V and 135V batteries powered the receiver, but a manually-cranked generator was connected to the right side of the radio to provide current to the transmitter. The L-shaped antenna was connected to the side that faces away from the operator when carried on the chest. This impractical arrangement consisted of a 1.4m horizontal boom length at 90° to the 65cm vertical rod, the latter being the actual antenna. In October 1944, the US War Department published a technical bulletin for the 94-6 in English: apparently, during the fighting on Guadalcanal, American Marines captured quite a few 94-6's and put them to use. The post-war destruction of all Japanese wartime equipment explains why so few of these beautiful sets have survived.

Type 97: the IJN walkie-talkie. This miniature radio was employed by the Japanese Special Naval Landing Forces: the Imperial Japanese Navy's beach assault infantry. Referred to incorrectly as Japanese Marines, their role was to spearhead amphibious landings, seeing extensive service in the Second Sino-Japanese War and during the 1941-45 Pacific War. Developed in 1937, the Type 97 is extremely lightweight and sized approximately 18 x 13 x 8cm, thus small enough to be carried on the chest, with the battery power supply carried in a backpack. The set had the same features as the Type 94-6, including an 'L' shaped antenna, except that it was waterproofed to cope with beach landings through surf conditions and worked on a different frequency of 23-31MHz. It had a communication distance of two miles using AM Voice, but much further using CW Morse. Power was supplied by dry-cell batteries and a hand-cranked generator with a transmission output of 0.5W. Now extremely rare, Axis Militaria (axis-militaria.com) recently sold one described as: '100% complete with no missing parts, including the rare radio tube, but missing its leather case'. The price has since been taken down, but as a guide, eBay is currently advertising a Japanese WWII Type 1 KU wireless (direction finder for aircraft, described as 'rare') for US$6,800 (£5,600).

Type 92 Field Telephone was developed in 1932 and draws its power from its own battery, supplemented by wire transmission and was the most used of all Japanese communication

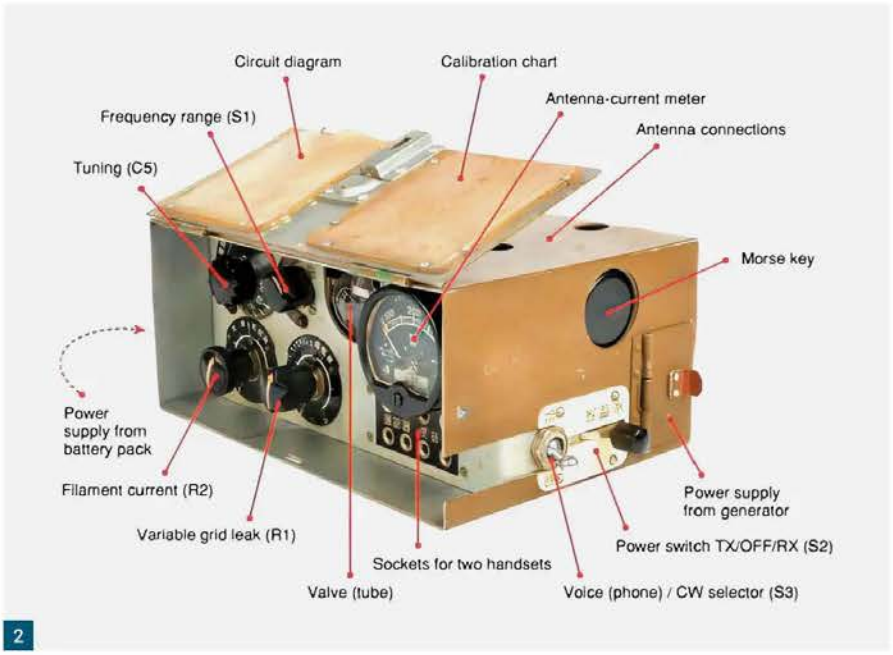

Fig. 1: The Type 94-6 walkie-talkie in its leather case. At only 18cm (7in) wide carried on the chest, it operated on CW Morse, but had a very limited range using voice. *(achern.artstation.com/projects/Pme1Z4)*

Fig. 2: The inside of the Type 94-6. Note the circular Morse key on the side. An opening in the leather carry-case allowed access to this function when on the move. *(cryptomuseum.com)*

