PRACTICAL WIRELESS

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Running GB90PW

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Antenna Rotation

Detailing the construction of this handy mechanism

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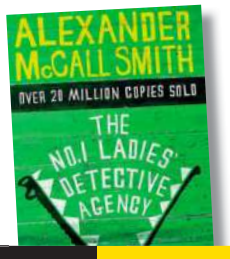

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Keylines

I've been busy this month operating GB90PW, as you can read elsewhere in this issue. The 6m Sporadic E season has, of course, pretty much come to an end and HF propagation is still somewhat variable although we can hope for an improvement as the autumn progresses. There are certainly some interesting HF DXpeditions to look forward to, a welcome change after the various lockdowns – many remote islands were very reluctant to open up again to overseas visitors given that they had managed to keep the dreaded COVID away.

Archive Articles

I hope you are enjoying the archive articles we have been running over the past three months. Personally, I am finding it fascinating to look back at some of the constructional projects that have appeared in the magazine in years gone by. Apropos of which, I was trying to discover when and under what guise the late **George Dobbs G3RJV** had entered the world of *PW*. As far as I can discover, we ran a series of constructional articles on the so called *PW Severn QRP 7MHz Transceiver* starting with the May 1983 issue but George doesn't appear to have featured again until his *Getting Started the Practical Way* first ran in the March 1991 issue. This series ran for quite a long time and then morphed, presumably because his readers would have been well grounded by then, into *Carrying on the Practical Way*. Those getting started articles featured lots of advice on what tools and test gear were required before launching into some simple projects. Happy memories!

Old and New Radios

And reverting to the GB90PW operation for a moment, it was fascinating to be told by several people I worked about the vintage equipment they were using – a KW2000A, a National NCX-5, even in one case a Plessey Clansman set. It's great to know these old radios are still kept in working order. And, of course, the old Collins and Drake gear is very collectable nowadays and although it holds its value nicely, it can still be bought for a lot less than in would have cost originally, in real terms.

What these radios lack are some of the gizmos that we find in modern sets, although that doesn't actually detract from them when used for 40m SSB, as was the case with those QSOs I referred to. What has happened over the years, of course, has been the development of external keyers (the early ones, remarkably, used valves!) and speech processing in the early days (1970s largely), then computer interfaces (RS232 back in the late 80s), external soundcards and so on. A lot of add-on units were made and sold on the back of the emerging need for such devices but, gradually each and every one has been incorporated into modern transceivers.

This Month

We don't have any reviews this month, although there is at least one to come next time. But we do have some excellent constructional projects, from 3D printing a lightweight rotator to building a simple vertical antenna for where space is limited. And next month we have our usual Christmas Quiz, put together this time by regular contributor **Steve Telenius-Lowe PJ4DX.** I am gradually catching up with some of the excellent articles that were contributed during lockdown when, it seems, some of you had nothing else to do but write for *PW*, for which I am truly grateful! But I'm getting to the point where I would be more than happy to receive articles from new authors (check with me first, to be on the safe side, in case there is something similar already in the works), so do put your thinking caps on. Just to be clear, we do pay (by the page) – not a lot, but it can help to fund your radio hobby!

Don Field G3XTT
Editor, *Practical Wireless* Magazine

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Upgraded Anytone AT-5555 PlusV3 10m Mobile Transceiver

The Anytone AT-5555 PLUS now has the new the RX noise reduction option (NRC). With a completely new designed PCB board the Anytone AT-5555 PLUS is one of the most modern and up-to-date 10m radios on the market.
Updates and new (menu) functions are:

- VOX
- CTCSS/DCS codes
- RX compander
- Noise gate
- RX noise reduction (extra PCB inside the radio)
- Program cable connector on the backside of the radio (program cable is optional)
- Extra ventilation holes on the top and bottom cover

Available from stock at Moonraker for £169.95 plus p+p.

GB22YOTA

From **Jamie Williams M0SDV**: This year we are hoping to get the callsign GB22YOTA, pending Ofcom approval, and I would like to invite you all to participate and get Youngsters on the air once again! As usual, the callsign will be on air from various locations throughout the month of December 2022 where we will join the international 'December YOTA Month' activity organised by the IARU R1 Youth working group.
During December Youngsters from around the world will be getting on-air to promote activity on the amateur bands, once again proving the YOTA slogan, *"Yes, there is youth in ham radio!"*
There will be a series of slots available for people to operate with GB22YOTA. You must be a full licence holder or supervised by one to operate with the callsign. Available operating slots will become clear in the coming days on QRZ.com, just search GB22YOTA and there will be a calendar for you to see. If you are interested in operating this December, please email **YOTA.Month@rsgb.org.uk** with your preferred operating slots, Club affiliations if any and who the supervising full licensee will be. Also let me know what you'll be planning!

JOTA-JOTI 2022

JOTA-JOTI 2022 (Jamboree-on-the-Air-Jamboree-on-the-Internet), the world's largest amateur radio Scout event, is set for 14 to 16 October. The event connects millions of young people around the world for a full weekend of amateur radio and online activities that promote friendship and global citizenship. Using both the airwaves and the internet, JOTA-JOTI enables young people and volunteers to participate in fun and engaging group activities focused on developing 21st century skills through Scouting. JOTA is one of World Scouting's longest-running global events, dating back to 1958. JOTA-JOTI aims to support young people of all ages to learn about communications technology, the values of global citizenship, and their role in creating a better world. To learn more about JOTA-JOTI, visit their website at:
www.jotajoti.info

J Birkett

PW's Designer **Mike** recently visited Lincoln and was pleased to see that long-time *PW* advertiser Birketts are still in business, despite the loss of the company's founder. We thought you would like to see some photos and also to know that they have a stand booked at the Newark Hamfest.

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

THE TRANSATLANTIC CENTENARY TESTS: The RSGB are hosting an International Amateur Radio Activation, The Transatlantic Centenary Tests, on the HF bands, for the entire month of December 2022, to commemorate the centenary of the achievement of Amateur Transatlantic communication, during the Transatlantic Tests that were held between 1921 and 1923.

24 December 1922 was when the very first amateur radio signal from Europe was heard in North America; this was from the RSGB station (G)5WS, which was established at Wandsworth in South London, as part of the Third Transatlantic Tests.

Unlike the tests of the 1920s, which consisted of one-way communication, the 2022 tests will encourage worldwide two-way communication with UK & Crown Dependency based stations by having a series of awards available for making QSOs with activating special stations. The Club Log team have kindly agreed to provide the supporting infrastructure for the Tests.

In anticipation of this centenary celebration, with the assistance of Ofcom (the UK licensing authority), the RSGB have reactivated five callsigns that they held in the 1920s:

- G5WS, used for the 1922 tests – 'the first to get across'
- G5AT, used for the 1923 tests
- G6XX, used for the 1923 tests
- G6ZZ, used for the first amateur tests on a moving railway train in 1924
- G3DR, Scottish Highlands Call – GM3DR.

These historic callsigns will be activated by RSGB members and Clubs, using G5WS, G5AT, G6XX, G6ZZ and G3DR (England), GM5WS (Scotland), GW5WS (Wales), GU5WS (Guernsey), GD5WS (Isle of Man), GJ5WS (Jersey) and GI5WS (Northern Ireland).

Full details of how to participate will be published on the RSGB website at:
https://rsgb.org/transatlantic-tests

BRAZIL REGULATOR PROPOSES MANDATORY LOTW FOR UPGRADES: In a move being opposed by Brazil's national amateur radio society, use of the ARRL's Logbook of the World would become mandatory for any radio amateurs in that country who are seeking licence upgrades, according to an online report. Brazil's national amateur radio society, Liga de Amadores Brasileiros de Rádio Emissão, announced that the national regulator ANATEL proposes that amateurs wishing to advance to a Class A or Class B licence from a Class C, would be required to confirm QSOs by using LoTW.

This proposal is designed as one component in an alternative being considered to replace the CW test. It is being called the experience test and it mandates that LoTW be used to document contacts that prove the upgrade applicant has sufficient experience to warrant the change in licence class. Separately, applicants would also have to fulfil the experience requirement by showing participation in courses and radio-related activities.

The proposed use of the free online QSO authentication service has drawn some controversy. In an online statement, LABRE claims its use would constitute outsourcing to a foreign entity because the service is provided by the American Radio Relay League. LABRE also believes this proposed mandate puts applicants at a disadvantage if they do not engage in contesting or DXing.

NEW MOUNTAIN GOAT: Andy Clift G6PJZ has achieved the coveted Summits on the Air (SOTA) Mountain Goat status for reaching 1,000 activator points. His Mountain Goat-qualifying activation took place from Helvellyn in the Lake District. Andy's SOTA journey started back in 2015, when he learned about the program by answering a CQ call from a SOTA activator.

He soon activated his first summit -- Rogan's Seat in the Yorkshire Dales -- and started, as so many do, a keen obsession over the ensuing years. Reflecting on his achievement, Andy commented, *"Without SOTA I would not do anywhere near as much walking. I would not be as active on the radio, and I would not have discovered some of the fantastic smaller Marilyns* [parts of larger mountain systems that are situated in protected areas] *that people don't bother travelling to"*. For more information about SOTA, visit:
www.sota.org.uk

FIRST 40MHZ SSB CONTACT BETWEEN UK AND SOUTH AFRICA: Paul G7PUV has tweeted a video of his 40MHz SSB contact on 17 September with Willem ZS6WAB in Polokwane, South Africa. The QSO is thought to have been made by Trans Equatorial Propagation (TEP).

Paul is one of a number of UK radio amateurs who have applied to Ofcom for an experimental licence to use the 40MHz band.

In South Africa, the 40MHz (8m) band is included as a standard amateur radio licence. Radio amateurs have a Primary allocation of 40.675 to 40.685MHz and can run up to 400W output.

The Ofcom Innovation and Trial Licensing page is at:
https://tinyurl.com/2p98d58w

8M (40MHZ) EMAIL LIST ON GROUPS IO:
https://groups.io/g/8m/topics

LATEST VERSION OF RSGB EMF CALCULATOR: The RSGB has issued trial version 2 of its EMF Calculator app. This version removes the restriction on frequencies below 10MHz and the minimum separation of near field boundary. The app is being released as a trial version as the RSGB would welcome feedback from users. You can find the app and more information in the RSGB EMF pages:
http://rsgb.org/emf

MORE AFRICAN COUNTRIES ARRIVE ON 60M: The South African Radio League (SARL) has announced that three new African countries have joined the ranks of 5MHz/60m operators. They are Botswana, Lesotho and eSwatini (formerly known as Swaziland). Each has the new WRC-15 Amateur Secondary Allocation of 5351.5 – 5366.5kHz. This makes a total of 89 countries now on the band worldwide.

ZD9, TRISTAN DA CUNHA AND GOUGH ISLANDS: The new ZD9SSS WSPR Beacon is now QRV from Gough Island thanks to the efforts of South African Nation Space Agency (SANSA) and Jonathan Ward. The new beacon has been reported QRV on 20 through 12m with reports on 14.100, 18.110, 21.100, 24.930 and 28.126MHz.
http://wspr.rocks

OPERATION UNICORN: RAYNET Groups in Scotland were involved in providing communications support for the late Queen's cavalcade as it travelled from Balmoral to Edinburgh, monitoring its progress and providing important information on public safety. This continued until Tuesday evening when her coffin left Edinburgh Airport and was flown to London.

KUHNE UNDER NEW OWNERSHIP: Many readers will be familiar with Kuhne as a manufacturer of high-quality VHF/UHF/Microwave gear, including transverters.

We see that they have been acquired by Alaris Holdings, a leading radio frequency technology holding and investment company.

Kuhne electronic, founded in 1994, is an RF and Microwave electronics engineering company, which develops, manufactures, and sells products/components into the healthcare, industrial, radio amateur and defence market segments. It is an owner-managed entity, which has an in-house design and development team and a manufacturing department capable of supporting both prototype product build and medium scale batch manufacture.

Mrs Jutta Kuhne, CEO of Kuhne electronic GmbH, said that they *"are excited to become part of an international group of companies, thereby exploiting synergies to create new business opportunities. I think there is a great rapport between Kuhne electronic and Alaris Holdings and we were very warmly received, which is an excellent foundation"*.

It will be interesting to see what, if any, the impact of this change of ownership is on their amateur radio product range.


1

Don Field G3XTT
practicalwireless@warnersgroup.co.uk

GB90PW

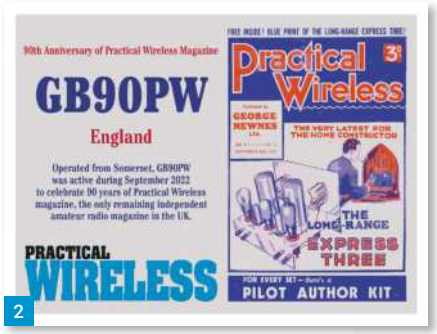
Don G3XTT relates the story of GB90PW.

As most of you will be aware, I applied for the use of GB90PW for the month of September, to celebrate the 90th anniversary of *Practical Wireless*, issue 1 having been the September 1932 issue. There was a slight hiccup with the licence as Ofcom nowadays don't automatically allow special event calls with two numbers, but they kindly relented given that we have previously held GB70PW, GB75PW and GB80PW (and possibly others before those).

The only stipulation was that all QSOs should be made from my location, which ruled out allowing others to operate the callsign from their shacks. This meant that for the most part (with some honourable exceptions mentioned below) I would have to do the operating myself. I set myself a target of 1000 QSOs. However, as my 70th birthday fell at the end of Week 1 and we were busy organising a big celebration, I got off to a slow start! Week 2 was going well until the death of the Queen, which rather caused me to take my eye off the ball, although I did manage some reasonably productive operating sessions. A bad start, though, insofar as my very first QSO (with a UK station on 40m SSB) resulted in the comment *"I had no idea PW was still in existence"*! Fortunately, that was soon put right with several QSOs with subscribers, including one with **Rob GD4VBA** who features in this issue with a multiband vertical antenna and, yes, it turned out that that was the very antenna he was using for our QSO.

Some Highlights

As the week went on, I managed to make several hundred contacts using CW, SSB and FT8, on all bands 80 through 6m. The station, by the way, consists of an Icom IC-7300 transceiver, Expert linear amplifier and an inverted-vee dipole for 80m (at about 40ft in the centre), a SteppIR Yagi antenna for 40 through 10m (only about 30ft high) and, above that, a 6-element Yagi for the 6m band.



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One of the highlights, incidentally, was a 20m SSB QSO with regular HF Highlights contributor **Steve PJ4DX**, a good 59+ both ways, with Steve using the Hexbeam featured in his article in this issue. Another was working our VHF columnist **Tim GW4VXE** who was very loud on 40 SSB. But I did work a number of other occasional contributors too, which was nice.

Resolved to push on, I made a determined effort the following weekend (17/18 September), putting over 400 contacts into the log on 40 SSB (this band was proving the most productive for working round the UK and, hence, catching up with readers of the magazine). Yes, quite a number were readers, many of them regular subscribers, and many having taken the magazine for even longer than me. One said he had inherited a collection of pre-war issues from his father, and was looking at one from 1938 with a cover price of 3d (just over 1p!). I was delighted, among these QSOs to work a number of QRP (low power) stations and especially a large number of Foundation licence holders. The contacts also covered all constituent parts of the British Isles as well as many countries around Europe, particularly France, Belgium and the Netherlands.

I mentioned above that there were some other operators. I'm delighted to say that both my son **Edward 2E0WWF** and granddaughter **Caitlin M6XTT** did some operating. And a few days before the end of the operation I was joined by **Paul Devlin G1SMP** from NHS England, who featured just last month (*Amateur Radio in the Public Sector*, p.32). This gave me the opportunity to run both GB1NHS and GB90PW in parallel, emphasising the strong links we at *PW* have been able to establish with Paul's efforts on behalf of the NHS and the public sector generally.

Once again, Paul and I heard some great stories from those we contacted, from some who worked for or had been cared for by the NHS and from others who owed their careers to having been readers of *PW* in their early days.

Summing Up

The final tally, for those who like to know these things, was just shy of 1300 contacts, with well over 500 of those on 40m, mainly from around the UK and Eire. But the tally includes contacts

on all bands 80 through 6m. Given the various constraints on my time mentioned at the beginning, I am very happy with this result. Thanks to our *PW* Designer **Mike**, we have a super QSL card, which is of course available to all who made it into the GB90PW log (I am acting as QSL manager for the call – email requests are fine, I don't need your card). The log will also be uploaded to Club Log and Logbook of the World by the time you read this.

Now it remains to keep going for another ten years so that *PW* can celebrate its centenary! **PW**

Photo 1: Edward 2E0WWF working Tim GW4VXE on 40m SSB.
Photo 2: The QSL card, provided by *PW* designer, Mike Edwards.
Photo 3: Caitlin M6XTT operating 40m FT8.
Photo 4: Paul G1SMP with Don.

1

The Hexbeam Redux

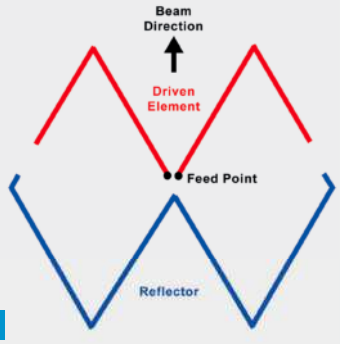
Steve Telenius-Lowe PJ4DX repurposes his previously-used Hexbeam antenna.

Steve Telenius-Lowe PJ4DX
teleniuslowe@gmail.com

Regular readers of *PW* will know that I have been using a heavy-duty five-band Spiderbeam antenna since late 2013 – and with great success I should add. However, while I was away on a visit to the UK in mid-2022, the mast supporting the Spiderbeam fell over (see *HF Highlights*, *PW*, September 2022), requiring the antenna to be completely dismantled in order for the mast to be raised once again. When disassembled, the effect of nearly nine years' exposure to the tropical sun on the fibreglass spreaders could clearly be seen, **Fig. 1**.

The Spiderbeam works very well but it is rather a big antenna, requiring an open space greater than 10 x 10m in order to assemble it. As the garden had grown dramatically in those nine years, I no longer had sufficient space in which to rebuild the antenna. However, following a visit to Bonaire by **Ant David MW0JZE** and his wife **Laura MW6INK** in 2017 I did have an almost new Hexbeam in storage. Ant makes and sells Hexbeam antennas as 'G3TXQ HEXBEAM Antennas & Hardware' **[1]**. He manufactures two versions: the standard (heavy-duty) version and an ultra-lightweight (6kg) version specifically intended for DXpeditions, Field Day operations and the like. It was the lightweight version that I had and after having used it and being impressed by its performance I wrote a review of the antenna that was published in the January 2018 *PW* **[2]**. Since then, though, because I was using the larger Spiderbeam, the Hexbeam had hardly been used and it has been packed away in storage for the last few years.

Thanks to Bonaire's relatively benign climate (outside the hurricane belt, very dry, never any ice or snow, though with a salty atmosphere and very high levels of UV radiation), I felt it was worth trying the lightweight Hexbeam as a permanent replacement to the Spiderbeam.



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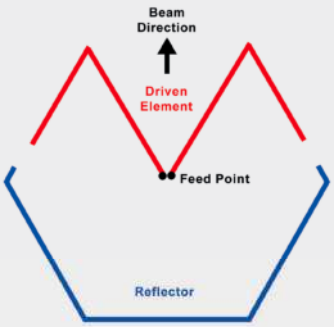

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A Bit of Background

The original Hexbeam was developed by **Mike Traffie N1HXA** in the 1990s. He came up with a design for a five-band two-element Yagi in which the driven elements were bent into 'M' shapes and the reflectors into 'W' shapes, **Fig. 2(a)**, thus considerably reducing the size requirement when compared with a standard two-element Yagi. N1HXA manufactured and sold his design as the classic 'HEX-BEAM'. The antenna worked well but had one drawback: although it had electrically full-size elements, in common with most reduced-size antennas it had a narrow bandwidth.

In the UK, **Steve Hunt G3TXQ** (SK) was much taken by Traffie's design and carried out numerous practical experiments in order to produce a more broadband version. He eventually achieved this by changing the shape of the reflector elements from a 'W' to something resembling a 'C', **Fig. 2(b)**. The gain was similar to that of the original HEX-BEAM but with a low SWR over almost the whole of each band, at the expense of a slightly greater turning radius. The resulting antenna became known as the 'G3TXQ Broadband Hexbeam'.

Steve Hunt gave permission to Ant MW0JZE to manufacture the Broadband Hexbeam and to use the G3TXQ callsign for marketing purposes. Ant also added elements for 50MHz to make it a six-band antenna.

The Build

Bert van Oort PJ4KY strongly recommended that I give the fibreglass spreaders of the Hexbeam a coating of Owatrol oil **[3]**, **Figs. 3** and **4**, to prevent damage similar to that caused to the Spiderbeam. Owatrol is a colourless, penetrating and isolating rust inhibitor designed for use on metal and wood but as it leaves a thin protective film on any surface, Bert had discovered that it also helps to prevent UV damage to fibreglass. It would probably not be necessary in the UK, though I write this during the August heatwave and, as temperatures reached 40°C in parts of England in July, it might be a good idea even there!

In the past I had assembled the Hexbeam from scratch in about an hour, but on this occasion it took well over two hours due to the lack of space in which to build it. The Hexbeam wires often got tangled up in the numerous trees and shrubs that had grown up in the last nine years and I also had

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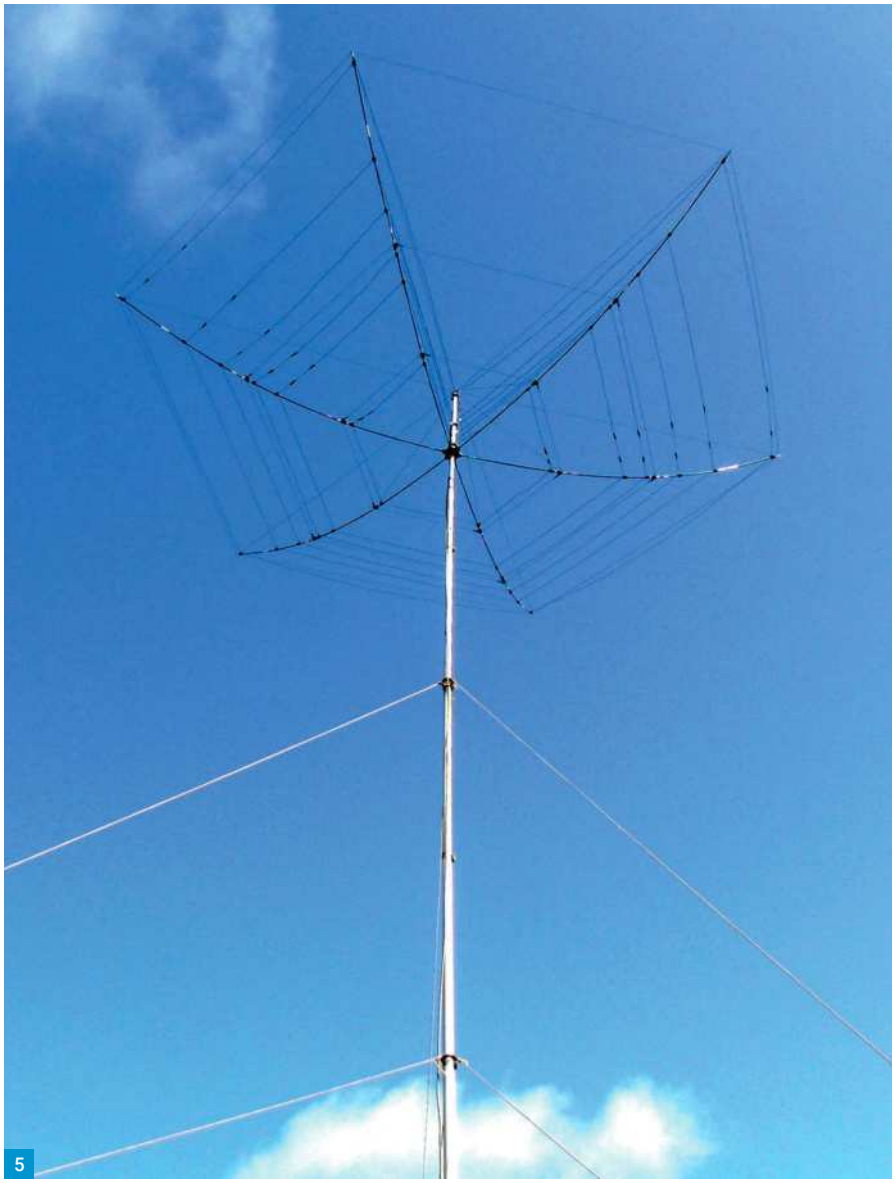
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Fig. 1: The top of one of the Spiderbeam fibreglass spreaders, bleached almost white by UV radiation: it should be the colour at the left-hand end of the spreader, where it had been protected from the sun. Fig. 2 (a): Layout of the original 'Classic' HEX-BEAM designed by Mike Traffie N1HXA. (b): The improved G3TXQ Broadband Hexbeam. Fig. 3: Owatrol oil used to offer some protection from UV radiation on the Hexbeam fibreglass spreaders. Fig. 4: Applying the Owatrol oil. Fig. 5: The completed Hexbeam, up 14m high. Fig. 6: NanoVNA display of the six band resonances of the Hexbeam. Fig. 7: The 14MHz SWR curve of the Hexbeam: better than 1.5:1 across the whole band.

to take frequent breaks for shade and water as the sun was fierce.

SWR measurements were made initially with the antenna mounted on the push-up mast at a height of only 2.5m above ground. They indicated that all was well, with sharp dips to the SWR close to the required frequencies. We assumed that the resonant frequencies would shift somewhat when the antenna was raised to its final height. An 'antenna party' with Bert PJ4KY, **Peter de Graaf PJ4NX**, **Jim Richardson Sr WA1SOT/PJ4JR** and his son, **Jim Richardson Jr KC2WEK**, had the antenna up in the air in just over an hour, **Fig. 5**.

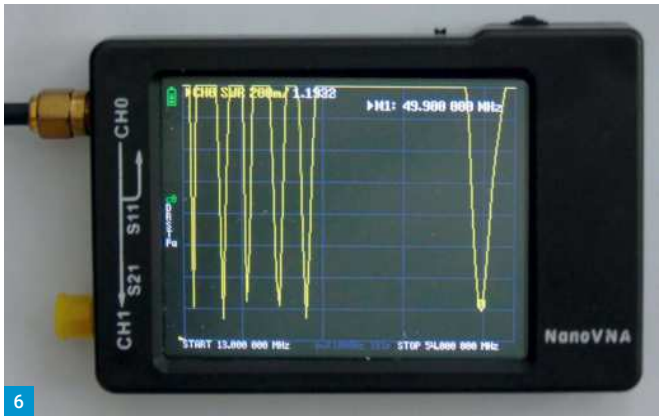
Measurements

Fig. 6 shows an SWR sweep of the spectrum from 13MHz to 54MHz, as measured on a NanoVNA, with the Hexbeam at its final height of around 14m (46ft). The sharp dips in SWR at each of the six amateur bands between 20m and 6m can clearly be seen.

Fig. 7 zooms in on the 20m SWR curve. Here, the minimum SWR was at around 14160kHz, where it was an almost perfect 1.1:1. The SWR was 1.5:1 at both band edges, i.e. the SWR was 1.5:1 or better over the whole band, exactly as desired.

On four of the other five bands the frequency of minimum SWR was somewhat below the bottom of each band, suggesting that the elements were fractionally too long (perhaps the wires had stretched a little during the antenna's previous outings?). On the narrow 17m and 12m bands this was not an issue at all as the SWR was 1.3:1 or better over the whole of both bands. On 15m the SWR was 1.3:1 at 21000kHz but it had risen to 2.17:1 at the very top of the band, 21450kHz. However, normally most activity on this band is below 21350kHz where the SWR was 1.8:1, a perfectly acceptable level.

The 10m band is a wide one and no efficient antenna can cover the whole 1700kHz of band with a low SWR. The Hexbeam's frequency of minimum SWR was at 28220kHz, perfect for those operating a beacon and also very good for both CW and FT8, but rather low in the band for SSB operators. Once again, this is not a real issue for



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most operators because the SWR remained below 2:1 right up to 28920kHz (and, incidentally, the SWR was also nice and low in the 11m CB band). If I wanted to operate on 10m FM above 29MHz it might be useful to use an ATU to bring the SWR down to 1:1.

Finally 6m: on this band the frequency of minimum SWR was again below the bottom of the band but was only 1.3:1 at 50100kHz, ideal for CW and SSB operators. The SWR rose to 2:1 at around 51400kHz but was still only 1.5:1 at the popular FT8 frequencies of 50313 and 50323kHz.

Table 1 summarises these measurements. I had expected the frequency of minimum SWR to rise after the initial measurements when the antenna was only 2.5m above ground, but any increase in frequency when the antenna was at its final height was actually fairly minimal. I'm not sure why this should be, but perhaps it is because the Hexbeam is a broadband design and therefore has a low *Q*.

I have no way of measuring gain, but the claimed gain and front-to-back figures on Ant's website, copied here in **Table 2**, look about right or actually rather modest.

Band	Freq of min SWR	SWR 2:1 points	Whole band
20m	14160	13930-14520	Better than 1.5:1
17m	17770	17490-18349	Better than 1.3:1
15m	20860	20520-21380	1.3:1 @ 21000, 2.17:1 @ 21450
12m	24870	24100-25335	Better than 1.28:1
10m	28220	27420-28920	1.3:1 @ 28000, 2:1 @ 28920
6m	49460	48560-51400	1.2:1 @ 50000, 2:1 at 51400

Table 1: SWR measurements of Hexbeam at 14m above ground.

Performance

When the Spiderbeam came down, I used my 40m inverted-V dipole on 15m, where it works reasonably well. I also made a 20m wire ground plane for temporary use so as to still have some capability on that band. It consisted of a 5m long vertical element and two 5m long radial wires at 180° to each other, sloping downwards at about a 45° angle. The antenna was mounted on a 12m fibreglass pole, so the feedpoint was about 7m above ground. The antenna worked, the SWR was good (1.4:1), though it was rather noisy on receive. I kept the ground plane for a day or two after the Hexbeam was put up, but the difference in performance was stark. Many weakish, but 100% readable, SSB signals on the Hexbeam were completely inaudible on the 20m ground plane or, on 15m, on the inverted-V.

Using the Hexbeam brought me my 313th DXCC entity from Bonaire: VK0MQ on Macquarie Island, using FT8 on 14MHz. This station could not be decoded on the ground plane, but was worked easily on the Hexbeam. This perfectly illustrates the advantage of going from a vertical or dipole to a beam: you can copy many signals that you would not even know are there on single-element antennas.

I have heard it said that MW0JZE's Hexbeam adds 50MHz as a sort of bonus, but that the antenna does not really perform very well on that band. I would dispute that: on 26 and 27 July I caught two late-in-the-season multiple-hop Sporadic E events during which I worked numerous stations across Europe and as far east as Cyprus, Asiatic Turkey and Israel. I even decoded three separate 9K2 stations in Kuwait (11,750km away from Bonaire) and later discovered that one of them had also decoded my signal, although unfortunately no QSO resulted. Given that the Hexbeam is only a two-element antenna, I think it performs extraordinarily well on all bands.

On most bands the Hexbeam is noticeably less directional than was the Spiderbeam, and this is borne out by the front-to-back figures in **Table 2**. However, this can at times be an advantage as it is less necessary to have the beam orientated precisely where it should be in order to hear or work a DX station. It does, however, mean having to contend with stronger unwanted signals off the back of the beam when trying to work a specific part of the world. For example, in my case if I am attempting to work weak Japanese or Korean stations, I need to beam around 330° to 340°. At 180° to that, beam headings of 150° to 160°, are much stronger South American stations. From the British Isles, the same applies: beaming towards North or South America means that numerous European stations are directly off the back of the beam. A higher front-to-back ratio would help here, but that is a small price to pay for such a compact antenna.

Band	Forward Gain	Front-to-Back
20m	3.8dBd (5.95dBi)	22dB
17m	3.2dBd (5.35dBi)	19dB
15m	3.5dBd (5.65dBi)	16dB
12m	3.6dBd (5.75dBi)	13dB
10m	3.6dBd (5.75dBi)	16dB
6m	2.7dBd (4.85dBi)	11dB

Table 2: Claimed gain and front-to-back figures for the G3TXQ Hexbeam at 12m above ground.

To Sum Up

Until July, it had been several years since I had used the Hexbeam. Revisiting it now, once again the performance of this small and lightweight antenna has not failed to impress. It goes without saying that it won't outperform massive multi-element Yagis but it certainly does outperform verticals, dipoles or other 'long wires', and probably most 'mini-beam' designs too. Its design offers similar performance to a monoband two-element Yagi but on no fewer than six bands and provides modest but useful gain. For those who are restricted in what antennas they can put up, whether due to a small garden, intolerant neighbours, or restrictive planning issues, the Hexbeam may very well be the answer.

References

[1] **g3txq-hexbeam.com**
[2] 'Review – The Ultra Lightweight Hexbeam', Steve Telenius-Lowe PJ4DX, *PW* January 2018.
[3] **https://owatrol-international.com/en/**

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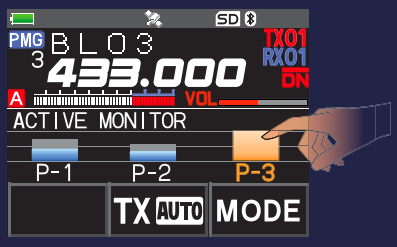

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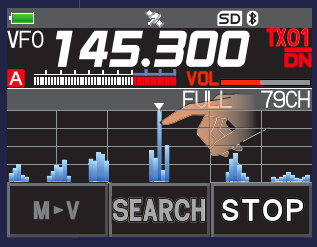
- Touch & Go Operation allows immediately moving to the frequency and starting communication by touching a displayed channel bar.



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So far in this series we have featured radio amateurs with many years of operational experience in the hobby. But we all have to start somewhere and this month we meet a very recently licensed newcomer who is the proud owner of the call **MM7CMY**. His name is **Alexander McCall Smith**, **Fig. 1** – '**Sandy**' to his friends – and he acquired his Foundation Licence only last year. I was particularly looking forward to our meeting as I also knew that Sandy was also a world-famous fiction writer though his background was actually in Law. Quite a change – how had it all come about?


1

The Face behind the Call

Roger Dowling G3NKH invites readers to meet Alexander McCall Smith MM7CMY.

A Career in Law

Sandy spent his childhood in Southern Rhodesia ((now Zimbabwe) and was educated there and in Scotland, where he graduated from Edinburgh University with a degree in law. He became an academic lawyer, initially at Queen's University in Belfast, and then at Edinburgh University, where he eventually became Professor of Medical Law. He had a long-standing connection with the University of Botswana, and worked there for a year in 1981. He is a former chairman of the Ethics Committee of the British Medical Journal, the former vice-chairman of the Human Genetics Commission of the United Kingdom, and a former member of the International Bioethics Committee of UNESCO.

A Change of Direction

Sandy retired from the University of Edinburgh in 2005 in order to concentrate on a writing career. His first published success was *The White Hippo* (1980), published by Hamish Hamilton, but it was not until he started writing his *The No. 1 Ladies' Detective Agency* series in 1998 that his writing career took off in a big way, **Fig. 2**. Set in Botswana, their central figure of the stories is the rotund **Mma Precious Ramotswe** ('traditionally built', she would prefer to describe herself) who establishes a detective agency in Gaborone, travelling around the country in her 'tiny white van' to solve a variety of domestic issues. They are not traditional 'whodunnit' detective tales but more a gentle and often humorous account of life in Botswana in the company of her husband, always known – even to his wife – as **Mr J L B Matekoni**, the best mechanic in the whole of Botswana and proprietor of Tlokweng Road Speedy Motors garage. Her faithful assistant is **Mma Makutsi**, a graduate of Botswana Secretarial College, always keen to let the world know that she gained an astonishing final examination mark of 97%.

The ongoing series, already 23 in number, have become enormously popular all over the world with well over 20 million copies sold in English alone. They have been translated into over 40 languages.

Sandy is a prolific writer who thinks nothing of writing several thousand words each day. In addition to *The No. 1 Ladies' Detective Agency* series, his many works also include the popular *44 Scotland Street* novels set in Edinburgh (he was up to volume 16 when we spoke) and the *Sunday Philosophy Club* series (also known as the *Isabel Dalhousie Mysteries*) where he is up to volume 17.

Amateur Radio

Sandy's busy life as a top author takes him all over the world and I was intrigued to know what attracted him late in life to the world of amateur radio. *"I think it dates back to the romance of radio when I was young,"* he said. *"I used to love the wonderful big dials with distant stations like Hilversum, and looking in the back and seeing the gently glowing valves."* Although Sandy no longer owns such a radio, he has the next best thing: a modern equivalent, complete with tuning dial, by Muzen, **Fig. 3**. *"It's a lovely little device and is by far my favourite little radio,"* he enthused.

Foundation Licence

I asked Sandy how he set about gaining his Foundation Licence. *"We were still very much in the world of lockdowns when I decided to make a start,"* he said. *"So, attending classes in the normal way or joining a radio club were both out of the question. However, the RSGB produce a really excellent Foundation Licence training manual and I also enrolled for a course with Essex Ham who have a really good online course of video lectures. Then I registered with the RSGB for the online exam, which the RSGB invigilate remotely. It's terrific because you get the result of the exam immediately. But what I really missed, because of Covid, was the personal interaction with other radio amateurs of lockdown that you can normally obtain through one's local amateur radio club."*

Having passed the examination, it was soon time for Sandy to apply to Ofcom for his licence and obtain some equipment. *"I contacted Martyn Lynch & Sons Ltd and I would like to say how helpful they were, particularly* ***Richard Saxby 2E0SXX***

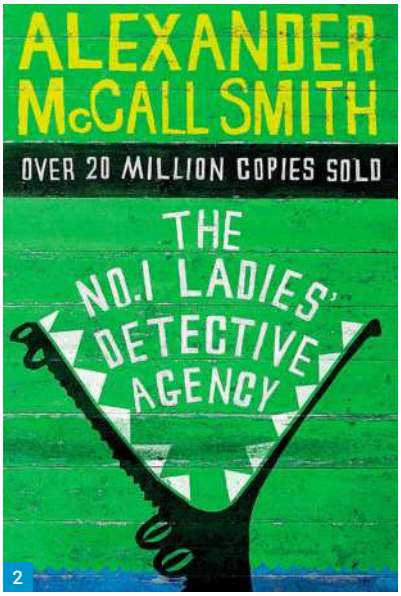

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Fig. 1: Alexander McCall Smith MM7CMY.
Fig. 2: The No. 1 Ladies' Detective Agency.
Fig. 3: Sandy with the Muzen receiver.
Fig. 4: At Sandy's second home by a sea loch.
Fig. 5: The Cairns of Coll.
Fig. 6: The Really Terrible Orchestra.
Fig. 7: Sandy with bassoon.

who advised me on the choice of transceiver and antenna," said Sandy. *"In fact, I opted for two Icom IC-7300 transceivers, which are really good and give me coverage from topband to 4 metres. I use one at my home QTH in Merchiston, south Edinburgh, where I have a 20m end-fed longwire fed via an unun, and the second in our second home* [**Fig. 4**]*, on a sea loch surrounded by mountains in Argyll on the west coast of Scotland, where I have a vertical."*

The Cairns of Coll

In 2014 Sandy, a keen environmentalist, purchased the Cairns of Coll, **Fig. 5**, a chain of small rocky outcrops extending from the north end of the Island of Coll in the Inner Hebrides of Scotland. *"I intend to do absolutely nothing with them, and to ensure that, after I am gone, they are held in trust, unspoilt and uninhabited, for the nation. I want them kept in perpetuity as a sanctuary for wildlife – for birds and seals and all the other creatures to which they are home,"* he said at the time.

Knowing of the Islands on the Air (IOTA) programme designed to encourage contacts with island stations around the world I was keen to ask Sandy more about his islands. *"Some of them are very tiny,"* he said, *"but the largest of is around 50 acres and has a lovely beach. It would certainly be possible for a suitably equipped group to organise an expedition there. How splendid it would be to work them from one of my QTHs and get the Cairns of Coll on the air for the first time!"*


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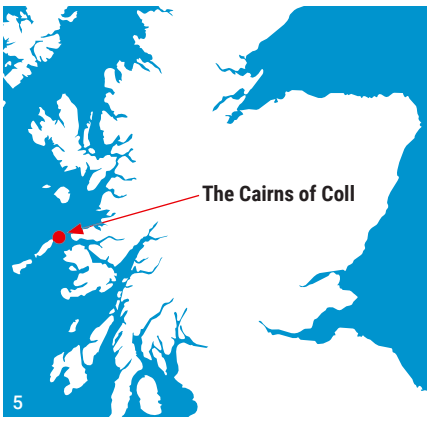

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The Really Terrible Orchestra

As if writing novels and starting up on amateur radio were not enough to fill his day, Sandy has another passion: music.

It was this that led, in 1995, to his becoming one of the founders of the UK's most unusual ensemble: the Really Terrible Orchestra, **Figs. 6** & **7**. *"The name was chosen with care,"* said Sandy, who modestly describes himself as an 'extremely incompetent bassoonist.' *"What it said was what you would get!"*

But surprisingly the audience seemed to like what they heard. The London debut in 2007, was at the Cadogan Hall; two years later the RTO travelled to the United States and played at the New York Town Hall. *"Like most orchestras we had to suspend activities because of Covid-19,"* said Sandy. *"But we really enjoyed being back at the Edinburgh Festival Fringe this year."*

And Next?

Sandy is already well into his copy of the RSGB Intermediate Licence manual and no doubt the Full Licence manual will soon follow. We wish him well in his studies – and indeed any SWL readers inspired by his example. **PW**

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

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1

Huntley & Palmer's Best? The MCR Spy Set

Philip Moss M0PBM gets his hands on an unusual spy receiver.