Fig. 3: Illustration of the Type 94-6 man-pack. The backpack battery provides power to the receiver. A separate hand-cranked generator supplies power to the transmitter. Note the 'L' shaped antenna, which was 1.4m x 65cm! Fig. 4: The inside of the miniature IJN Type 97 walkie-talkie employed by the Special Naval Landing Forces. Similar to the Type-94-6, but waterproofed for amphibious operations. Fig. 5: Special Naval Landing Troops operating their chest-mounted Type 97 walkie-talkies. Note the impractical 140cm x 65cm 'L' shaped antennas! Fig. 6: A Type-97 walkie-talkie is being chest operated in the background, whilst in the foreground a Type 94-3A wireless is sending Morse. Fig. 7: Japanese army radio operators coordinate with radio-men in the field during training exercises in preparation of the coming American invasion force, Iwo Jima, January 1945.

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Fig. 8: Wood encased Type 92 Field Telephone in its leather carrycase. Visible is the handset, speaker piece and frequency chart in the lid. *(museumofworldwarii.org)* Fig. 9: Japanese army signallers belonging to a field telephone platoon. Note the reels of telegraph wire ready to be deployed for long distance communication.

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Fig. 10: This US Marine is seen using a captured Japanese Type 92 Field Telephone on Saipan in the Marina Islands, Western Pacific Ocean, 1944. Fig. 11: Japanese technicians explaining their radio equipment to sergeant A. I. Mansfield of the Australian Occupation Force, Menado, Celebes Islands, October 1945. *(awm.gov.au)* Fig. 12: Japanese WWII radio accessories currently on sale. Left: Morse key £180 *(worthpoint.com)*. Right: headset with connector plugs £49.95. *(eBay)*

equipment in the Chinese and Pacific theatres. The advantages of field telephones over wireless was their longer range, small size, ease of portability, superior reliability, higher sound quality, ideal in defence, plus telephone traffic was more difficult to intercept. Their limitations were the time taken to lay a complete wire system, vulnerability to artillery and mortar fire and a disadvantage during the advance. These devices operated as 'point-to-point' when two were linked together, or as a 'common battery system', when many were linked to a switchboard operated at battalion level and above. The wooden-cased Type 92 was sized 27 x 12 x 17cm and came with a hand crank generator to signal another telephone. The range was five miles on the field and over 150 miles on an overhead wire. Several compartments contained the handset, headset, additional earpiece, spare wires and a small set of tools. Genuine sets in good condition are plentiful from £190-£600 dependent upon condition and completeness. International Military Antiques (ima-usa.com) currently have a matching pair for US$550 (£450).

Soviet Russia

Much of the radio equipment the Soviets possessed at the time of the German invasion in 1941 was lost in the months following. Domestic production could not initially replace these losses, relying throughout the war on USA, Canadian and British Lend-Lease, which accounted for an estimated 30% of their communication equipment by 1945. This included over 250,000 radios supplied by the US alone, including large numbers of SRC-300s, 536s and 584s. Radios were rarely seen below regimental level, the Soviets preferring field telephones, but by late 1942, Russia's own new and improved wireless designs were in full production: for example, in 1944 alone, 64,000 locally produced radios of all types were issued to the Red Army. Even so, there is a dearth of WWII-era radios on the second-hand market today, no doubt due to the Cold War preventing any cooperation with the West until 1991, a gap of 50 years since the Great Patriotic War commenced during which time Russian radio amateurs snapped up the surplus. Today, anything of value coming on the market (other than Soviet field telephones) appears to be sold via specialist dealers, such as WorthPoint (worthpoint.com) and Axis Militaria (axis-militaria.com) among others.

RB 3P. Technically 'RB 3R' in Western script; this set was introduced in 1938 as a welcome addition to Soviet produced portable transceivers due to its small size and portability. It was designed for infantry communication between division-regiment-battalion levels. The sheet-metal case measures 34.1 x 19.1 x 24.1cm with a weight of 28kg, which takes two men to quickly set up. The set's frequency is 1475-6025kHz with a power outlet of 5W (hand-cranked generator for transmitting and four anode electrode BAS 60 batteries when receiving) for an effective range of 18 miles. There were two antenna options, a 1.8m whip, or a 2 x 17m dipole when set up as a permanent ground station. Information on this radio is scarce, but *Compendium 4*, a reprint of a German document about the radio, can be found on Wireless for the Warrior (wftw.nl). The Walt

Fig. 13: Portable wireless 3P (Western descriptor 3R) replaced the older RB set for communication down to battalion level. Batteries supplied the power receiving, but for transmitting a hand-cranked generator was required. Fig. 14: This 3P (3R) radio is sitting on its battery case and could be set up in under three minutes. It had a range of up to 15 miles when using voice mode Fig. 15: Over 800,000 women served in front line roles in the Red Army during the war. This Signaller is receiving a message on the 3P (3R) wireless. Note the carrying straps used when transporting the set as a backpack. Fig. 16: The 1940s 6PK man-pack wireless, the forerunner of the RB-M, is popular with radio amateurs, but has become scarce. As a price guide, the popular 1970s USSR P407 (R407) man-pack radio sells on eBay for £600-£700. Fig. 17: The short-wave RB-M radio at battalion level and above. Extremely portable at only 13.5kg it had a range of six miles on the AM band for voice, but as a ground station, using a 7m mast, the range was 18 miles for voice and 50 miles for CW. *(radioscanner.ru)* Fig. 18: A Soviet *Starshina* (Sergeant Major) operates a RB-M radio during the battle of Berlin, April 1945.

Gromov's Radio Museum in Moscow (rkk-museum.ru/index_e.htm) has a 3P radio in its collection with photographs of its outside case and inner workings.

RB-M is a famous WWII Soviet portable radio. The first RB Radio was designed in 1938 as an improvement on the earlier 6PK wireless, which after several modifications, its new designation became RB-M (Radio Base – Modified) until the final variant, RMB-1, was manufactured up until the end of the 1950s. The RB-M nine-tube portable radio operated on the short wave band: AM for Voice or CW for Morse, and was deployed in 1942 at the battalion level and above. It was transported in two steel cases: one housed the transceiver, while the other contained the power supply unit. The transceiver is sized 34.5 x 19.5 x 26.0cm, with a weight of 13.5kg. The frequency range is 1.5-5MHz and the communication range, using its whip aerial, was six miles by voice and nine miles using Morse. As a ground station, using a 7m mast antenna, its range was increased to 18 and 50 miles respectively. The power source is a 2NKN-22 (2NKN-24) battery and three BAS-80 anode batteries, or two batteries and a VPR-6 vibration transducer and transmitter output power 1W. There has been sales activity on various Polish sales websites during the last few years of non-working RB-M sets (conditions described 'as seen' and all without their power component) with prices in the £100-£140 range, but there's been no record of an RB-M, or an RMB-1, coming up for sale elsewhere. An option, from EU-based RAM-Werks (replica-weapons.com) is their full size RB-M working replica with full functionality. This model looks indistinguishable from a real RM-B and is made to order: £POA.

A-7. As early as August 1941, the Soviets began researching the feasibility of frequency modulation (FM) in the Very High Frequency (VHF) range for communication. Trials were conducted with the new A-7 portable radio station during the Stalingrad offensive. The A-7's role from 1943 was to provide communication in voice, or Morse, between infantry regiment level and artillery divisions. It had a range up to six miles and weighed 15.5kg. The transceiver, with power supply and accessories, is housed in a 28.5 x 13.5 x 16.5cm wooden box with shoulder straps designed as a portable man-pack, or two men over long distances. Frequency range was 27-32MHz with a power source of two dry anode BAS-80 batteries (total 160V) and two NKN-10 nickel-cadmium batteries. Transmitter output power was 1W. In 1944 the simplified A-7A version was introduced with CW Morse removed, followed by the A-7B in 1945 with a 50% increased transmitting range on a frequency of 24-28MHz, which model continued to be manufactured until 1956. A-7 radios and their variants are rare items to find these days other than in private hands or museums, but a non-working A7-B, marked as 'rare', is currently for sale on eBay for US$2,500 (£2,100).