This is another set donated to the British Vintage Wireless & Television Museum, Dulwich. Incorrectly identified there at first, I immediately knew what it was, as I suspect most of you will: it looks very clandestine. And my title? They were delivered, mainly by air, in 2lb Huntley & Palmer biscuit tins, in which the sets were then in a sealed cardboard box. It would have had a pair of lightweight headphones, 800Ω, and a Bakelite card carrying 30ft of aerial wire and an earth wire.

They were supplied either with three batteries, or with two plus a universal mains supply. The need it was designed to fulfil was for a lightweight set that could be used in the field or on mains power. The set weighs 2lb 12oz with one coil-pack attached, and the battery 2lb 6oz. The mains PSU is 3lb 14oz. All units are 'Battleship' grey. Surprisingly no spares were supplied with it, despite the manual pointing out the valve filaments were delicate, and if dropped, they would probably break. None of the coil packs had been 'got at', all cores were still wax-locked as made. The set with one coil-pack attached is in **Fig. 1.** Note the small window above the big knob. This is tuning position indicator.

Very Collectable

All spy sets are collectable, so I was very pleased that this set came in. It was developed for SOE (Special Operations Executive), to whom it was known as Type 36/1, fulfilling the need for a lightweight set. I speculate that MCR is for miniature communications receiver. It is a receiver only. I am much indebted to **Louis Meulstee's** *Wireless for the Warrior, Volume three, Reception Sets*, for information on this set. I have referred before to this excellent series of books, which need to be more available. That is a hint to The Editor, one I have dropped before…

Sadly, it is missing two knobs. Well, we can't have everything. Sadly, much more so, for on opening I found we can't have just that missing, too. The set had been got at by an idiot. I was worried when apart from the knobs I noted eight missing screws, as can be seen from the chassis pictures, it has been effectively wrecked. The four missing valves are no great problem, they are common, but the butchering of the wiring will require something close to a complete re-build, and the missing output transformer isn't going to be easy to get! So, this set will remain as a display item only. The state it is in can be seen in **Fig. 2**, the hole towards the RH side is where the output transformer should be. Examination of this picture will show the extent of the butchery. I had hoped to get it working and available for demonstration, but alas that will not be. Even if it was just the transformer, which may well have failed. The very fine wire used in battery valve transformers is prone to go open circuit, or get 'Green Spot', the dreaded corrosion if moisture gets in, and causes the winding to go open. A battery-valve set output transformer would do, and if it was down to speaker impedance, that would be OK.

You could even use it as a choke and capacitively couple the output to old-type high impedance headphones. In fairness, it isn't only battery valve transformers that go, it can be mains sets, though the thicker wire used is less vulnerable. The knobs are reaction, sensitivity, and aerial trimmer apart from tuning. It is the first two that are missing.

History

The set was introduced late 1943 and manufactured by Philco, and was not replaced until 1954 by the Type 301 whose appearance makes it clear it was derived/inspired by the MCR, so it must have been deemed a very successful set. That said, there was a /9, which looks quite different. Just how many iterations there were isn't known, ours is an MCR1. The serial number is 55276, which seems very high, I suspect that they did not start at one, and possibly the 55 was allocated to the type.

Inside the Set

As can be seen in Fig. 1, the set is in several pieces. There are four coil packs so we have all, and also as it happens duplicate 1 to 3, the internals of the band one bandpass unit being the larger of the two, and band three being typical of the other three packs which are shown in **Fig. 3**. The four packs are shown in **Fig. 4** side-by-side. One is shown in Fig. 1 attached to the receiver main part, and a universal PSU is shown in **Fig. 5**, with the end off to show the two lines of voltage taps, one AC the other DC. Like the radio, it is also marked 36/1.

It could run off a combined LT/HT battery, 7.5 and 90V, which we don't have. Consumption is 5 to 8mA HT and 50mA LT. Battery life was specified as 30 hours. Frequency coverage is 150kc/s to 15Mc/s, with a gap between 1.6 and 2.5Mc/s. The

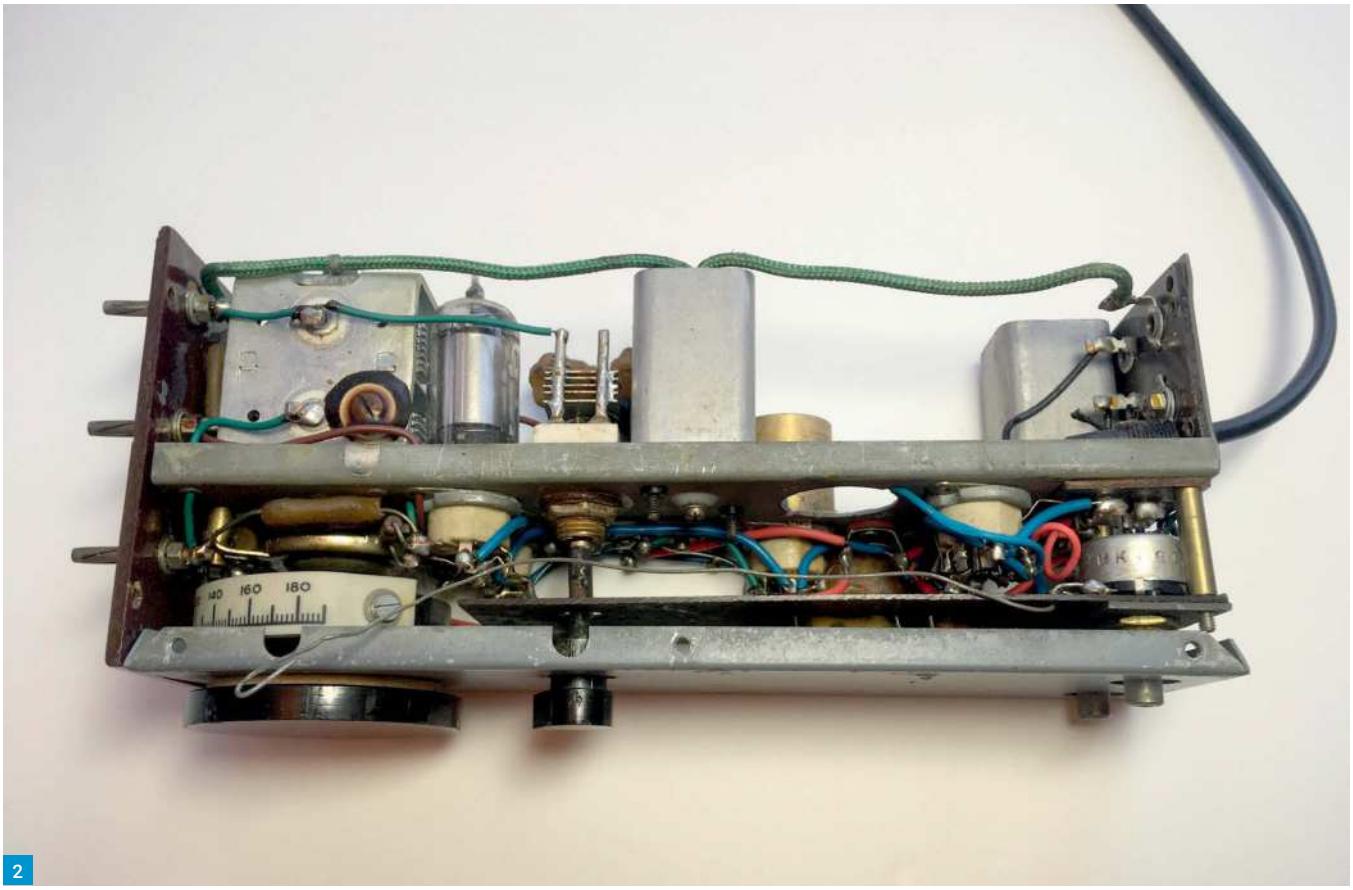

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Fig. 1: The set with one coil pack attached.
Fig. 2: The internals (not in a good state).
Fig. 3: The bandpass units.
Fig. 4: The four coil packs.
Fig. 5: The universal PSU.

3

wide coverage allows BBC broadcasts to be listened to and they carried coded messages. The most bizarre I know started *"My aunts have lost their knickers"*. Make what you may of that. It was one sent just before D-Day. Possibly other Allied stations carried messages too.

The IF is an unusual 1.73Mc/s. There is an IF trap in series with the aerial input. The coverage is: Range 1: 150kc/s - 1.6Mc/s, Range 2: 2.5 - 4.5Mc/s, Range 3: 4.5 - 8Mc/s and Range 4: 8 - 15Mc/s. Range one covers a ratio of >10:1, which cannot be tuned in one go, so there is only a low-pass filter, rather reminiscent of modern receiver architecture. Its greater complexity can be seen in Fig. 3, the other packs simply having an RF coil and local oscillator coil, and padder capacitor. Because the IF is high, the ratio for the local oscillator there on range 1 is much smaller: 1.88 to 3.33Mc/s, or 1:1.77, quite manageable. Fortunately, the inners had not been got at of any of the seven packs.

The tuning control has a 5:1 step-down ratio to the capacitor. The knob is friction-coupled to it, and can be turned endlessly. The feel is very smooth. There is a very small window in the top of the set, with numbers that go from effectively -10, though no minus sign is shown, through zero to 170. The last marking is at 160. The numbers are at twenties, with a longer intermediate bar at tens, and then the short bars are every two. To know the tuned frequency, you relate this to the scale on the end of each coil-pack, as can clearly be read in Fig. 4. This is a steel table, and unlike the individual graphs on the coil-packs of the HRO, they appear mass-produced. It would be interesting to know how accurate these were required to be. These scales are robust.

No SNR/SINAD ratios are given in the specification but it is specified to produce 1mW for 10µV input, though at an unspecified

frequency. Maximum audio is 5 to 8mW. No image frequency rejection figure is given, but the high IF means it is probably quite good, even though there is no tuned RF amplifier stage. The image response is at twice the IF: ie 3.46Mc/s, well away from the frequency tuned. The bandwidth is a rather wide 18kc/s at -20dB down. There is no AGC in the set either.

There are five valves: 1R5 (DK92) usually used as a frequency-changer, ie as oscillator and mixer, but here only as mixer. Then there are four 1T4s (DF92), one used as local oscillator, then IF amplifier, then regenerative detector using leaky-grid detection, and audio output. The regenerative detector also acts as BFO if the gain is turned up far enough to allow oscillation. The sensitivity potentiometer controls the bias applied to the mixer and IF amplifier, this is effectively the volume control. All valveholders are ceramic, some components are bitumen-dipped, and the coils are mainly iron-dust pot core types: I didn't think we had them here at this time although the Germans already had ferrite cores. I wasn't too impressed with some of the soldering I have to say.

On the subject of the Germans, August's *PW* had an article by **Tony Smith G4FAI** titled *Double Agent Ham Chat*. When you compare the German receiver supplied to their agents with this set, you may be surprised how much better ours was.

The PSU Type 36/1 covers both AC and DC input from 107 to 235V. In the AC position, it uses an autotransformer, in DC dropper resistors. Note the set is live-to-mains, but the circuitry is isolated from the case by a capacitor. The two-core mains lead has two individual round plugs on the end. For DC, if the set does not work, the user is told to reverse the plugs. On AC the advice is if there is a lot of hum, to try reversing them. The rectifier is solid-state. The picture, Fig. 5, shows the PSU with the end cover off and the screw adjustment method visible.

Conclusions

Usually at this point I would detail what was needed for restoration but this being a basically hopeless case, there is none. The PSU was not opened as there is nothing to use it with.

In the full manual there is a drawing of a man using the set surreptitiously, which may look to us rather amusing. Wearing a full-length coat and headphones I don't think would be particularly well-hidden. He has the aerial wire wrapped round him and the set on a belt (not included in the kit). As there is no tuning lock, I would think it would easily get detuned. Maybe hope for cold weather! I write this as we have just suffered the hottest day ever recorded! Why anyone would need to be receiving while walking is another matter.

Finally, the full title of the book I refer to is *Wireless for the Warrior, Volume 3, Reception Sets*, ISBN 0952063352, published by Wimborne Publishing, though I fear that they as with *Radio Bygones* magazine may well not be still around. The full manual for the set is published by VMARS (The Vintage & Military Amateur Radio Society) on their website (below). It's entry 149, but entering cntrl-F allows a fast-search to an item by its name.

vmars.org.co

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904H..... 150W Travel ATU with 4:1 Balun..£229.95

POWER OUTLETS
1104..... 3 way 30A DC Power Pole outlet...£62.95
1112..... 6 way 15A DC multi power outlet...£59.95
1117..... 4 way 35A DC multi power outlet...£89.95
1118..... 8 way 30A DC multi power outlet £134.95
1129..... 10 way 40A DC power outlet.....£159.95

ANTENNAS
1020C..... Tuneable indoor active antenna...£159.95
1026..... QRM eliminator+active antenna.£299.95
1763..... 3 element 2m beam.....£79.95
1799X..... 9 Band vertical.....£379.95
1982LP... End fed half wave 80-10m 30W...£64.95
1982MP.. End fed half wave 80-10m 300W.£95.95
1982HP...End fed half wave 80-10m 800W.£129.95

TELESCOPIC MASTS
1902H..... 10ft Strong Fibreglass mast.....£159.95
1904H..... 25ft Strong Telescopic mast.....£224.95
1904HD.. 25ft Super Strong Fibreglass.....£249.95
1906..... 33ft Strong Fibreglass mast.....£224.95
1908H..... 43ft Strong Fibreglass mast.....£359.95

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1700C..... 6 Way coax switch,2kW.....£189.95
1701..... 6 Way coax switch 2kW (SO239)..£119.95
1702CN.. 2 Way coax switch 2kW (N Type)..£99.95
1704 (P)..4 way coax switch 2.5kW (SO239)£139.95
1704 (N)..4 way coax switch 2.5kW (N type)£139.95
1705H..... RF By-pass switch 60MHz 1.5kW...£59.95
1708B..... RF Sensing T/R Ant Switch 200W.£132.95
1708BSDR.....RF sensing SDR switch.....£179.95

SWR/WATTMETERS
813.....QRP SWR/Wattmeter.....£59.95
826B..... Digital SWR/Wattmeter.....£295.95

DUMMY LOADS
260C..... 300W DC-650MHz SO-239.....£74.95
260CN.....300W DC-650MHz N type.....£74.95
261N..... 100W DC-500MHz N type.....£44.95

ACCESSORIES
1025..... Noise canceller/signal enhancer...£269.95
1234B..... Rig Pi Station server.....£399.95

We carry a HUGE range of MFJ Products – check our web site for full listing

COMET - UK IMPORTER

CA-52HB4
50MHz 4 element HB9CV Wideband Beam

£129.95

- Lightweight - ideal Portable Antenna
- Gain 10.4 dBi, boom 3.2m

CAT-300 Cross Needle Antenna Tuner

- 1.8-60MHz
- 300W PEP

£229.95

VHF/UHF FIBREGLASS BASE ANTENNAS
GP-15N..... 50/144/430MHz, 2.4m..... £139.95
GP-1M..... 144/430MHz 1.2m..... £59.95
GP-3M..... 144/430MHz, 1.78m.....£69.95
GP-6M..... 144/430MHz, 3.07m.....£99.95
GP-93N..... 144/430/1200MHz, 1.78m.... £129.95
GP-9M..... 144/430MHz 5.15m.....£199.95
GP285..... VHF 5/8 (135-175)MHz.....£89.95

VHF/UHF BEAMS
CA-52HB2...2 element HB9CV for 50MHz...£89.95
CA-52HB4...4 element HB9CV for 50MHz.£129.95
CYA-1216E. 6 element, 1200MHz.....£119.95
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ANTENNA TUNER
CAT-10..... 10W (3.5-50)MHz.....£129.95

HF PORTABLE ANTENNA SYSTEM

BOX SET HF-350M
Multi Band Vertical

- Covers: 160m to 6m
- Complete Portable system
- With Carrying pouch

HFJ-350M... 1.8-50MHz Box Set w/case... £149.95
HFJ-350M... 3.5-50MHz 9 Bands.....£129.95

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CHV-5A..5 band rotary loaded Dipole 4m long. £369.95
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CBL-2500.... 1.8-56MHz 2.5kW/CW.....£44.95

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CF-30MR..... 1.8-32MHz 1kW/CW.....£59.95
CF-50MR..... 1.8-57MHz 1kW/CW.....£84.95

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CF-360A.... 1.3-30/49-470MHz 2xPL259 SO239.....£59.95
CF-360B.. 1.3-30/49-470MHz 2xSO239 PL259.....£59.95
CF-4160B.. 1.3-170/350-540MHz SO239 N PL259 £39.95
CF-416A.... 1.3-170/350-540MHz SO239 2xPL259.£49.95
CF-416B.... 1.3-170/350-540MHz SO239 PL259 N £49.95
CF-503C.... 1.3-90/125-470MHz PL259 2xSO239..£89.95
CF-530..... 1.3-90/125-470MHz SO239 2xPL259. £57.95
CF-530C.... 1.3-90/125-470MHz 2xSO239 PL259. £49.95
CF-706PL.. 1.3-57/75-550MHz SO239 2xPL259. £54.95
CF-706N.... 1.3-57/75-550MHz SO239 N PL259. £59.95

TRIPLEXERS
CFX431A... 145/433/1296MHz PL259 2 x N sock £89.95
CFX-514N..50/144/430 MHz 2 x PL259, N sock.. £69.95

CROSS NEEDLE SWR/POWER METERS
CMX-200.... 1.8-200MHz 30/300/3k..... £99.95
CMX-400.... 140-525MHz 30/60/300W.....£109.95

CIVIL/MILITARY AIRBAND
AB1230H.... H/Held Airband receive.....£29.95
AB1230M... Mobile Airband receive.....£39.95
AB380..... Base Airband receive.....£99.95

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CSB7500..2m/3.6dBi, 70cms/6.1dBi.....£59.95
CSB7700..2m/4.4dBi, 70cms/6.9dBi.....£69.95
CSB7900..2m/5.1dBi, 70cms/7.7dBi.....£79.95
SBB-2..... 2m/2.15dBi 70cms/3.8dBi 0.46m. £29.95
SBB-4..... 2m/3.0dBi, 70cms/5.5dBi 0.92m. £39.95
CA-285.... 2m/3.5dBi, 50MHz/0dBi 1.32m...£34.95

TRI-BAND MOBILE
SB15..... 6/2/70cms 1.53m 120W..... £59.95

HF MOBILE
UHV-4..... Quad Band 28/50/145/433MHz.. £89.95

ACCESSORIES
MCB3.Drive on Base for mobile mast support. £79.95
MG-4M.... Magnetic Mount c/w 4m cable....£39.95
CTC-50M...Thru window cable/SO-239 assembly £45.95
3D4-M..... SO239 socket/Cable assembly 4m. £26.95
3K-054M...SO239 w/ 4m miniature cable/PL259 £29.95
CS-400P...Lightning arrestor DX -500MHz...£29.95

MORSE KEYS

Iambic Chrome

Bencher BY-1

BENCHER
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BY-1B..... Iambic Black Chrome NEW!....£239.95
BY-2..... Iambic Chrome.....£239.95
RJ-1..... Hand Key Deluxe Black.....£169.95
RJ-2..... Hand Key Deluxe Chrome.....£199.95
EZ-1..... Universal Key hook up wire.....£16.95

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Original Deluxe.....Bug Key Chrome.....£299.95
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HEADSETS for ICOM RADIOS
Pro-7IC..... For Icom (also Red EOL).....£279.95
Pro-Set 6.....HC6 element.....£159.95
Pro-Set Elite IC...for Icom radios.....£184.95
PMS-IC..... Single Lightweight Headset.....£99.95
PMD-IC..... Double Lightweight Headset..£119.95

HEADSETS (HC6 or HC7 elements)
Pro-7(BK, BU or RD).HC7 (Black, Red or Pink).£269.95
Pro-Set 6.....HC6 element.....£159.95
Pro-Set Elite 6.....HC6 element.....£174.95
PMS-6 Pro Micro..Single headset HC6.....£89.95
PMD-6 Pro Micro..Double headset HC6 .....£109.95
HTH-Dual.....Lightweight Dual for H/helds...£45.95
HTH-Single..Lightweight Single for H/helds. £34.95

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HPS-5.....Amplified Speaker.....£199.95
PRASEQ..... Audio Processing unit.....£269.95

MICROPHONES
ICM.....Quality Hand mic for Icom radios.. £123.95
PR-781G..... Gold Studio Microphone.....£209.95

ACCESSORIES
HS-2..... Hand PTT control.....£36.95
FS-2..... Footswitch dual channel.....£54.95
FS-3..... Footswitch single channel.....£35.95
PL2-T.....Balanced Boom for Studio mics. £138.95
CB-1PTT.....Heavy duty Mic base.....£76.95

Full range of leads and mounts in stock!

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Tecsun H501x
Flagship radio with Bluetooth

- Covers: LW, MW, SW, FM (64-108 MHz)
- All mode reception incl. SSB

£329.95

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Top of the Range Portable Radio with Bluetooth

- Covers: LW, MW, FM, SW (1.711-29.999)MHz
- MP3 player via SD port

£259.95

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SSB Masthead Preamplifiers

SUPER AMP - SERIES

Super-low-noise, large-signal handling, protective circuit. High quality Helix filters, Vox control, remote & T bias DC feed.

MHP-200R..... 1.5kW 2m (T-Bias).....£599.95
SP200..... 750W 2m (T-Bias).....£349.95
SP70..... 500W 70cm (T-Bias).....£349.95
SP400..... 750W 4m (T-Bias).....£389.95
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DCW-2004B..... Sequencer 6/2/70cm.....£279.95

TIGERTRONICS

Tigertronics SL-USB
Sound card - Supports all digital modes
FT8, FT4, WSPR, RTTY, SSTV, CW plus lots more!

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- Radio Interface Lead..... £24.95

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- TX: HF Amateur Bands
- RX: 0.5-30MHz
- Large colour TFT Screen
- Built in Auto Tuner

20W Portable HF Transceiver **~~£449.00~~**

XIEGU X6100

- HF/50MHz ALL Modes + data
- Power: 10W external supply, 5W internal battery
- High-resolution colour screen
- Automatic Antenna Tuner
- Built-in Bluetooth/Wi-Fi function

10W QRP SDR Transceiver **~~£599.95~~**

XIEGU

Xiegu XPA-125B
100W Amplifier with ATU

- Covers: 1.8-54MHz
- Input power 1-5W
- Output power 125W (max)
- Antenna Tuner built-in

£599.95

GRN1
Digital Audio & Noise Filter

- Improves SNR up to 22dB
- Low cut - Hi cut audio filters
- Headphones or Speaker output
- Power: 12V DC (not supplied)

£199.95

Xiegu GY03 3W Speaker for GNR1....**£39.95**

ANYTONE

Anytone AT-588
70MHz (4m)
40W FM Transceiver

- TX/RX: 66 -88MHz
- Memories: 200

~~£169.95~~ **now £149.95**

SPIDERBEAM

SPIDERBEAM YAGI KITS

- No compromise design
- Handle 2kW power!
- Lightweight, Portable
- For home or Dxpeditions

SPIDERBEAM YAGI KITS

Spider 3	10/15/20m Standard..... £389.95
Spider 3HD	10/15/20m Heavy Duty..... £489.95
Spider 5	10/12/15/17/20m Standard... £429.95
Spider 5HD	10/12/15/17/20m HD..... £499.95

TELESCOPIC MASTS AND POLES

Fibreglass Telescopic Poles

10m – **NEW!** Mini pole	£69.95
12mtr Heavy Duty	£109.95
18mtr Standard	£229.95
22m 'Long John' **NEW.**	£399.95
26mtr Standard	£499.95

Aluminium Telescopic masts
German engineered!

10 metre Standard (1.35m retracted)	£399.95
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12.5 metre (1.65m retracted)	£549.95
14.5 metre Heavy Duty (2m retracted)	£599.95

ALINCO

Alinco DM-330MW MkII
'Best in Class!'
Communications Grade 30A Supply

£159.95

DM-330FXE	30A standard filtered supply..£149.95
DM-30E	30A (peak) digital display.....£99.95
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Alinco DR-MD520E
Dual Band DMR Mobile Radio

FEATURE PACKED!

- Built in GPS w/ APRS support
- DMR Tier 1 and Tier 11
- Large LCD colour display
- 55W VHF/ 40W UHF
- Plus lots more!

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Alinco DJ-MD5X-EG
Dual Band DMR/Analogue

- Built in GPS with APRS support
- Automatic repeater roaming
- Power: 0.2/1/2.5/5W

£179.95

YAESU

YAESU FT-710 AESS

NEW

- HF/6m 100W SDR Transceiver
- Full SDR packed with features
- See our web for latest details

£1099

ELECRAFT

USED MODEL

Elecraft K3 with KAT3 ATU

- Manual
- Cables (no mic)
- 6 month warranty

£1,695

DAIWA

Factory Direct - FULL RANGE IN STOCK!

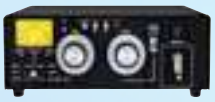
CN901 HP3
Cross Needle - High Power

- Freq: 1.8-200MHz
- Power: 30/300/3kW
- Measures: P.E.P (for SSB)

£179.95

CN-901G	(900-1300)MHz 2W/20W.....£249.95
CN-501H2	(1.8-150)MHz 2kW..... £119.95
CN-501VN	(140-525)MHz 20W/200W.....£99.95

PALSTAR



Palstar AT-2K
2kW Antenna Tuner

Built like a tank!

- Covers 160 - 6m
- 6 Way antenna switch

£699.95

DIAMOND POWER SUPPLIES

Genuine Diamond with 2 year warranty!

GZV-2500

- 25 Amp (5-15V DC) supply
- With built-in speaker

£139.95

GZV-4000	40 Amp (5 -15V DC)..... £199.95
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ALINCO

Alinco DX-10
28MHz Multi Mode Transceiver

- AM/FM/SSB/CW
- 25W RF output
- Channel operation
- Frequency Programmable
- Multi colour display

£189.95

ULTRA LOW LOSS COAX

Ecoflex 15
per metre.....£8.29 price per 102m drum..... £829
Ecoflex 15 plus
per metre.....£8.95 price per 102m drum..... £889
PL259 connector (Part: 7350)..... £8.95
N type connector (Part: 7395)..... £10.95
Ecoflex 10
per metre.....£4.75 price per 102m drum..... £430
Ecoflex 10 plus
per metre.....£4.30 price per 102m drum..... £429
PL259 connector (part: 7378)..... £5.95
N type connector (part: 7367..... £6.50
Aircell 7
per metre.....£2.99 price per 102m drum..... £279
PL259 connector (part: 7390)..... £3.25
N type connector (part: 7392)..... £6.95
Aircell 5
per metre.....£2.75 price per 102m drum..... £259
Other 100M Coax Drums
Westflex 103.. Semi Air-spaced low loss.....£195.95
RG-213 (Cabnex) Drum..Low loss good quality.. £139.95
RG-Mini 8..... Super XX..... £99.95
RG58/CU..... Mil spec..... £59.95
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450 Ohm..... Twin feeder..... £89.00
300 Ohm..... Twin feeder..... £76.50
Nevada Antenna Wire
Coated flex weave Antenna wire..... £59.95
Nevada KEVLAR – green ultra-strong wire!
Nevada 28..... 2.8mm 2kW per metre..... £0.99
Nevada 32..... 3.2mm 5kW per metre..... £1.20

LDG ELECTRONICS

FAST AUTO TUNERS

REMOTE – DESKTOP – ZERO POWER

Designed to work seamlessly with your transceiver and match a wide range of antennas!

Z-100 Plus
Zero power Auto Tuner

Handles 125 Watt and will work from just 100mW of drive. Latching relays use almost zero current once tuned. 2,000 memories and a matching range of 6 to 800 Ohms its ideal for Portable or mobile operation

£179.95

AT-600 Pro II
General purpose Auto Tuner

Designed for mid sized amplifiers up to 600 Watts with a large easy to read bargraph that shows Forward/Reverse power and SWR. Switch between two antennas with 2,000 memories for each antenna, giving almost instantaneous recall.

£384.95

AT-100 Pro II
100W & QRP Auto Tuner

Requires just 1W for operation, so ideal for QRP, but will also handle up to 100W. Has two antenna outlets and 2,000 memories per antenna. The bargraph display provides both 12.5W and 125W scales for easy QRP or higher power readings.

£249.95

AT-1000 Pro II
Flagship Auto Tuner

Handles 1,000 Watts with a large easy to read Bargraph display. Covers 1.8-54MHz with a choice of two antennas. Matches from 6 to 1,000 Ohms so easily handles Yagis, Dipoles, or virtually any coax fed antenna.

£539.95

Z-11 Pro II
QRP Portable Auto Tuner

Ideal QRP tuner needing just 0.1W for tuning, but capable of 125W. Dedicated buttons for manually fine tuning the antenna once near match. Ideal for portable use with internal AA batteries requiring just 20 micro amp standby current.

£199.95

BALUNS
LDG provide a selection of 200W Baluns & UNUNS with 1:1, 2:1, 9:1 & 49:1 ratios

FROM £34.95

RBA-4:1 RU-9:1 Unun RU-1:1 Unun RU-49:1 Unun

LDG IMPORTERS of LDG products

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YAESU

G-2800DXC	Extra heavy duty..... £929.95
G-5500	Azimuth/Elevation...£654.95
G-1000DCX	Heavy duty..... £499.95
G-450C	Standard duty..... £339.95

Hy Gain YRC-1X & YRC-3X
Computer controllers for Yaesu rotators **See our web!**

CREATE
Uses worm gear for higher torque

RC5-B3 Heavy Duty

- Controller w/preset

£1289.95

RC5-A3	Heavy duty with pre-set..... £899.95
RC5-3	Medium/HD with pre-set..... £679.95
RC5-1	Medium duty..... £569.95

AIRSPY

NEW

Airspy HF+ Discovery

- Pre-selectors
- 9kHz - 13MHz
- 60MHz - 260MHz
- Use over internet
- 60x45x10mm

£199.95

Airspy R2
VHF/UHF/SHF Receiver

- 24MHz-1,800MHz
- 10MHz panoramic spectrum
- 3.5 dB NF (42-1002)MHz
- Tracking RF filters

£199.95

Airspy Mini

- SDR Dongle
- 24 – 1,800MHz

£119.95

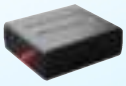
SDRplay

NEW

RSPdx SDR in metal case
Covers: 1kHz-2GHz
Now with Improved:

- Performance below 2MHz
- Plus more!

£194.95



RSP 1A
Wideband Budget SDR

- Covers: 1 kHz - 2GHz
- Software upgradable
- Good dynamic range

£99.95

RSP DUO Dual Tuner SDR

- Covers: 1 kHz - 2GHz
- Software upgradable

£239.95

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XIEGU G-106

NEW PRODUCT

- QRP Portable Transceiver
- 5W RF output, 3 CW Filters
- AM/CW/SSB + FT8 (with DE-19 option)
- Receives: 0.55 – 29.7MHz + FM Broadcast

£349

FOR A RELIABLE FAST, FRIENDLY SERVICE

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ACOM Amplifiers you can trust!

FREE UK MAINLAND DELIVERY this month!

Acom 1500
- Power: 1.5kW PEP
- Frequency: HF + 6m
- Silent QSK operation

£3299.95

Acom 1200S
- Covers: 1.8-54MHz
- Power: 50W input for 1.2kW output
- Full protection for SWR and overheating

£2999.95

Solid State Amplifiers

A1200S	1.2kW HF + 6m…new version	£2999.95
A700S	700W HF + 6m	£2649.95

Valve Amplifiers

Acom 1000	1kW HF + 6m	£2599.95
Acom 1010	700W HF	£1979.95
Acom 1500	5kW HF + 6m	£3395.95

Auto Antenna Tuner

Acom 04-AT	1.5kW Auto Tuner + 4 way switch	£1069.95

ICOM Hot products!

Icom 7300
Top selling HF/50/70MHz 100W SDR Transceiver

£1299.95

Icom 9700
2/70/23cms Transceiver
The Boss's choice!

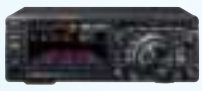
£1899.95

Icom IC-705
VHF, UHF, HF, D-Star all mode 10W QRP portable transceiver

£1399.95

Full ICOM RANGE in Stock!

YAESU Hot products!



Yaesu FTDX10
HF/6m/4m SDR 100W Transceiver - **A WINNER!**
Rated № 3 in the Sherwood Performance chart!

BEST UK DEAL - see web for details

Yaesu FT-991A
Full coverage HF/VHF/UHF
- 160-6m, 2m and 70cm
- SSB/CW/FM/AM/RTTY/PSK/C4FM
- 160-6 meter built-in Autotuner

£1199.95

Yaesu FTdx-101D
SDR HF/50/70MHz 100W Transceiver

£2999.95

Yaesu FTdx-101MP New 200W version **£4199.95**

ICOM

NEW

New from ICOM
Icom ID-52E
D-STAR Digital Handheld
- Bluetooth Technology
- UHF Military Airband RX
- Picture sharing function
- Louder audio output
- Waterfall Scope
- Tough & IPX7 Waterproof
- Micro SD card slot

£549.95

YAESU

New Product!
YAESU FTM-200DE
50W DUAL Band C4FM/FM with single receiver & GPS
- TX: 2m/70cms
- RX: 108-999.995MHz
- Recording function
- Micro SD card slot

£349.95

DAIWA

QUALITY PROFESSIONAL METERS from JAPAN at AFFORDABLE PRICES
Factory Direct - FULL RANGE IN STOCK!

CN-901HP3
Cross Needle - High Power
- Freq: 1.8-200MHz
- Power: 30/300/3kW
- Measures: P.E.P (for SSB)

£179.95

CN-501H2
2kW high power version

£119.95

CN-501VN
140-525MHz

£99.95

CN-901G
900-1300MHz

£249.95

Yaesu FTM-400XDE
Dual Band UHF/VHF Transceiver

£399.95

Icom IC-R8600
Wideband Communications Receiver

£2599.95

Yaesu FTM-300DE
50W Dual Band Digital Transceiver

£349.95

Icom IC-7100
HF/VHF/UHF 4m Transceiver
Remote control head

£1124.95

Yaesu FT-891
HF/6m Mobile
Great portable radio

NOW **£679.95**

Yaesu FTM-6000DE
50W Dual Band Mobile
- 3W powerful Audio

£259.95

Alinco DJ-MD5X-EG
Dual Band DMR/Analogue
- Built in GPS with APRS support
- Automatic repeater roaming
- Power: 0.2/1/2.5/5W

£179.95

£50 CASHBACK

Yaesu FT5DE
C4FM Handheld
- 5W rf output
- Loud 1W Audio
- Touch & Go operation

~~£399.95~~
AFTER CASHBACK
Valid until Sept 30

£349.95

NEVADA Quality Power Supplies

2 YEAR WARRANTY!

Nevada PS-40M
Linear
- 40A (max) with meter
- 1.5-15V DC
- Cigar adaptor output

£139.95

PS-08	Linear 8A (max) 13.8V DC	£39.95
PS-30M	Linear 30A (max) 3-15V DC	£99.95
PSW-50	Switch mode 50A (max) 9-15V DC	£129.95
PSW-30	Switch mode 30A (max) 9-15V DC	£89.95
PSW-30H	Switch mode 30A (max) 9-15V DC	£69.95
PS23-SW1	Switch mode 23A (max) 13.8V DC	£69.95
PSW-07	Switch mode 7A (max) 13.8V DC	£29.95
PSW-04	Switch mode 5A (max) 13.8V DC	£26.95

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1kW power rated - no external tuner required!

EF-80-10-JR-KW	80-10m, 75ft long	£169.95
HF-ALLBAND-KW	80-10m, 130ft long	£169.95
EF-40-10-KW	80-10m, 66ft long	£159.95

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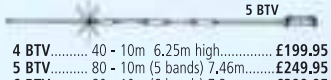

4 BTV	40 - 10m 6.25m high	£199.95
5 BTV	80 - 10m (5 bands) 7.46m	£249.95
6 BTV	80 - 10m (6 bands) 7.3m	£299.95

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- Wideband 400-470MHz
- Boom: 2m, Gain: 14 dBi

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CX4-68	(68-73)MHz 4m 4.15dBi	£59.95
CX440	(440-455)MHz pmr 4.15dBi	£29.95
CX455	(455-470)MHz pmr 4.15dBi	£29.95
TORNADO 50-60	(50-60)MHz 6m 3.5dBi	£59.95

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SY3	3 el (26-28)MHz 10.65dBi	£99.95
SY4	3 el (26-28)MHz 13.15 dBi	£129.95
SY50-3	3 el 50MHz 8.5dBi	£99.95
SY50-5	5 el 50MHz 10.5dBi	£129.95
SY68-3	3 el 70MHz 7.0dBi	£74.95
WY108-3N	3 el 108-137MHz Air Band	£89.95
WY140-6N	6 el 2m (wideband) 10.5dBi	£99.95
WY400-6N	6 el 70cms (wideband) 11.0dBi	£89.95
WY400-10N	10 el 70cms (w/band) 14.0dBi	£109.95

26-28MHz Verticals

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Gain-Master	Full size 7.3m 500W	£139.95
Vector 4000	3/4 wave 8.4m 1kW	£99.95
Sirio 2008	5/8 wave 6.1m 1kW	£109.95

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PA-50-6-6BG	6 el, 11.5dBi 5.84m	£299.95
PA-50-7-9BGP	7 el,12.7 dBi,8.68m	£359.95

Dual Band 6/4

PA5070-7-3	6m 3el/ 4m 4 el	£229.95
PA5070-11-6 BG	6m 5el /4m 6 el	£299.95
PA5070-13-7BGP	6m 6el/ 4m 7 el	£369.95
PA5070-15-9BGP	6m 7el/4m 8 el	£429.95
PA5070-15-9-2CBGP	6m /7el 4m 8 el	£449.95

4M Yagis

PA70-2-08A	4m 2 el 6.2dBi 0.8m	£69.95
PA70-3-1A	4m 3 el 6.9 dBi 1m	£89.95
PA70-4-1.5B	4m 4 el 8.2dBi 1,46m	£149.95
PA70-5-3B	4m 5 el 3m boom	£169.95
PA70-6-4B	4m 6 el 6m boom	£199.95

Dual Band 2/70cms

PA144-432-8-09RA	3/6 el rear mount	£99.95
PA144-432-9-1R-2CRA	13/6 el rear mount	£119.95
PA144-432-37-7-2CBGB	12/25 el 2 con	£349.95
PA144-432-13-1,5-2CB	5/9 element 2 con	£159.95
PA144-432-17-2A	6 el/ 12 el	£159.95
PA144-432-19-3-2CBP	7 el / 12 el	£219.95
PA144-432-21-3B	7 el / 14 el	£199.95
PA144-432-13-1.5A	5 el/9 el 1.5m boom	£139.95
PA144-432-34-6-2CBGP	11 /23 el 2 conn	£289.95
PA144-432-38-6BG	11 / 28 element	£299.95

2M Yagis

PA144-5-1.5B	5 el 1.5m boom	£99.95
PA144-6-2A	6 el 2m boom	£119.95
PA144-8-3	8 el 3m boom	£169.95
PA144-9-5A	9 el 4,67m boom	£199.95
PA144-11-6BG	11 el 5.72m boom	£249.95
PA144-12-7BGP	12 element	£289.95
PA144-13-8BGP	3 el, 7.84 boom	£339.95

2M Crossed polarised Yagis

PA144-CROSS-20-6BP	2m 10 + 10 element	£349.95
PA144-XPOL-16-4-5B	2m 8 + 8 element	£249.95
PA144-XPOL-18-5B	2m 9 + 9 element	£295.95

70cms Yagis

PA432-8-1.2R	8 el 1.2m boom	£109.95
PA432-14-3	14 el 3m boom	£169.95
PA432-23-6	23 el 6m boom	£259.95
PA432-30-8BG	30 el 8m boom	£269.95

23cms Yagis

PA1296-13-1R	13 el 1m rear mnt	£109.95
PA1296-18-1.5AR	18 el 1.5m rear mnt	£139.95
PA1296-36-3BRG	36 el RG Balun	£169.95
PA1296-36-3BUT	36 el Teflon Balun	£189.95
PA1296-43-3-6AUTHD	43 el (High Wind)	£249.95
PA1296-70-6RG	70 el RG Balun	£239.95

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DUAL 5500	1.8 MHz 1.5kW	£229.00
DUAL 5690	50 – 54MHz 1 kW	£225.00
DUAL 6160	70 MHz 300W	£179.95
DUAL 6320	144 MHz 1kW	£269.95
DUAL 6540	432 MHz 1kW	£229.95

Power Dividers

DUAL 4330	2m 2-way 0.5 w/ 1.5kW	£89.95
DUAL 4010	6m 2 way N type 2kW	£99.95
DUAL 4000	6m 2 way 2 way SO239 2kW	£99.95

Low Noise Preamplifiers

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Steve Telenius-Lowe PJ4DX
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Get set for Autumn

Steve Telenius-Lowe PJ4DX looks forward to the autumn DX season as well as sharing reports from his usual band of reporters.

Readers of this column who are also RSGB members may have read the two-part article in the July and August issues of *RadCom* by **Dr Frank Howell K4FMH** and **Dr Scott McIntosh**, in which the authors outline a new method of forecasting the solar cycle. While the traditional forecasting method by the Solar Cycle Prediction Panel has Cycle 25 peaking at 115 sunspots in July 2025 (i.e. a fairly weak cycle similar to that of Cycle 24), the new projection is for a much greater cycle peaking earlier, in mid-2024, with 190 (±20) sunspots. The monthly solar flux (SFI) is projected to be at 200 (±25) at solar maximum.

I'm sure we all hope that the new forecast will be the more accurate of the two, but we will have to wait until 2024 or 2025 to be sure.

Meanwhile, Cycle 25 is progressing. On 28 August the SFI registered an astonishing 252 units but it is understood that this figure was affected by a flare and the very high level did not translate to impressively enhanced propagation. The following day the SFI was down to a more normal 131. The SFI and sunspot number (SN) peaked at 152 and 122 respectively on 11 September, see **Table 1**.

Autumn DXpeditions

DXpedition organisers often plan their operations around this time of year, to take advantage of the improved HF propagation that usually occurs during the autumn months. There are three major DXpeditions planned for this month, and no doubt there will be several smaller ones too.

Members of the Italian DXpedtion Team should be operating from 12 to 26 November from the Central African Republic as TL8AA on CW, SSB and RTTY, and as TL8ZZ on FT8 (Fox/Hound mode). Further details at:
www.i2ysb.com/idt

A team led by **Rolf DL7VEE** is heading off to Papua New Guinea and is scheduled to operate from Loloata Island, IOTA OC-240 (**Fig. 1**), as P29RO between 25 October and 10 November.
p29ro.mydx.de

I will be looking for this DXpedition with some interest because I lived in Papua New Guinea between 1991 and 1994 and once kicked around a football on the beach at Loloata Island with a friendly group that included the then Prime Minister, **Rabbie Namaliu**. The island has been completely transformed since those days and the Loloata Island Resort now claims to be *"The best luxury island resort in Australia & Oceania"*.
www.loloataislandresort.com

DX-World, always a good source for forthcoming DX activity, reports that VK9CM from the Cocos (Keeling) Islands, **Fig. 2**, will be on the air from 26 October until 3 November using CW, SSB and FT8 (Fox/Hound mode). During the CQWW DX SSB contest on 29 and 30 October the group will use the callsign VK9C.
www.dx-world.net

CQWW CW Contest

The CQ World Wide DX CW contest takes place on 26/27 November. I am definitely no CW contest operator, but last year I decided to see what I could work on 1.8MHz during the contest. **Fig. 3** shows something extremely rare, unique even: a CW contest First Place certificate for PJ4DX. Not only that, but I was number 1 in South America and set a new Bonaire record to boot! With only 34 QSOs, what this almost certainly means is that last year there were no other South American entrants in the 1.8MHz High-Power Assisted category, and that there have never been any from Bonaire. It also shows that, with a careful choice of the mode, band, power level, and assisted or non-assisted category it is still possible to set a new record!

ILLW 2022

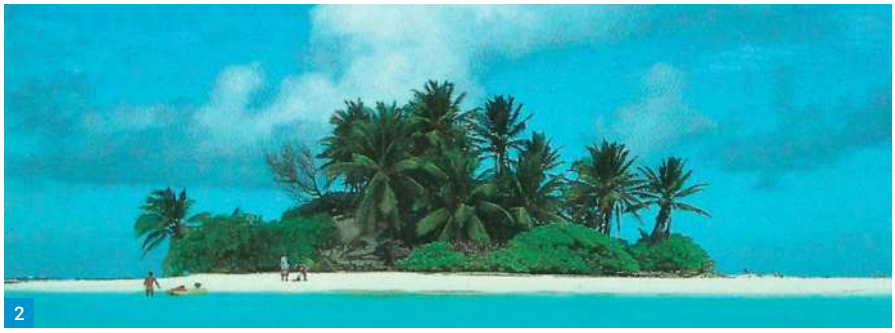
Carl Gorse 2E0HPI/P operated on 7 and 14MHz SSB from Heugh Lighthouse in Hartlepool (UK-0188) for the International Lighthouse/Lightship Weekend (ILLW) on 20 and 21 August. *"Over the weekend I worked 104 stations using the Yaesu FT-818 and a homemade dipole by the North Sea at my favourite location, with the luxury of the added benches"* (**Fig. 4**).

The Gibraltar Amateur Radio Society activated ZB2LGT from Europa Point Lighthouse (GI-001), **Fig. 5**. GARS members **Kevin Hewitt ZB2GI, John King ZB2JK** and **Ronnie Payas ZB2RR** were assisted by club regular **Andy Rainer** and **Kirill Kats VE3AXC**, who operated CW on the Sunday. The main station was a Yaesu FT-450 running 100W to 10m of wire wound on a 9m telescopic fishing pole and connected via a 9:1 balun, with two 8m counterpoise wires. The data-modes station was a Yaesu FT-450 running 40W to an Antron 99 on HF. The ZB2LGT HF log included over 600 SSB, 400 FT8 and 50 CW QSOs.

Readers' News

It's always encouraging to receive contributions from those who may have been *PW* readers for a long time but who have never written in before. One such is **Lance Whitelegg G0CCU** from Bristol who wrote to say he got back on HF after a long break in June. He has limited antenna possibilities but eventually *"settled on an 18ft fibreglass and stainless whip Sigma EuroComm vertical mounted on a 20ft pole on the side of my shed. This has proved to be great and so far I have over 400 contacts and 98 countries worked – the most HF success I've ever had since getting the G0 in 1985! In fact, I overtook my entire previous HF career about two weeks after starting FT8! I'm limited to*

Fig. 1: Two *Iakatoi* canoes on the beach in Port Moresby, with OC-240 in the background. Fig. 2: Prison Island in the Cocos (Keeling) group. Fig. 3: Pick your category carefully and you could set a new contest record, as this certificate attests. Fig. 4: Carl 2E0HPI/P operated from Heugh Lighthouse, UK-0188, taking advantage of those comfortable benches. Fig. 5: The antenna at ZB2LGT, Europa Point Lighthouse. Fig. 6: 2E0HPI/P location at Summits on the Air (SOTA) reference G/TW-003 Guisborough Moor.



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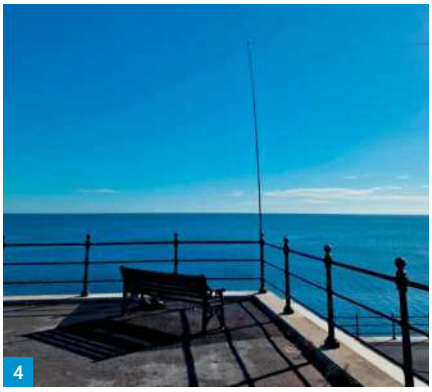

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33W on 40m and lower but 20m and up is OK for 400W... I also have your new book [HF DX Basics – **Ed**] *and the FT8 info is very good as is the rest of it, including 6m."*

Victor Brand G3JNB wrote: *"my reinstallation of FT8, reported last month, has proved singularly unattractive. EU callers abound but my good decodes of seemingly ignored DX stations remain an enigma* [probably so-called 'bots' that are not responding to callers – **Ed**]. *Regrettably PSK31 is still moribund... Hopefully, the approaching autumn will bring much improved propagation and digi DX will be back. Then we had that heatwave! Days of 90ºF temperatures in the shack severely curtailed activity. But on 17m, a lonely but strong VU2TMP India did hear me and after repeats of my call, the QSO was completed. The very next day, I heard a strong YB0ECT Indonesia call 'CQ DX' exactly on the 17m frequency I just happened to be monitoring. My responses brought multiple 'G3?s'. Then 'sri QRM no cpy CQ DX'. He was obviously sitting on a major, simplex pile-up (inaudible to me) so I moved my FT-450D VFO slightly, within his audio passband, and tried again. There followed a long series of 'G3?' and 'only G3' until he copied 'G3J??'. At last we successfully logged the QSO and I felt that at 11,753 miles, 100W to my old fishing rod vertical was most acceptable as we progress into Cycle 25.*

*"Missing the convenience of a second receiver in my FT-818, I retrieved an old monitor from my 'municipal dump shelf' and installed it as a second monitor to enable me to use a remote SDR in conjunction with the main logging screen. My impression by the 26th was that evening propagation on the DX bands is slowly improving. 30m yielded FM5BH and FY5KE, 20m CX5UA and OX3XR, with ZD7BG logged on 15m. So, I am hopeful that, to quote **Sherlock Holmes**, 'The game's afoot!'*

It was a pleasure to speak to regular contributor **Kevin Hewitt ZB2GI** on 18MHz SSB during the month. Kevin wrote, *"Thank you for calling in on 17 metres, it has been a while since we worked on SSB."* Once again Kevin made hundreds of QSOs this month under his own callsign as well as from ZB2LGT at the lighthouse (see 'ILLW 2022' above).

Howarth Jones GW3TMP said *"W0TDH and I are still keeping our daily 15m skeds as and when we can, but conditions have been up and down, last month we went to a later time 2000 but now we are on at 1400 again. When conditions are good on SSB we go over to AM and the 8th was fantastic with S9 signals both ways. I was using the DX-100 and Tom was on his IC-7300 but hopes to get his Collins 32V3 back on soon with the 75A2 receiver. We have had three AM contacts in the past couple of weeks but yesterday was just like old times."*

Our 28MHz beacon-watcher **Neil Clarke G0CAS** reports that, as expected, August saw the Sporadic E season winding down, with conditions deteriorating after the 23rd. *"In fact, on the 29th no beacons were heard. ED4YBA 28263 was logged on 24 days and IZ8RVA 28240 was heard on 21 days of the month, making them the two most heard beacons during August. The average daily number of beacons heard for August was 14, five down on the previous month... Smaller, more localised openings should take place through September and hopefully into October.*

"DX beacons were also down in numbers logged during August with 4X6TU only heard on 14 days. PY4MAB 28270 was logged on 12 days and LU4AA 28200 heard on only seven days. 4U1UN 28200 located in New York was heard only on the 12th with no other beacons heard from that direction. No beacons were heard from the Pacific and South Africa... Several new or reactivated beacons were heard for the first time, including F1ZTS 28236, IK0IXI 28299 and PY4YYF 28115."

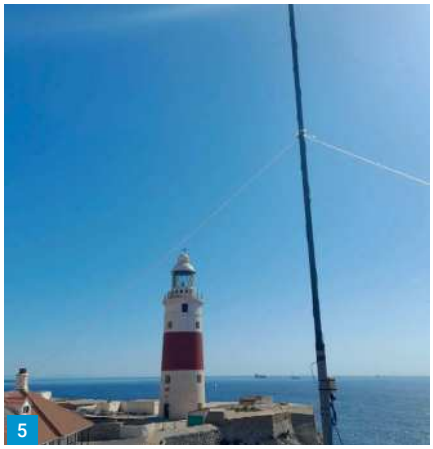
Jim Bovill PA3FDR reckoned that August was a good month for DX contacts, with most activity on 14 and 21MHz and very little on 28MHz. *"I did manage a few new DXCC QSOs, the best were ST2NH from Sudan on the 28th and EP5CZD from Iran on the last day of the month... In previous months Japan has been by far the predominant country for DX QSOs but this changed in August. Now USA has replaced Japan as the predominant DX country. I suppose it is due to changes in propagation in the summer months.*

	Sep '22	Mar '22	Sep '21	Difference
SFI:	152	127	95	(+57)
SN:	122	90	124	(–2)

Table 1: Solar Flux Index and Sunspot Numbers on 11th of the month: this month, six months ago and one year ago. The final column shows the difference between now and the same time last year.

"For some time I have had a long wire antenna approximately 20m long strung across the garden but never got it to work successfully. Recently I acquired an Icom AH-4 long wire tuner, and on the last day of the month hooked it up to the wire and the IC-7300. To my delight and perhaps a little surprise, within 15 minutes managed to log QSOs with Indonesia (YC5NBY and YC1IFR), a crew member on an oil tanker leaving Korea en route to the Persian Gulf (YO4RYV/MM) and Iran (EP5CZD)."

Etienne Vrebos OS8D made *"only 200 QSOs this month... but today, by coincidence, I had a QSO with **Don** – you know, the guy from* PW *– on 40m this morning: GB90PW, that's the QSO of the year! What a surprise, Don recognised me from a live meeting in Friedrichshafen some years ago, and an evening dinner [where we were] bitten by mosquitoes by the million!"* Etienne added that he was a little disappointed by the poor quantity of DX worked: *"it makes me chase a lot of stations /P and /M. I have a lot of respect for their efforts with QRP stations mostly and calling CQ on 40m brings*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a lot of new OM [operators] still shy to push the PTT. They really deserve our help, otherwise they will all disappear in anonymous FT8!"

The arrival of a 'spare' laptop in **Tim Kirby's GW4VXE** shack has allowed for some interesting experiments. Tim writes, *"I installed SDRUno on the laptop to use with a RSP2Pro receiver and an indoor G8CQX loop antenna (with preamp). I'd noticed a few weeks back that a plug-in for the SDRUno software was available to decode FT8 signals. It proved very easy to install and I have been very pleased with the results. Although the indoor loop antenna is not the same as a full-sized antenna outside, it works very well indeed. Most often I have been leaving the receiver decoding FT8 on either 21 or 28MHz and it has been fascinating to see signals coming through at odd times. The FT8 decoder for SDRUno does not have some of the checking that WSJT-X and similar programs contain, but you soon get to mentally sift out the false decodes. Of course, there is nothing to stop you running WSJT-X in conjunction with SDRUno and piping the audio output from SDRUno into WSJT-X using a Virtual Audio Cable or similar. That would probably work even better, but as the laptop I'd acquired was fairly low spec, I decided to keep things simple."*

"Not many QSOs this month," said **Owen Williams G0PHY** *"but nevertheless there was some good DX about. There were a couple of openings to the Caribbean on 18MHz in the evenings and 21MHz was open to the USA and Brazil on the first day of the WAE [Worked All Europe] contest."*

It's quite a while since we heard from **Carl Gorse 2E0HPI/P** but he explained that a foot injury had put his 'radio hiking' on hold. However, he has been out and about again recently – see 'ILLW 2022' above. *"I also operated at SOTA G/TW-003 Guisborough Moor* (**Fig. 6**) *and Herrington Country Park G-0554 near Sunderland with my best contact being VY2/ZL2ZHM on 20m. Yesterday [2 September] I operated in Northumberland at Alnmouth on 40m and 20m with a nice contact with VE9MY and VE9GLF at VEFF-0802 on 20m using the Elecraft KX3 at 15W."*

Around the Bands

Victor G3JNB: 14MHz CW: OH0/DL1SVA. **18MHz CW:** XQ6CF. **21MHz CW:** KP4HF.

Gibraltar ARS, ZB2LGT: 3.5MHz FT8: CT3IQ. **5MHz FT8:** AA7A, K8ET, K9ATX, NK1I, WS3V, ZL2CC. **7MHz CW:** EA7OF. **7MHz FT8:** AA0N, AG1A, K4IHS, KA2MGE, N3DNA, V31DL, W9AV, WB8EKG, ZL2DD. **10MHz FT8:** 6D5C, CO2QU, FK1TS, FK4TK, KF8PD, KV4AA, VK2UWP, VK7AC, W5XO, WS3V, XE1GPW, XE1TD, ZL3PIE. **14MHz SSB:** 8P6LL, JA1HTY, KP2AD (VI-001), N4RF, N5FBB, PY2VB, V51RS, VE2CSI, VE9EZ/P, VK3HJ, VK5PAS, VP8TAA, W1HN, W2RT, WA3OFR, ZD7MY. **14MHz CW:** 4X6PB/P, W2CR, WB6CDT. **14MHz FT8:** VK2EX. **18MHz SSB:** DK0MTS/LH (DE-0124). **18MHz FT8:** 9Y4DG, 9Z4SS, JG1ULT, JR6EZE, KP4HF, LU4FW. **21MHz SSB:** MX0WGS. **21MHz CW:** HK4HAN, PR5J, WA9AQN. **21MHz FT8:** 7K4DHB, 7Z1IS, CE3QY, JG4NNS, LU4DRH, PY7AN, WB2BIN, WP4QEC, YC5YZ, YY7ECA, ZS2EZ. **24MHz FT8:** 3B8CW, 3B9FR, 4X5DF, 5R8LH, 9K2NO, 9K2YD, A71XX, CE3BT, CX1VH, JA0AOO, JA1AGG, JA7KY, JF2XGF, JG0CQK, KK2I, LU6XQB, LU7HN, N3AAA, PU4SYB, PY2BS, PY3TO, PY5EJ, TA4Q, TK5IH, VE3BW, VP8ADR, VU3CAU, YB0SAS, YB3COY, ZP5DNB, ZS2Y, ZS6JZ. **28MHz CW:** PT2CVA. **28MHz FT8:** 4X5MZ, 9K2YD, CX2DSN, LU4FW, LU5EPB, LU8DAL, PP5AK, PU1KPS, PY2ATI, PY3FF, W5HVV.

Kevin ZB2GI: 5MHz FT8: NK1I, ZL2CC. **7MHz FT8:** AA0N, K4IHS, KC2SST, N9WQP, V31DL, WB8EKG, ZL2DD. **10MHz FT8:** CO2QU, FK1TS, KV4AA, N4PAJ, VK2UWP, VK7AC, W5XO. **14MHz SSB:** AA7G, AB3AH, AC4DV, AD2T, CE5DSQ, HI8HRD, HP6DJA, HR3Q, K1XV, K5VXT, K7ACZ, K9EE, KA2NYE, KA8IVJ, KC1DQH, N6RWC, NP4JM, PJ2LS, PT7PT, VA2MP, VE1FA, VE3LUZ, VE9RK, VK5AVB, VK5QD, W3FOX, WP2MNI, XE3ISS, YV5AEP. **14MHz FT8:** VK5JAK. **18MHz SSB:** 5B4AIX, EA8CWA, K2CBI, PJ4DX, VE1SK, WA1GZY, WP3AV. **21MHz FT8:** 4X5MZ, AA8IK, AB9M, AC2PB, AD5HA, AE0DC, CO6XE, FG1AG, N6WS, N7RO, PY4PS, TA3LHH, VA3VF, VE1RY, VE2PLE, XE3E, YD9RRP. **21MHz FT8:** 7K4DHB, WB2BIN. **24MHz FT8:** KC0CF, KI4DLS, N6AR, N7XR, NR8Z, V31MA, W5GJ, W9DCT. **28MHz FT8:** G4HUE.

Jim PA3FDR: 7MHz FT8: CO7MTL, KE2UK, KF9UG, KK4CQN, N8PS, RX9ATX, V31DL, VP2EIH. **14MHz FT4:** 4X5MZ, 7X2ARA, 7Z1IS, 9K2YM, HS5NMF, JA8JYV, JH4IFF, JR2BYJ, KB8U, KZ9DX, ST2NH, TF3VG, UB0IBA, VE2BJG, VK3BOB, W2CG, YC1IFR, YC2TTG, YC5NBY, YO4RYU/MM. **14MHz FT8:** 4X4ZP, BG4WOM, BG5BPT, EK1KE, EP5CZD, HS0ZOY, HZ1ML JE1JIM, JR7RHO, K5WE, K6EK, RZ0SW, YB5WIR, YC3AJO. **21MHz FT4:** AC2OC, N5IF, PU4DEE, PY4AW, PY5JO. **21MHz FT8:** 4X4ZP, AD4ES, HI3A, HK6JCF, K2AK, K5WE, K6ND, KB9MYP, KP4SE, LU2NI, LU5VV, LU8VLE, LW4EAZ, N1MGO, N8PS, PP5TG, RA9LL, TA9J, W8JWN, WB4VMA, WX7MB, YD8BUL. **28MHz FT8:** LU8DY, PY1SX, PY5QW.

Etienne OS8D: 7MHz SSB: GB90PW. **14MHz SSB:** 4K3ZX, 4L6DL, 9M2SAF, 9M6TMT, 9V1YC, JA7YRR, KH6ML. **18MHz SSB:** JY5HX. **21MHz SSB:** 8H77D, 8I77N, 9M2SAF, HS8HEX, JA3AOP, JA6WFM, JH4UYB, JN2AMD, UN0LM, UP4L, YB0IBM, YE9BJM, YH1AT.

Owen G0PHY: 14MHz SSB: FY5KE, JA3NGD, PY2ZZ, TA3DE, UN0LM, VE9MY, W3LL. **18MHz SSB:** 9Z4FE, FM5BH, V4/NT5V. **21MHz SSB:** CT9ABN, NA8V, PT5J, VY2ZM.

Carl 2E0HPI/P: 7MHz SSB: F4HZR/P (FFF-2564). **14MHz SSB:** CS2SP/LH (PT-023), SP3W/P (SPFF-1561).

Signing Off

Thanks to all contributors. Please send all input for this column to teleniuslowe@gmail.com by the 11th of each month. Photographs of your shack, antennas, or other activity would be particularly welcome. For the January 2023 issue the deadline is 11 November. 73, Steve PJ4DX. **PW**

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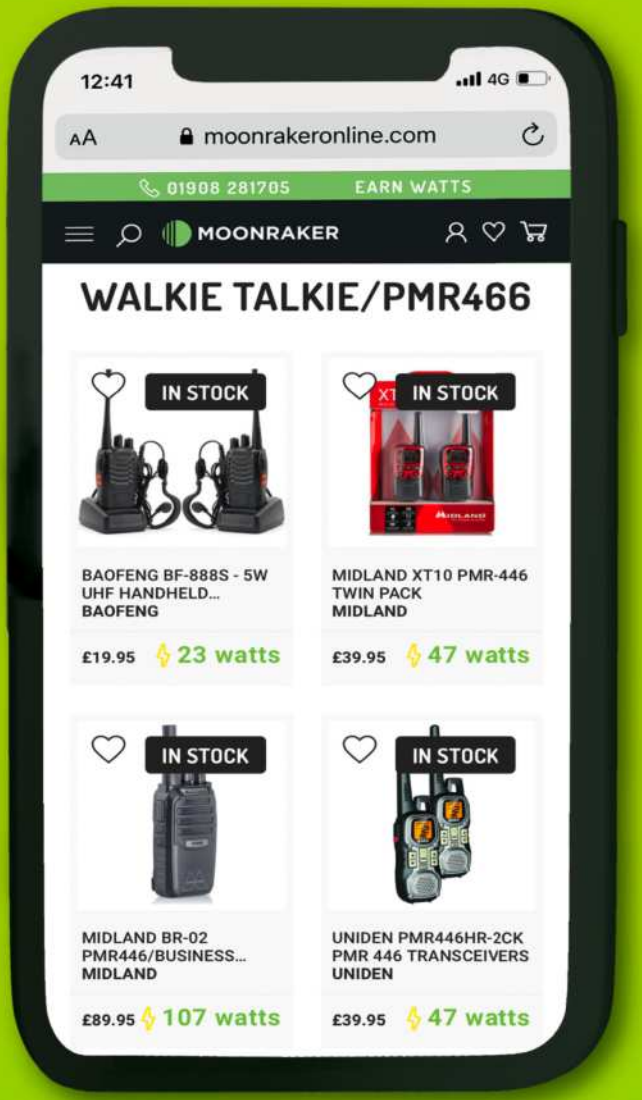

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David Allen G8LHD
practicalwireless@warnersgroup.co.uk

Simple VHF/UHF Coaxial Relay PCB

David Allen G8LHD develops a PCB for switching at VHF/UHF using the popular CX-120P relay.

One of the cheapest solutions for a coaxial switch that maintains good isolation, low insertion loss and a good return loss (low VSWR) to well over 500MHz is the CX-120P miniature PCB-mounted relay. These are found inside many rigs and are well engineered with power handling up to 150W at 500MHz. As frequency decreases this improves to 250W at 50MHz.

In order to use these relays, ideally a separate PCB is required to connectorise them. This kick started this project off the drawing board (or these days where very little is drawn by draftsmen, the proverbal CAD system). The photos, **Figs. 1** and **2**, show the relay top and underside pin view. The underside photo shows the decent grounding and screened contact housing arrangement. The first problem encountered was a dimensional drawing for the part but researching the web managed to yield a drawing and a part was created in 2D and 3D for the CAD system. The latter 3D as a reality check to ensure the part matched the PCB footprint when imported and because I prefer to visualise what's on the CAD before risking the outlay of getting a PCB manufactured.

Fig. 3 shows the general pin dimensions from the top side of the PCB.

Microstrip or Coax?

Now we could use microstrip techniques to connect the RF ports. Microstrip dimensions for 50Ω on FR4 board are typically a ratio of W/H = 2 where W is the width of the trace and H is the thickness of the dielectric core. For 1.6mm thick 1oz copper FR4 board where the dielectric is of the order of 1.57mm, a trace of 3.14mm would yield a 50Ω characteristic impedance. But as this board was to be mounted on a metal chassis, I opted instead to use RG402 semi-rigid coax. The reasoning for this is that microstrip requires at least three to five times the width of the conductor as free space above the trace to not have any discontinuities (or in our case below the PCB). This would require a stand-off pillar of equal to or greater than 10mm. To get this height down I opted for this alternative approach and used semi-rigid coax, which probably also benefitted isolation between ports.

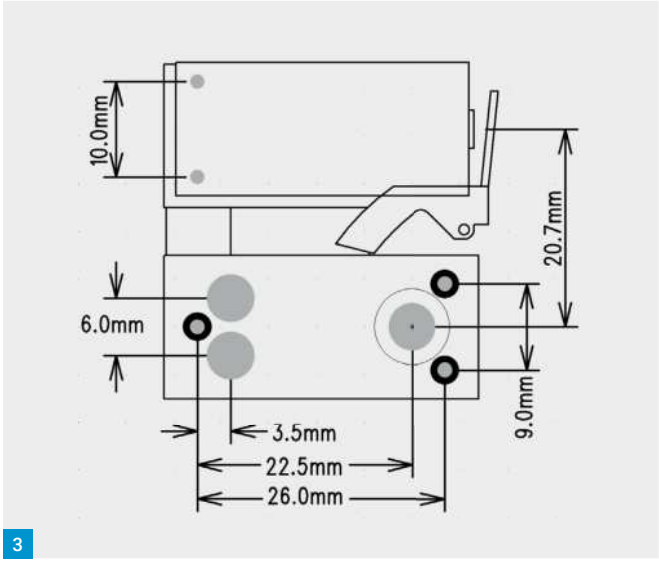
Fig. 4 shows the schematic. The relay coil back emf is neutralised by diode D1 and further protection is given by an MOV (metal oxide varistor) The MOV serves not only to protect from discharges but is of the order of 5000pF so a nice RF decouple across the diode.

Fig. 5 shows the relay CAD view in 3D. The PCB measures just 65 x 70mm. Note the connectors are small flange N type, more suitable for VHF and UHF operation and not to be confused with larger standard flanged connector. These are available from several sources on eBay, usually supplied in packs of ten but at prices that equate to less than a £1 each. The flange dimension is 17.6mm^2 and hole centres are on 12.7mm so will also accommodate BNC connectors.

The drawings show, **Fig. 6**, the PCB top copper of the PCB, and **Fig. 7**, the bottom copper. With respect to the top copper, note the thermal relief

CX-120P	Loss dB		Isolation dB	
Freq MHz	N/O	N/C	N/O	N/C
50	-0.01dB	-0.01dB	-48.9dB	-48.7dB
145	-0.02dB	-0.02dB	-38.6dB	-38.7dB
432	-0.05dB	-0.06dB	-30.5dB	-29.9dB

Table 1: Measured insertion loss and isolation.



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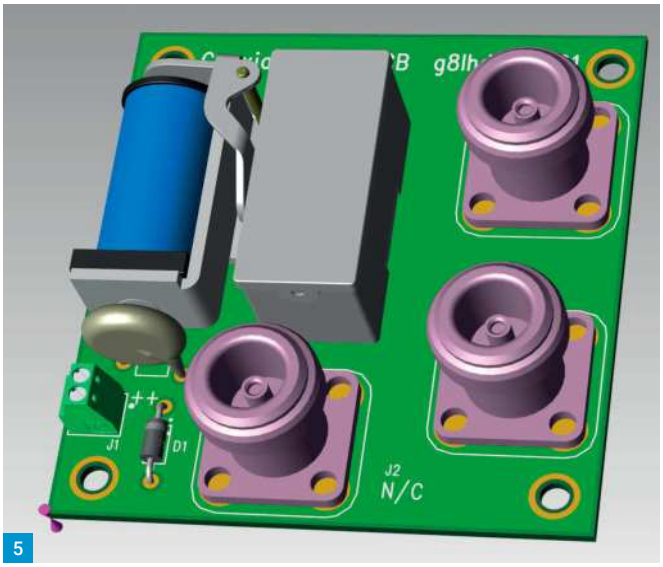

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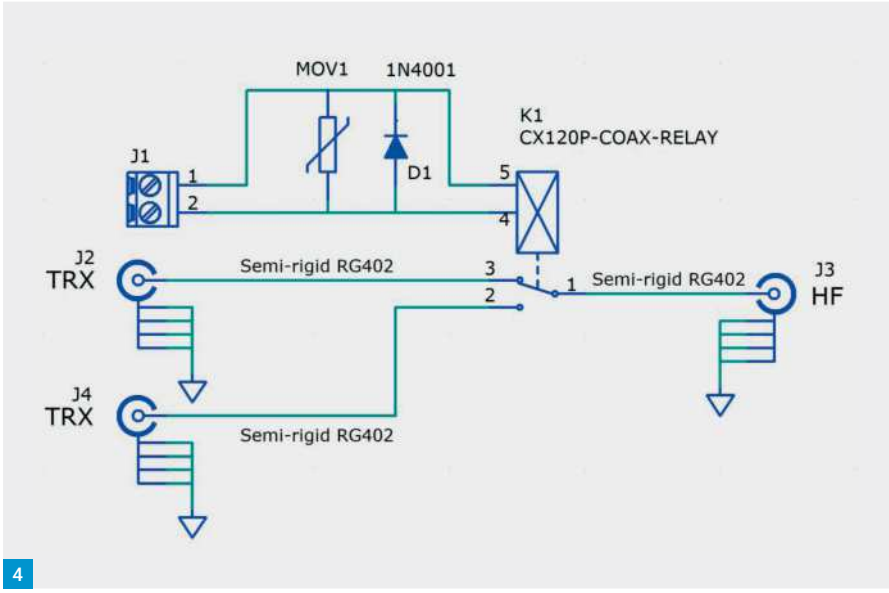

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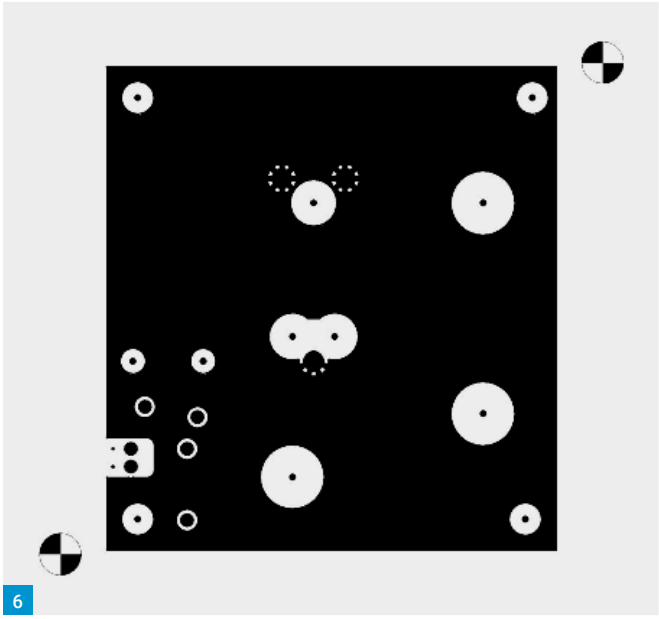
Fig. 1: Relay top view
Fig. 2: Relay underside pin view
(relay photos courtesy of The DX Shop)
Fig. 3: The general pin dimensions from the top side of the PCB.
Fig. 4: Relay PCB schematic.
Fig. 5: Relay CAD view in 3D.
Fig. 6: PCB Top copper.
Fig. 7: PCB Bottom copper.



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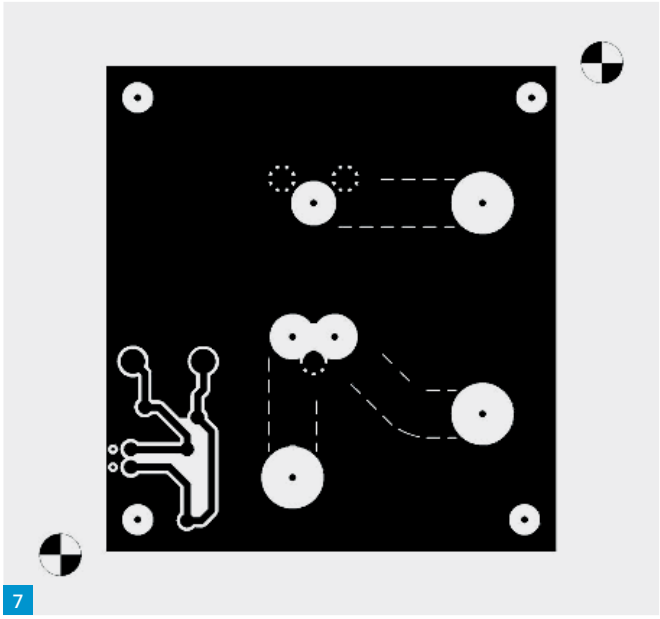

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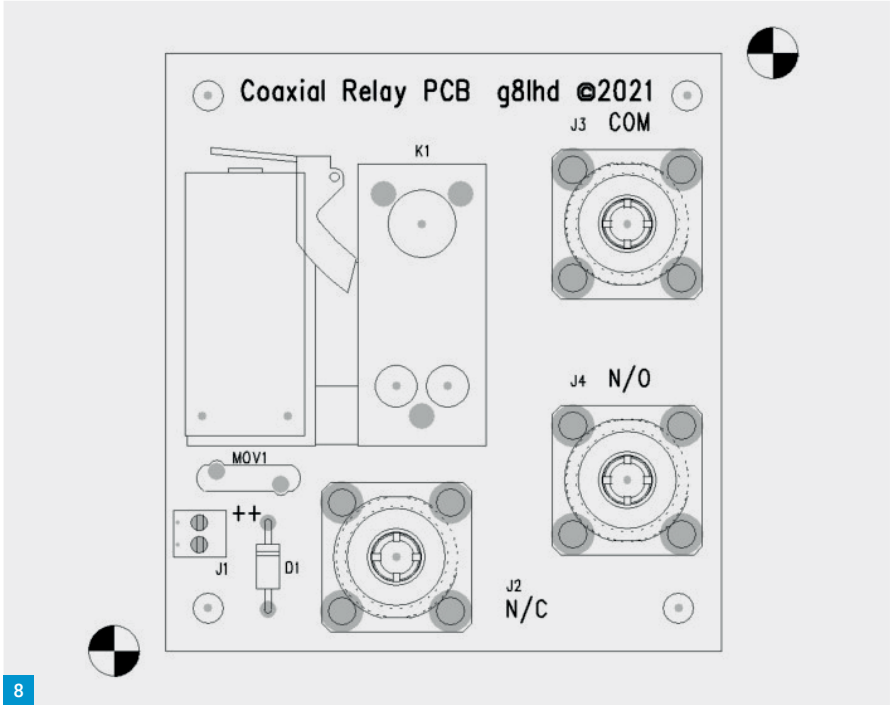
Fig. 8: Assembly drawing top side of PCB. Fig. 9: Top side of PCB with relay, connectors and DC terminal. Fig. 10: Underside of PCB.

around the relay ground mounting pins. The board peripheral and relay mounting holes are peppered with stitching vias (small copper plated 0.5mm diameter holes) between top and bottom ground for good overall RF performance. The area under the DC connector is relieved of copper as some manufacturer parts are not insulated and can otherwise short to the ground plane if the resist becomes scratched. Note also that where the semirigid coax is placed on the board, thermal relief is provided so that soldering is made easier.

Fig. 8 shows the assembly of the top side of the PCB, also seen in the photo, **Fig. 9**, showing the silkscreened port functions and reduced flange N connectors. DC screw terminal block is mounted bottom left-hand side with positive 12V marked **++**

The final photo, **Fig.10**, shows the bottom assembly of short sections of RG402 semi-rigid coax. Braid soldered direct to the bottom ground plane. The ground stitching vias can be clearly seen in this view.



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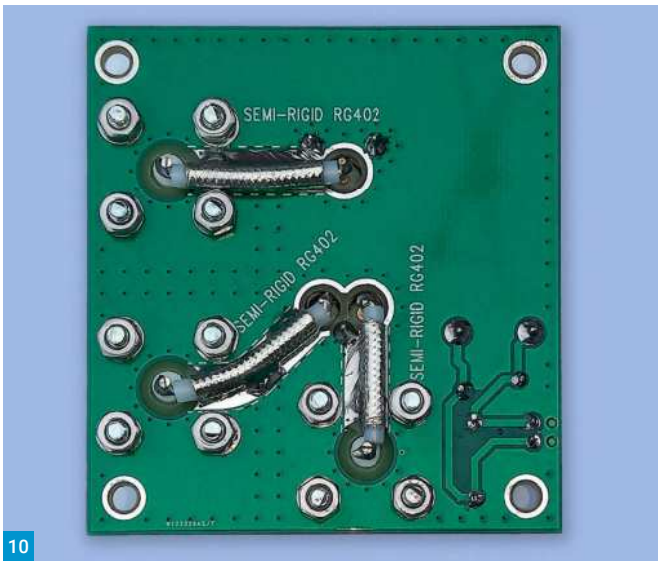
Performance

Insertion loss and isolation are shown in **Table 1**, measured on a VNA at 50MHz, 145MHz and 432MHz, using 10MHz sweep and 1dB resolution. Cable and connector losses are calibrated out.

Conclusion, losses were well within manufacturers specification. Isolation was good but the length of exposed relay contact pins between the normally-open and closed contacts meant that some isolation was lost. This was only to be expected as the length of cropped pins are adjacent to each other and this becomes more significant at UHF. This could be improved with a short screen soldered between the pins, but I only see this as an issue if you were intending to use this with a masthead amplifier where isolation may require further optimisation. **PW**

9



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Item	Qty	Reference	Description	Manuf Part No	Manufacturer	Notes
1	1	D1	Diode General Purpose 1A	1N4001	General Semiconductors	
2	1	MOV1	14V 5A 2.0J 43V Clamp Voltage Varistor	B72210S0140K101		
3	1	K1	COAX-RELAY SPCO 12V 80mA	CX-120P	Tohtsu	The DXShop
4	3	J2-4	N Connector Female Bulkhead Small Flange			ebay & Amazon
5	1	J1	TERMINAL BLOCK, PCB, 2WAY 6A	MPT0.5/2-2.54-2	PHOENIX CONTACT	

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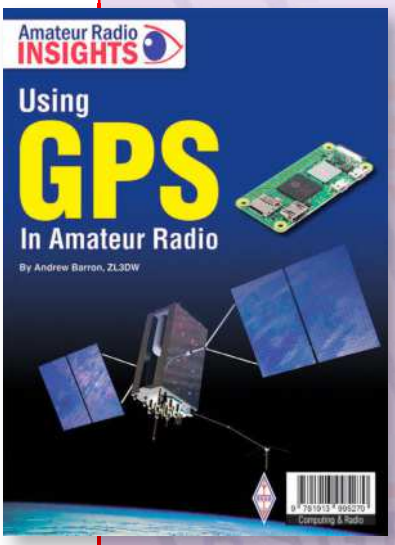
Using GPS in Amateur Radio

By Andrew Barron, ZL3DW



Today many of us have GPS (Global Positioning Satellites) units in our cars, a host of other gadgets and even some amateur radio equipment. However, as radio amateurs are we getting the most from this technology? Popular author Andrew Barron, ZL3DW sets out to explain the GPS technology and illustrates how you can experiment with it in amateur radio.

Using GPS in Amateur Radio is about GPS and other GNSS (Global Navigation Satellite System) satellites and how we can use the data broadcast by them for amateur radio. You will find that GPS benefits in digital modes like FT8, WSPR, and WSJT that rely on accurate transmit and receive period timing and this is easy to achieve with internet access to international time servers. GPS governed clocks dramatically improve the frequency stability of our transceivers working in the UHF and microwave bands and allow us to frequency lock our frequency counters, spectrum analysers and signal generators, turning cheaper instruments into professional tools. Andrew has included some Python programs and a few inexpensive Raspberry Pi projects that you can build at home. These are all designed to illustrate how you can experiment with using GPS data in your amateur radio endeavours.

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Special Event Station GB9HRH

Michael White G4HZG reports on a commemorative event for the Reign of Her Majesty Queen Elizabeth II, operated from Merryton Low Staffordshire, IO93AD, SK0395 6170 on Sunday 18 September.

Michael White G4HZG
raynet@sky.com

"I have an NoV for GB9HRH to celebrate the reign of HRH Queen Elizabeth II. I plan to operate 2, 20 & 40 from Merryton Low IO93AD from 10:00. Anyone wishing to pop along and take a turn would be very welcome. Otherwise, all calls are welcome. 73."

Thus, the germ of an idea for a Special Event Station was promulgated. The sudden death of the reigning monarch has caused a shock which was not anticipated, though inevitable. The death of **Her Majesty Queen Elizabeth II** brought home a realisation of what the UK had lost, for it is clear now that she personified and was the real 'Jewel in the Crown'.

So, an opportunity for radio amateurs to record a unique historic event came into being in a small way.

Merryton Low is an escarpment that overlooks the A53 Buxton to Leek road in the Staffordshire Peak District. One glance at the OS 119 map tells you the road is a straight Roman Road dating back at least 2000 years. Less obviously the A53 is reputed to be the most dangerous road in the West Midlands, with dozens of fatal incidents during the last 20 years.

Local radio amateurs are familiar with Merryton Low for its 'take off' in all directions. So, the choice of venue was an easy one to make.

Sunday morning was very windy. Indeed, **Mike M0XMX** had to abandon the site on Saturday evening, because apparently he dislikes being rocked to sleep, though Teddy the dog wasn't complaining….much.

The cloud layer was at about 350m, which meant we experienced horizontal rain at times, Merryton Low being at 487m asl. Certainly, the vertical colinear was slant polarised most of the time. (Only wimps use guy lines and the motorcyclists don't like them either!)

GB9HRH operated on 70cm, 2m, 40m and 20m with variable success.HF was noisy and the A.T.A.S. antenna did its best with a number of VK stations heard, but not worked, earlier on 20m. One station in Switzerland (HB9HAL) worked us, reporting that we were *"just above the noise floor"* on 20m. A contact is a contact.

Tom 2Q1FUE reported that a number of stations were looking for us on 40m, which we then tried without any success. We were challenged to work 100 stations. Mike and I decided that 70 & 96 contacts would be good; marking every year of Her Majesty's glorious reign and life.

Most stations were worked on 2m FM. It was good to operate without the time pressure and format of contest conditions and many pleasurable, albeit short, conversations ensued.