Fig. 19: The A7 man-pack VHF-FM radio, which provided higher clarity, low interference and lower power consumption than AM band radios. Note the battery compartment bottom right and how the sectional antenna was stored. *(rkk-museum.ru/index_e.htm)* Fig. 20 A stack of three Soviet A7s VHF-FM radios. Note that there seems to have been no standard colouring for the metal case. *(30news.ru)* Fig. 21: Transporting the A7 man-pack radio. The wooden case, with a back panel and carrying straps, houses the radio station, telephone handset and the battery compartment, for a total weight of 21kg. Fig. 22: The TAI-43 Field Telephone was the Red Army's standard means of communication well into the 1960s and are plentiful to purchase, often excellent condition, for as little as £60. *(Worthpoint.com)* Fig. 23: Two Red Army soldiers stop to use a TAI-43 field telephone as buildings erupt in flames behind them during the Battle of Berlin, April 1945. *(colour by Darryl Oats)* Fig. 24: Soviet WWII radio accessories currently on eBay. Above: transceiver microphone-headset £45. Below: wooden-based Morse key £65.

TAI-43 Field Telephone. Field telephones provided maximum portability due to their small size and weight and were the Red Army's standard communication equipment. The TAI-43, sized 27.9 x 22.8 x 10.1cm and very lightweight at only 5kg, was produced in massive numbers during the war based on the excellent German FF-33 field telephone (see *PW* February 2024), which the Soviets captured in large numbers. It was in the MB class of portable field telephone systems: i.e. incorporating an internal 1.5V dry cell battery. It had a range of up to 16 miles in the field and 150 miles on overhead wires. The TAI-43 was manufactured in a wooden case until 1946, at which time it was upgraded to heat-resistant Bakelite to match the German FF-33. They were able to use German technology to do this, because one of the spoils of war was the FF-33 factory! The good news for collectors is that TAI-43 working models are plentiful online from £60 to £150. Another option is to search for the TA-57 field telephone used during the Cold War, with an equally wide choice on eBay in the £40-£90 range.

Conclusion

This issue, and the three preceding issues of *Practical Wireless*, have covered WWII portable military communication equipment of Great Britain, Germany, USA, Imperial Japan and Soviet Russia. For those readers with a passing interest, or undertaking research, there are many international private and museum collections online, each with in-depth technical data, history and images of just about every type of military radio employed between 1939 and 1945.

For those considering starting a WWII radio collection, they should concentrate on British and American sets, which come up more frequently for sale. Initially, investigate military field telephones of any country, which are plentiful to purchase. For under £200 you can obtain a matching working pair, some telegraph wire and instantly experiment with communication over a short distance. They are also fun to connect between the home and a child's garden cubby house!

Acknowledgement

Thanks are due (for USSR) **Louis Meulstee**, *Wireless for the Warrior* at **www.wftw.nl** and (for Japan) Hubert Miller, Newport, OR, USA.

Prices and availability of sets mentioned were current in late 2023. **PW**

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Radio Communication Equipment of WW2

Dear Don,

I really enjoyed **Graham Caldwell's** excellently researched review of WW2 equipment. One thing that I have always wondered is where did all the German WW2 equipment go to? As an amateur that hails from the 1950s my early involvement in amateur radio equipment was with ex-WW2 surplus gear eg, 1155, 1152, BC348, HRO, AR88 and many others. Most of it came via Lisle Street and Tottenham Court Road in London.

Over the years I have asked the question to UK and many friends in DL/DJ land *"Have you ever used or seen any German WW2 equipment or worked anyone with it?"* Nobody seemed to have ever heard of it. The only time I have seen any equipment has been in Jersey and at Bletchley Park. So, the big question is *"Where did it go to?"* Google says 'down the scrapyard' but that seems a shame as it looked so good.

Roger Wheeler G3MGW
Colchester

Where did the German WWII radio equipment go?

Observing the Universe—Letters

Dear Don,

It is fairly evident that my previous letter published in the *Your Letters* section of *PW* where I mentioned 'holographic illusions' and 'waveform particle duality', has rattled the cage of **Tim G4WFT** (April 2024).

Yes, as Don, the editor comments, *"we are still at a loss to explain some of the more fundamental concepts that would bring the macro and micro worlds together"*. However, one reason for this, could be the ongoing acceptance of what mainstream scientists have to say about the macro and micro worlds. As if what they put in the public arena is 'set in stone', so therefore cannot be challenged. When in fact, a lot of their theories and explanations are not watertight. There are so many 'holes', the 'water' is literally pouring out. But of course, they prefer to turn a blind eye to the 'holes' and the 'water'.