Mike M0XMX and I would like to thank all stations for their positive support and comments. We managed to complete 104 exchanges, using 12W output from an FT-857 and dual band collinear.

Kind Regards from the two Mikes: M0XMX, G4HZG and Teddy the dog. **PW**

Photo 1: Mike G4HZG and Mike M0XMX.
Photo 2: Ecoflex coax and slant polarisation indicate the wind speed experienced by GB9HRH.

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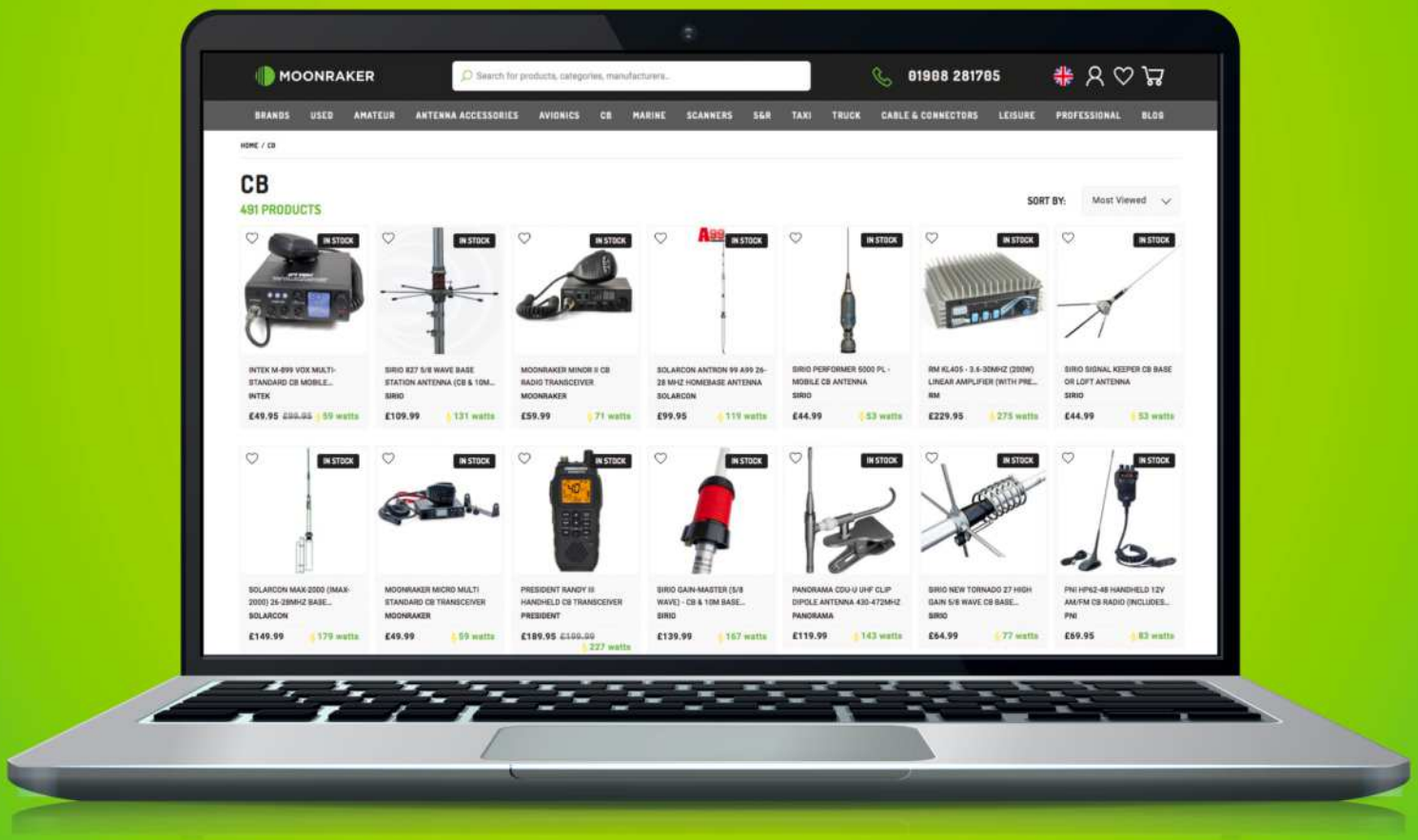

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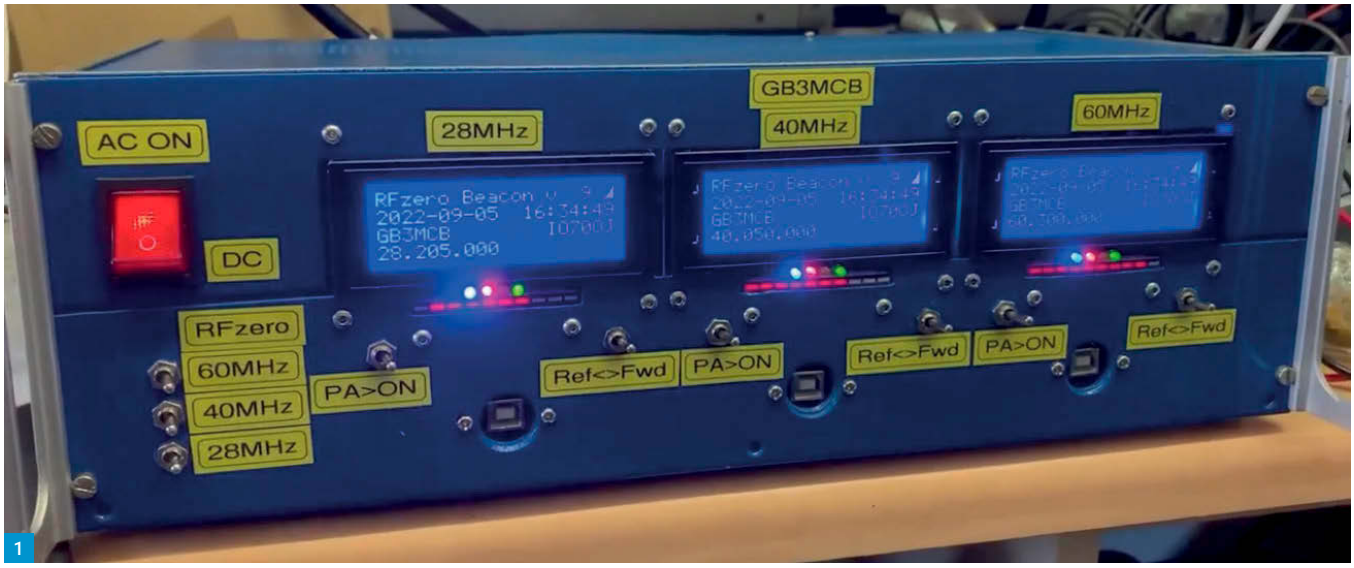

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Allstar on Android

Tim Kirby GW4VXE has another packed column, staring with some interesting information about accessing Allstar.

Tim Kirby GW4VXE
gw4vxe@icloud.com

A few months back, I wrote a little bit about analogue hotspots, using a Raspberry Pi based hotspot, such as the G7RPG Microhub, to connect to various analogue networks, including the UK's Hubnet and the PAPA Repeater system in California. **Jef ON8NT** mentioned to me recently that there had been a release of the DVSwitch software, which does not require a Raspberry Pi but instead can be run on an Android device.

I've not mentioned the DVswitch software before, but up until now, it has comprised a server component, which runs on a Raspberry Pi and connects to the different radio networks, including DMR, Fusion and D-STAR. A piece of client software, the DVSwitch app for Android runs on your mobile or network radio device and connects to your server, allowing you to communicate with the various radio networks, across the internet or your local area network.

Although it interested me, with the current shortage of Raspberry Pi machines, I haven't got around to trying out DVSwitch yet. However, when Jef mentioned that I could run a Beta of the DVSwitch software on an Android device, without needing a server, I was intrigued.

You can read more here:
https://tinyurl.com/2p9xatnx

The new DVSwitch software for Android is known as DVSM 2.0. It features two ways of connecting to the Allstar network, 'Node Mode' and 'Web Transceiver' mode. To use Node Mode, you'll need to have a node number available on the Allstar network. I already had a node that I was using, but I decided to register a separate node number so as not to interfere with a system that was working well. As it turned out, that was a good decision! I'll explain shortly.

For some information on how to register a node on the Allstar system, there's a useful video here, from **Peter Kendall G7RPG**:
www.youtube.com/watch?v=_1JkljSsArU

You will only need this if you want to use 'Node Mode' rather than the 'Web Transceiver', but as it turns out, 'Node Mode' gives more options, so I'd recommend you do that.

You'll also need to register for the Beta program, which you can do on the Community Allstar Link shown above. Once you have done that, you can install the DVSM 2.0 software from the Google Play store onto your Android device (sorry, no iOS version available).

Having done that, follow the instructions at the link below to configure your device, which is quite easy to follow. You may need to join the DVSwitch Mobile group on groups.io to download this PDF.
https://tinyurl.com/pun82b2a

In some respects, Web Transceiver mode is the easiest to get going, but unfortunately, the majority of Allstar nodes seem to be configured not to accept connections from 'Web Transceivers'! One that does work is node 2600, so you can try connecting to that.

In Node Mode, you should be able to connect to pretty much any Allstar Node (try 2021 for Hubnet). One problem I found was that Node Mode was restricted to a connection of five minutes, because the software was in Demo Mode. I tried to register (really!) but the ability to purchase a full version of the software didn't work on my device, probably, I think, because I was using an old version of Android. The support team were very helpful and are looking into resolving the issue. In the meantime, I found that what I could do was to use my G7RPG Microhub at home to connect to whatever Allstar node I wanted to. Then, because my Allstar node is configured to accept Web Transceiver connections, I could connect to my Microhub node from the Android device. That worked fine if I was away from home, on a cellular network.

I've not yet tried connecting from the DVSM mobile software to DMR, D-STAR or Fusion networks so cannot confirm how well that works. However, if you have an interest in using the Allstar system but have not set up a node, this might well be a way to try it out, if you have an Android device.

Let me know how you get on! It's quite interesting to play with. Thanks to Jef ON8NT for alerting me to the software.

The 8m Band

Roger Lapthorn G3XBM (Cambridgeshire) says that EI9KP (IO54) at a distance of 649km has spotted Roger's signals quite often recently. It's an intriguing distance and Roger and I discussed that it's unlikely to be Es – perhaps more like some sort of scatter. Roger has also been heard in Spain and Portugal but he hasn't caught any F2 propagation so far. Roger is looking forward to the new 8m GB3MCB beacon being on air and feels that he ought to be able to hear it most days. It is fascinating to see what is possible on this new area of the spectrum, for radio amateurs, at least.

Roger Greengrass EI8KN reports that **Robbie Phelan EI2IP** (IO52) made the first ever Europe to North America QSO on the band, an FT8 QSO with WM2XEJ (EM83). Robbie was also heard by ZP4KFX (GG14) at a distance of 9848km. Roger

Fig. 1: The new GB3MCB beacons for 28, 40 and 60MHz on test in Peter G8BCG's shack. Fig. 2: Allan GM4ZUK's 2m station for the IARU 144MHz Trophy Contest. Fig. 3: An example of a DAB Slideshow from the Netherlands as received by Allan GM4ZUK. Fig. 4: The impressive 2m array at the DR9A Club station. Fig. 5: Adrian GU0VLG operating on 2m from the Guernsey Amateur Radio Society club station.

says that experiments continue, although up to now QSOs have involved Sporadic E, which is now in decline, but perhaps there will be possibilities via TEP.

Peter Taylor G8BCG (Liskeard) worked ZS6WAB on 17 September when Peter was running 5W of FT8 to a dipole – impressive stuff! Peter has had the 28/40/60MHz beacons for GB3MCB on test into a dummy load and is waiting for a rigger to install the antennas at the beacon site – hopefully the beacons will be on air shortly, **Fig. 1**.

The 6m Band

Kevin Hewitt ZB2GI writes that Gibraltar Amateur Radio Society activated Europa Point Lighthouse ZB2LGT (GI 001) for the International Lighthouse and Lightship Weekend on the 20th & 21st August. GARS members Kevin Hewitt ZB2GI**, John King ZB2JK and Ronnie Payas ZB2RR** took part in the event, assisted by club regular **Andy Rainer**. **Kirill Kats VE3AXC** operated CW on Sunday. The station operated on HF + 6m, 2m, 70cm and QO -100. The 6m station consisted of an FT-450 with a homemade two-element Yagi.

The 6m station was active on SSB and FT8; finding more activity on FT8, including a QSO with *PW's* editor, **G3XTT**!

Jef Van Raepenbusch ON8NT (Aalter) lists some nice DX, despite things being quieter in August. Jef runs 10W of FT8 from an IC-7300 to a V-2000 vertical. Highlights of Jef's log include EA8JK (IL18), 9K2YM (LL48), TA9J (LN10), OY1DZ (IP62), TF8KY (HP83) and W3LPL (FM19).

Steve Telenius-Lowe PJ4DX reports that 6m has been showing signs of life again. *"After what seemed like weeks of no activity at all on 6m, on 13 September I worked six PY stations, three in LU, plus HC5VF, CX6VM, CX1VH, XQ3SK, OA4DOS, EA8DO, EA8RH and EA8/DF4UE, all using FT8.*

"On the 14th the band was dead, but on the 15th and 16th it opened once again to PY and LU and on the 15th I also worked XE3N plus semi-local P41E. One interesting callsign worked was LU7JMS/GR, which both JTDX and my logging program thought was in England, though he was definitely in Argentina! The /GR suffix apparently indicated an operation from the Province of Formosa, close to the border with Paraguay."

Peter G8BCG caught a TEP opening on 16 September and worked XT2AW for a nice one. XT2AW was very busy with stations from the Mediterranean area but little further north.

2

3

Here at **GW4VXE**, the beam has been pointing southwest, in the hope of some TEP, but so far without any luck, although on 13 September, I received a solitary decode from 9Y4D. That hardly seems like TEP propagation, more like some brief multi-hop Es. I've caught a few Es openings, but there have been very few longer distance contacts. Highlights of the log include YL2EA (KO26), TF3VS (HP94), LA5WJA (JP43), TF3VE (HP94), EA8/DF4UE and CU3EQ (HM68), all on FT8.

The 2m Band

Allan Duncan GM4ZUK (Aberdeen) enjoyed the September 2m trophy contest, operating from his usual site on the Cairn O'Mount (IO86RW), **Fig. 2**. Allan got on site late on Friday to start getting set up and when he arrived, the DAB radio in his car was showing slideshows from stations in the Netherlands, **Fig. 3**. By the time the contest had started on the Saturday, conditions had deteriorated considerably, but Allan managed to make some excellent QSOs, including DR9A (JN48), **Fig. 4**, and OL80WPN (JO60).

Kev ZB2GI reports that ZB2LGT worked EB8BRZ (IL28) during the ILLW weekend. During the Perseids meteor shower, Kev operated from the top of the Rock using 50W from his FT-897 and a Cushcraft five-element dual-band 2m/70cm

beam and a receive preamplifier. Kev made some nice QSOs on FSK441, including G1KAW (JO00), G4TRA (IO81), I2SVA (JN45), F1HQM (JN23), F5LEN (JN38), IV3NDC (JN65), F5JNX (JN37), IK4DCX (JN64) and F4EZJ (JN05). Kev worked some nice tropo too, with EA5GJ (IM97), EA5IK (IM98), EA5WU (IM99), EA7DAP (IM86), EA7HLB (IM76), EA8CHC/7 (IL27), EA8FB (IL18), EA8JK (IL18), EA9E (IM75), EB5EA (IM99), IM0/I2KQE (JM49) and IW8PQU (JN61), all worked on FT8.

Jef ON8NT worked G0LTG (IO81) in the UK Activity Contest on 2 August.

Simon Evans G6AHX (Twyning) writes, *"I have had a couple of successful contacts with **Adrian GU0VLG*** **[Fig. 5]** *using 144MHz SSB. Adrian is a close friend who has moved to Guernsey and has joined their local club, which is located in a WW2 bunker. The club antenna for 144MHz was found to be faulty. So, Adrian climbed through a grenade hatch onto the roof. Then with a three-element SOTA beam mounted 3m up a mast and the club's FT-897, we had a successful contact on 27 August. Then, next day he was able to join a regular three way net we have with G4NZV (IO82) and G3SQQ (IO93). It shows what's possible under flat conditions. Apparently, the GU club has been given a new rotator and beam for 144MHz".* During the September 2m UK Activity Contest, Simon had 17 QSOs in 12 squares, with his best DX being GM3SEK (IO74).

David Johnson G4DHF (Spalding) writes, *"The excitement of the summer is over and it's been quite quiet here so I've been renovating some 1980s 2m SSB radio gear, which has been fun. Not much to report, but I have worked a few auroral QSOs as I have a good take-off to the northeast from here in rural Lincolnshire, even though the aurora was not so strong or extensive. Almost all of the contacts were between 30° to 60° QTF. On 4 September, I completed with several reasonably strong GMs and then went on to work YL2AO (KO16), SM6BFE (JO68), LA3EQ (JO28) and SM6YNO (JO67). I found activity levels to be quite low, unfortunately".*

Ian Bontoft G4ELW (Bridgwater) says that he has finally retired (congratulations!) and has found some more time to play radio. He writes, *"I invested £25 in an old five-element Yagi, which I have thoroughly enjoyed refurbishing. At the moment, it's only 4m up in the air (we live almost at sea level anyway) and the only reasonably clear take-offs are to the South and East (via the Armstrong method). But it's been interesting being able to call CQ on the V2000 and see which way the band is open (if at all) and then try the beam. Initial observations are that there seem fewer spots on horizontal polarisation but further afield".* Running 15W of FT8, Ian lists some nice QSOs, including F6EGD (IN88), F5BEG (JN07), TM3GGR (IN96), F4BKV (IN95), F5LMG (IN88), F6IFX/P, EI3KD (IO51) and F8PRC (IN99). Ian was surprised to be spotted by GM3SEK (IO74)


4


5

while G4ELW was beaming south – I'm guessing that was perhaps an aircraft reflection, either to the south or overhead of Ian's location, which GM3SEK was also able to see. Just a guess, of course!

Here at GW4VXE there's not too much to report. I'm still using the vertical antenna but it's probably time to get the 2m beam back aloft now. QSOs of note (all FT8) include EI3IS (IO53), GW8IZR (IO73), GW0WZL (IO73) and EI9KP (IO54).

The 70cm Band

During the ZB2LGT activity, the station worked EB8BRZ (IL28) on the band for a nice QSO. Operating as ZB2GI from the Top of the Rock, Kev worked EA8DMF (IL18).

Jef ON8NT found a nice opening to northern England on 10 August, during the FT8 Activity Contest, working G4RQI (IO93), G8EEM (IO93), G4KUX (IO94), OV3T (JO46) and G0ISX (IO93). Jef runs 25W from an IC-9700 to a five-element LPDA.

During the 70cm FT8 Activity Contest, Roger G3XBM was hearing signals from both the Netherlands and Cornwall using his 2m big-wheel omni. As Roger says, *"FT8 is really good!"*

The 23cm Band

Jef ON8NT uses his IC-9700 and a WIMO flat panel antenna for 23cm. During the UK Activity Contest on 16 August, Jef worked G3XDY (JO01) as well as hearing the PI7ALK (JO22) and PE9GHZ/B (JO11) beacons. During the FT8 Activity session on 17 August, Jef worked G7LRQ (JO01).

Phil Oakley G0BVD (Great Torrington) reports a local QSO on the band with **Fred G0EOB** and **Dave G4XWQ**. Fred G0EOB was using an old TV antenna donated by G4XWQ. Phil says that it was a most enjoyable few hours getting it all working.

Satellites

ZB2LGT from Gibraltar was a popular station during ILLW on QO-100 and over 150 QSOs were made on SSB and over 50 on CW. There was some nice DX on CW, including PP2RON (GH53), PY2PIM (GG67), PY4LF (GH80) and VU3ARP (MJ88). Operating on the ISS Crossband repeater as ZB2GI, Kev worked EB2CDU/P (IM67), EA9E (IM75), EA1AB (IN70), EA8ARI (IL18), EA4M (IN80) and EA1DR (IN83).

Jef ON8NT monitored an ARISS QSO on 3 August between **Samantha Cristoforetti IZ0UDF** and a station at the Swiss National Scout Jamboree, operating as HB9JAM. Samantha made contacts in English, French, Italian and German. Throughout the month, Jef continued his FT4 activity on the RS-44, FO-29, XW-2A and XW-2C satellites. Highlights of Jef's FT4 activity on satellites include 2M0JUM (IO75), R5AO (KO86), VE1CWJ (FN85) and KN2K (FM18).

The AO-91 satellite has been approaching apogee, meaning that longer distance QSOs are possible, so here at GW4VXE I've been keeping an eye on some of the lower passes in recent days and have enjoyed QSOs with VA3VGR (FN25), W2GDJ (FN32), KB1HY (FN31), VE1CWJ (FN85) and K8YSE (EN91).

Patrick Stoddard WD9EWK (Phoenix) has been getting out and about, operating on satellites from interesting places. He notes that **Kjell Lindgren KO5MOS** has been heard operating NA1SS once again. At the time of writing Kjell has just a couple more weeks left on board the International Space Station. He has done a great job in providing an NA1SS QSO for many satellite enthusiasts.

That's it for this month! Thanks to all of you who have been in touch. If you have been thinking about contributing but haven't got around to it, please do, there is always room for more! See you next time. **PW**

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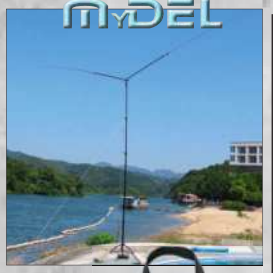

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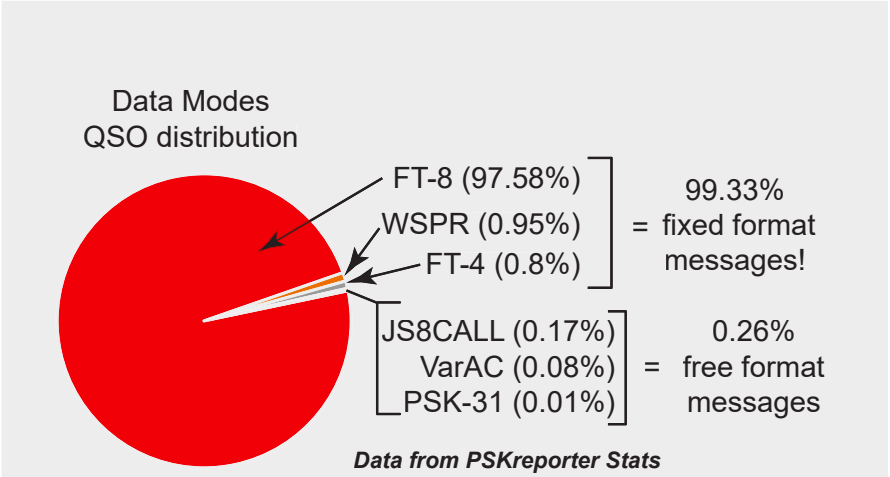

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Conversational Data Modes

Mike Richards G4WNC exhorts readers to try using a conversational data mode.

I was recently approached by the RSGB to give a talk for their Tonight@8 series of online lectures. The brief was to cover conversational data modes. The talk went ahead as planned on the evening of 5 September and seems to have been well received.

However, as part of the research for the talk, I pulled some statistics from the PSK Reporter website. Unsurprisingly, this showed that a frighteningly large proportion of data modes contacts occur using fixed format messaging systems such as FT8, FT4 and WSPR. These modes have little or no opportunity for any conversation as they pass the bare minimum of contact information in a fixed format.

Depending on when you look at the stats, you will normally find that greater than 99.5% of all reported data modes QSOs used fixed format messaging systems so have no human interactions, **Fig. 1**.

This is a big disappointment and leaves many of those amateurs missing out on the heart of amateur radio, which is the friendship and camaraderie that comes from sharing ideas and engaging with others. The Tonight@8 talk is a useful platform to sow the seeds to encourage people to change the way they operate.

There are usually upwards of 200+ live attendees, which are swelled by many hundreds more over the following weeks as people access the recordings. I thought it would be appropriate to follow-up my talk in this column and try to encourage more data modes live QSOs.

Which Modes?

My research into conversational data modes led me to three prime contenders, which were: PSK31, JS8call and VarAC. I'll run through those modes in detail over the next couple of months, but I will start with what is arguably the best keyboard QSO mode so far; PSK31. When FT8 arrived on the scene many amateurs dumped PSK31 in favour of the new mode, but It's worth remembering why PSK31 was so popular in the first place.

PSK31: This is an often-forgotten masterpiece of data mode engineering. PSK31 was invented by **Peter Martinez G3PLX** who has been a pioneer in this field. It was Peter who brought us AMTOR back in the late 1970s. Most of the following information has been obtained from Peter's excellent article in the Jul/Aug 1999 issues of *RadCom*. For PSK31, Peter began with a blank sheet of paper in the mid 1990s and set about designing a new mode that would be optimised for hand-typed QSOs on the HF bands.

At the time, error correction systems were gaining popularity in amateur radio with systems such as Packet and PACTOR. However, Peter soon realised that the introduction of any error correction scheme introduced a significant delay to any keyboard QSO. With ARQ (Automatic Repeat Request) systems, that delay was caused by having to wait for an acknowledgement from the distant station before sending the next block of data.

Attempts to mitigate this delay by increasing the data rate resulted in yet more delays because the higher data rate will suffer more errors so a greater number of data blocks will need to be repeated. While this is fine for handling a file transfer, live keyboard QSOs can be badly affected.

You might think the solution could be to use forward error correction (FEC). This is where additional information is added to the transmitted message so that errors can be detected and corrected at the receiving station. A simple example would be the FEC variant of AMTOR, where every character is repeated with a delay of three characters.

This still causes problems because to obtain the same typing speed you would have to send twice as much data. That higher speed would bring more errors, thus slowing the system. Another problem with error correction modes is the difficulty in communication with more than one station. All the ARQ systems rely on a 1:1 link between the two stations.

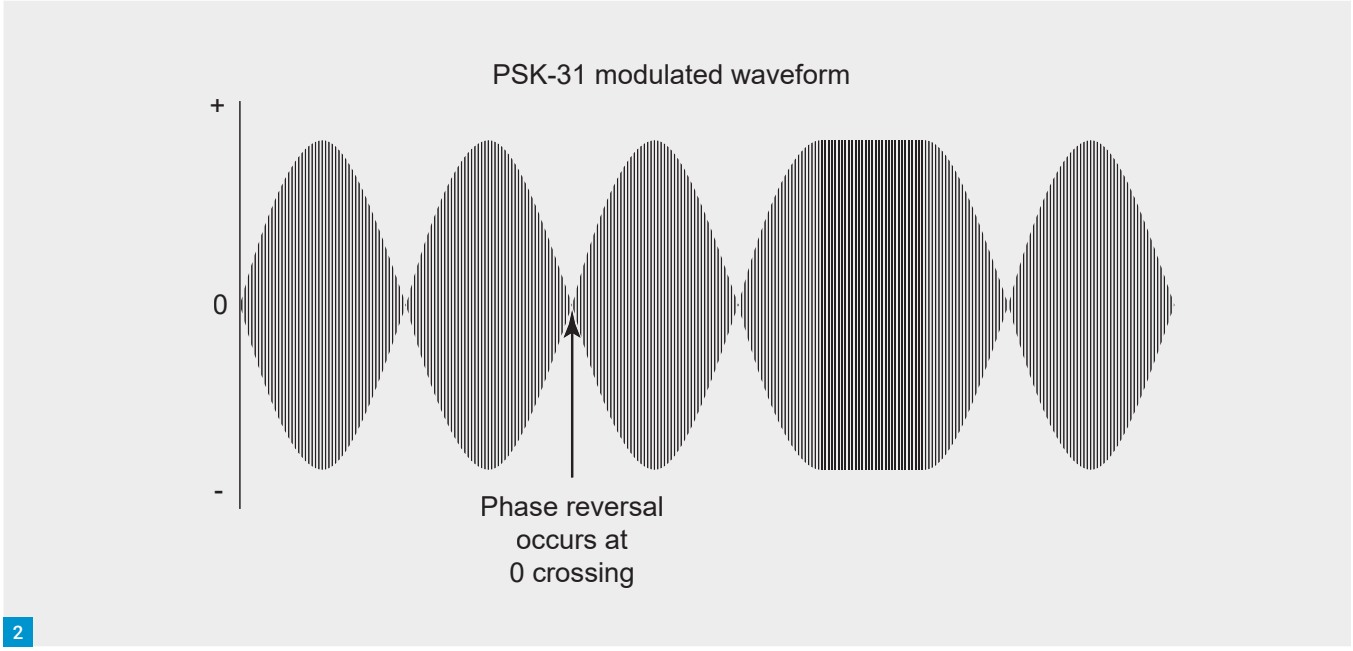
Anyone trying to monitor will either see unnecessary repeats or miss chunks of the message entirely. The net result of this analysis is that Peter decided that his new mode should avoid error correction systems.

In developing PSK31 Peter began with a close look at Morse code. This is the simplest of radio communication codes and is very efficient. There are no synchronisation problems with Morse as it's easy to spot the inter-character spaces.

This is because the inter-character space is only present between characters; it appears nowhere else. This avoids the problems you get with RTTY where a missing Shift character can corrupt the remainder of the message.

Morse efficiency is aided by the code structure, where the most commonly occurring letters have the shortest code, such as a single dot for 'e'. Having isolated the vital characteristics of Morse code, Peter began the development of his new code. Looking at the code as logic 1s and 0s, the shortest character is a single 1 on its own. To achieve the simplest, Morse-like, synchronisation, a unique code was required for the letter gap. This had to be a code combination that would never appear in any letter or symbol. The solution was to use '00' as the letter gap.

With those two constraints established, Peter calculated that he could handle the entire 128-character ASCII set with just 10-bits of data. The resulting code table or alphabet is called Varicode and uses the same methodology as Morse, with the most common characters



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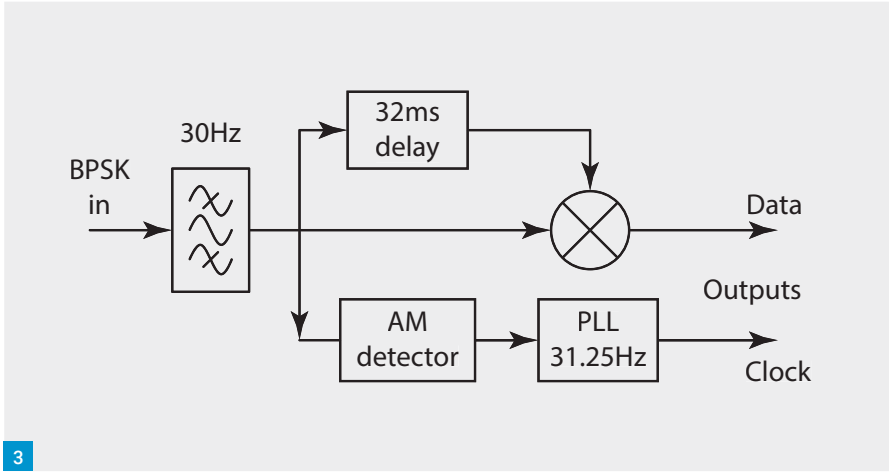

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Fig. 1: Data Modes Activity.
Fig. 2: PSK-31 Phase change at zero crossing point. Fig. 3: PSK-31 block diagram of an analogue decoder. Fig. 4: Google translate.

allocated the shortest codes. I've shown a few samples of the code in **Table 1**.

With the alphabet established, the next consideration was what modulation systems to use. At the time, RTTY was the most common data mode, and this used frequency shift keying (FSK) with a spacing of 170Hz. FSK was originally selected because of its good tolerance of drifting transmitters. However, by the time of Peter's work on PSK31, the stability of amateur transceivers had improved significantly to the point that it was no longer an issue.

Peter based his new system on a typing speed of approximately 50 words per minute. This equates to a data rate of about 32-bits per second using the PSK31 varicode. In the practical system, Peter selected 31.25bps because this rate was easy to derive from an 8kHz sample rate in the soundcard. This results in a theoretical bandwidth of just 31.25Hz, a significant improvement on the 170Hz shift of RTTY. Instead of using the on/off keying of Morse, Peter opted for phase modulation using phase reversals. Peter describes this as equivalent to reversing your antenna connection.

However, if the implementation was that crude, there would be very wide sidebands due to the abrupt change. In practical PSK31 systems, the amplitude of the carrier is first reduced to zero, phase swapped and then restored to its previous level. I've shown an example of this technique in **Fig. 2.** The result is a very clean narrow band transmission. Originally called polarity reversal keying, it has become more commonly known as binary phase shift keying (BPSK). Several techniques can be used to demodulate BPSK signals but one of the simplest is to delay the signal by one-bit period and compare it to a signal with no delay. If we do this using a comparator or balanced modulator, the comparator output will be negative when the signal reverses and positive when it doesn't, **Fig. 3**.

For this to work successfully we must be able to predict when the signal is due to change so we need to be synchronised with the transmission. This turns out to be simple because BPSK modulation carries an AM modulation component at the baud rate. This varies with the data so, to provide easy synchronisation, Peter uses his Varicode with 0 set to give a reversal and 1 gives no reversal.

This simple solution means that any gaps in the transmission (logic 0) provide a continuous stream of reversals and thus a strong modulation tone at 31.25Hz. In practical systems, you will notice that there is a short burst of reversals before your message begins. This provides the synchronisation necessary to ensure a successful decode. The transmission also ends with 0s (reversals) and this can be used to squelch the receiver to stop the reception of garbage.

After releasing PSK31, Peter received many requests for an error-corrected version so he duly experimented with various options including the use of convolutional code. However, the net result was that simple PSK31 emerged as the most successful variant.

As mentioned at the start of this feature, any attempt to add error correction means more data must be sent, so the rate has to increase to preserve the same typing speed. That higher rate means greater bandwidth and more errors plus delays in the change of overs, etc.

As you can see, PSK31 has been very carefully crafted as a keyboard QSOs mode and it still reigns supreme in that role. However, a look around the bands will reveal that many operators are still using it for rubber stamp QSOs or with

very long pre-recorded macros. I believe there is a strong case for returning to simple keyboard QSOs where we can exchange ideas and learn from each other. With that in mind, I have prepared the following updated operating tips.

PSK31 Operating Tips

In the early days of PSK31, typing speeds were often very poor, so many operators relied on the use of stored text messages (macros) to keep the QSO running. However, the world has moved on and in 2022 most of us have much-improved keyboard skills.

This has been driven by the increasing use of computers in the shack and our growing dependence on computers to run our daily lives. Therefore, we should be able to manage a hand-typed QSO without too much difficulty. I suggest that we take a close look at the stored macros we use and adapt them primarily to store procedural messages and information that we would exchange in every QSO. Keep the station information concise. Nobody needs to know your age or what version of Windows you're running! In **Table 2**, I've shown a suggestion for a set of minimised macros to support live keyboard QSOs. The final column shows the keywords to use with FLDIGI macros. I've avoided using protracted equipment lists or a lengthy sign-off because these are better hand-typed and tailored to the QSO. You may also note that I've used lowercase throughout. This is because lowercase characters use shorter codes so are quicker to send.

Starting a conversation. One of the simplest ways to start a conversation is to ask the other station about their equipment. Most amateurs are very happy to chat about their station. This is particularly useful if the other party has a homebrew element to their station. For example, you could ask *"what do you think of your rig/antenna/linear?"* etc. With international stations, there may well be a language problem. In that case, you can turn to the excellent translation services provided by Google Translate:

https://translate.google.co.uk

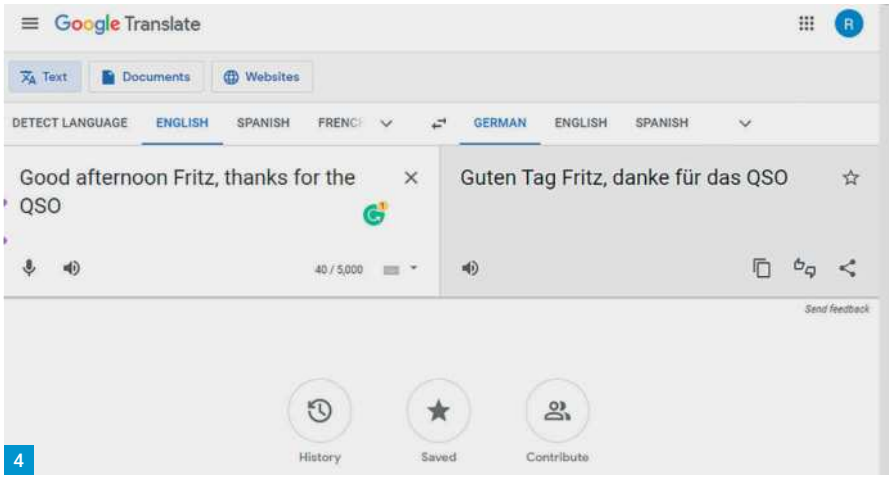
If you go to that URL, you will find a very compact translation website where you can enter text in the left-hand box and it will be live translated into the right-hand box, **Fig. 5**. All the languages you are likely to need are available and you can copy and paste the translated text into your data modes software.

When dealing with a received foreign language message, just copy and paste the text into the left box and it will immediately appear translated on the right. You can easily swap the translation direction by clicking the pair of left/right arrows in the centre.

There's even a copy button at the bottom of the translation panel that will copy the text to the clipboard for you. This tool makes conversing in most languages a possibility. It's remarkably close to the powers of the famed Babel fish from **Douglas Adam's** *The Hitchhikers Guide to the Galaxy*!

To conclude it would be great if a few more data modes operators could actually try to strike up a conversation, it just takes a bit of practice and determination, and we could be gaining so much more from the hobby.

Next month I'll be delving into VarAC and showing you how to make the most of this relatively new chat mode. **PW**



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Character	Varicode	Character	Varicode
a	1011	A	1111101
b	1011111	B	11101011
c	101111	C	10101101
d	101101	D	10110101
e	11	E	1110111
f	111101	F	11011011
g	1011011	G	11111101
h	101011	H	101010101
i	1101	I	1111111
j	111101011	j	111111101

Table 1: Extracts from the G3PLX Varicode alphabet.

Function	Transmitted message	FLDIGI macro code
Call CQ	cq cq cq de g4wnc g4wnc cq cq cq de g4wnc pse k	<TXRSID:on><TX> CQ CQ CQ de <MYCALL> <MYCALL> CQ CQ CQ de <MYCALL> <MYCALL> pse k <RX><@TXRSID:off>
Answer another station's CQ call	'Their call' de g4wnc g4wnc kn	<TX><CALL> de <MYCALL> <MYCALL> kn <RX>
Between overs your turn	'their call' de g4wnc	<TX> <CALL> de <MYCALL>
Between overs, back to them	'their call' de g4wnc kn	btu <NAME> <CALL> de <MYCALL> k <RX>
Your info	Name: mike qth: ringwood locator: io90cu	name: <MYNAME>, qth: <MYQTH>, locator: <MYLOC>
Rig and antenna	rig: hermes lite 2 with 5W, ant: hf9v vertical	rig: hermes lite 2 with 5w, ant: HF9V vertical
Ending the QSO	'their call' de g4wnc '73 sk	73, <CALL> de <MYCALL> sk <RX>

Table 2: Suggested shortened macro to support PSK31 keyboard QSOs.

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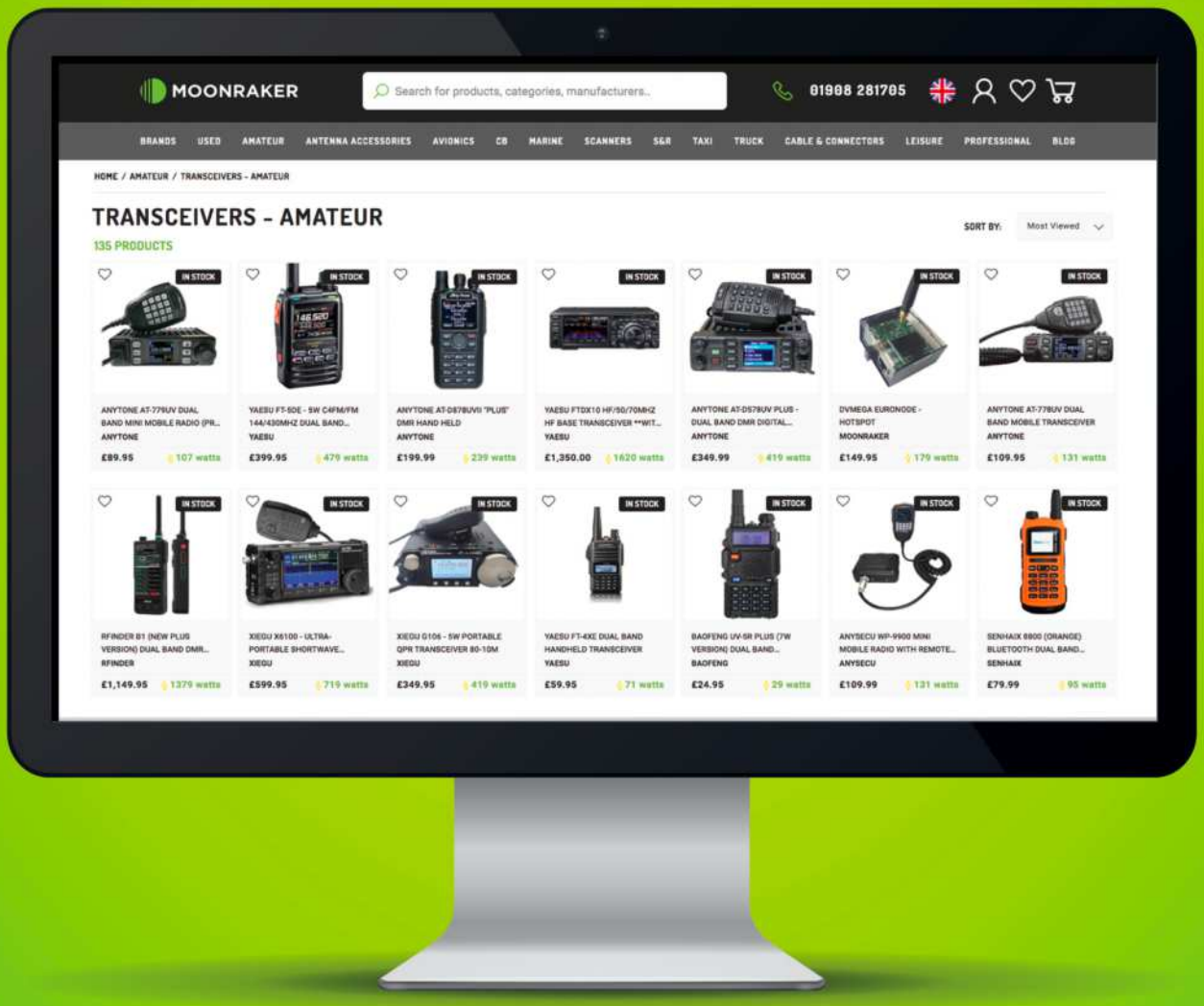

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Mark Foreman G7LSZ/SA6BID
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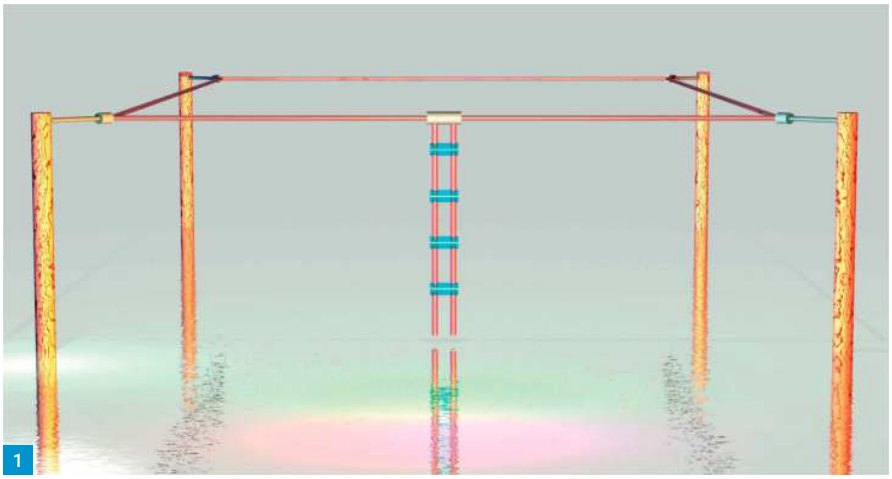
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The German Quad

Mark Foreman G7LSZ/SA6BID describes an antenna that works for him as a multiband arrangement in a modest garden.

Years ago at the SK6NP club I was shown a simple HF antenna, which works on all HF bands other than topband without any need for traps. The SK6NP antenna is 80m of wire in the form of a square whose sides are 20m long. It is a simple antenna, which requires a rather large garden. After enjoying the benefits of this antenna at the club I decided to make a half-size one for my garden in Sweden. The concept is shown in **Fig. 1**. All you need for this antenna is 50m of wire, some plastic pipes, some trees in suitable locations, rope, some hand tools and little effort. Sadly, I cannot claim to be the inventor of the antenna, the design for the original antenna came from a German radio magazine, hence it is known at the club as 'Den tyska quad' or for those of you who cannot read Swedish 'The German Quad'.

Construction

Start by knocking a nail halfway into something big and heavy at one end of the garden. I used one of my wooden vegetable boxes. Hook the end of a 50m tape measure over the nail and tie one end of a 100m roll of PVC-coated house wiring wire to the nail. Now a friendly word of advice, choose brown or some other dark/neutral colour. When I first moved to Sweden I put up an antenna made of blood red wire and my wife hated the sight of it. I have found that brown or even white wire raises fewer objections. I am sure other non-hams are troubled less by dull coloured antennas than the blood red one.

You need to mark the wire at the following locations away from the end, I have provided a table to help you, **Table 1**. One option is to use a black marker pen. If you do this, I advise you to make a hoop of ink on the wire. The reason is that when the wire is laying on the ground, if it is only marked on one side, then the mark might not be visible to you unless you keep picking the wire up and turning it over.

Next take four short lengths of plastic pipe and drill holes for the antenna wire and at the other end holes for the rope. These will be used as insulators, which will hold the four corners of the square. It is best to thread all four insulators onto the wire. Slide them along until they are at the right points on the wire. Then tie a knot in the wire to lock them into the right locations. See **Fig. 2** for a photograph of one of the corners of the antenna.

Next take a length of plastic pipe and drill wire holes at each end. This will function as a 'dipole centre' for the antenna. Thread one end of the wire through the holes at one end. Next slide it to the right spot and then tie the knot to hold it. The photographs, **Figs. 3** and **4**, of the dipole centre show you how I did it, while **Fig. 5** is a photo of the actual feedpoint.

Finish off the main part of the antenna by doing the same with the other end of the wire. Now to finish off the antenna we need to make the feed line. My first version was a 40m square of wire to which I soldered a length of 300Ω ribbon line. My simulations in 4NEC2 with a 40m wire loop 4m above the ground suggest that the square will resonant a bit on the high side. **Fig. 6** is a graph of impedance (Z) as a function of frequency.

So, I have lengthened the sides of the antenna slightly to bring the centre of the resonance down to 7.12MHz for those of you who want the best out of the antenna on 40m. This has lowered the 4th resonance to 13.98MHz. Another version of the antenna uses square sides of 10.6m, this one has its 1st, 2nd, 3rd and 4th resonances at 3.56 (2.33MΩ), 7.2 (37Ω), 10.6 (18.4kΩ) and 14.1 (163Ω) MHz. For your convenience I calculated the feedpoint impedance of the antenna when it is at these resonances when the antenna is 4m above the ground. I think that the antenna will be impossible to use for transmitting at the first resonance as we are likely to have an insulation breakdown at the feedpoint. Years ago, when I first got to Sweden, I set up an 80m dipole (half wavelength long) in my garden. I heard a station on 40m and managed to adjust the ATU to match the antenna. I then tried to transmit with 5W of SSB, I suddenly had a vast mismatch and a very high SWR. I think that I was having some strange effects due to insulation breakdown while trying to drive an antenna that had a close to infinite impedance.

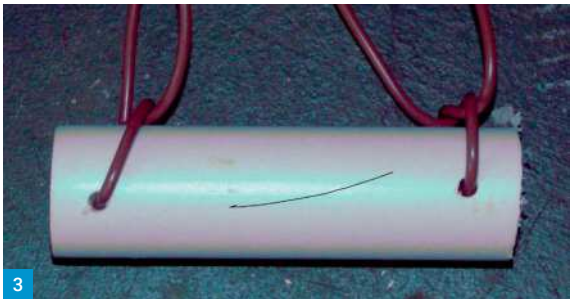
The calculation of things to do with antennas can become mathematically taxing, but the good news is that we can enjoy antennas with or without the maths. The big thing in AC theory in my view is the topic of complex numbers, these numbers contain a real part and an imaginary part. In recent years the advent of software like 4NEC2 has given us a convenient way to calculate things.

I did my calculations for the antenna 4m above the ground, but I thought it was prudent to repeat the calculations for the antenna at different heights. What I have noticed is that the resonant frequency changes for the full-size antenna at about 14MHz a bit, but the feedpoint impedance does change a lot, **Fig. 7.**

Antenna Impedance

This suggests to me that we need to be careful about making bold predictions about the impedance of the antenna. It is well known that the impedance of an antenna changes as the height above ground is altered. Because I have no idea of the height that my readers will put the antenna at or the electrical properties of the soil in their gardens I cannot make a firm prediction of the feedpoint impedance. I think you will need to use an ATU with the antenna unless you are very fortunate.

I have lost count of the number of times that I have had to reattach the feeder to the antenna. So, I reason a better design would be to make both the antenna and the feeder out of one length of wire. I used plastic hair curlers as spacers for the open feeder, I bought mine from an outlet of the Danish shop Normal in Karlstad. For all transmission lines we can write the telgrapher's equations. When we have a perfect line with no losses we can write ($\omega = 2\pi f$). In these equations L and C are the inductance and capacitance per meter of transmission line.



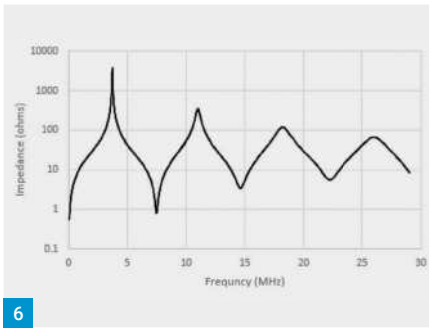
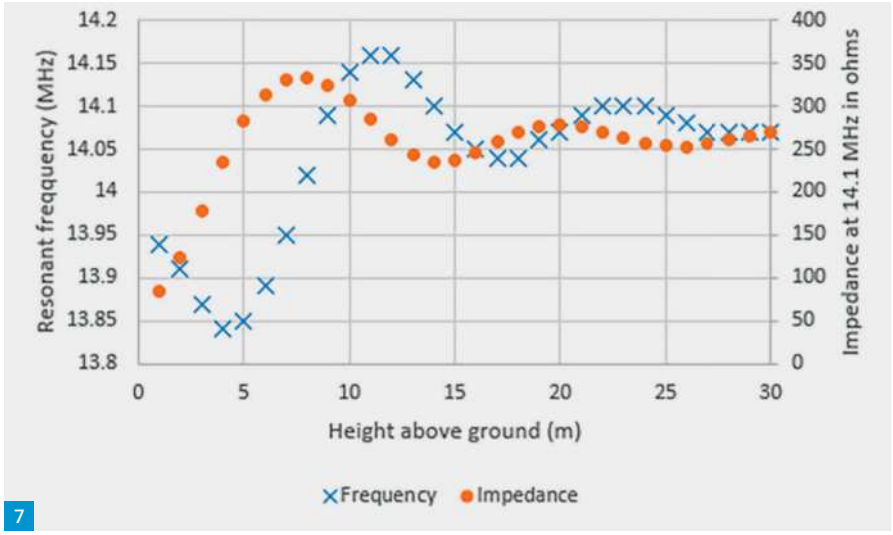


Fig. 1: Diagram of the concept. Fig. 2: One of the corners of the antenna. Figs. 3 and 4: The 'dipole centre' showing how the wires are tied. Fig. 5: The actual feedpoint in situ. Fig. 6: NEC4 simulation of impedance vs. frequency. Fig. 7: Resonant frequency and impedance (20m band) vs. height above ground.



$\nu = 1/\sqrt{LC} = \omega/\beta$ and $Z_0 = \sqrt{(L/C)}$

However, for real lines where we have losses we need an extreme algebra festival using complex numbers with equations like this where R is the resistance of the transmission line per unit length and G is the conductivity of the dielectric per unit length:

$\gamma = \alpha + j\beta = \sqrt{((R+j\omega L)(G+j\omega C))}$ and $Z_0 = \sqrt{((R+j\omega L)/(G+j\omega C))}$

Those of you who want to have an algebra festival should consider themselves free to have one with plenty of complex numbers, in case you do not know j is the square root of minus 1. Now while those of you who enjoy this can work out the impedance of a transmission line which is a pair of parallel cylinders with this delightful equation, when the diameter of the wires is d and the spacing between their centres is D, on the right-hand side we have an approximation that is normally OK to use:

$Z_0 = (\sqrt{(\mu/(\varepsilon_0 \varepsilon_r \pi^2)) \ln(D/d + (\sqrt{(D^2/d2 - 1)})) \approx 120/\sqrt{(\varepsilon_r)} \ln(2D/d)}$

I would suggest using a balanced feeder between the balun and the 50Ω coax that goes into the shack. One option would be to use a long length of 300Ω ribbon, which is connected to terminals mounted on a good electrical insulator, which are then connected to the line, which is attached to the antenna. My experience is that with an ATU in my shack attached to a length of RG213 connected to the balun I can match my FT-450 to the antenna on 40m, 20m and all the higher frequency HF bands. But I will confess that I have never used the antenna much except for on 40 and 20m.

One idea I have for this antenna, which I have never had the chance to try out, would be to have a set of remote-controlled relays, which can be switched from the shack. The idea is that if the two wires of the feeder between the balun and the antenna were connected in parallel to the core of a coaxial cable at the surface of the ground and the braid was connected to a ground plane, then the loop could be used as a monopole on 80m. **PW**

Item	Distance along wire	
	40m version	20m version
'Dipole centre'	5	5
Corner 1	10.35	7.7
Corner 2	21.05	13.1
Corner 3	32.75	18.5
Corner 4	42.45	23.9
'Dipole centre'	47.45	28.9

Table 1: Dimensions

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Your Signal Strength is in The Log(arithm)

Godfrey Manning G4GLM explains why S9 is also –73dBm

Logarithms (logs) have their uses. By means of log tables and slide rules, they simplify multiplication/division (wake up, Godfrey, it's electronic calculators these days). They make something seem complicated, hence justifying maths teachers' salaries (nothing changes there, then). They make the numbers easy when trying to accommodate the huge range of signal strengths arriving at our receivers (now you're talking!).

Those Decibels

Let's move on to decibels. Only, we haven't actually moved. Decibels (dB) are just another manifestation of logs. Why keep it simple when you can have two words for the same thing?

Practical Wireless 2021: May p60 Table 1 calibrated a signal strength measurement as S9 being a voltage level of 50μV equating to –73dBm. Now we've got three numbers for the same thing: S reading, voltage and something to do with decibels. To find out how this can be, we first need to know what those logs really are.

Logs

All you need to know in order to find the log of a number is which key to press on a calculator. Any scientific calculator suitable for GCSE students will do. Most calculators offer two types of log and it's the common sort (officially known as base 10) that we need, so ignore natural logs (ln) or anything to do with base e.

Converting from a log back to its original number is simply a matter of raising 10 to the power of the log (that's easy for him to say).

Power Not Output

Hence the next question: what's power? Not watts of power (from a transmitter). In maths it means how many times you write the same number in a row, before putting multiply signs between each one. Bet you know about squares.

Is that tent big enough for the field day station? Work out the surface area of its floor by multiplying the length by the width. If it's a square tent, these dimensions are the same and we'll call them L. Then the area is L × L, in other words write number L twice and put a multiplication sign in. Shorthand is L^2 which is also called L squared. Makes sense for a square tent. Then L to the power of 5 is written $L^5 = L \times L \times L \times L \times L$. So-on for any power.

Whole-number powers of ten are easier to visualise, 10 squared being written $10^2 = 10 \times 10$ but you immediately see that's 100. Try $10^5 = 10 \times 10 \times 10 \times 10 \times 10$. That's 100,000, in other words the power of ten is the quantity of zeroes that appear in the actual number.

73 is Best Wishes, –73 is in dBm

Ideal communications receivers are designed to look like a 50Ω resistor as far as the antenna's concerned. The signal voltage that the antenna applies across this (notional) resistor could be anything from tiny to huge. The number range is unwieldy and that's where logs help. Whereas 10^2 is only 100, going up to 10^5 is a thousand times bigger at 100,000. Instead of writing all those zeroes, a simpler scale of voltage just looks at the power of 10. Then 100 becomes 2 on the scale and the colossal 100,000 is simply written as 5. This is a logarithmic scale.

The electrical power in the receiver's (pretend) 50Ω resistor is voltage-squared divided by 50 (see *The Full Licence Manual* if you want this explained). The S9 calibration was decided as 50μV appearing across the antenna terminals and this feeds the receiver with electrical power 50μV-squared over 50Ω.

Properly written this is $(50 \times 10^{-6})^2 / 50$ because a microvolt is one-millionth of a volt. A million volts would be 10^6 but, to get millionths, the power-of-ten is made negative. The effect is to divide, not multiply, with the correct number of zeroes and that looks like:

1 / 1,000,000

Writing out $(50 \times 10^{-6})^2 / 50$ fully, the electrical power is:

$50 \times 10^{-6} \times 50 \times 10^{-6} / 50$

A top-and-bottom 50 cancel each other leaving $50 \times 10^{-6} \times 10^{-6}$.

Because powers say how many times to write the same number in a row, they can be added together (well, subtract if they are negative) making it look simpler as 50×10^{-12}

The 50 is actually 5 × 10, the 10 has just one zero so you could call it 10^1 making the calculation look like $5 \times 10^1 \times 10^{-12}$ allowing the powers to be added again (1 - 12 = -11) giving 5×10^{-11} watts.

That's a miniscule fraction of a watt, but the original calibration was in milliwatts. One penny is one-hundredth of a pound, so multiply by 100 to convert pounds to pence (£2 = 200p). It takes more pence than pounds to express the same amount. It takes more milliwatts than watts to express the same electrical power (1000 times more).

One thousand is 1000, yes, that's 10^3 and again powers of ten are added. Taking 5×10^{-11} watts times 10^3 allows adding the powers 3 – 11 = –8.

Electrical power into the receiver is 5×10^{-8} milliwatts.

Finally, those (deci)bels! They're logs and your calculator gives log of 5 as near enough 0.7. Then log of a power of ten is just the power so log of 10^{-8} is just –8. When ordinary numbers are multiplied, logs are instead added (making life easier). The electrical power from the antenna is then 0.7 – 8 = –7.3, which is Bm, bels related to milliwatts.

Are We There Yet?

You wanted decibels! Another complication. Deci means 10 of them in every bel, so -–7.3 bels times 10 gives –73dBm, decibels based on milliwatts, the right answer. That's taken a lot of steps to reach the bottom of the page, because I've made each step a simple one. **PW**

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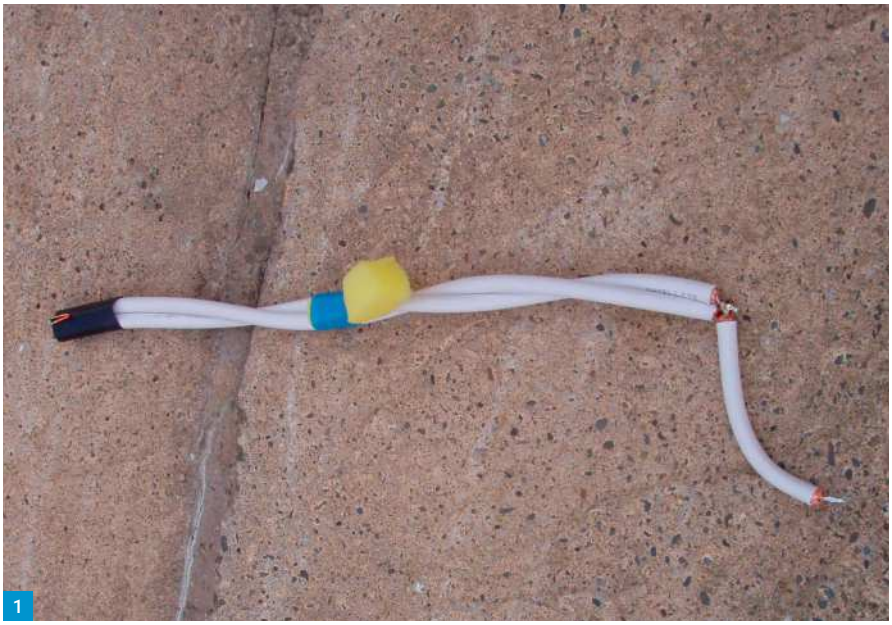

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The VBA Special Mk.II

Rob Harrison GD4VBA asks "Can Rules and Regulations be Beneficial?"

Well, yes, some can. Many of us have been affected by the new Ofcom regulation of moving antennas away from neighbours by at least 4m. I have had to do just that.

Living in a bungalow, and not having enough space for a tower and beam, verticals are really my only option. My homebrew (Mk.1) vertical was a roach pole of approximately 6m with a 9:1 UNUN and earthed with some 22mm copper pipe into the banks of the stream at the bottom of our garden. It was fine on the upper bands, and okay(ish) on the 40m band (or so I thought). I felt, though, that if I had to move it, then I may as well try to get the best out of a replacement.

When I initially erected the Mk.1, my MFJ analyser gave me an SWR reading of around 3.0 on 40m. I used it, as the auto-ATU in my TS890S tuned it admirably, but I was never truly satisfied with 40m until after dark, when the band opened up more.

Construction

An amateur friend was disposing of a broken 10m long roach pole, because the top two sections were damaged, He gave it to me, so I could erect a new (Mk.2) vertical while still having the use of the Mk.1.

First was a 'board meeting' with my beloved wife **Susan**. She, nor I for that matter, wanted to erect a new antenna in the middle of the lawn! So, an alternative location was discussed. I finally settled on locating it on the side of the conservatory. This had a brick lower half, so was suitable for anchoring it to, as everything needs to be secure with the Irish sea winter winds whistling across GD land!

I thought very carefully as to how I might improve the new installation. The Mk.1 one had a length of WF100 satellite coax running up the inside as the radiator. I used WF100 because I am also a satellite 'Geek' so plenty of the coax was to hand and WF100 has a foam insulator, so was also comparatively light.

I decided to use 2 x 8m lengths of coax spirally twisted up inside the 8m length pole, with the centre core, the foil screen and the braiding all soldered together top and bottom, so all the copper was at the same potential, **Fig. 1**. I also taped on bits of bath sponge along the coax's length, as the Mk.1 didn't have it, and when the wind blew, the coax inside 'tapped' annoyingly on the inside of the tube!

I used two lengths because 40 years ago as a newly licensed amateur (then G6GZF), I had a very experienced Mentor, **Francis G3IVG** (RIP), whose philosophy was 'Metal in the sky', plus, 'Try it and see', so doubling up on the radiator would give me more metal in the sky, and wasn't likely to make things worse.

The radiating coax was inserted inside the pole, allowing an extra 25-50mm of the WF100 core to bend over at the top, to 'Hang' the coaxes on the pole. Then I wrapped the bent-over piece with self-amalgamating tape to secure it in place, and wound a bit more at the top, to twist together for weatherproofing.

So, we were now ready to erect it. I used 3 x 50mm SWA cleats with builders' concrete screws for securing it at the bottom to the conservatory wall, all great so far.

As I had a spare 9:1 UNUN I continued to use that with the longer 8m antenna and it did seem better, but still 40m signals were a bit 'weak'.

This proved to be more evident in the early part of the year, as I got hooked (line and sinker!), on the Italian WRTC competition. I felt I was losing out to some degree on 40m contacts (or lack of them) with the WRTC stations.

During my six months of days and nights building up my points in the competition, I often looked out of the shack window at my Mk.2 vertical and wondered if the present configuration was the best I could achieve.

Coincidentally, during the WRTC event, another amateur friend had bought the latest NanoVNA, and very kindly gave me his 'H' model. During the quieter periods of the WRTC chase I got to grips with the Nano, and found to my surprise the SWR at 40m, was 5.5!

How could I improve on that? Well, I thought of lengthening the radiator, but as random length wire antennas are not designed to be resonantly long for the frequency in use, I decided to leave it at 8m. Plus 8m is about the shortest random length suggested for 40m use, so I looked to the UNUN next.

9:1 UNUNs are generally the norm for random wires, but as G3IVG once told me, a long wire can be 200 or 2000Ω. This has stuck with me over the years, so I then wondered if my vertical was the usual 450(ish)Ω, as I had been thinking. I knocked together a test rig with a couple of carbon resistors for the loads, one of 470 and also one of 270Ω, to see how the 9:1 UNUN responded. The results from the Nano were that the 9:1 gave a better match on the 470Ω load. But not too good on the 270Ω load.

I then wound a 4:1 bifilar UNUN, tested that, and found it to be better on the lower 270Ω load. This proved to me that my installation was likely to be lower than the 450Ω 'norm'.

Next was to fit the 4:1 UNUN on the vertical. This was easy enough, just three wires to unsolder in the UNUN box and resolder the new 4:1 one in.

Testing this with the Nano gave a far better match and SWR reading on 40m. The other bands from 40m up to 6m were fine too. I did trials of differing 4:1 UNUNs of which I had wound a 9 turns one, a 12 turns one, and a 16 turns one, all on 40mm diameter ferrite type 43 rings.

As I had also got into FT8 during the WRTC competition, and seeing as the bands have not been at their best during 2022, I used FT8 signals as my 'Datum' with all three 4:1 UNUN tests. The results were interesting. I tested all three of the

Fig. 1: Showing how the twisted 8m lengths are connected at either end with a single length going to the UNUN.
Fig. 2: Internal view of the UNUN.
Fig. 3: Top of the aluminium earth plate.
Fig. 4: The feed arrangement into the shack.
Fig. 5: The completed antenna system.

UNUNs, quickly changing them so within 2 or 3 minutes I could change from one to the other and be back on the air.

Of the three UNUNs the 9 turns one was the poorest. The 12 turns one gave good balanced reports both ways from worked stations, and the 16 turns one, not much different to the 12 turns one, so I settled on the 12 turns UNUN, **Fig. 2**.

The wire I used for the 4:1 bifilar UNUN was Figure-8 twin, rated at 8A DC so it would cope fine as I never run more than 100W and that is only for SSB, digi-modes 30-50W. The wire cross sectional area is about 1 to 1.5mm^2.

I had done all my tests using the already in place RG58, so now having found the most effective UNUN, I turned my attention to the coax feed and earth.

Another amateur friend and I did some bartering and exchanges of equipment, and I ended up with 15m of Ultraflex 7. 13.5m was needed to the shack, so ideal.

At this point I decided that as the smaller ferrite ring was doing a good job, I wound wind a new 4:1 on a 61mm diameter ferrite type 43 bought from a dealer, at around £9, as I was also changing the UNUN box, so a larger box was bought from B&Q for £3.50. It is IP66, and double-socket sized, so fine for the larger UNUN, and our winds and rain.

I decided not to use a plug and socket at the UNUN box, hopefully reducing any further losses, but to feed the cables in via drilled holes directly soldered to the UNUN. And, of course, all cables sealed at the entry points with builders' silicone.

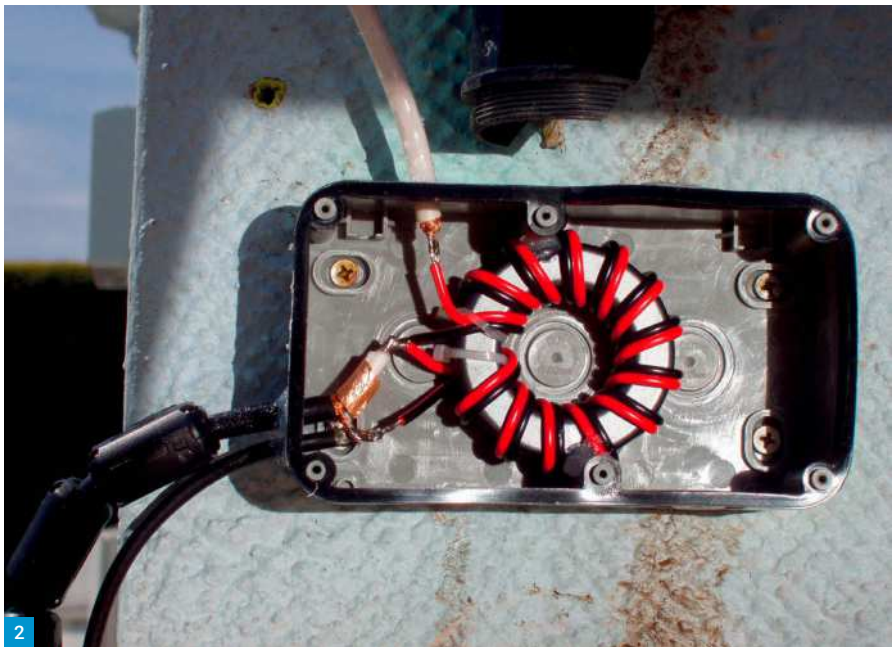
Earthing

Before anyone reels back in horror at me using aluminium for my earthing the reasons are thus:

As I said earlier, the Mk.1 vertical on the neighbouring fence was earthed with a length of 22mm copper tube in the ground by about 60cm. The ground of our back garden is about 30cm of good, heavy, black, soil, then yellow clay below that.

When I removed the Mk.1 copper earth tube I found that the copper had been chemically affected by the clay, this section now being lumpy with a sort of bubbly growth on it. I filed it off and the copper seemed okay(ish) but was badly discoloured in the section that had been in the clay. This made me think that copper may not be the best earthing material at my location.

I also have an 80m helically wound quarter-wave vertical, which had been on a 50mm diameter piece of aluminium scaffold pole, again in the ground about 60cm for around two to three years. I moved the 80m antenna to a fence post and when I pulled up the aluminium pole, I found to my surprise that it was still bright and shiny, like new! Perhaps keeping oxygen away from the metal preserved it nicely, or there was no chemical interaction with the clay.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Bands	3.5	7	10	14	18	21	24	28	50
SWR	3.0	1.8	1.7	1.8	1.7	1.3	1.1	1.1	1.2

Table 1: Measured results.

I bought a piece of aluminium 6mm plate, 10 x 60cm, so with both faces of the plate, the contact area to the ground is 1,200cm^2.

The earth feed to the UNUN is a 2m or so length of RG58, again with the core and screen soldered together. The plate I drilled and tapped 8mm with a stainless cap head bolt securing a soldered ring terminal to the plate. I have tried radials in the past with no noticeable difference, perhaps due to the good wet ground here. The photo, **Fig. 3**, shows the top of the aluminium earth plate protruding from the ground.

Results

The new UNUN and box were now fitted, the Ultraflex 7 run to the shack was in place and clipped, **Fig. 4**, so it was time to test the new installation, **Fig. 5**, with the NanoVNA and the TS890S.

Somewhat nervously I connected the PL259 to the NanoVNA, and the results looked very good. I tested the antenna with a Nano SWR sweep from 3 to 55MHz to cover all of the bands I was likely to use. The results are shown in **Table 1**. I was delighted to see these figures, particularly for 40m.


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Now for the acid test! Connect up to the TS890S. Wow! My waterfall was alive. I could not believe my eyes. After a brew and calming down a bit, I ventured onto all the bands, again using FT8 as my datum, and was astounded at the results.

Since completing this antenna re-vamping, I have worked so many new stations and many new countries too, with stations from the list below giving me good reports:

JA, 5Z, LU, 7Z, VK, ZL, YB, E21, 9V, 7Q, HS, VP as well as both the Americas, Africa, and Europe too many to mention.

Of course, these are examples of more distant/rarer stations. But I have been quite astonished at getting replies from stations and countries I have never worked before with past verticals and wire antennas. The 6m band was also very good when open, with many contacts throughout Europe. It does tune okay on 80m, is only one S-point down

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on my dedicated 80m helical vertical, and I have had numerous contacts into Europe with it. So, it is useable, even on 80m. 40m (as well as all other bands) Is now quite crowded with voice and digi-modes.

Of course, I cannot compete with the 'big boys' with multi-element beams, and megawatts of power! But I am delighted with my new antenna arrangement and its evident efficiency. So now I am looking forward to more sunspots. Hopefully soon. So, you see, new rules and regulations are not always a bad thing! **PW**

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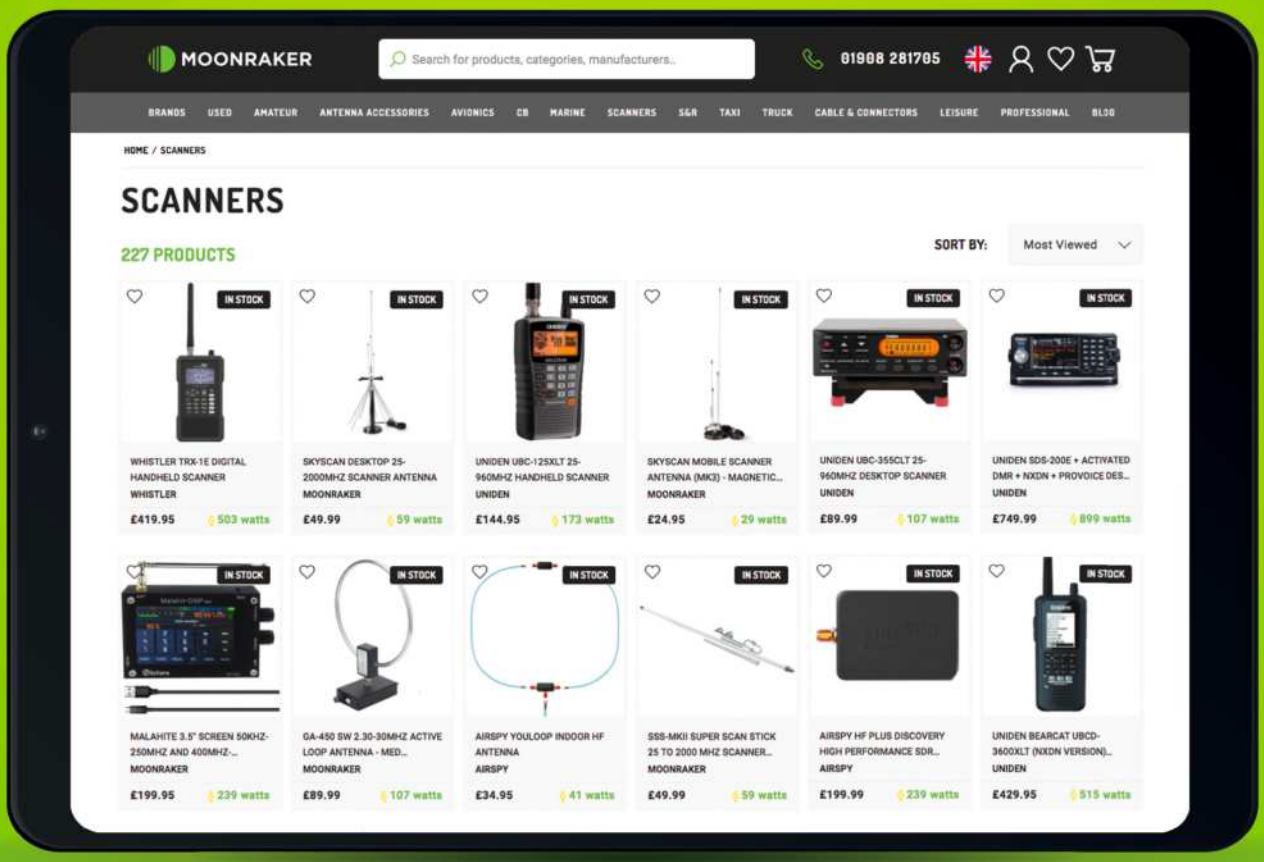

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SCAN TO SHOP

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/M Standing still

Bernard Nock G4BXD tries operating portable – from home!

In an attempt to operate portable both in the UK and abroad I have tried various antennas from bits of wire to dipoles and verticals of one sort or another. My favourite antenna is a US made dipole, two plastic holders with 33ft of thin wire in each that you simply pull out to the required length for the frequency of operation, hook up to a couple of trees, say, and it has a centre piece with an SO239 socket. When not in use you simply wind up the wire (tape measure), and stow.

Not Happy

I found an FT-817, the dipole kit, a 10m length of RG58, bits of string and a 12V battery all went in the case quite easily. However, when out in the UK in a field, for example, such as at a boot sale, country fair, etc, then stringing dipoles up is a pain. Having tried several of the 'portable' whips around, I was not happy.

When I bought one of the 817s second-hand it came with a 'portable' whip, a small plastic box with a knob in the middle and a PL259 plug, which you pushed in the back of the 817. It had a 3ft or so telescopic whip but was so pathetic that at the first knock the plastic case around the whip mount simply cracked. I tried gluing it, I tried adding a small metal plate to spread the load but basically the plastic was too weak for the job. The next thing was the slider, which selected the tap on a ferrite ring coil, started going intermittent. The thought of how much the guy had paid for this new appals me.

When I bought my IC-705 second-hand it too came with a whip. This was a base-mounted tapped-coil type, 5ft or so pull-out whip and with three bases, a 3/8in stud mount, a PL259 plug or a BNC plug. I tried the BNC plug first, it was so weak and feeble I decided against trying it the field. I made a bracket for my 705 with an SO239 socket and a 3/8in post on it but when I tried it in the garden, even with counterpoise earths on it, it failed miserably.

An Idea

Sitting in the sun the other day I thought how nice it would be to operate al fresco. I have plenty of rigs that run off internal batteries or a small external 12V one but needed an antenna. I then remembered I had a 'proper' mobile antenna, a very old Tavasu of Chesterfield unit, which is a base-loaded, screw-in coil type with a 7ft (2.5m) solidly made telescopic whip section and loading coils for the various bands, **Fig. 1**.

After locating the antenna under a pile of other stuff I proceeded to make it usable. In mobile use you would have drilled a hole in the wing, roof or boot lid of the car, mounted the base and hey presto. There was no way I was drilling holes in my posh car so another solution was needed. I proceeded to fabricate a bracket out of aluminium suitable to hold the antenna base, a large screw thread bolt, not the same as the 3/8in type but similar, **Fig. 2**, and which allowed me to hold it up in the air on a pole or some similar fixing, **Fig. 3**.

I use an old military tripod for my portable microwave outings so I pressed that into service. I had fitted a pole holder to the tripod before so finding a suitable length of aluminium tube, I used the pole holder on the tripod, which worked out quite well, **Fig. 4**. The antenna base was mounted on the bracket and I added a bolt and wing nut to which I could attach radials as these would be needed to form the ground plane.

In use the telescopic whip is extended to full height and then retracted to get the best SWR match on the band in use. The IC-705 has a built-in SWR checker that sweeps the band and shows the SWR on the screen. It was thus very easy with the 20m coil in place to set the whip with the top section half-way extended, check the SWR and see if it was better either lower or higher in the band. The first test showed the SWR was best right at the bottom of the band so the antenna was too long. I retracted the top section bit by bit until the SWR was 1:1 at 14.2MHz.

While the IC-705 has a good SWR meter system, even the FT-817 has a similar option on its screen. However, for those with portable rigs without a meter system, a small external SWR meter can be used and with the transmitter on low power the whip adjusted to get the best SWR reading, remembering of course to adjust and then step back from the whip so as not to detune it. The bands were in poor shape on the

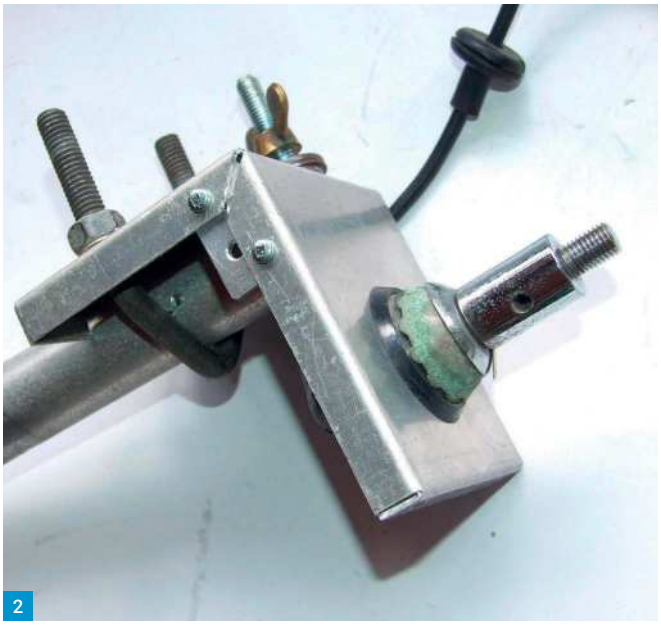

Fig. 1: Tavasu loading coils (for 10, 20, 40 and 80m). Fig. 2: Bracket with 3/8in mounting bolt. Fig. 3: The bracket attached to a pole. Fig. 4: The final arrangement, supported by a tripod.

first day I tried it but I worked a Finnish station with ease with just 5W from the 705.

For the radials (ground plane) I used a couple of lengths of 6-core cable, 33ft long, but I cut two at 16ft and two at 11ft to suit the 40, 20 and 15m coils I have. The 33ft should also work OK for the 80m band. If I were going to use the antenna for a few days at the same site, I would also use a ground stake connected to the mounting bracket on the pole.

Reflections

Subsequent use of the arrangement in the garden over a few weeks gave good results considering the 5W I was using. I tried the 40, 20 and 15m bands but did not try 80m, the bands being poor I figured there would be little reward. Various countries around Europe were worked with ease and once conditions pick up I feel certain the little portable setup will be able to give even better results.

I used what I had to hand. It was just by luck I had the Tavasu whip and coils but the same principle could be used with any HF mobile whip. A lighter camera tripod could be used or a length of aluminium tube, pointed at the end, which could be pushed into the ground to hold the whip up. Certainly, a proper mobile whip, with a base designed to take the strain of actual mobile use, will be a lot sturdier and last a lot longer than these not so cheap but plasticky type 'portable' antennas that break at the first use.

Of course, the best sort of loaded vertical is one with the coil at the top but this is impractical for mobile operations. The next best is centre-loaded and indeed I do have several military whips that have a centre-loaded coil arrangement. The third option, not the best but the easiest to arrange, is the base-loaded whip as with this Tavasu and many other types intended for operating on the move. So, at the next rally keep an eye out for HF mobile whips even if you do not intend to operate /M, they can be used in the garden. **PW**

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Moving Home and a Fresh Start with Amateur Radio (Pt III)

In the third part of this series, **Richard White G6NFE** completes the build and gets on the air at last!

Looking back to September 2021, this day seemed a long way off. In my mind I had an overall plan of how things would look; when I'd finally got the new station up and running, but the details of how exactly I'd achieve it were not yet complete. In some ways I made the detailed plan up as I went along, section by section.

Strangely, and it is hard to explain, sitting in the completed shack feels like a bit if an anti-climax. After months of digging through soil and bricks, burying conduit in the ground, cutting through concrete pathways and diamond drilling through walls, sitting in front of a desk with working radio equipment feels a bit 'oh, okay, everything works. That's good'.

In our old house the shack was a rather 'cosy' aka tiny, cupboard under the stairs. The new house wouldn't provide that, but it does have a sizeable vestibule, which seemed to me to be wasted as a cloakroom/shoe store/main entrance to the house. After some carefully worded suggestions to my wife, she agreed that it could become my new 'radio room'. Hooray, a full-size desk, I could stand up without hitting my head, and a major plus, I could turn the chair around without hitting my knees! In other words, a 'proper' shack.