And I don't understand why G4WFT has a problem with 'wave-particle duality' and 'holographic illusions' – more homework, perhaps? And yes, there has always been *"a great deal of speculation and many theories to 'explain' the weirdness of the quantum world"* – that's the problem, they are all theories. Most are made up in a vain attempt to validate previous theories, which didn't quite cut the mustard. Hence yet another theory.

Well, as for 'bunkum', there was a time when washing your hands before and after a surgical operation was considered bunkum. A time when rockets and aircraft were thought to be bunkum too and so on.

Of course, using all manner of instruments scientists can 'see' many different frequencies, including gamma rays etc. But, without these instruments, humans are restricted to seeing only a small sliver of visible light. Including scientists.

I'll finish up with what **Terry Pratchett**, he of *Discworld* fame, once said: *"I'll be more enthusiastic about encouraging thinking outside the box when there's evidence of any thinking going on inside the box"*.

Ray Howes G4OWY/G6AUW
Weymouth

*(**Editor's comment**: Thanks Ray but we'd probably better put this one to bed now! Glad to hear you are back home and fully recovered.)*

Dealing with SMDs

Dear Don,

Regarding dealing with SMD packages, **Mike Richards G4WNC** told us a novel way to deal with multi-pin SMD packages last month. However, I think this is over-complicated.

I have to replace these awkward beasts from time to time, and use a simpler technique. I simply cut all the legs off using a sharp knife like a Stanley: *"other brands are available"* as the BBC would say..., then with the device removed I sweep the legs into the vacated centre with a soldering iron, one or more at a time. This involves less heating of the PCB than G4WNC's method, then when I am sure there are no solder bridges left, I use a jelly flux. I have a red-jelly activated rosin flux I bought from RS years ago. I flux all the solder pads and a bit in the centre as a glue for the new device to keep it in place. Then carefully align the new device, and hold it down with a meter-probe, until I have soldered a couple of legs. I find usually there is enough remnant solder left not to need any more. A fine-tip iron is essential.

Philip Moss M0PBM
Surbiton

Ali Express - Beware

Dear Don,

I ordered three items via Ali Express, each item was from a separate supplier. A couple of weeks later a parcel turned up, which contained two of the ordered items. When I checked the delivery status of the third item it said it too had been delivered. I discovered that despite being from three different suppliers all three items had the same tracking number.

No attempt to convince the supplier (ProRadio Store) or Ali Express that the third item was missing has been successful. I requested a refund but this was refused. I appealed but this was also rejected. ProRadio Store and Ali Express have had my money but have not delivered the goods.

My advice would be to think very carefully about the risks of buying via Ali Express and if you must do it, don't order more than one item on the same day so they are forced to issue separate tracking numbers for each item.

Roger Trett G8JWT
Bungay, Norfolk

*(**Editor's comment**: Sorry to hear that Roger. I have twice used Ali Express now without problems – indeed, I have been very happy with their service and prices. I wonder what experiences other readers have had?)*

Rallies & Events

All information published here reflects the situation up to and including **25th March 2024**. Readers are advised to always check with the organisers of any rally or event before setting out for a visit. To get your event on this list, email the full details, as early as possible, to: **practicalwireless@warnersgroup.co.uk**

14 April

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

20 April

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

21 April

NARSA RALLY (NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION): Norbreck Castle Hotel Blackpool FY2 9AA, 1030am. Contact Heather Stanley M6HNS,
info@m0juw.co.uk

5 May

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

19 May

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

9 June

JUNCTION 28 RADIO RALLY: Alfreton Sports Centre DE55 7BD, 1 mile from M1 J28. Open 10.15am. Bookings open for tables at £12 in advance. On the day £4. Cash Only. Everything is indoors with bar/refreshments. Large and small suppliers, new and used equipment. As usual RSGB and specialist groups. (BB, CR, LB, RSGB, SIG)
www.snadarc.com
contact j28rally@snadarc.com.