However, getting set up in the new shack wouldn't be easy. Although not technically challenging, routing the cables through the garage turned out to be a messy and at times, painful process. I can confirm that hitting your head on a steel RSJ above a garage door during hot and humid conditions, with cables trying their best to escape from the trunking, does indeed test your patience. But, with an ample supply of cold orange squash and a lot of help from my son, the trunking was installed and all coaxial and control cables finally ended up in the right place, **Fig. 3**. It also occurred to me that as I had cut through interior and exterior walls via a garage, I'd better fireproof the cable ducting. This was achieved by using Sylmasta Pack & Seal, a fire-retardant putty, **Figs. 1** and **2**.

Inside the Shack

Once inside the new radio room, to avoid drilling any more holes than absolutely necessary, I decided to put my faith in 'command' strips. These are those incredibly useful Velcro strips with strong adhesive on the backing. Given that my Bosch metal detector was suggesting the walls were literally 'alive' (anyone seen '*Event Horizon*'?) with metal and electrical cables, I thought I'd try my luck. And to be fair, they seem to work really well. Even with the trunking loaded with heavy cables they have held everything firmly in place, **Fig. 4**.

And although it might seem back to front, once I'd got the shack trunking fitted and the cables pulled through, it was now time to make the final connections in the outside ESD protection cabinet. It was the last hot day in August, so with a liberal covering of factor 50 sunblock, a baseball cap and cold drinks, control cables and coaxial cables were terminated in the cabinet, **Figs. 5** and **6**. I didn't care how hot it was, this work had to be done before the sky started leaking again!

Again, due to weather constraints and not wanting to drill any more holes this year, I decided to install as much flexible external trunking as I could. Two of the three conduits are now full, but the third one is empty except for a nylon draw rope. At the moment I have one spare RG-213 cable, another spare M&P Ultraflex7 cable and a 3-core waterproof pond cable installed in the second conduit. My intention it to assign the coaxial cables to my Hyendfed 10/20/40 antenna and a 2/70 Halo antenna for SSB. The 3-core cable will suffice for installation of a lightweight 'TV type' rotator at a future date (I suspect all in 2023 now), **Fig. 7**.

Finally On-Air

So, the moment finally arrived. What radios should I carefully extract from comfortable, padded hibernation? I have a strange penchant for my 1980s Yaesu hybrid HF radios (something else I can't easily explain). What should it be? My 'lucky' FT-101ZD Mk3, which is the only radio that has, so far, enabled a transatlantic SSB contact from the old QTH, or the FT-902DM, which seems to have a superb receiver and good transmit audio reports? Eventually it dawned on me that although I have a huge improvement in desktop real estate, cluttering it up with piles of electronic 'radio rubbish' as my family call it, might not be a good look as visi-

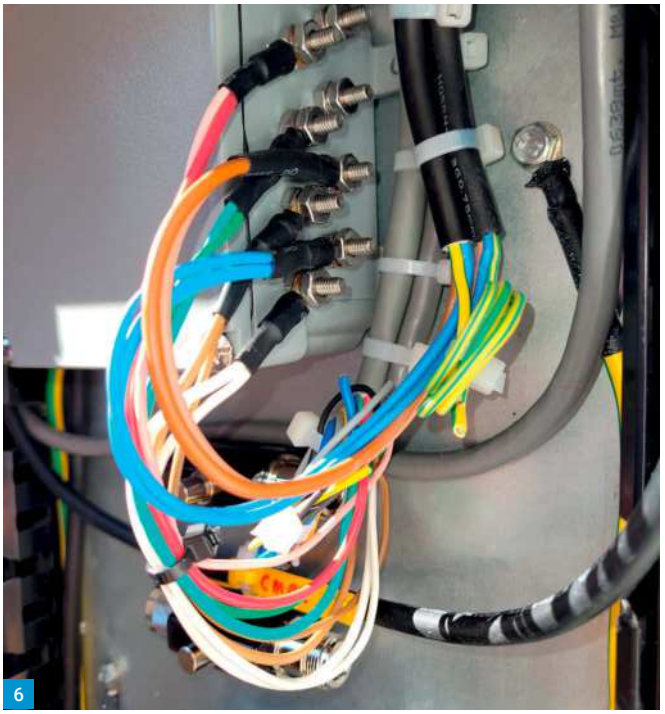

Fig. 1: Cable routing inside the garage. Fig. 2: Fire protection of cable entry. Fig. 3: Inside the shack, finally. Fig. 4: Internal trunking, held by 'command' strips. Fig. 5: The cabinet for cable termination. Fig. 6: So many cables! Fig 7: Three conduits leading to the shack. Fig. 8: A working shack after eight months of building out. Fig. 9: For when the bands are dead!

tors enter through the front door, straight into the radio room. Some compromises had to be made.

Eventually I decided. It would be the FT-902DM, the FT-450D (for data comms and eventual 6m capability) and for future 2m SSB ambitions I'd also add the Icom IC-251. Finally, to tame the noise levels, my WolfWave DSP device would see daylight again, **Fig. 8**.

Final Thoughts

Any final thoughts? Well, I did discover that the Ciro Mazzoni Baby Loop could be a little pedantic with tuning on the 20m band during the very highest temperatures in August. Typically, this would manifest itself by refusing to move from, say, 14.100 to 14.300MHz. Powering off and starting again by retuning to, say, 21.000MHz then going back to 14.300 would clear the problem. This only happened on the 20m band and strangely stopped once the August heatwave ended. Very odd. Apart from that little issue the antenna works very well and unless I get an unwelcome letter from the local council referring to the 'thing' in my garden, it will have served its purpose as an acceptable low profile 'compromise' HF antenna.

And lastly, when the Sun isn't playing ball the local birds have a use for the Baby Loop, **Fig. 9**.

Enjoy the hobby, good DX and 73! **PW**

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A Lightweight Antenna Rotator

Jonathan Hare G1EXG describes an Experimental Lightweight 12V DC 3D Printed Rotator for Small Lightweight Antennas.

An experimental lightweight 12V DC powered rotator is described. Many of the parts can be created on a standard 3D printer, providing ease of replacement or modification. I created this little rotator so I could rotate a small 1296MHz beam on top of a 15m telescopic fibreglass mast but I have also used it to rotate other antennas such as lightweight dipoles (10, 6 and 4m band – see header photo) and VHF HB9CV antennas. The rotator might also prove to be useful to remotely position ferrite rod receive antennas for LF and VLF reception.

Specifications

- turn time 12V (360°): ~10 sec
- turn time 6V (360°): ~20 sec
- mass of rotator: 500g
- fits 22mm mast (two clamps) and 40mm mast (side fixed, see text)
- Note: this version has no position sensor

Introduction

I live in the city and only have a relatively small back yard for antennas. I cannot go out horizontally very far, but I can go up. I have a 15m fibre mast secured using two sturdy TV antenna brackets on the yard wall.

In an ideal world I would like my antennas to be on the top section of the mast and to be raised as high as possible. This means as lightweight antenna as possible. If you use a directional antenna, you either need to turn the mast or use a rotator to position it for best signal (or lowest noise). However, rotators are heavy devices and also add a considerable wind loading to the antenna system, which means it's not really practical to raise the masts to full height.

To overcome these issues I have made a lightweight prototype 3D printed rotator, which can be fitted at the top of the mast, perhaps not with full length extension (depending on wind) but at least start to be able to have a working rotatable antenna system high up.

Many standard antenna rotators used by radio amateurs require mains power and are often quite heavy. These are ideal for a fixed mast setup or on the side of a house etc, but they are not so good for small portable use. Some cheap lightweight TV type rotators rely on the mains voltage and frequency to synchronise the rotator motor and control readout but DC to AC converters are often not very reliable in this way. Of course, you can use a generator to create mains voltages but it's a lot more effort and gear that needs to be moved around and no one really wants to have 240V mains outside in the mud and rain if they can help it.

There are few commercially made 12V portable rotators available and some are very expensive. A well-priced and well-made UK portable rotator can be found here [1].

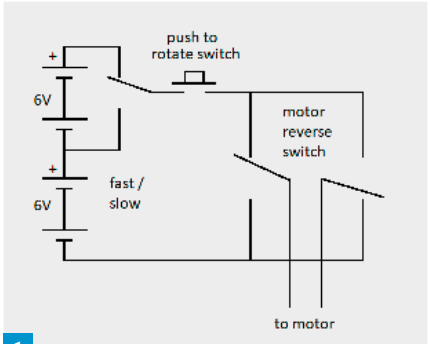
If you are portable, you have the option of rotating the mast by hand to point an antenna but if you are in a parked car, for example, constantly going in and out can become tiresome. What we need is a small lightweight rotator that can be viewed from the car window say, that can run on 12V, is easy to put up and control and does not cost the earth.

A 3D Printed Rotator

I have written before [2] of how a 3D printer can be a fantastic aid to prototyping ideas for amateur radio. Here I present a simple 12V rotator suitable for turning small antennas, many of the parts of which can be printed out economically on a standard 3D printer.

My prototype weights about 500g (including the motor but not the wiring), most of the parts are 3D printed and the motor drive is an easy to source geared motor. If a part gets broken or worn down, you can simply print another part to replace it.

Currently 1kg of filament is about £25 so the 3D printed parts for this design will cost you about £10. The DC motor was about £10 to £15.



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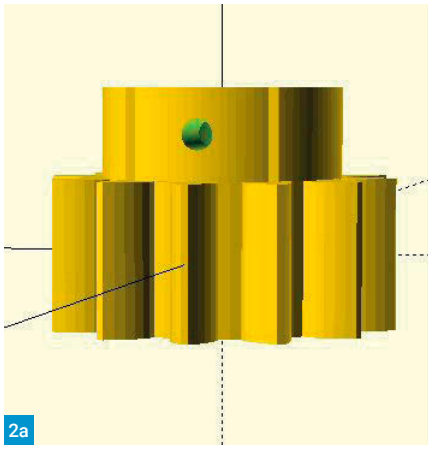
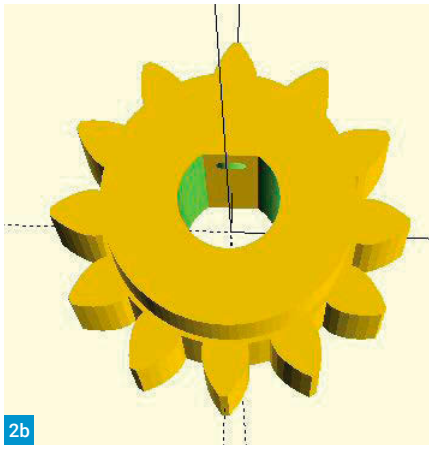
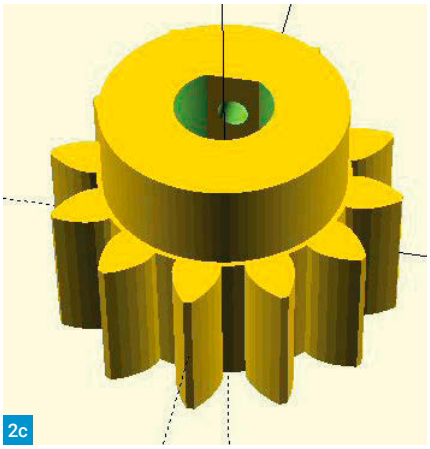
I used a length of 8mm studding for the drive shaft of the rotator, which happens to perfectly fit standard roller skates/skateboard bearings, which are easy and cheap to obtain.

You can run the rotator motor direct from a 12V battery or use a variable voltage regulator circuit to adjust the speed for greater control. It's easy to arrange a simple push and toggle switch circuit to control the ON/OFF and rotation direction control (see diagram, **Fig. 1**).







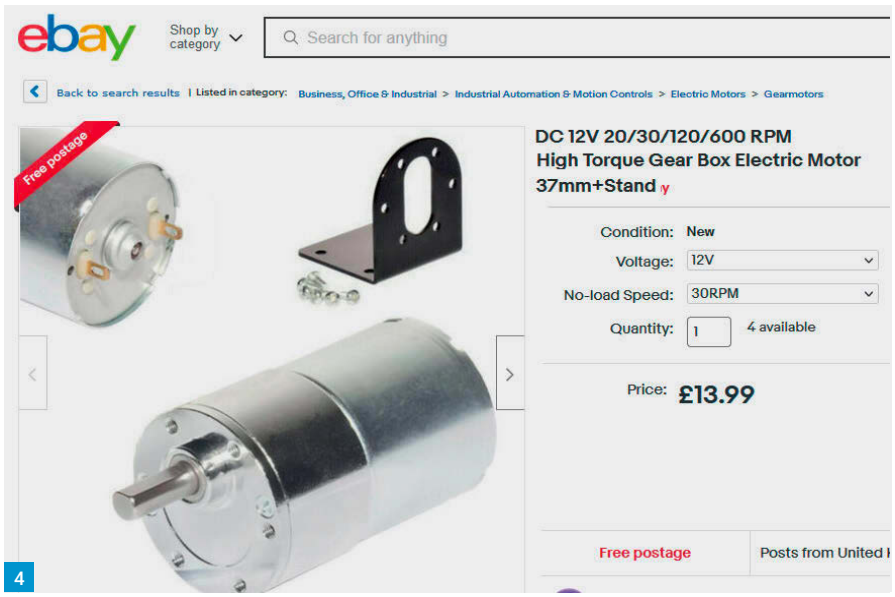


Fig. 1: Using a toggle switch for ON/OFF and direction control. Fig. 2: The small cog. Fig. 3: The large cog. Fig. 4: Listing for suitable motor on eBay. Fig. 5: Various views of the completed rotator. Fig. 6: The controller. Fig. 7: Dipole centre. Fig. 8: Dipole arrangement and rough lengths. Fig. 9: The motor.

Waterproofing

I am only using the rotator for a few hours each time in my experiments, so I haven't made any attempt to waterproof it. However, silicon grease could be used on the plastic cogs and simple box arrangements could be fitted around the motor to protect from water.

3D Parts

Once the 3D prints are ca. 5mm or greater in thickness they are surprisingly strong. However, sunlight and heat are a problem for thermoplastics used in 3D printing. Hence, I am not suggesting this rotator be used permanently outside. My prototype used PLA filament but for outside use other filament types may be preferred, for example ABS, nylon or ASA.

When you have such a range of 3D filament colours to choose from, what colour is best? Black absorbs heat but some white pigments degrade over time. As these parts are all experimental and are not designed for longevity, I don't think it really matters. Bright colours show up well 'out in the field' and so might be worth considering, to minimise the chance of leaving things behind after going out portable for example.

3D Printed Cogs

Plastic cogs are not as strong as metal cogs, but they are re-printable and cheaper. You can of course modify the 3D printed cogs to your own specification and application. I take no credit for the design of the cogs used in this article. The Cog design (type of teeth etc.) was downloaded from Thingiverse **[3]** and I have modified the OpenScad code in this application. They are 3D printable customisable Involute Spur Gears, and I used the code to create the small and large cogs used here. I included a collar for self-tap screws to fix the cog in place. I also included additional circular cut-outs to removed much of the unnecessary plastic to save on filament and weight but keep strength.

Small and Large Cog

The small cog, **Fig. 2**, goes on the motor gearbox drive shaft and consists of a 20mm diameter, 10mm thick, 12 toothed gear. I designed it with a D-type shaft hole to fit the motor shaft. It has a collar that has a pilot hole to take a self-tap screw so that it can be locked onto the motor shaft. The large cog, **Fig. 3**, is a 100mm diameter, 10mm thick, 62 toothed gear. It has a central hole to take the 8mm studding rotator shaft and the collar has two pilot holes for self-tap screws to fasten the cog onto the rotator shaft.

Once printed, both gears might need a little cleaning up to remove the odd bit of stray filament. The parts printed closest to the printer bed tend to be slightly wider (to get a good first layer grip on the bed) so this part of the gear teeth may need to be filed down a little.

Motor Drive

I used a small motor easily sourced from online outlets such as eBay, **Fig. 4**. Search for 'DC 12V 20/30/120/600 RPM High Torque Gear Box Electric Motor'. I have also experimented with stepper motors but decided here on the simplicity of the standard motor. I chose a 30 RPM motor, but a lower speed (e.g. 20 RPM) motor might be preferable.


5a

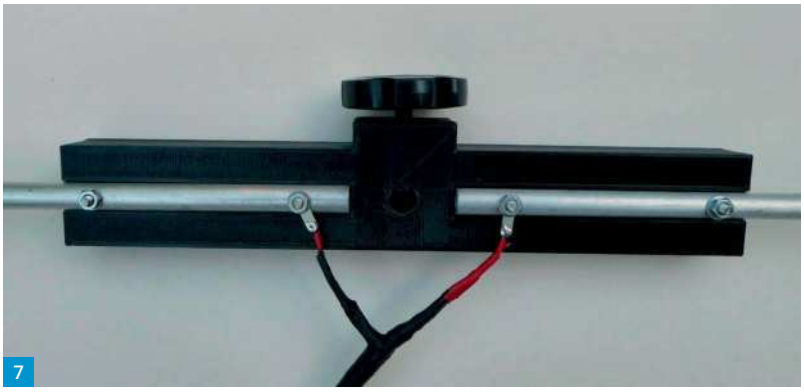

5b


5c


5d


5e

6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Putting the Bits Together

Note: you may need to drill out some of the position and pilot holes in the 3D printed parts. For example, the self-tap screws holes etc. but be careful not to widen them out too far before trying them out.

Once you have all the 3D printed parts printed out and the other bits of hardware, you can assemble the rotator. To help hold everything I built a stand from a piece of wood and a short length of 22mm tube. Fit the two thumb screws/bolts into the mast clamp holes. Depending on the size of the bolts you may need to drill these out a little but there is no need to tap holes. Slide the main base onto the stand, tighten the thumb screws, then you can work on everything easily.

Depending on the motor you purchased it may, or may not, fit the six holes I printed on the main base. You may need to drill these out. I only used three of the holes. You can then fit the small cog onto the motor shaft and secure using a self-tap screw.

Put a bearing into the top bearing support part, **Fig. 5d**, and, at this stage, very lightly fit it into place under the main unit using two 3M nuts, bolts and washers. Pop the other bearing into the L shaped 'lower bearing support' and fix it into place using two self-tap screws into the side of the tube support, **Fig. 5e** (there are two holes printed for this, but you might need to open them up depending on the size of the self-tap screw you use).

Note: I have made the 3D printed 'cups' that take the bearings a little large. This is much better than too small as it would be very difficult to open them out. Although I didn't need to, you might find a small amount of packing (e.g. tape) or glue might be needed to secure them in place.

Using a 30cm length of 8mm studding for the rotator shaft, slide it down into the two bearings (you will need to add washers and nuts as you do so). Adjust the nuts so they sit on the bearings, to take the weight evenly. Then add one or two washers on top, slide the large cog onto the shaft and fix in place using two self-tap screws (the collar under the cog). I filed down parts of the 8mm studding where the self-tap screw goes so the cog can't slip. Adjust the top bearing unit so the two cogs interlock properly and tighten the two 3M bolts to secure. Finally add a large washer and two 8M nuts to the bottom of the studding to secure the shaft in place. That's basically the rotator made. The photos, **Fig. 5**, may help to see what you need to do/what's going on.

Wiring Up

The next step is to connect suitable length wires to the motor and wire it up to the control switches and (if used) the variable regulator. Everything should move around nicely when voltage is applied (>6V). The rotation speed will of course depend on the voltage applied to the motor and the gearbox drive ratio that you chose to use. Rotation speed will also be dependent on the size and wind loading of the antenna you are using as well as the wind speed.

The combination of the gear ratio on the motor and the two 3D printed cogs means that the antenna is quite stable and movement of the antenna is unlikely to go back along the cogs and move the motor so you don't need a brake. But obviously bear in mind that this is a plastic setup and eventually with enough wind loading or wind speed some damage will be done. If this happens, you can easily print out spare parts.

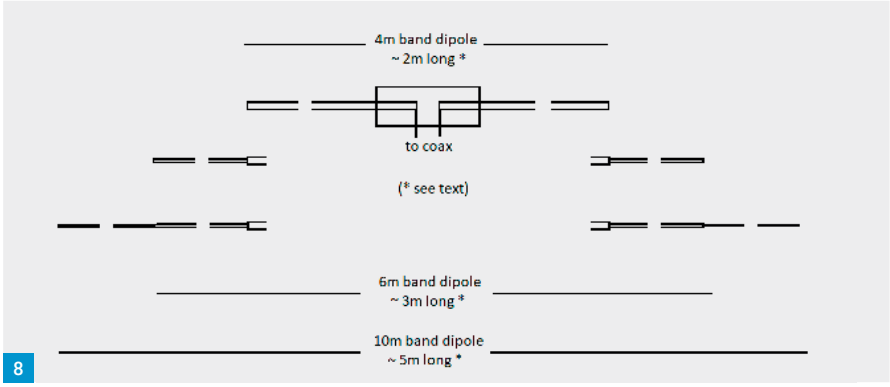
Speed and Power Control

A nice aspect of using a 12V motor is that you can easily use a voltage regulator to control the speed. I made up a simple 0-12V regulator using a LM317 regulator chip with a TO3 case, which I mounted to the side of the controller's metal box as a heatsink. As the current was under 1A, a smaller TO220 LM317 (on a heatsink) would probably work fine.

I used a push switch on the input from the 12V battery so that there was no current drain by the controller when the motor was not in use. I also fitted a large diode on the power line to prevent accidental incorrect wiring. The regulator output goes via a DPST toggle switch wired so it reverses the power to the motor: you can get clockwise or anti-clockwise rotation when the 'rotate' button is pressed.

Alternately two 6V batteries wired in series could be used (see diagram, Fig. 1 again and the photo, **Fig. 6**) to provide a fast and slow option with just the two switches.

The 3D printed rotator turns faster (10-20s) than a standard antenna rotator (60s). It's probably about the speed that you might turn a portable mast by hand if you didn't have a rotator, so I think that's acceptable. As we are turning smaller and lighter antennas with this setup we can afford go a bit faster. I found that my motor would run fine on 6V so could easily be slowed down. However, much lower voltages might not have the power to turn against wind.



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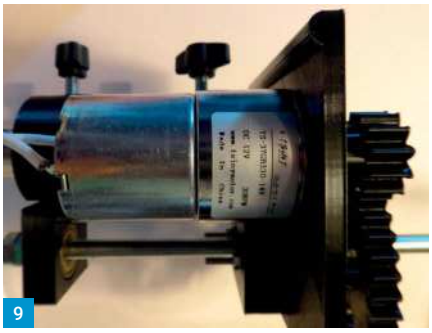
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Remember this rotator is designed for low weight antennas; it won't reliably turn a full-sized HF antenna or even a 7-element 144MHz long Yagi, for example.

Rotator Mast Fixing

The top section of my fibre mast is a 22mm diameter tube so I designed the main 3D printed base for this diameter, but I have also included a semi-circular cut-out on the side, **Fig. 5b**, so that the rotator could be attached to a 40mm diameter mast. If this is used, you will need cable ties or hose clips to hold the rotator to the mast.

Lightweight 3D Printed Dipole Centre & Elements

I also designed a 3D printed dipole centre to fit the 8mmrotator shaft to create a lightweight rotatable dipole for the 4, 6 and 10m bands **[2]**. A side of the 8mm rotator shaft will need to be filed flat to form a D shape to fit the 3D printed part. A thumb screw secures in place.

For strength, I have made the dipole centre as large as possible (ca. 200mm long), so it prints along a diagonal on the 3D printer bed.

The centre has semi-circular channels to take 100cm long 8mm diameter tubes to form a 4m band dipole. Smaller tubes and rods can then be slid into these 8mm tubes (and secured using small hose clips or wire loops tightened up) to lengthen the dipole for other bands. Obviously, the tubes and rods need to be able to slide into the holes in the adjacent tubes comfortably (not too snug otherwise over time they tend to get stuck with corrosion or when dirt gets in).

The 6mm tubes I used were about 60cm long.

For the 6m band dipole about 10cm was slid into the end of the 8mm tubes to create a 3m long dipole. You can of course adjust the length for best match. For the 10m band dipole I also used 3mm aluminium welding rods pushed into the 6mm rods. About 3cm or so of the rods were fitted into the 6mm tubes (see **Table 1**).

In free space a dipole should have an impedance of 70-75Ω, which when connected to a 50Ω cable should give an SWR of about 75/50 = 1.5:1 (a lower SWR than this probably means something is not right). I fed the dipole with mini-8, which is relatively lightweight and for 10-15m lengths is good to 144MHz. Losses on a 10-15m length of mini-8 at 70 MHz (and below) for this SWR, should be relatively small. I made up a simple choke balun by winding ca. 10 turns of the coax on a piece of 40mm diameter plastic tube fitted as close to the feedpoint as practical.

I used two of the tube securing bolts as points to join the coaxial cable using solder tags (see photo, **Fig. 7**). The wires and end of the coax were painted with flexible rubber sealant to help keep moisture out.

The SWR can be adjusted by sliding the tubes in and out. The exact lengths will depend on the diameter tubes you happen to use, which is why I have only given rough lengths in the diagram, **Fig. 8**. For the 4m band you can either try the dipole with just the two 100cm long 8mm tubes or you can add length by sliding in short lengths of 6mm tubes. You get a little bit of extra length added in from the end wires coming from the coaxial cable to the solder tag connections on the tubes, but this may only be significant on the 4m band dipole.

Final Thoughts

There are no stops on the rotator. It can continually turn so it's not limited to 360° rotation. You will need to look at where the antenna is pointing.

There is no rotation position feedback potentiometer built into this design but a multiturn potentiometer could be fitted to the bottom of the 8mm studding and I may work on a prototype in which case I will add details to my web pages later on.

3D Printed Parts List

- (all the files can be found on my 3D printing web page [2])
- main body/base unit, Large cog, small motor drive cog
- bearing holder for bottom of axial, bearing holder for top (base)

Other Parts

- 1 x 12V DC motor with built-in gearbox (I used a 12V 30 RPM motor, see screen grab image, **Fig. 9**)
- 12V variable voltage supply (ca. 6-12V)
- 3 x 10mm 3M bolts for motor
- 2 x standard skate bearings (8mm shaft)
- 2 x thumb bolts 4M (as used for action cams etc)
- 3 x ca. M3 15mm self-tap screws (for cogs)
- 1 x 30cm long 8mm studding (rotator shaft)
- 2 x 3M bolts and washers (top bearing support)
- 2 x 4M self-tap screws (bottom bearing support)
- Wiring cable for rotator
- 3 x 10 mm 3M nuts, bolts and washers for motor
- 2 x 3M nuts, bolts and washers (top bearing support)

Here are the details and weights* for three dipoles:

- 4m band dipole: 200g, 3D centre + 2 x 100cm 8mm tube
- 6m band dipole: 225g, 3D centre + 2 x 100cm 8mm tube + 2 x 60cm 6mm tube
- 10m band dipole: 250g, 3D centre + 2 x 100cm 8mm tube + 2 x 60cm 6mm tube + 2 x 100cm 3mm aluminium welding rod.

(*not including weight of coax and choke/balun)

Table 1: Dimensions and weights for each band.

I have had some positive experience using ferrite rod antennas for LF and VLF reception and I plan to use this 3D printed rotator to locate the ferrite rod in a far spot in the garden to remotely rotate the receive antenna. The whole setup would be small enough to cover with a storage crate or even a bucket, to provide some simple weatherproofing.

Updates and improvements on the design will be posted on my website **[2]**.

References & Links

[1] **https://tinyurl.com/fmat8h96**
[2] for details of this and my other 3D printed articles see my website: **www.creative-science.org.uk/3D.html**
[3] cog ref: e.g. **www.thingiverse.com/thing:41246**

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1

CW Key to PC

Billy McFarland GM6DX explains how to connect your CW key to your PC.

Most people are aware that you can make a simple interface that will allow your PC to connect to your transceiver for CW sending. This is usually done with a connection to the CW key socket on the rig. However, what happens when you want to connect the interface the other way around? In this article I will explain how you can do this for under £10.

You will need a few parts as seen in **Fig. 1**. That is:

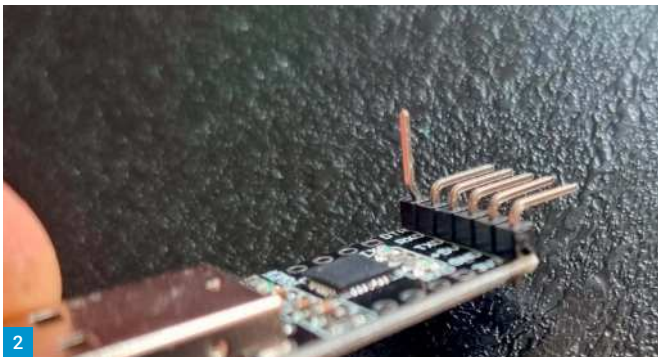
- 1 x CP2102 USB TO TTL
- 2 x 1µF capacitors
- 4 x 10kΩ resistors
- 2 x 1N914 diodes
- 3.5mm stereo socket
- Some prototype board

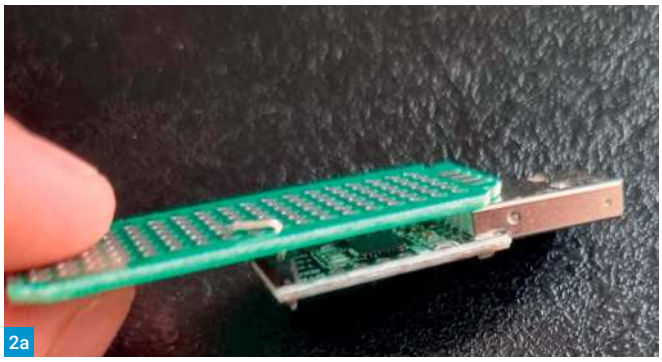
I had all these parts lying around. However, you can buy them from Aliexpress and eBay. The first step is to cut the prototype board down to size and then bend the DTR pin up. Slide the prototype board over the pin and finish off by bending the DTR pin back down horizontal. This can be seen on **Fig. 2**. Add some hot glue at the front of the prototype board to support it and solder the pins onto the board as seen in **Fig. 3**. We are now going to add our components to the board. Take two short insulated wires and connect these to the DSR and CTS pins as seen in **Fig. 4**. These connections are likely to be on the underside of the TTL. However, please check the one you have in case it is different. Once the wires are soldered in place reinforce the connections by using hot glue. This will prevent them from being pulled or coming loose later, **Fig. 5**. Make sure you can get these wires to the prototype board without bulging out. I took a small notch out of the board for the wires to pass from the board to the TTL as seen in **Fig. 6**.

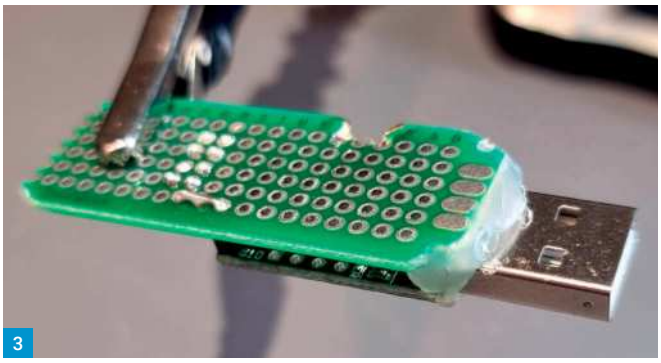
Now for the tricky part. We need to solder a few components in place to act as a 'debouncer' to help prevent any lag between the key sending and PC processing. **Fig. 7** shows the circuit. Connect the 2 x 1µF capacitors to the DTR leg on the prototype board, make sure the capacitor isn't shortened out and keep them away from the other pins of the TTL, which we are not using. Take one of the 10kΩ resistors and one diode, put them in parallel and solder one leg onto the other, trimming off the excess leg. Do this twice and solder these onto the other end of the capacitor. Make sure the diode is the correct orientation and refer to Fig. 7 as many times as you need throughout this process. As it stands you should have two wires connected to the CTS and DSR pins only, two 1µF capacitors attached to the board along with two pairs of 1N914 diodes and a 10kΩ resistor in parallel as seen in **Fig. 8**. Now connect a 10kΩ resistor to another short piece of insulated wire (I have used blue and orange for reference when looking at my images), twist one end of the cable and resistor together tidying it off with a tin of solder. Take this end and place it onto the board at the remaining side of the parallel diode and resistor, then solder our newly added parts to the parallel diode and resistor. Do this whole process again for the other parallel diode and resistor set. Take our wire from the CTS and DSR pins and solder them onto our board. Make sure they are spaced out and not connected together. Take the remaining end of our 10kΩ resistors that we just added to our board and connect one to the CTS wire and the other to the DSR wire. Take another short piece of wire (green) and attach this to the DTR pin on the board. That completes the circuit on the board. All this can be seen in **Fig. 9**. All these parts are very close and fragile in nature. To prevent any damage or future issues I covered the whole board in hot glue, see **Fig. 10**.

Nearly Complete

Our interface is nearly complete. Turn the board upside down and take your 3.5mm stereo jack socket. Connect the DTR (green) wire to the ground of the 3.5mm stereo socket. Take the wire from the board that is connected to the CTS wire (orange) and connect that to the ring connection of the 3.5mm stereo jack socket. Finally, take the







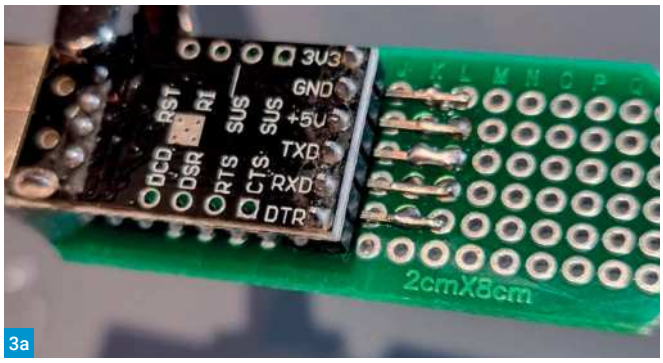
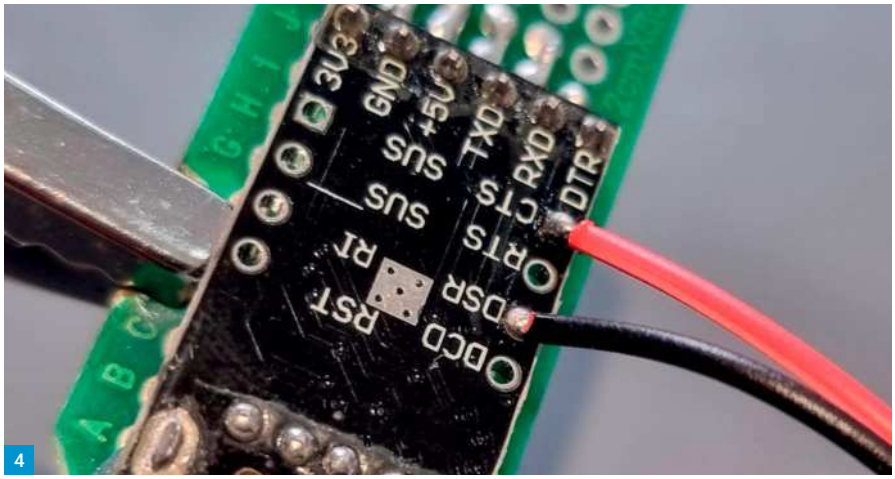
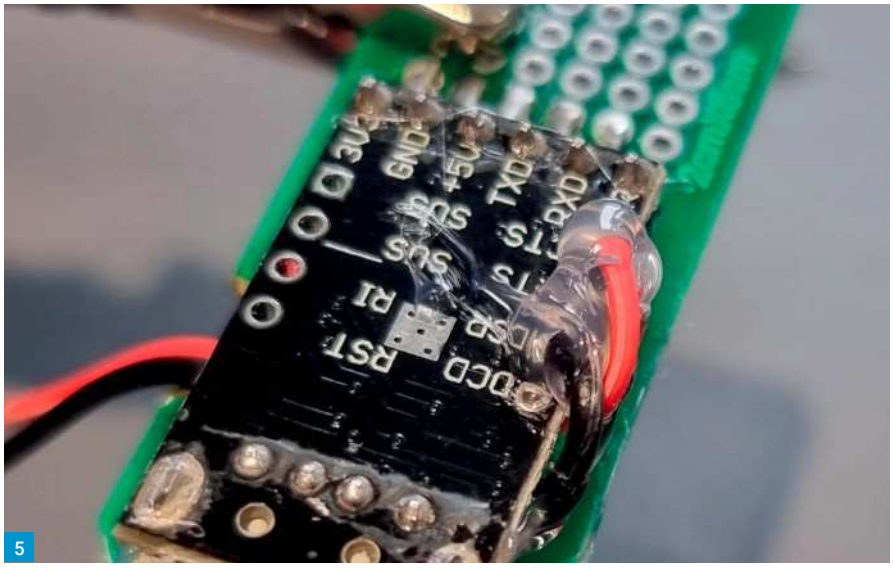


Fig. 1: Parts required for the project.
Fig. 2: Preparing the prototype board.
Fig. 3: Soldered and hot glued.
Fig. 4: Wires connected to DSR and CTS pins.
Fig. 5: Wires from Fig. 4 hot glued for security.





wire from the board which is connected to the DTS wire (blue) and connect this to the tip of the 3.5mm stereo jack socket. Once soldered use hot glue to hold the socket in place. You can insert a 3.5mm jack while gluing to ensure you don't glue any working parts of the socket. This can be seen in **Fig. 11**. To cover all the working parts, use a few layers of heatshrink. Note when you use a heat gun you are likely to re-melt the hot glue so place the TTL into a clamp while the heatshrink cools down to prevent any parts from moving, **Fig. 12**. Connect the interface into you PC and if it all works, the TTL should light up as seen in **Fig. 13**. Take a 3.5mm stereo lead, plug this into your interface and connect it to your Morse paddle. This completes the physical connections.

We need to download Morse Keyer software, so visit:

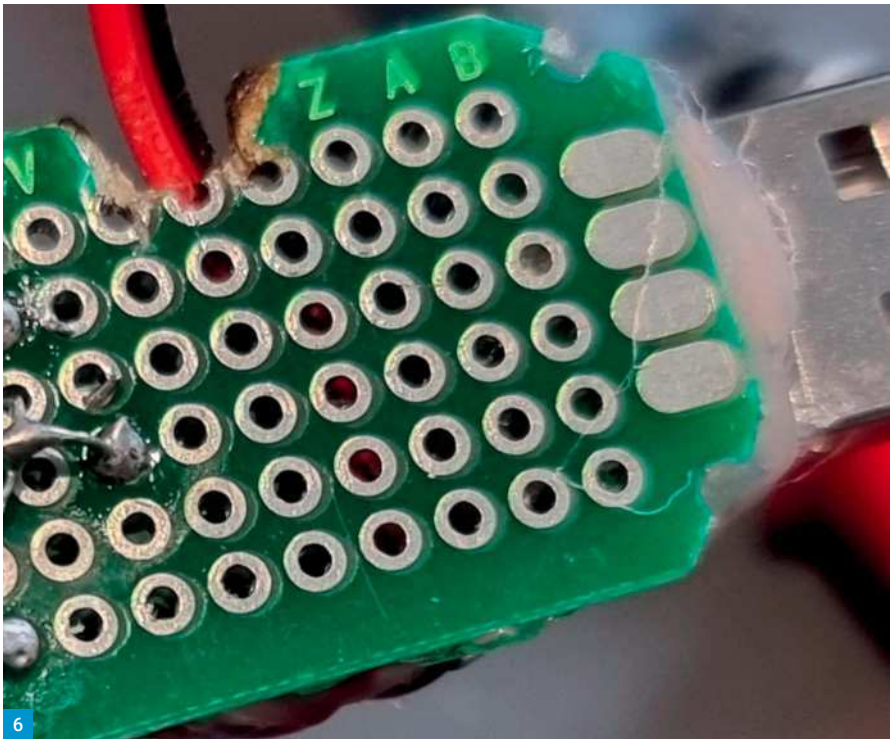
http://morse-rss-news.sourceforge.net

and download the latest version. It's free to download. Once downloaded install the software and run it. Note it will install two applications. One is Morse News, the other is Morse Keyer. Once the software runs you will see a simple interface box as in **Fig. 14.** On the right-hand side of the software under Serial I/O select the comport number of your device and then tick the Use Serial box,

which is located below that. At the top left of the software you select Iambic Paddles, CW speed and if you tick the Swap left/right box, it switches around the dots and dashes on the paddles. At the bottom of the software is the sound output. Here you select the pitch of the CW as well as the output sound card. You just need to start sending Morse on the paddle and you will hear this on the output soundcard. This not only allows you to hear what you are sending by using your PC as a CW keyer but if you have an audio line out as a sound card option, or a virtual audio line, then you can even have a QSO over the internet or feed the audio into other amateur radio software. This software allows the user to connect a straight key and also a bug. For a straight key wiring you only require the connection of the DTR (CW key ground) and CTS (CW key dash). If this all seems a bit too much for you, then you can always purchase a plug-and-play option from: **https://hamradio.solutions/vband**

Overall, this is a fun cheap project, which offers you more flexibility in your CW training or operating. If you have any questions then please email me.