9 June

MENDIPS RALLY: Farrington Gurney Memorial Hall, Church Lane, Farrington Gurney, BS39 6UA, 9am - 1pm, Admission £2, Free car parking, Hot & Cold refreshments, Inside tables £8 each, Field Pitches £5, Traders from 7.30am. (CBS, CR, FP, TS)
Luke 2E0VHV, 07870168197
mendipsrally@hotmail.com

15 June

ROCHDALE & DISTRICT AMATEUR RADIO SUMMER RALLY: St Vincent de Paul's Hall, Norden, Rochdale, OL12 7QR. Doors open at 10am with entry still at only £3. Usual Traders and caterers. Plenty of free parking. Contact Dave, G3RIK – details below. Please note that all proceeds from this rally will be given to a local charity. Last year we were able to donate £4000 from Rally sales and Silent Key donations to the Rochdale Springhill Hospice. (CR FP TS)
dave@cardens.me.uk,
01706 633400 Mobile: 0781 367 1296

23 June

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

14 July

MCMICHAEL RADIO & ELECTRONICS RALLY AND CAR BOOT SALE: Reading Rugby Club, Holme Park, Sonning Lane, Reading, Berkshire, RG4 6ST. 09:00 entry (08:00 for Trader Set-up). Entrance Fees: Visitors - £4 per person, Traders - £10 per Table (includes entry for two people)
https://mcmichaelrally.org.uk

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

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REVIEW – ALPHA DELTA ANTENNA SWITCHES: Richard Constantine G3UGF discusses antenna switches and reviews the products from Alpha Delta.
REVIEW – THE SDRPLAY RSP1B AND THE STAMPFL STRESSLESS: Georg Wiessala has been looking at a couple of interesting receivers.
THE DIGITAL TUNEAID: Andrew Woodfield ZL2PD describes the construction of a Precise 1kHz Sinewave Test Oscillator.
A 160 AND 60M ANTENNA FOR THE SMALL(ISH) GARDEN: Steve Telenius-Lowe PJ4DX describes the development of a 160m antenna suitable for a small plot (and it works on 60m too).
BUILD A FIELD STRENGTH METER: Alpar Cseley HA8KT describes how to build a useful shack accessory.
There are all your other regular columns too, including HF Highlights, World of VHF, Data Modes, Antennas, Book Reviews, What Next, The Morse Mode and Amateur Radio on a Budget as well as your Letters, the latest News and more.

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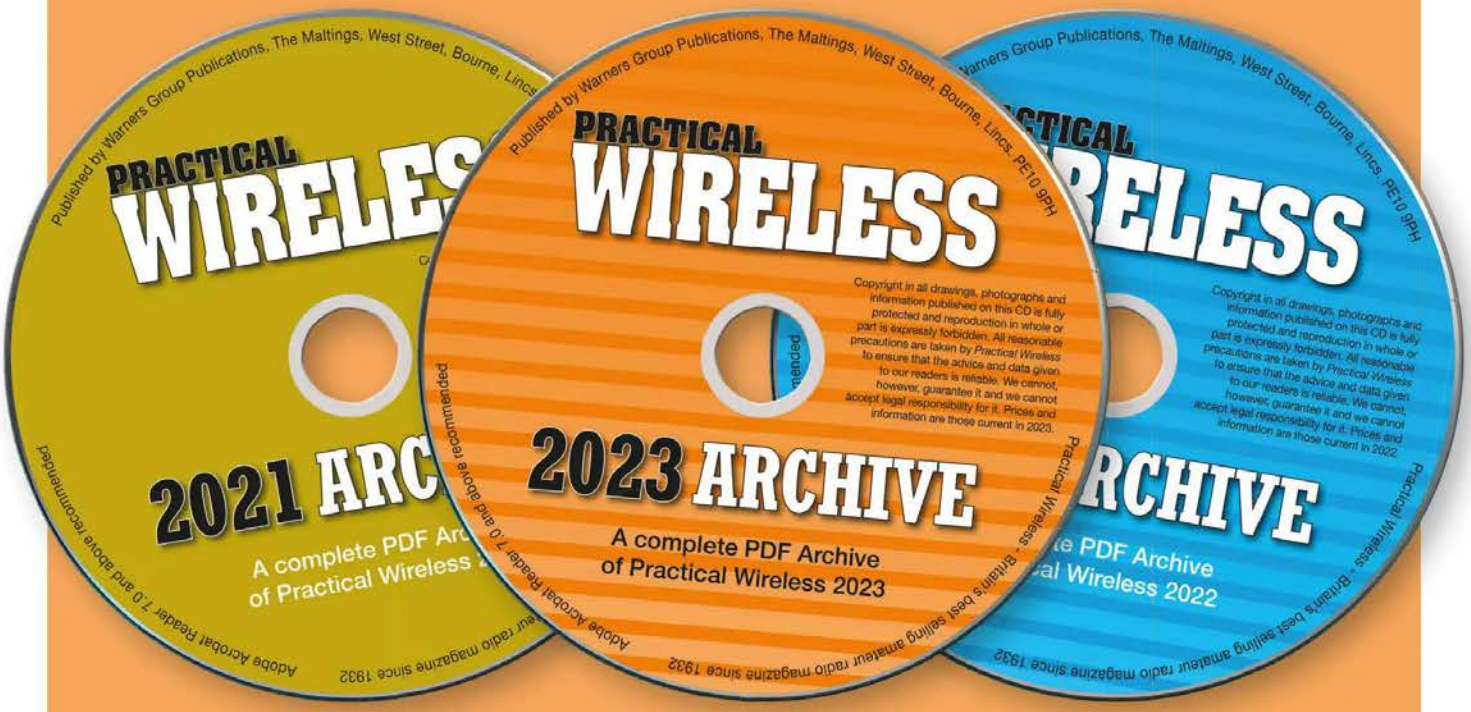