The photo, **Fig. 15,** shows the finished interface. **PW**



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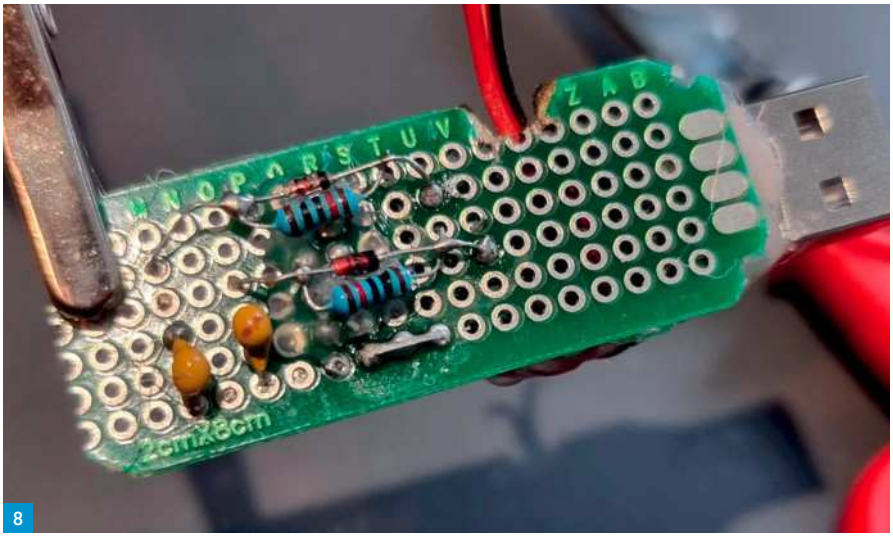

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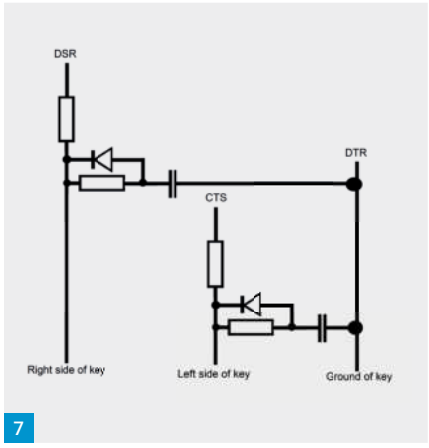

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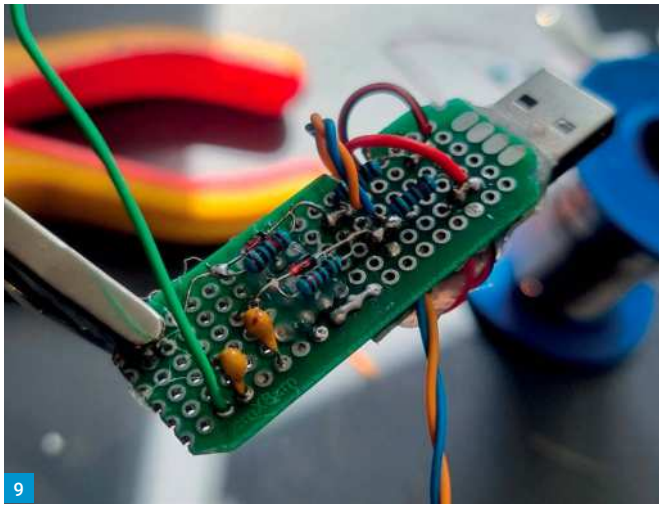
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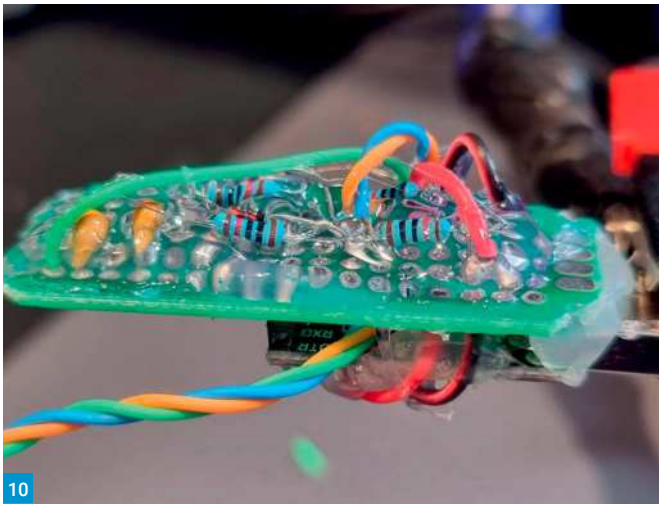
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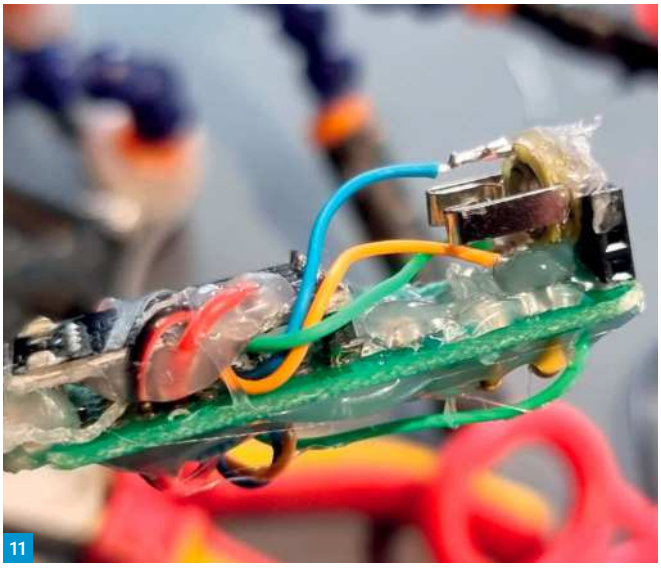
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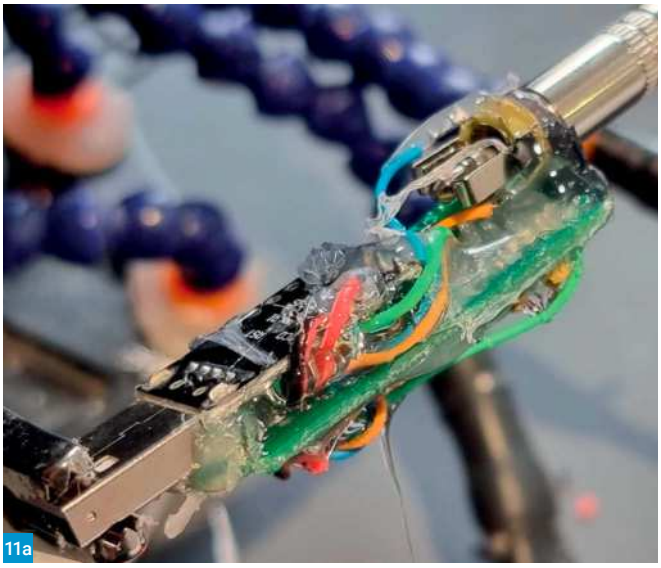
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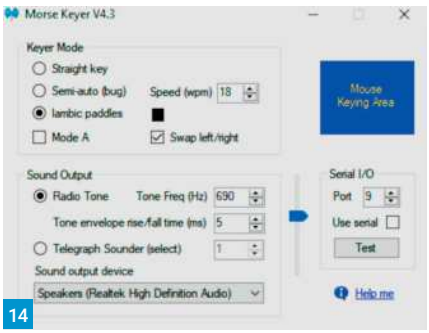
Fig. 6: Notch for the wires to pass through.
Fig. 7: The debouncer circuit.
Fig. 8: Physical realisation of the debouncer.
Fig. 9: The completed board.
Fig. 10: The board encased in hot melt glue.
Fig. 11: Installing the jack socket.
Fig. 12: Sealing in heatshrink.
Fig. 13: The LED lights up.
Fig. 14: Keyer software interface.
Fig. 15: The finished project.



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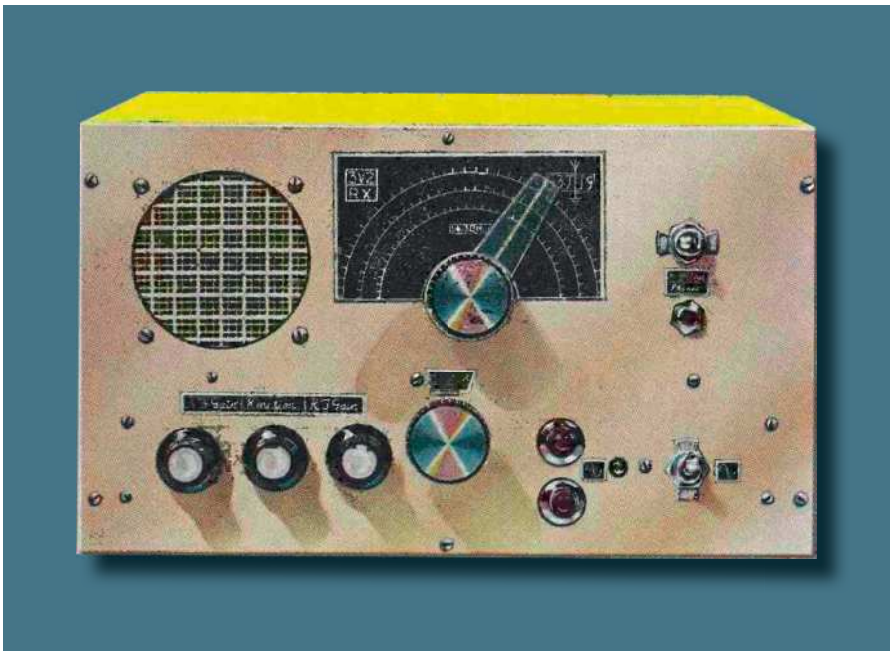


A Communications T.R.F. Receiver

Our featured article this month is a three valve Tuned Radio Frequency (TRF) receiver by **T. Simon**

There is no question that the superhet receiver offers far superior performance figures to those of the t.r.f. However, the constant reminder that one does not get something for nothing is very evident in this statement. With the superior performance comes additional and often complex circuitry, together with the need for a fair array of test equipment with which to tune and align the finished receiver for peak performance.

Very few serious amateurs or s.w.l's these days would dream of using a t.r.f. in fact the majority would probably laugh at the idea. Yet in the past these receivers were extremely popular and one reads of simple circuits giving truly amazing results. The writer wished to use "double" valves for a particular application, but not having had a great deal of experience with them, decided to try the idea out first in a simple application in order to investigate the possibilities and the various snags which would doubtless arise. The result of this experiment is the unit about to be described.

Standard Circuitry

The "standard" circuit of a t.r.f. receiver is usually offered as a three valve unit. This comprising three stages with one valve to each stage; r.f. amplifier, detector and audio amplifier. It was decided to duplicate this "standard" but with the proviso that the three valves should be "double" valves. This arrangement gives, on the face of it, a three valve t.r.f., but since these valves are "doubles" then the project becomes a six-stage circuit. By this means it has been possible to design a t.r.f. receiver giving above average performance and having features which place it in the communications class.

The valves chosen are all the same type - ECF82/6U8. These are triode-pentodes whose normal function in life is in the role of a frequency changer up to 200 odd Mc/s. These are freely available both from manufacturers' sources and the surplus market.

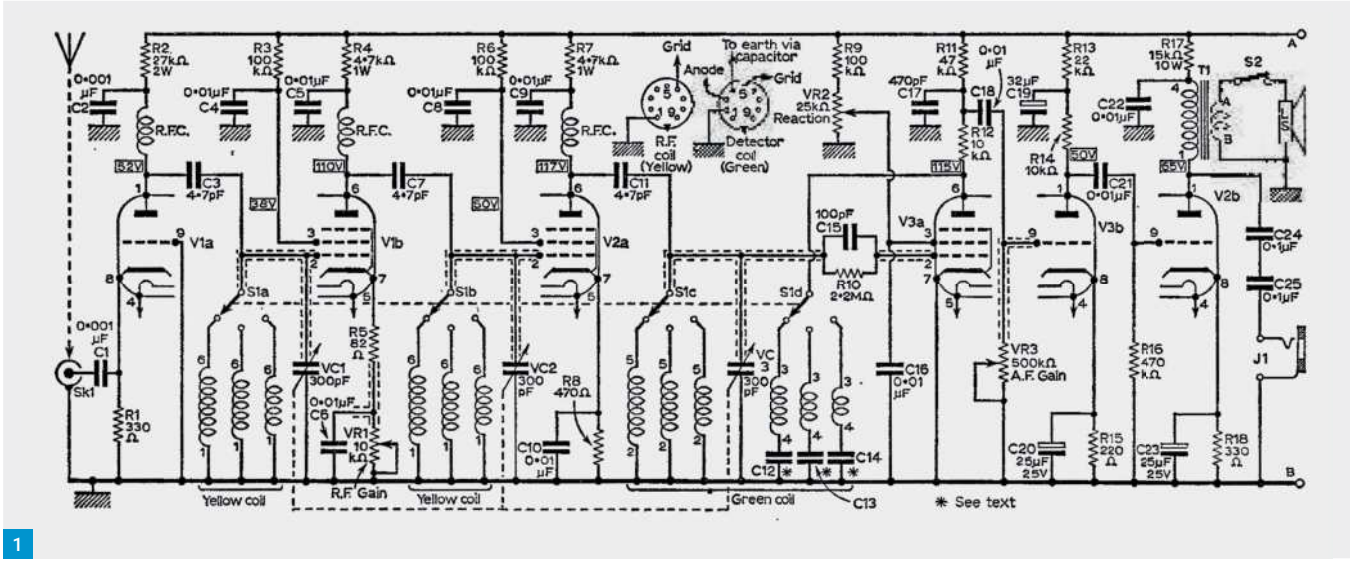
Having now a chassis with three innocent looking valves perched on it, the problem resolves itself into fixing a function for each stage since in effect we have a six-valve circuit comprising three pentodes and three triodes.

The main drawbacks or "bugbears" of t.r.f.'s are (a) radiation of interference by the reacting detector stage; (b) lack of selectivity; (c) tricky reaction, often due to variations from the aerial circuit affecting the detector. In this design these difficulties are not so much reduced as annihilated!

The Circuit

Commencing with the aerial, the first valve in **Fig. 1**, the triode of V1 is connected in a grounded grid configuration noted for its ability to isolate one stage from another and also present a low impedance input to the aerial. This stage is capacity coupled to the first tuned r.f. amplifier, the pentode section of V1. This stage in turn is again top capacity coupled to V2a pentode wired as another tuned r.f. amplifier. V3a pentode is a reacting detector using the variation of screen potential as a reaction control. At this point it will be realised that any spurious radiation from the detector has to fight its way through two tuned r.f. stages plus the grounded grid in order to reach the aerial. In the prototype it proved too much for this particular gremlin and no such radiation could be detected. The whole receiver is installed in an earthed aluminium case to ensure minimum radiation from the actual circuitry and components. Selectivity is extremely good since there are three tuned circuits plus an a.t.u, used by the writer. Also, variations in aerial loading affecting the regenerative detector stage are minimised by the three stages between detector and aerial, but more on this point later. The high value of screen resistors was found imperative in the interests of stability. In the writer's model it was possible to reduce these values to around 82kΩ before instability set in. Since this "threshold" will vary with different constructors it was thought best to use the values marked. The voltages at various strategic points in the circuit are marked in fig. 1 and should act as a guide only and not be interpreted as absolute values. Similarly, for those who wish to experiment, the values of R13 and R17 may be varied for more gain on the audio side. The remaining two triodes, V3b, V2b, are used as audio amplifier and output stage respectively, providing ample volume on local signals to drive the small loudspeaker used

This article appeared in the October 1966 issue of PW, the third issue bought by your editor! Last month we featured a regenerative receiver. This one is a TRF – a better solution and much simpler to build than a superhet.



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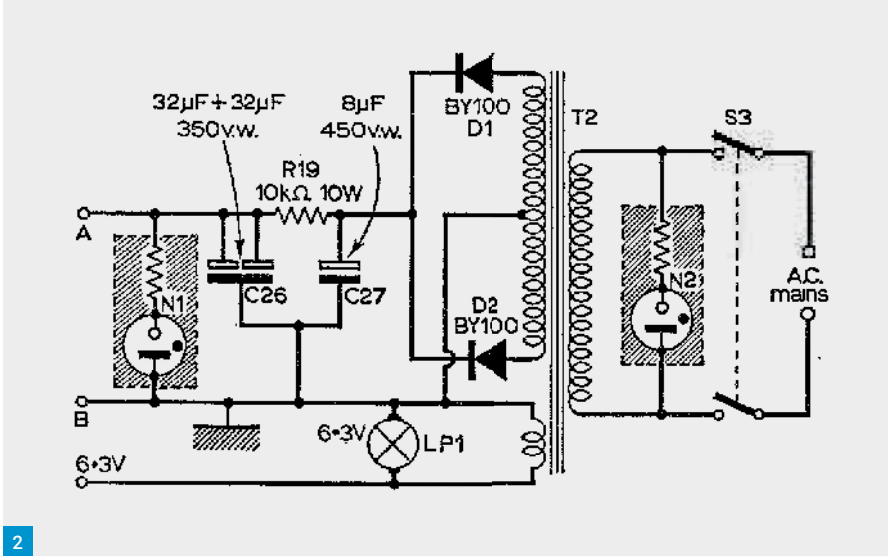

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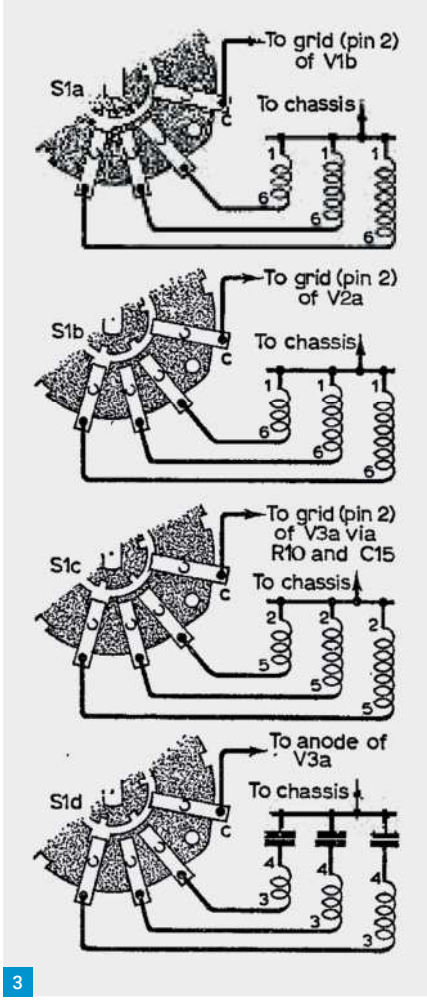

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Fig. 1: Circuit diagram of the receiver, less power unit. (See Fig. 2) Fig. 2: The power unit. The resistors with N1, N2, are an integral part of the neon units. Fig. 3: Wiring of the wavechange switch S1-a, b, c, d. Screens omitted for clarity. Fig. 4: Under chassis layout showing positions of some of the main components. Note small screen across V1. Fig. 5: Top chassis layout of the valves and two transformers. Fig. 6: Front panel drilling diagram. Fig. 7: Rear view of the completed receiver, without case.

Construction

There is a great deal of gain in this receiver, and if due care is not taken in construction the end result will always be the same - instability. Careless wiring or a dry joint will practically guarantee this so watch these points carefully.

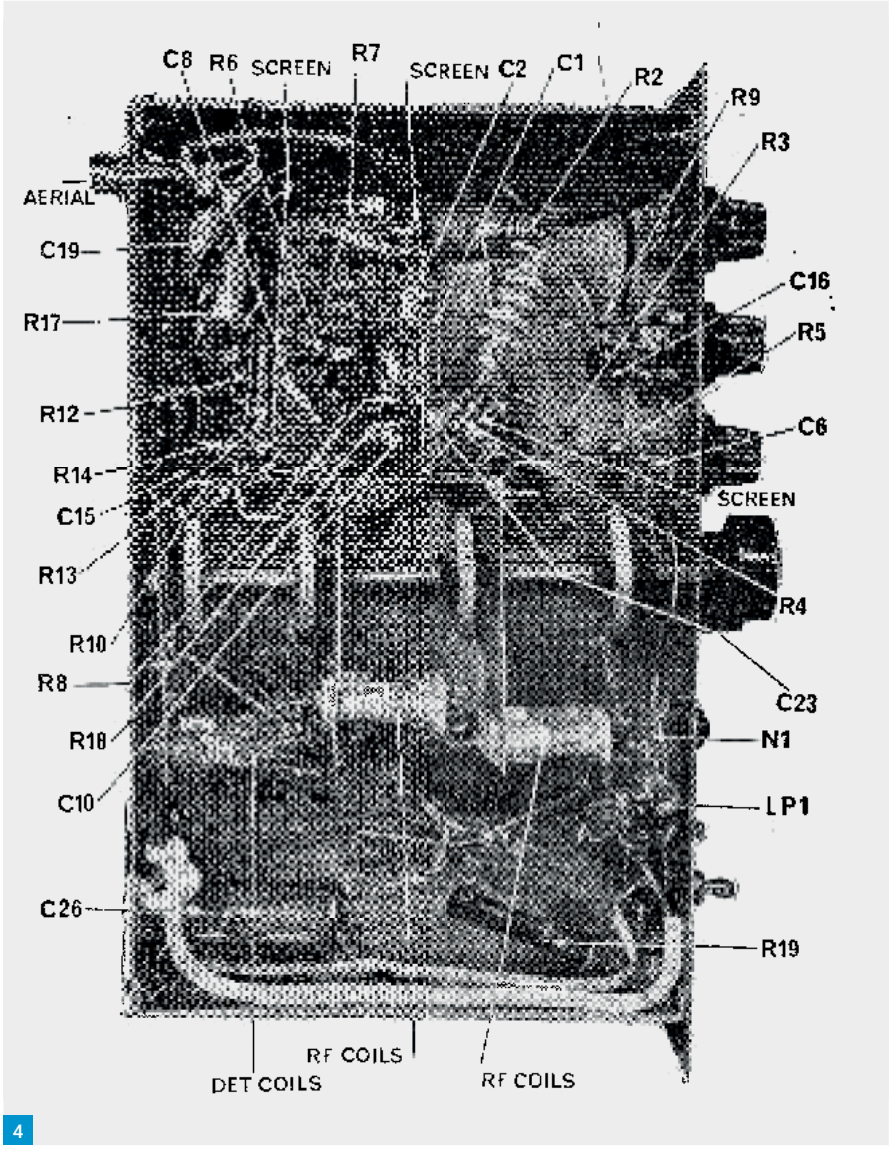
Each valve is screened from its neighbours with a strip of tinplate to help eliminate interaction between stages. Note also the extra screen across V1 which shields the triode section and its components from the pentode section. We don't want our hard won selectivity and isolation ruined by signal leaking round by various alternative paths.

Although there is more to this one than the average t.r.f. it is really no more difficult to wire up. If you can wire up a simple one valve circuit, then all you have to do is just that - six times! The obvious rules apply and are no different from any other unit construction. Heater leads twisted and kept away from the grids and associated components, wire these first, tuck the leads out of the way and wire 0.01µF disc ceramics across the heater pins at each valve base using the shortest possible leads. Keep anode and grid wiring as far apart as possible and make sure, very sure, that all soldered joints are "good uns".

The main tuning capacitor has a 10:1 reduction drive fitted. On the H.F. bands a greater reduction would be an asset due to the dozens of stations receivable. The dial pointer was made from a piece of thick celluloid and locked in position with the lacking nut on the slow motion drive.

Bandswitching

As shown, the receiver covers approximately 1.5 to 30Mc/s in three switched bands. There is no reason at all why plug in coils should not be used and this would only require three B9A valveholders in place of the bandswitch. By this means the tuning range of the receiver could be extended to cov-



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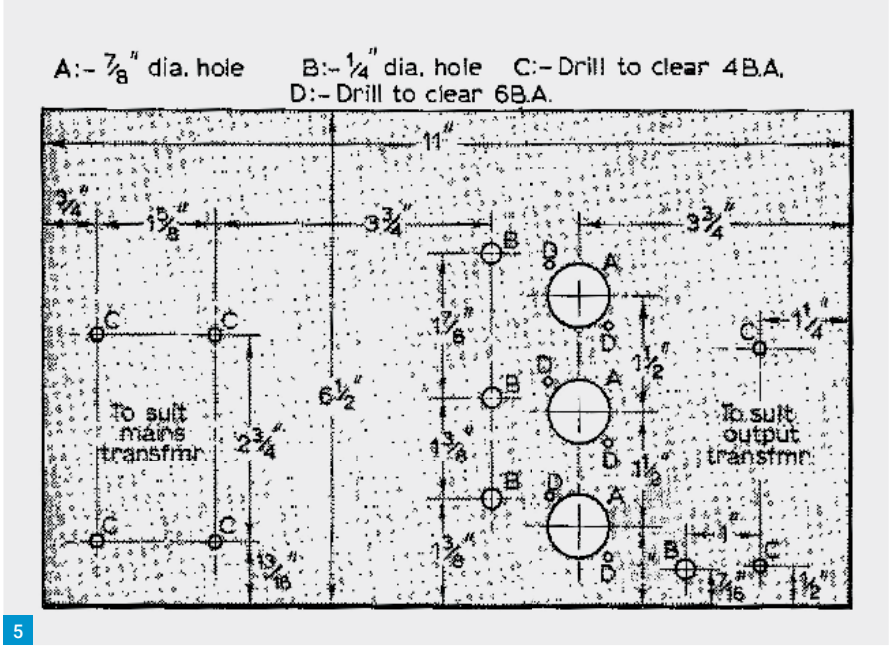

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er M.W. and L.W. Details of the bandswitch and coil unit are given in **Fig. 3**. Your scribe must confess to an oversight here in that when the unit was finished it was thought impossible to adjust the cores of the coils in order to align the receiver. However, by drilling holes in the screens to allow a fret saw blade through in line with the coil slugs this disaster was avoided.

To obtain peak performance the cores of the coils should be adjusted for maximum signal. The r.f. coil cores should be fixed before the unit is installed, the second r.f. stage and detector coils can then be peaked after the coil pack is fitted in position.

The reaction feedback capacitors C12, C13, C14, will require a value between 50-200pF. The best idea is to use a 200pF trimmer in these positions and adjust for the set to just oscillate when VR2 is at minimum. Alternatively various fixed values might be substituted until a satisfactory value is found. There are no trimmers across the coils, if there were then these could be peaked instead of the coil cores. Would-be constructors might care to think along these lines before commencing construction. Dimensions are given but these will depend on the actual components used. An underchassis layout photograph is given in **Fig. 4**. Purchase all components first, lay them out on the chassis and then, only then, start drilling,

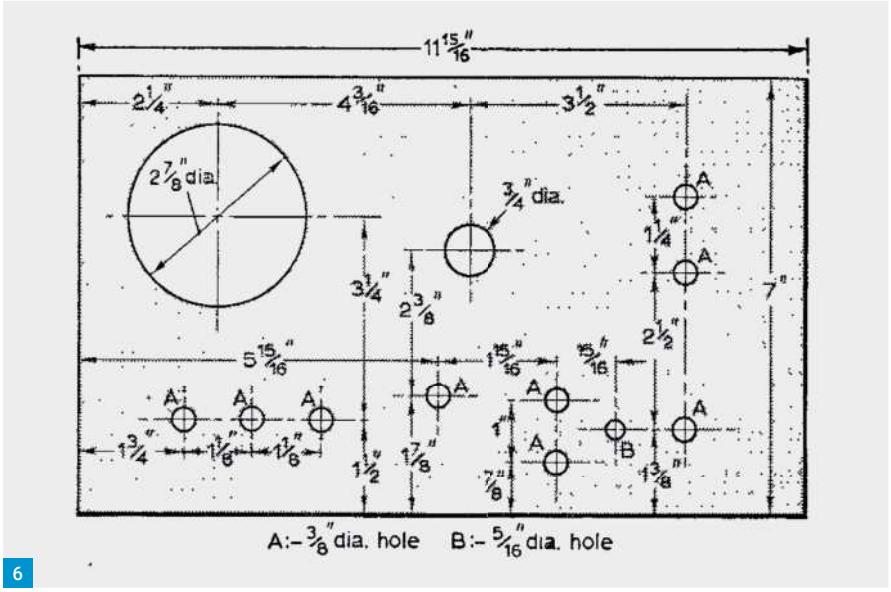
The loudspeaker in/out switch is optional if phones only are to be used. Also the power indicators, N1, N2, LP1, might be dispensed with since it is rather a luxury to have visual indication of mains, h.t., and heaters, perhaps fuses would be more useful. Certainly the inclusion of a fuse in the lead from the centre tap of the mains transformer to earth would be a wise precaution.

There is room beneath the chassis to install a smoothing choke for those who prefer this type of circuitry. If this is adopted then choke input is strongly recommended.

The mains transformer shown is a standard item although 80 mA is a very generous rating since the set only draws some 15-20 mA. Any transformer rated from 30 mA upwards at 20 volts will serve. Similarly almost any choke which will pass 30 mA may be used for the choke input circuit suggested. The dials and wording are all hand-made to suit using scraper board, while the case is a standard item but with its front panel re-sprayed. Almost any output transformer will suit for T1 if phones only are envisaged. Incidentally, if phones and speaker are to be used together then the phones must be high resistance, say, 2000-4000Ω. Using low resistance phones will result in a drastic reduction in volume from the speaker.

Panel Controls

These controls are fairly straightforward but, due to the very high sensitivity, the setting of the r.f. gain does affect the reaction control to some slight degree. However, the r.f. gain pot. is extremely



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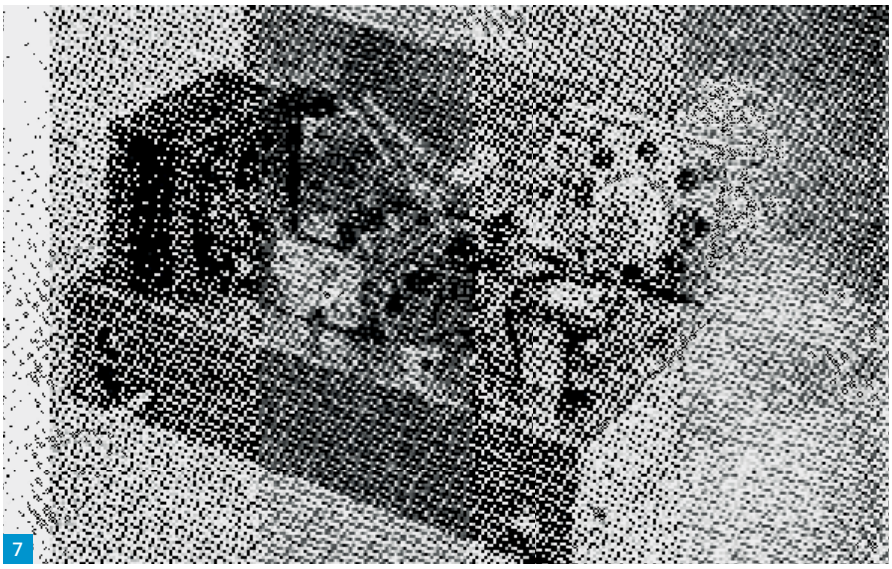

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useful on strong signals, particularly the Light Programme, Luxembourg, pop pirates, etc., as it prevents the detector from being overloaded. The input circuit is designed to accept a low impedance input but any length of wire plugged in will receive signals. The prototype was fed from a 100ft. long wire via an aerial tuner unit. This method is strongly advised not merely for this receiver but for all those which cover the short waves. In this way it is possible to cover almost any sector of the short waves spectrum and still present a nicely matched 80 ohms to the input of the receiver. As will be appreciated, the impedance at the end of a random length of wire will vary, its exact value depending upon the frequency in use. Since the receiver is designed to accept an 80Ω input, any value other than this will present a mismatch, and thus the efficiency of the unit will be impaired. A dipole cut to a particular band, will automatically present this 80Ω impedance but the dipole is essentially a one-band device. (A dipole cut for the 7Mc/s amateur band, will present around 90Ω's on the 21Mc/s amateur band, which can be tolerated.)

The reduction drive of 10:1 is quite adequate on the lower and middle range. However on the 10-30Mc/s range, crowding of stations is noticeable and an even greater reduction is desirable. Constructors who like to experiment might consider putting a 3-gang variable capacitor of say 25pF per section in parallel with the main tuning capacitor. However if this idea is adopted due allowance should be made in the layout.

Set r.f. gain, a.f. gain and reaction to half way and tune in the signal. Adjust the r.f. control for max. signal, then turn up the reaction. The r.f, gain may now need a slight adjustment. If greater volume is now required turn up the a.f. gain. For reception of a.m. signals and B.C. stations the reaction should be advanced to the point just before it commences to oscillate. For c.w. reception it should be adjusted to just on the point of oscillation. **PW**

Components List

Resistors

R1 330Ω
R2 27kΩ 2 watt
R3 100kΩ
R4 4.7kΩ 1 watt
R5 82Ω
R6 100kΩ
R7 4.7kΩ 1 watt
R8 470Ω
R9 100kΩ
R10 2.2MΩ
R11 47kΩ
R12 10kΩ
R13 22kΩ
R14 10kΩ
R15 220Ω
R16 470kΩ
R17 15kΩ 10 watt
R18 330Ω
R19 10kΩ 10 watt
All 1/2W. except where marked

Capacitors

C1 0.001μF
C2 0.001μF
C3 4.7pF
C4 0.01μF
C5 0.01μF
C6 0.01μF
C7 4.7pF
C8 0.01μF
C9 0.01μF
C10 0.01μF
C11 4.7pF
C12, C13, C14 see text
C15 100pF
C16 0.01μF
C17 470pF
C18 0.01μF
C19 32μF 250V. electrolytic
C20 25μF 25V. electrolytic
C21 0.01μF
C22 0.01μF
C23 25μF 25V. electrolytic
C24 0.1μF
C25 01μF
C26 32+32μF 350V.
C27 8μF 450V. electrolytic

Valves

VI ECF82/6U8
V2 ECF82/6U8
V3 ECF82/6U8

Miscellaneous

VC1, VC2, VC3 3 gang 300pF
VR1 10kΩ pot.
VR2 25kΩ pot.
VR3 500kΩ pot.
D1 BY100
D2 BY100
3 Coils Yellow Range 3, 4, 5
3 Coils Yellow Range 3, 4, 5
3 Coils Green Range 3, 4, 5
(Denco miniature dual purpose coils)
Switch 1P 3W 4B Code SS/666 Specialist Switches Ltd., 23 Radnor Mews, London, W2. (24/- inc. p. & p.)
SPST (Speaker in/out)
DPDT (Mains on/off)
Co-ax. socket, 3Ω loudspeaker
6.3V. 0.3A bulb, Slow motion drive 10.1 (Eddystone)
Jack socket, Knobs, Dial, etc.
T1 Radio Spares Standard O.P.T.
T2 Mains Transformer 250-0-250 80mA. 6.3V. 3A.
3 B9A. valveholders, N1, N2 mains neons (Bulgin type)

Rallies & Events

All information published here reflects the situation up to and including **28th September 2022**. Readers are advised to check with the organisers of any rally or event before setting out for a visit. The Radio Enthusiast website **www.radioenthusiast.co.uk** has the latest updates, please check it regularly. To get your event on this list, e-mail the full details as early as possible: **wiessala@hotmail.com**

7-9 October
THE RSGB CONVENTION:
https://tinyurl.com/34e7m8ya

14-15 October
THE NATIONAL HAMFEST 2022: George Stephenson Pavilion, Newark & Nottingham Showground, Lincoln Rd, Winthorpe, Newark, Notts. RG24 2NY (Local and international traders; B&B | Books | CBS | Clubs | CR | FM | RSGB | SIG). Tickets can now be purchased online.
http://nationalhamfest.org.uk

14-16 October
JAMBOREE ON THE AIR / INTERNET (JOTA/ JOTI) 2022: Ready for an amazing digital and radio Jamboree?
JOTA-JOTI 2022 promises to be the best ever, with an improved digital & offline experience for participants around the world.
With so many opportunities to learn, play and connect with others, the Scouts are here to help guide your experience in a new way […]
https://tinyurl.com/28kf4n6y
https://tinyurl.com/332cyyvj
https://tinyurl.com/tarw8hny

16 October
HORNSEA ARC RALLY: Driffield Show Ground, Driffield, East Yorkshire YO25 9DW.
www.hornseaarc.co.uk

22 October
BATC CONVENTION FOR AMATEUR TV (CAT 22) (PART 2 (ONLINE): Online talks about ATV-related topics from 10 am until 3 pm.
http://batc.org.uk/live
https://tinyurl.com/3hvkyanu

22 October
ESSEX CW BOOT CAMP/ CW CONVENTION: 3rd Witham Scout & Guide HQ Rear of Spring Lodge Community Centre Powers Hall End Witham Essex CM8 2HE. Doors open at 08:30 for registration. Begin 09:00. Finish approx 16:30.

Entry is £10, with free drinks; Pre-register with G0IBN as places are limited (CR | FP).
Tel: 0745 342 60 87
g0ibn1@yahoo.com

30 October
GALASHIELS RADIO RALLY : Volunteer Hall, St Johns Street, Galashiels, TD1 3JX. Open from 11 am. (BB | CR | TS).
http://galaradioclub.co.uk/?cat=7

30 October
HACK GREEN RADIO SURPLUS HANGAR SALE: Hack Green Secret Nuclear Bunker, Nantwich, Cheshire CW5 8AL.
Sale of electronic equipment, amateur gear, components, military radio items, and vehicle spares. The doors are open at 10 am.
Tel: 01270 623 353
www.hackgreen.co.uk
coldwar@hackgreen.co.uk

6 November
BUSHVALLEY ARC RALLY: Limavady Football Club. Doors open at 11 am; entry is £3 with a door prize ticket.

6 November
HOLSWORTHY RADIO RALLY (HARC) : Holsworthy Leisure Centre, Well Park, Western Road, Holsworthy, Devon EX22 6DH. Traders from 8:00 am; doors open to the public at 10 am. (BB | CR | D | TS) . Traders & General Enquiries, Contact the Club Secretary:
m0omc@m0omc.co.uk
https://tinyurl.com/yckypn5v

19 November
THE ROCHDALE & DISTRICT AMATEUR RADIO WINTER RALLY: The Rochdale & District Amateur Radio Winter Rally will take place in St Vincent de Paul's Hall, Norden, Rochdale, OL12 7QR. Doors will be open at 10 am with the entry fee still only £3 (CR | FP | TS).
rozallin@gmail.com
dave@cardens.me.uk
Tel: 01706 633 400
Mob: 0781 367 1296

19 November
WILTSHIRE WINTER INDOOR RADIO RALLY: Kington Langley Village Hall & Fields, Church Road, Chippenham, Wiltshire SN15 5NJ. Doors are open from 9 am to 1.30 pm. £2 entry for buyers (under 16s free). £10 per table for sellers (CR | D). To reserve tables contact Brian G6HUI via e-mail:
rally@chippenhamradio.club
Chairman@g3vre.org.uk
https://tinyurl.com/ykyhf7nc

20 November
CATS 43RD RADIO AND ELECTRONICS BAZAAR: Oasis Academy Coulsdon, Homefield Road, Coulsdon, Surrey CR5 1ES. Doors open from 10 am to 1 pm.
Tel. 07729 866 600
bazaar@catsradio.org.uk

27 November
BISHOP AUCKLAND RAC RALLY: Spennymoor Leisure Centre, High St, Spennymoor DL16 6DB: Radio, old and new, computers & electronics. Takes place in a large ground-floor hall.
Doors open at 10.30 am (10 am for disabled visitors). Admission is £2 - under 14s free of charge with an adult. (BB | CR | D | FP | TS).
Tel: 07710 023 916
g4ttf@yahoo.co.uk

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

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Telephone 01788 574774

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NATIONAL PANASONIC RF3100L DR31 SW/MW/LW/FM Radio in very good condition.
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Godfrey G4GLM: (020) 8958 5113
cgmm2@btinternet.com

LOWE-HF – 150 RECEIVER, preferably in working condition.
Tel: 01425 837296

OLD HALF INCH FERRITE RODS. Must be half inch 12.7mm in diameter and be six inches long or more will pay good money for the old rods.
Contact Peter Tankard on 0114 2316321 or email: peter.tankard@gmail.com
SHEFFIELD

For Sale

IWATSU 55-5710 60 mhz dual beam oscilloscope (rectangular screen). C/W, full manual, 2 through probes, 2x10 probes, BNC T pieces, all in attached soft carry case. £150
Call Tony: 07747 732366

For Sale

Two NOS unused REGUN TELEVISION CRTs A51-590X and A56-140X. Two NOS unused A56-150X television CRTs. Any offers please but must be collected.
Paul: 01603 898715 or email: paulburgess68@btinternet.com

DRAKE 2C Receiver, Good condition and working order, £170 ono **ATS 20 Multiband Receiver,** As new good condition and working order, £40 **SIGNAL CORP. 537S Airband Receiver**, works on vco, not sure if xtals fitted. good condition £40 **PCR COMMUNICATIONS/ Broadcast Receiver,** rebuilt resistors/ capacitors/bfo/psu/valves/built in speaker/resprayed. £90 ono **HAMEG HM 204-2 Oscilloscope,** twin beam good condition/working order £45
Tel: Rob 01273 834355
email: shadobi23@gmail.com SUSSEX

Exchange

Have a Yaesu FT60 h/held, in very good condition. Boxed, with all original accessories, looking for a decent Kenwood TH-F7 h/held in exchange.
Tel: Alan 0191 2534588 5pm-10pm

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E-mail: practicalwireless@warnersgroup.co.uk

Radio Constructor

Dear Don,
I was interested to read the letter from **Roger Dowling G3NKH** in the October issue. I too remember Dick and Smithy in the *Radio Constructor* magazine. I would put their adventures on a par with those of **Les Lawry Johns** in *Television* magazine.

I have to admit that Dick and Smithy were sort of behind my inspiration for the Lab Tutorials that I write for *PW* where there is an experienced engineer passing on his knowledge to a younger person.

Roger says that the author of *In Your Workshop* was **JR Davies**. Like yourself I never knew that but I seem to remember several books of the era about television servicing etc written by a JR Davies being advertised in the electronics magazines of the day.

Chris Murphy M0HLS
Derby

CWT?

Dear Don,
I listened on 40m this morning and was very confused as to what was going on. I looked online and found something on *YouTube*. From what I heard this morning it would be;
G4GHB cwt.
A station calls.
Bill F.
A reply.
TU.
Start again, G4GHB cwt.

No power given, no signal report and I doubt they would work a weaker station as they want to fill up their logbook fast, no aerial details, no QTH. Just a collection of callsigns to show for my effort. I hope the future of amateur radio is not going this way.

Not my idea of a contact. I'll stick to what I'm doing, even having had a few contacts where we have given each other 229 reports, hard work but satisfying. Far more of an achievement than quickly filling the logbook with 60 callsigns in half an hour. My QRP to another QRP station I find especially rewarding.

Bill Kitchen G4GHB
Ashton-under-Lyne

*(**Editor's comment**: Hi Bill. Thanks for your letter. What you ran across was the CWops activity event, every Wednesday. No signal reports required, exchange name and, if appropriate, CWops membership number. It's been mentioned several times by **Roger Cooke** in his* Morse Mode *column. It lasts for an hour - I'm not sure why some members try to squeeze in as any contacts as possible because there are no listings or awards for 'leading' stations - make at least 10 contacts in the hour (easily done) and you get a point towards the medals that are handed out at the end of the year. I guess it generates CW activity on the bands but, to me, it sometimes feels a bit like Groundhog Day, doing the same thing once a week!)*

Non-Availability of PW

Dear Don,
Harrogate's WH Smith has not received *Practical Wireless* yet again. I was told Menzies (distributor) had not delivered the September issue. When I asked Menzies they replied that data protection prevented any discussion with me and referred me back to WH Smith. I obliged, and the shop told me of two telephone conversations with Menzies basically saying insufficient stock for any shops other than those early on the delivery run. I reported back to Menzies who answered as before – full circle. *Practical Wireless* is the only public magazine for amateur radio. If it doesn't appear in shops each month, then random recruitment is not possible. You can only subscribe when you know it's there. It's rather like a CQ versus a mobile phone call. Without the chance encounter, half the fun of amateur radio is missed. We can't afford to lose any potential recruits.

David Andrews G4CWB
Harrogate

*(**PW Publisher Rob McDonnell responds**: Thank you for your letter David, and we wholeheartedly agree with you, which is why we distribute* PW *as far and as wide as is reasonably possible. However, in this particular case – upon investigation – Menzies took it upon themselves to reduce the number copies to this particular store! We've instructed them to increase the number of copies back to the levels we originally requested.*

All magazine publishers are reliant on wholesalers and retailers (like WH Smith) to keep up their end of the bargain. Unfortunately, we only find out when they haven't AFTER the event. So, always let us know if your local newsagent is struggling to get the copy of PW. *We'll fix it!*

Of course, the best way to get any magazine is to subscribe. You get it earlier and cheaper than in the shops, plus the publisher makes a little bit more money (you wouldn't believe how much money we have to give WH Smith!). To subscribe to PW *simply call 01778 395161 and our friendly UK-based team will walk you through it. Or why not read a digital copy, like literally thousands of* PW *readers now do? Simply go to **www.pocketmags.com** where you can get a copy of* PW *for any platform or device.)*

Adana Memories

Dear Mike and Don,
Regarding using the Adana printing press. Well, when I attended Fairlop school near Ilford in the early 1970s, one of the clubs we had at school was a printing club.

It was run by the Art t*eacher who taught us at lunch times or after school how to use a composing stick and put together a printing project. We were given a free reign to print tickets, invitations, Christmas cards etc.*

Although I wasn't licensed at the time I held a A8163 short wave listener code issued by the RSGB. So over the last two years at school I printed a number of SWL cards and some QSLs for members of the Barking Radio Society.

After I left school I worked in London and remember going to the Adana shop in Holborn and buying my own printing machine. My Dad made me a copy of the original wooden type drawer. One drawback was always the cost of the leaded type.

*Although I have not used it for many years I still own a Adana, which has b*een stored at the back of the shed for many years untouched. Maybe now is the time to dig it out to give it a try.

Dave Thorpe G4FKI
Bedfordshire

The EC-10

Dear Don,
I read with great interest the article on the Eddystone EC-10/Mk 1 and 2. I have two Mk 2 sets plus an EB-36. How they turned up in South Australia is a mystery! It must be remembered that the EC-10 was the first attempt by Stratton to produce a transistorized receiver, and using

the technology available at the time, I think they did a great job. They are built like Swiss watches. The EB-36, although similar in appearance to the EC-10, was intended for commercial use, press agencies, diplomatic service and the like. It includes a LW band, up to 500kHz, and band 1 maxes at 22MHz. None of my sets display any symptoms of germanium-whisker growth and work just as though they came from the BathTub 50 years ago. And, I can carry them! A far cry from my S760,(also working perfectly at over 70 years old), which took three of us plus a porter's trolly to get it to my car from the local buy and sell! I really enjoy articles about vintage receivers.

Norm Lee VK5GI
McLaren Vale, South Australia

Serviceability

Dear Don,

Thanks to reviews in *PW* (and elsewhere!) we often drool after that new radio and the reviews are really helpful in making an informed choice. However, one issue that I do not see covered is the serviceability of these new radios, particularly when they come to the end of their warranty period. I aim to keep my radios for life!

There comes a time for all of us when something goes pop or just doesn't turn on and the ability to get a radio repaired expediently is very important. So, when contemplating that new or possibly second-hand purchase, where one goes to sort out problems is on the top of my list.

Why am I thinking about this now? Well, I am an Elecraft super fan. I have pretty much all of their line up and very pleased I am with them all too. So, when the new K4 is paraded my wallet gets twitchy. However as far as I can see there is nobody in the UK that services Elecraft radios anymore. Perhaps apart from warranty claims. A pal has an Elecraft linear, which needs looking at and it appears that the only option is for it to go back to the States and when it gets there it has to sit in a queue for five months at Elecraft. Not a realistic proposition for anyone who relies on their radio for the hobby. So that rather puts me off moving on to the, what appears to be, superb K4. I am sure the same goes for other manufacturers.

Now I may be misinformed (it wouldn't be the first time) and am happy to be put right. However a section in the reviews setting out the serviceability and where one goes to get a repair for a radio would be a welcome sight and a valuable consideration in making a choice.

Trevor Clapp MW0TDZ/MW0DX
Narberth, Wales

*(**Editor's comment**: You make a fair point Trevor. Unfortunately, in the course of a review, serviceability isn't likely to come up but I certainly wouldn't want to own a multi-thousand pound rig without knowing that I could get it repaired if need be. The major UK dealers have servicing facilities but I realise that they don't necessarily take care of the more specialist items such as, as you say, Elecraft transceivers or, I believe, some linear amplifiers. I'll try to ensure we address this point in future reviews where appropriate.)*

★Star Letter★

The Star Letter will receive a voucher worth £20 to spend on items from our Book Store, or other services offered by Practical Wireless

A Simple Radio?

Dear Don,

I suspect I'm in a minority, but not sure how small a minority...

I've been interested in radio since discovering the crystal set as young teenager, and have been lucky enough to spend many years operating professional radio equipment. I've been a keen homebrewer all that time, and *PW* have been good enough to publish some of my articles over the years.

The hobby of amateur radio has grown and branched enormously since I was first licensed in summer 1980. And that's the point, it's a hobby. Equipment form earlier decades was easy to use. The controls even on commercial amateur radio equipment generally had just one (or maybe two) functions. Oh, to have a modern rig that is that simple to use!

I've lost count of the number of times I've had to reach for the manual of my modern rig just to find how to switch the AGC back on after seemingly turning itself off, or exploring why the TX light comes on but the microphone can't hear me, which menu has the function to change from a straight key to a paddle, or why the receiver has suddenly put itself into mute, etc. etc.

The best receiver I have ever used (and this view is shared by my colleagues) was the solid-state synthesized Racal RA1772. No menus, no memories, no hidden functions; just really good RF performance. Their RF performance was so good that they didn't even require an RF attenuator. Imagine that! When they were introduced in 1973 the versions we had at BBC Monitoring cost over £3,000 each - a massive sum. I expect the performance of this Racal receiver would be classed as fairly mediocre now in 2022, and easily achieved.

For those of us who don't use or want all the many wings and wheels of modern amateur radio equipment, is there a big enough market for a transceiver from at least one of the well-known manufacturers that follows the principles of the RA1772, i.e. concentrate on the RF performance and remove the gizmos?

There are plenty of us who thoroughly enjoy the many functions of modern rigs, which allow us to do things that were unimaginable a decade or two ago. We are now lucky to have equipment with these features comparatively cheaply, and no one wants to return to the 'dark ages' (whatever that is!) of amateur radio. But how about those who just want a rig without a 70-page operating manual, no firmware to update, is really easy to operate and that just does the absolute fundamentals really well? It might even appeal to those new to the hobby who could get put off by the cost and complexity of modern rigs, although the extra features probably don't add much to the cost and that's why they're stuffed in. Perhaps there would also be a market for such a simple-to-use, ready-built transceiver in the developing world? There are homebrew and one or two kit designs that fulfil this role, but how about a commercial manufacturer having a go? If there is one out there already, I apologise. I've missed it.

Maybe one of the larger current SSB/data/CW kit providers (many of whom have done some truly remarkable and innovative work) would also like to consider a menu-free design, with a real tuning knob, without the product drifting into feature-rich 'mission creep'?

Ian Liston-Smith G4JQT
Fakenham, Norfolk

*(**Editor's comment**: Thanks Ian, I have a lot of sympathy. I recall a friend, a serious contester and DXer, who had built a rig from a design in* RadCom *that had, as I recall, a tuning knob, bandswitch, volume control, mode switch and bandwidth control. Nothing else. And, frankly, for most operating those are all we need. But then there are the data modes operators, wanting a PC interface (configurable), those who want to store memory channels for easy access, those who love tailoring their transmit audio and so on. And before long, we have a raft of menus and sub-menus! The best recent radio I have come across in terms of simplicity was the Elecraft K2 but even Elecraft have gone over to the dark side and the K4 has more gizmos than you can shake a stick at!)*

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

Looking Back

Dear Don,

I started work age 15 in the early 1950s, as an apprentice radio and TV engineer on £1.50 a week, and a few months later was taken on holiday with my parents to Southport. On the first day of the holiday I stumbled across an enormous pile of old *Practical Wireless* and *Practical TV* magazines on a market stall and going cheap, bought them, and much to my parents disgust, spent a large proportion of the holiday poring over them in my room, instead of getting some fresh Southport air.

When I returned to work the following week, I found the chief engineer had been struggling with a projection TV, which was suffering with frame non-linearity. He had even quizzed a few friends in the trade, but could not find a cure.

Projection TVs were notoriously dicey to work on. They generated an extremely bright 2.5in picture on a small CRT using 25,000V of mains derived EHT and projected this on to a screen up to 3 x 4ft. This was in the days of 405 line TV, and if the picture should collapse into a single line, for even a fraction of a second (while you waggled a valve with an intermittent holder or tried connection a capacitor in parallel with another for instance) when the set was on, all the energy would be concentrated into one line, and you risked burning a line permanently on the rather expensive CRT.

Fortunately, I had spotted the solution to the non-linearity problem during my holiday reading, so at 15, not having learnt much about tact, I immediately said to all the staff *"Oh I know what that is, it is the cathode bypass capacitor on the frame output valve"*.

It was, but it would have been better if I had told him when no one else was there! When another engineer later asked how he had got on with the problem, he replied, *"Well the **** apprentice solved it"*.

We live and learn!

Harry Leeming G3LLL
Huddersfield

The Leicester Show

Dear Don,

Not that I want to make either of us feel old but I thought I would mention that it is 50 years since the first Leicester Show was held. The year was 1972, the venue was the Granby Halls in Leicester and the Show was initially in the larger of the two halls, eventually expanded into the second hall.

I missed the first Show. I went to the second and most of the subsequent Shows partly because of the enthusiasm for the Show shown by local amateurs (even with several major rallies in the area). I bought my copy of the RSGB's *Radio Amateurs' Examination Manual* at the second Show.

Some years I would be at the Show as a visitor and other years I would be there as one of the team running the BARTG stand. It was fun to see both sides of the Show.

The Show moved from the Granby Halls to the Donington Exhibition Centre and had its final year at Loughborough University in 2009 (the same year that the first National Hamfest was held).

Here's some sites to browse:

https://tinyurl.com/y3tbyrrd

"Granby Halls was also well known for housing the Home Life Exhibition, boxing tournaments, skating and amateur radio."

https://tinyurl.com/pkjxbje8
Ian Brothwell G4EAN
Nottingham

The PCR Receiver

Dear Don,

As a 12-year-old in the 1960s I was an avid reader of *PW*. It helped me pass the RAE at 15 and I worked 2m for a few years before life and work got in the way.

Fast forward 40 years, and retirement and the Covid lockdown got me back into amateur radio. I have just finished reading the 90th Anniversary edition of *PW* and was fascinated by **Michael Jones's** article on the Pye PCR for several reasons. My mother was a radio operator for the SOE and I have her Morse key and copy of **FJ Camm's** *Mastering Morse*. My schoolboy short-wave receiver was a No. 19 set, upgraded in accordance with the articles in *PW*. I grew up close to the REME depot in Newark and finally, I worked for Racal as an engineer then manager for 30 years. Thanks for the memories!

Mike Dunstan G8GYW
Woodley, Reading

Next Month

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

THAT'S PHASING FANTASTIC: Billy McFarland GM6DX describes how to phase two vertical antennas for improved gain and front-to-back performance.
ACOM 1500 FAULT DIAGNOSIS – AND A SIMPLE FIX: Steve Telenius-Lowe PJ4DX describes how he located and repaired a fault on his Acom linear amplifier.
DOING IT BY DESIGN: Eric Edwards GW8LJJ has a variable DC load.
LAB TUTORIAL: Jeff and Natalie discuss waveforms.
A TOWBAR MOUNT: Daimon Tilley G4USI describes a solution for fitting an antenna to the car's towbar.
CHRISTMAS QUIZ: It's that time again – we have our usual Christmas Quiz.

There are all your other regular columns too, including HF Highlights, World of VHF, Valve & Vintage, The Morse Mode, What Next and Data Modes as well as your Letters, the latest News and more.

We may all sell the same products but the service from ML&S is in a different league.

Don't take our word for it;

I am new to Ham Radio and needed setup advice

I am new to Ham Radio and was looking for specific setup advice. I visited Martin Lynch and Sons in Staines and got exactly what I wanted. The sales assistant, John Jenkins spent over an hour with me going over every detail, drew helpful diagrams and even soldered the connections in place. All this along with friendly and useful chat. I cannot remember ever being so well treated with a technical purchase - with the possible exception of the Apple store in Regent Street. I strongly recommend this company to novices and experts alike
Mr. Romer.
Date of experience:
30 August 2022

Excellent Service

Very helpful staff when I got in touch with them, the items which I purchased was a quick and easy transaction. Pleasure to do business with. 10/10.
Anne Christian
Date of experience:
03 August 2022

I purchased an item on-line

I purchased an item on-line and needed to return it. They received the item back and refunded me without any delay and without any stress. The sign of a remarkable and well-managed company with integrity. They can be trusted and I will be back.

I rarely have to return items, but another part of my big plan - the items needed to be returned within the "cooling off" period and they (a competitor of Martin Lynch) have been a nightmare to deal with and refuse to simply comply with the law. It's dishonest and it looks like a money claim. I'm so sorry that the items I needed were out of stock at ML&S and I was forced to buy elsewhere.

This is why I'm taking the trouble to endorse Hamradio and Martin Lynch and wish that more companies in this industry were like them.

Many thanks. Much appreciated.
Date of experience:
02 September 2022

I have nothing but 100% praise for ML&S

I have nothing but praise for Martin Lynch & Sons. I sent two well packaged Radios for a trade in, they were worth a considerable sum of money, but both went missing. ML&S went out of their way to sort it with the courier with one radio found 13 days later and I was more than happy with the outcome through this company. Trust me, ML&S goes the extra mile for customers and I am very happy to recommend them 100%.

Special thanks are due to Richard and Paul in particular. Fantastic company.
MM3GQT
Date of experience:
17 August 2022

Just what I wanted

Just what I wanted, super quick delivery thanks very much.
Andrew Ward
Date of experience:
23 August 2022

I Recently I purchased a radio that…

I Recently I purchased a radio that developed a fault under warranty. I contacted ML&S who arranged for the radio to go back to them, repaired and returned to me. The whole experience was organised and painless for me, the staff were helpful and cared about my problem. Good old fashion customer care. Would recommend them most highly and will purchase again.
Robert
Date of experience: 07 September 2022

Have used ML&S for years and can never fault their service

Have used ML&S for years and can never fault the service, be it telephone support or order processing and delivery. Highly recommended.
Graham McCusker
Date of experience:
05 September 2022

What can I say but carry on as the service is first rate by a mile

What can I say. Repeat business is always a pleasure with Martin Lynch and Sons and the team. First rate goods be they new or old . Delivery first class. Support first class. I shall be looking in late September for a new shack in a box .Yaesu Ft 991A and some accessories. All the best from Julia Merton, G7LJL
Date of experience:
05 September 2022

Just a top ham radio shop good website

Just a top ham radio shop good website fast postal service super safe way to pay like PayPal just keep up the good work
Date of experience:
18 August 2022

Delighted

The Orion 2 roofing filter arrived well packaged in immaculate condition, as represented. It functions perfectly.

I've been trying to acquire one for years. I was especially impressed with the professionalism of the entire transaction.
Jack Preston
Date of experience: 07 September 2022

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- Display is not included. The image is shown with an optional third-party external display that may be connected using a DVI-D digital cable.
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The Blitz

IN COLOUR

THE BOMBING BLITZ 80 YEARS COMMEMORATIVE ISSUE

The story of Nazi Germany's failed bid to bomb Britain into submission during WWII

The Blitz IN COLOUR

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Welcome

The Blitz is an event in British military history which will forever remain embedded in the collective national consciousness. And, however doubtful the value or relevance of such a term might be in the 21st Century, the expression 'Blitz Spirit' has endured across the 80 years since the Blitz to suggest a spirit of resilience in the face of hardship and adversity. However inappropriate its application might have been to any event suffered nationally across subsequent decades, the fact that the expression is very much part of the English lexicon - and something which is universally understood – speaks volumes as to the impact that the events of the Blitz had upon the British psyche.

With the word's origins attached to the German word 'Blitzkrieg' (meaning Lightning War), the single term Blitz has evolved to be understood as the bombing of British cities by the Luftwaffe. Primarily, of course, the Blitz is associated with the German air assault on London between September 1940 and May 1941. However, it is important to recognise that the Blitz involved the majority of British cities: including Glasgow, Belfast, Southampton, Bristol, Coventry and Birmingham. That list, though, is not in any way exhaustive. It is also the case that a huge number of other towns and villages came in for attention by the Luftwaffe across almost the entire duration of the war, and not just the period of the September 1940 to May 1941 Blitz. Additionally, the nation was also attacked from the air and from the sea during the First World War, too.

In this publication, then, we have looked at the whole range and scope of attacks against the entirety of the British Isles (including the First World War) which largely targeted the civilian population and industrial or non-military objectives. During the Second World War, this also includes the devastating Tip and Run attacks against largely coastal towns as well as the fearsome V1 Flying Bomb and V2 rocket attacks.

Throughout the Second World War alone, a total of 60,595 civilians were killed as the result of air attacks. Putting this figure into perspective against Britain's total number of military fatalities during the war (376,239) it represents around 16% of that total.

While the very largest percentage of those civilian casualties were suffered in the big towns or cities, it is hard to find a single rural community across mainland Britain which did not suffer a fatality or casualty. Thus, the Blitz on Britain affected almost every single community. And the whole nation was on the front line. Or potentially so.

In this publication to mark the 80th anniversary of the main part of the Blitz, we have looked at a wide range of related topics, examined how Britain was defended, how it was attacked and how the civilian population withstood an extraordinary assault.

In compiling this record of the varied attacks on Britain, we have examined that period through a range of colour images, including photographs that have been colourised specifically for this publication.

We hope that you enjoy this unique look at one of the most dramatic periods in Britain's recent history.

This publication is dedicated to the memory of the 60,595 innocent civilian lives so cruelly taken during the nation's dreadful ordeal under fire.

Andy Saunders
Editor, The Blitz in Colour

The Blitz IN COLOUR

INSIDE THIS COMMEMORATIVE PUBLICATION

CONTRIBUTORS

Richard J Molloy

The colourisation artist for this project was Richard J Molloy who specialises in the digital colourisation of historic images. His particular interest is with military subjects and he is a regular art contributor to Iron Cross magazine, also by Warners Group Publications Plc.

Using research based on known colours, and sometimes using period colour charts, Richard constructs accurate representations of period images. His evaluation of those images often requires forensic research to properly represent the image being coloured.

This piece of work on the Blitz on Britain is Richard's second such project for Warners Group Publications Plc, his first being Battle of Britain in Colour published in 2020.

Samples of Richard J Molloy's work may be viewed by searching:- @colourbyRJM

Andy Godfrey

The aircraft colour profile artwork for this publication was by Andy Godfrey of the Teasel Studio.

Andy specialises in bespoke profile artworks for publication and commission.

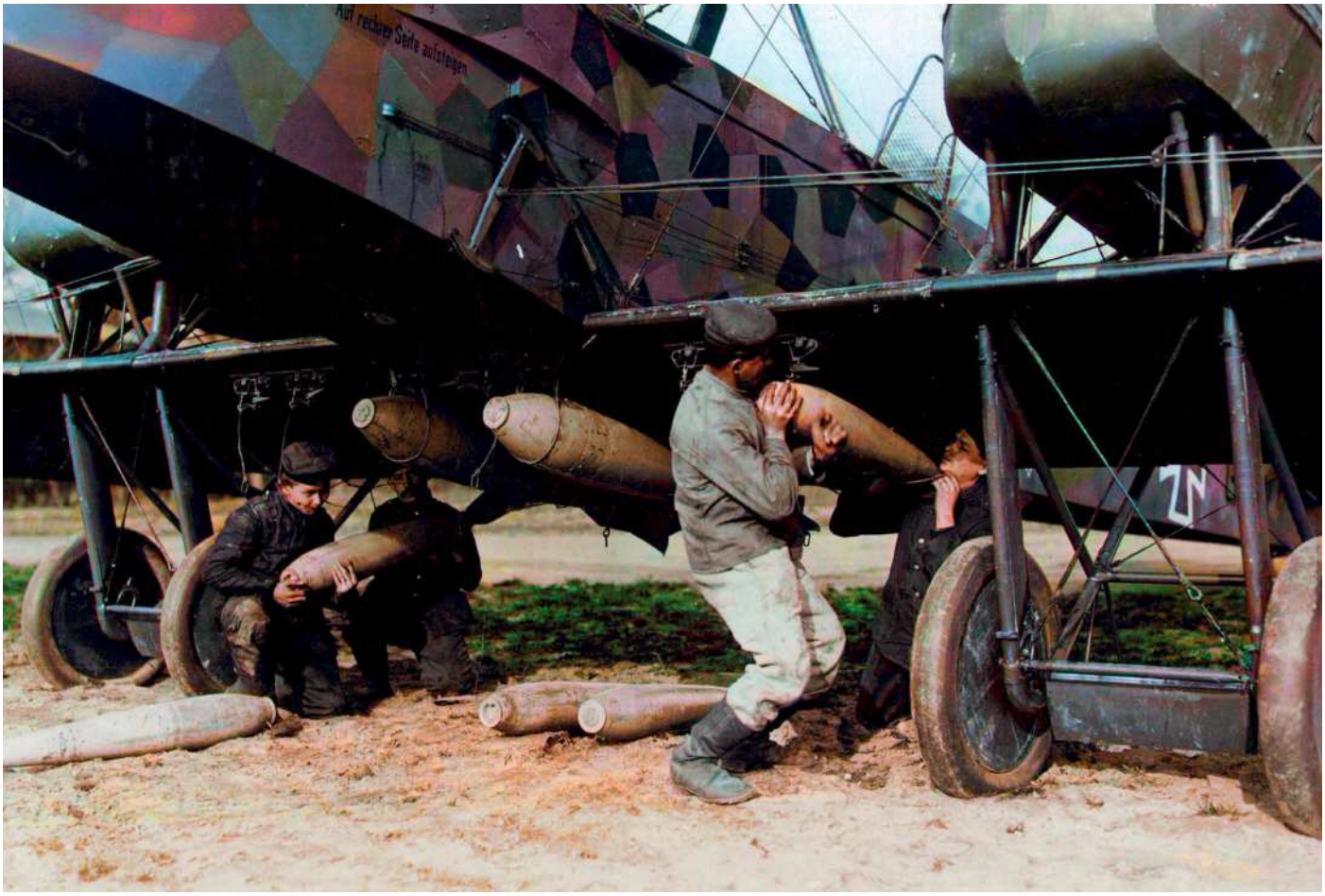
Working from his studio near Hastings, East Sussex, his work draws on an extensive reference collection, gathered over five decades, a deep fascination with aircraft and specialist knowledge of colours and markings.

For enquiries:- teaselstudio@yahoo.co.uk

Acknowledgements

The editor wishes to thank Ian Castle, Austin J Ruddy and Steve Hunnisett for their individual and valuable contributions to this publication.

Cover Story Focke-Wulf 190 fighter-bombers streak away from Eastbourne on 4 June 1943 after one of the devastating tip-and-run attacks endured by the town. **Artwork by Piotr Forkasiewicz**



‘No Longer an Island’

At the dawn of the 20th century, Britons slept soundly in their beds, safe in the knowledge that the Royal Navy protected the coastline from enemy aggression. However, advances in aeronautics soon exposed the country to assault from the air.

In July 1900, a retired German Army officer, Count Ferdinand von Zeppelin, launched his first eponymous airship using lighter-than-air gas, hydrogen, to lift its great bulk into the sky. Over the next years, von Zeppelin continued to experiment and by 1910 Zeppelins were operating regular flights over Germany. It was a fact not underestimated by the German military.

Six years later, aeroplane development had progressed slowly in comparison to airships, and when an aviation pioneer claimed a prize for being the first to complete a flight of over 100 metres in 1906 there was little reaction. However, a newspaper baron, Lord Northcliffe, recognised its stark significance, remarking:

‘England is no longer an island.’

Despite this early warning, Britain had little in the way of air defence when the country declared war on Germany in August 1914.

HATRED FOR GERMANY

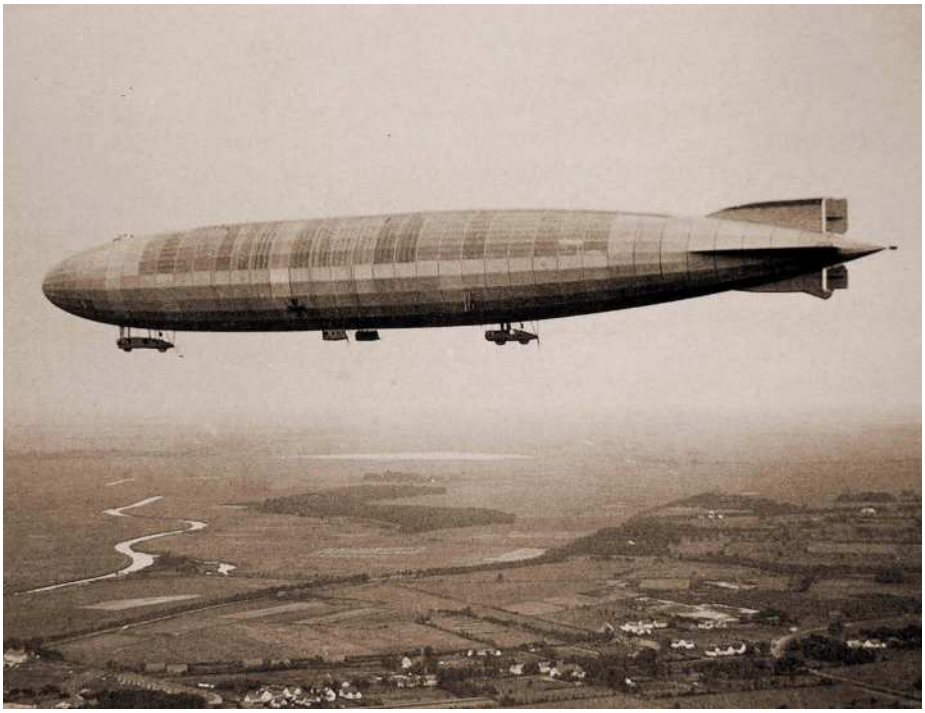
At that time, the Army and Royal Navy each had an air arm, the Royal Flying Corps (RFC) and the Royal Naval Air Service (RNAS). When the RFC accompanied the British Expeditionary Force to the battlefields of Europe, the RNAS accepted responsibility – temporarily – to defend Britain against aerial attack. Other than a diverse collection of 50 seaplanes and landplanes, there were just a handful of efficient anti-aircraft guns defending military installations. London only received its first guns – three ineffective one pounders – four days after the declaration of war.

There had never been a sustained aerial bombing campaign before and nobody could be sure what impact bombs falling amongst the civilian population would have on morale. In Germany, as early as August 1914, Paul Behncke, Deputy Chief of the Naval Staff, expressed his belief that attacks on London were likely:

‘...to cause panic in the population which may possibly render it doubtful that the war can be continued.’

Later, in October 1914, he warmed to his subject:

‘We dare not leave untried any means of forcing England to her knees, and successful air attacks on London, considering the well-known nervousness of the public, will be a valuable measure.’



Facing Page Ground personnel load 50kg bombs onto a Gotha G V, preparatory to an air raid against Britain.
Above Bomb damage in Great Yarmouth during the first Zeppelin raid on Britain. The bomb that wrecked this house in St. Peter's Plain also claimed the lives of the first two people in Britain killed by a bomb dropped from the air: Samuel Smith (aged 53) and Martha Taylor (72).

He was wrong. When bombs did start to fall across Britain there was no crumbling of morale but instead a hatred for Germany as its bombs killed innocent civilians as they lay asleep in their beds. And anger, too, that the British military appeared, initially at least, to have no effective means to oppose the raids.

AWE AND WONDER

The first significant raid took place in January 1915, when two Zeppelins bombed Great Yarmouth, King's Lynn and a number of Norfolk villages, claiming the lives of four and injuring 16 others. Something that seemed impossible just a few years earlier had become reality. And when those first bombs exploded, they opened-up a whole new theatre of war: The Home Front.

The experiences of those on the ground living through the raids varied enormously. Many people in Britain had not even seen an aeroplane before the war, and so when one of these huge airships passed over the blacked-out towns, cities and villages, illuminated by searchlights while moving serenely

on, they aroused widespread awe and wonder. Others, meanwhile, were simply – and understandably - terrified.

Air raid warnings were left to the discretion of local authorities and where such arrangements existed, they took the form of hooters or whistles sounded at factories or by the raising and lowering of gas pressure, which changed the brightness of lights in homes and workplaces. In London, though, there was no air raid warning system. Although debated, the government concluded

Top For residents of Britain du
World War, the Zeppelin wa
awe, wonder and fear.
Above Left In 1915
attacking Britain
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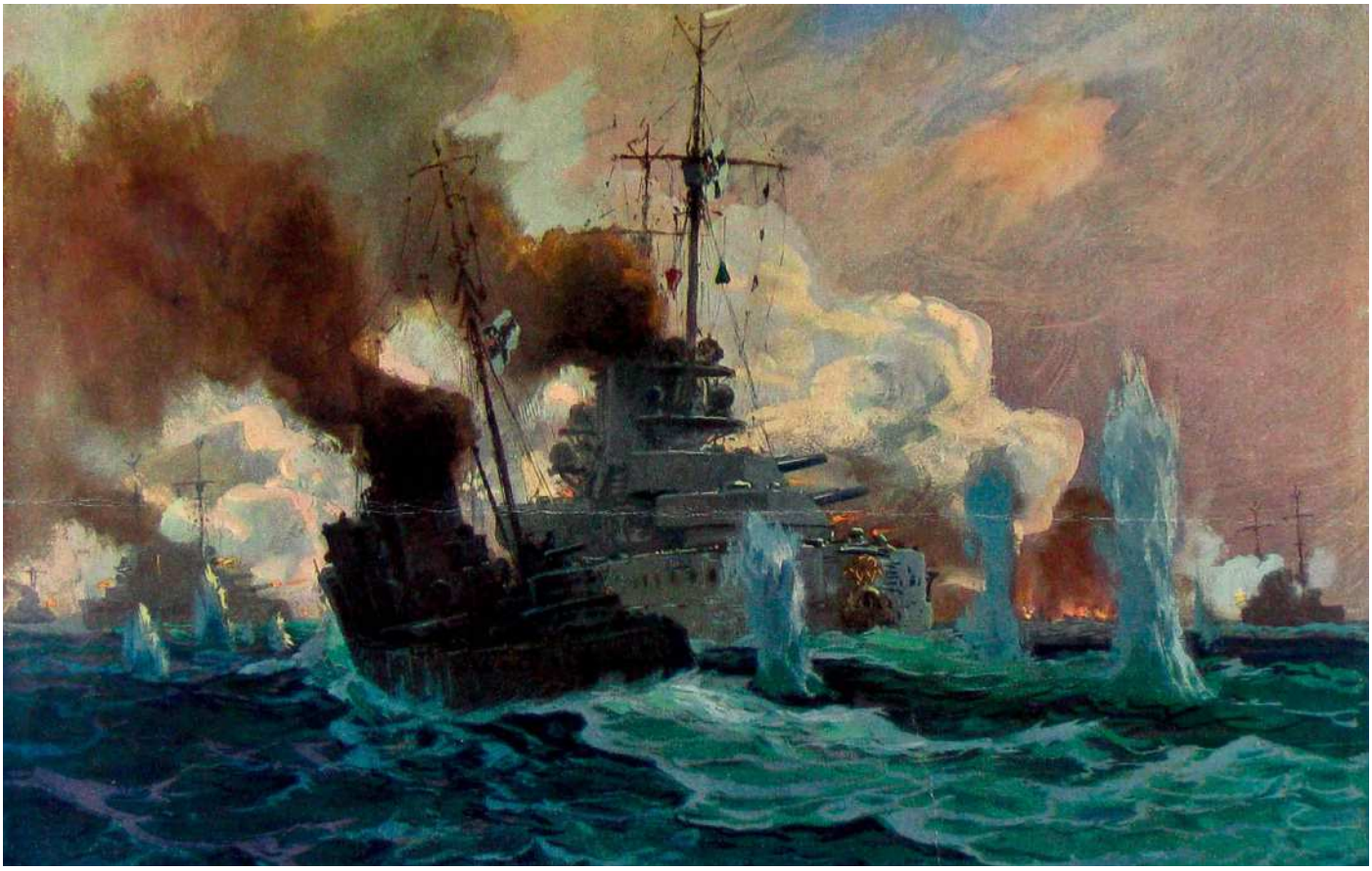

Beachfront Broadside

German raids against Britain usually involved air attacks, but during the First World War the German Navy also shelled several British towns from the sea.

Although geographically the closest town to Germany, the residents of Lowestoft were not particularly concerned that war would come to them in any real way when it broke out in August 1914. However, on the night of 15/16 April 1915 that complacency was dispelled when the town was raided by a Zeppelin. Terrifying though it was, the attack resulted in relatively little damage although it was a portent of things to come. War would arrive in Lowestoft with a vengeance just over a year later.

Plans to bombard towns on the east coast at daybreak on 25 April 1916, from the cruisers and destroyers of a battlecruiser squadron, along with Zeppelin raids the night before, were intended to entice the Royal Navy to battle. If successful, the High Seas Fleet might destroy significant elements of the British Fleet, reducing or eliminating the Royal Navy's numerical superiority. In addition, it was timed to coincide with an expected Easter Rebellion by Irish Nationalists.

As targets, Lowestoft and Great Yarmouth were selected because the former was a minelaying and minesweeping base, while Great Yarmouth housed submarines disrupting German movements. The destruction of harbours and military establishments there would assist the war effort - even if it failed to bait the British.

In a well thought out plan, with eight Zeppelins dropping bombs and providing reconnaissance, the ships could assist if an airship was lost over water. Two U-boats were also sent ahead to Lowestoft, while others laid mines against vessels despatched south to engage the German force.

'BOMBS UNLAWFULLY DROPPED'

At noon on the 24th, operations began with the intention of putting the bombardment group off Lowestoft and Yarmouth by daybreak to bombard them for 30 minutes. But, at 16:00, disaster struck as the battlecruiser *Seydlitz*, in the vanguard of the force, hit a mine and was forced to turn back with a 50 ft gash in her hull.

The British, aware that the German ships had sailed, received information at 20:15 they were heading for Yarmouth and at 15:50 the fleet was put on two-hours-notice, finally ordered south from Scapa Flow at 19:05. Around midnight, the Harwich squadron of three light cruisers and 18 destroyers was ordered north.

Meanwhile, the airships had dropped their bombs while reporting visibility over land as poor, the winds unfavourable and the towns better defended than thought. However, whilst causing widespread terror, the bombs only resulted in one death: 79-year-old Fanny Gaze at Hall Farm, Horning, with the coroner later recording:

Facing Page A German painting by the artist Professor Hans Bohrdt of the bombardment of Lowestoft on 25 April 1916.
Right This imposing house on the Esplanade was cut in two by one of the German naval shells.
Below Left A series of commemorative postcards were produced to mark the bombardment of Lowestoft, this card showing damage at Cleveland Road.
Below Right Bombardment of another of Britain's coastal towns had taken place in Scarborough on 16 December 1915, the devastating assault being used as a tool to encourage enlistment.

'Heart failure from shock endured by the terrifying effect of explosions produced by bombs unlawfully dropped from a Zeppelin aircraft.'

Finally, at 03:50, one of the German ships sighted British ships to the WSW which turned south, attempting to draw the Germans away from Lowestoft. Instead, the four battlecruisers opened fire on the town at 04:10, the terrifying bombardment lasting for ten minutes before the ships moved their attention to Yarmouth. Here, fog made targeting difficult and only a few shells were fired before reports arrived that a British force had engaged the remainder of the German ships, the battlecruisers then breaking off to join them. Yarmouth had had a lucky escape.

Unable to draw the Germans away, the Royal Navy turned towards the Lowestoft attackers, engaging the light cruisers and escorts but broke-off when outgunned by the battlecruisers which had caused severe damage to the cruiser HMS *Conquest* and destroyer HMS *Laertes* and slightly damaged a light cruiser. The Germans then ceased fire, turned NW and hoped in vain that the British cruisers would follow.

During the bombardment, the German light cruiser *Frankfurt* sank one patrol steamer, while the leader of a torpedo-boat flotilla sank another, the crews being rescued and taken POW. However, while battle at sea continued, havoc had been wreaked ashore in Lowestoft.

DEATH, DESTRUCTION & FAILURE

Fortunately, casualties were remarkably light amidst large-scale destruction and only three civilians lost their lives, despite the intensity of the attack: siblings Herbert and Annie Davey and eight-month-old Robert Mumford were killed while Robert's mother, along with Herbert and Annie's parents and their

two other children, were injured when a shell collapsed the upper floor of their home at 20 Sandringham Road. In addition, there was one service death: Petty Officer William Hollis being killed at North End House, the RN Anti-Aircraft HQ on Yarmouth Road.

Light though casualties were, damage was estimated at the then considerable sum of £25,000. Captain Jasper Mayne, East Suffolk's Chief Constable, reported:

'Damage as follows:- Convalescent Home and Porter's Lodge considerably; Headquarters RNAAS wrecked and gutted by fire; Swimming baths, London Road South, extensively; Claremont Pier land end extensively; South Pier, Naval Base, damaged; 40 dwelling houses extensively; 200 dwelling houses slightly; the telephone wires and tramway wires with part of London Road South near Swimming Bath were demolished, four shells exploded in the enclosure round the wireless station at North Lowestoft...shells were 11-inch and generally made cavities of about 10ft diameter x 3ft deep.'

The destruction would likely have been worse had the battlecruisers carried high explosive shells rather than armour piercing ones. In many cases, these merely created large holes and left unexploded ordnance lying in the streets.

For the Germans, the operation was a dismal failure, sinking only two patrol craft and a submarine by U-boat and damaging one cruiser and a destroyer. Meanwhile, the U-boats found no targets with one sunk and another captured after running-aground at Harwich. The Germans also took serious damage to a battlecruiser, only inflicted light damage to naval establishments at Yarmouth and Lowestoft and failed to take advantage of superior numbers to engage the British.

British casualties were 21 servicemen killed at sea and four persons killed and 19 wounded in Lowestoft. While the raid angered the British, the bombardment of towns and the killing of civilians cost the Germans dearly in world opinion. ■

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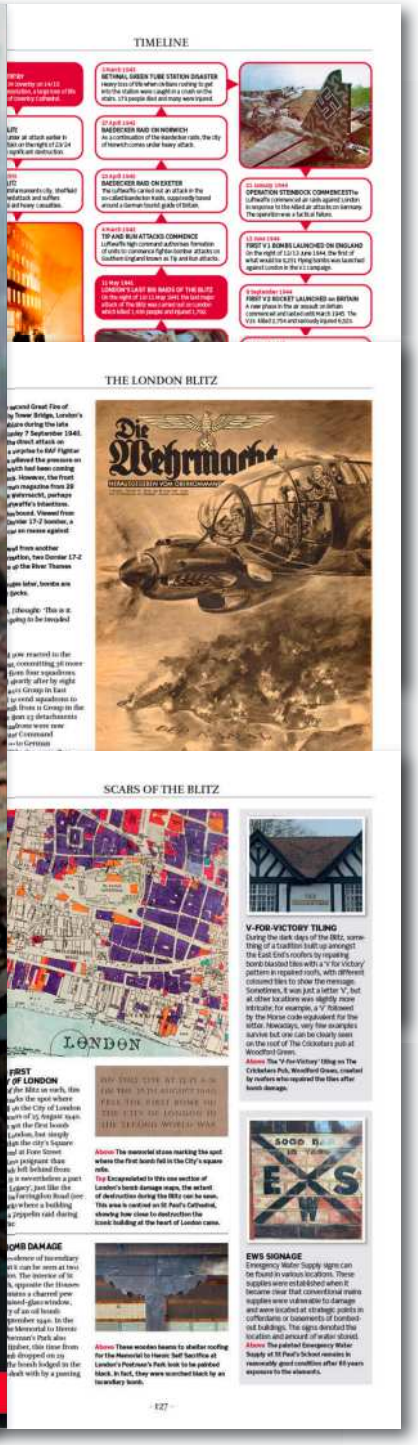

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