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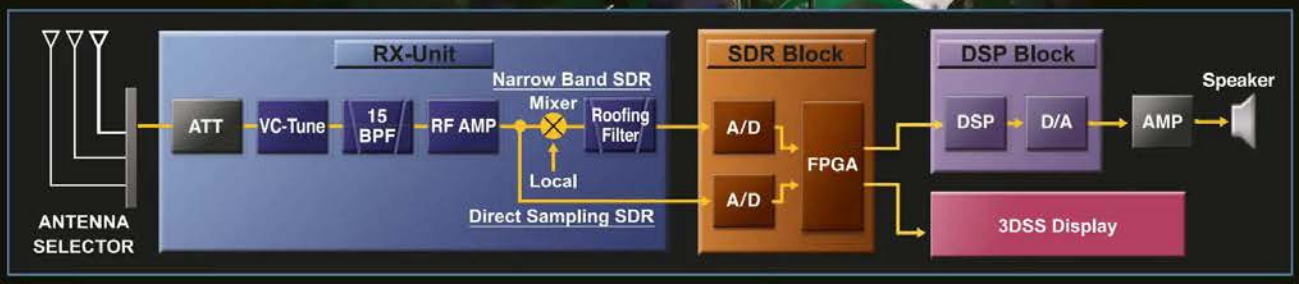
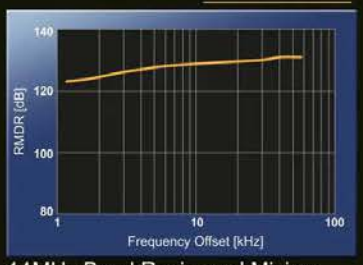
True Performance
Hybrid SDR Configuration

The Hybrid SDR Configuration combines the excellent performance of a Narrow Band SDR receiver with the wide band sampling of a Direct Sampling SDR receiver that simultaneously provides a wide bandwidth real time display of band activity

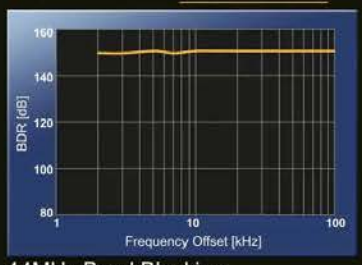


2kHz RMDR 123dB+



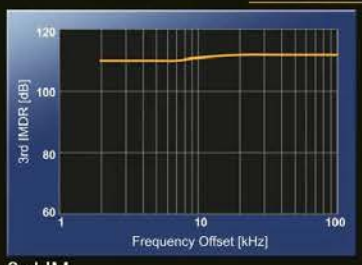
14MHz Band Reciprocal Mixing Dynamic Range (RMDR)

2kHz BDR 150dB+



14MHz Band Blocking Dynamic Range (BDR)

2kHz 3rd IMDR 110dB+



3rd IM Dynamic Range (IMDR)

HF/50MHz TRANSCEIVER
FTDX101MP 200W

HF/50MHz TRANSCEIVER
FTDX101D 100W

* Microphone M-1: Optional

YAESU
Radio for Professionals

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