

OCTOBER 2022

THE UK'S NUMBER ONE AMATEUR RADIO MAGAZINE SINCE 1932

**HOME BUILD** | Make an analogue display digital VFO, and a jig for soldering wires



## TESTING YAESU'S FTM-200DR/DE

A mid-range model with high-end features



### Contest Lowdown

The results of PW's 2022 144MHz QRP Competition



### HF Band Highlights

The Jubilee, DXpeditions, the IOTA contest and more

### HISTORY Amateur Radio and the Public Sector

The birth & present day role of public sector radio communications services



### ARCHIVE Constructional Project from PW's Library

Building an All-wave Two - a post war receiver for medium and short waves



## NEW PRODUCTS

Latest gear and news across the hobby

## YOUR LETTERS

Fellow readers air their opinions

**WARNERS**  
**£5.49**  
Display until 13th October 2022

# Contents

## PRACTICAL WIRELESS

October 2022 Vol. 98 No 10

On sale: 8th September 2022

Next issue on sale: 13th October 2022

ISSN 0141-0857

### Practical Wireless

Warners Group Publications plc  
The Maltings, West Street  
Bourne, Lincs PE10 9PH  
[www.warnersgroup.co.uk](http://www.warnersgroup.co.uk)  
Tel 01778 391000

### Editor

Don Field G3XTT  
[practicalwireless@warnersgroup.co.uk](mailto:practicalwireless@warnersgroup.co.uk)

### Designer

Mike Edwards  
[mike.edwards@warnersgroup.co.uk](mailto:mike.edwards@warnersgroup.co.uk)

### Advertisement Manager

Kristina Green  
01778 392096  
[kristina.green@warnersgroup.co.uk](mailto:kristina.green@warnersgroup.co.uk)

### Production Manager

Nicola Glossop  
[nicola.glossop@warnersgroup.co.uk](mailto:nicola.glossop@warnersgroup.co.uk)

### Production Assistant

Charlotte Bamford  
[Charlotte.bamford@warnersgroup.co.uk](mailto:Charlotte.bamford@warnersgroup.co.uk)

### Marketing Manager

Katherine Brown  
[katherine.brown@warnersgroup.co.uk](mailto:katherine.brown@warnersgroup.co.uk)

### Marketing Executive

Luke Hider  
[luke.hider@warnersgroup.co.uk](mailto:luke.hider@warnersgroup.co.uk)

### Publisher

Rob McDonnell  
[robm@warnersgroup.co.uk](mailto:robm@warnersgroup.co.uk)

### Photocopies & Back Issues

We can supply back issues, but we only keep them for one year. If you are looking for an article or review that you missed first time around, we can still help. If we don't have the actual issue we can always supply a photocopy or PDF file of the article.

### Technical Help

We regret that due to Editorial timescales, replies to technical queries cannot be given over the telephone. Any technical queries are unlikely to receive immediate attention so, if you require help with problems relating to topics covered in PW, please either contact the author of the article directly or write or send an email to the Editor and we'll do our best to reply as soon as we can.



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

### SUBSCRIBE TO PRACTICAL WIRELESS



See page four for our 90th birthday special offer  
For further details call  
**01778 395161**

Read on any device, anywhere, anytime at [bit.ly/pw-sub22](http://bit.ly/pw-sub22)



Keep up to date on Facebook  
[www.facebook.com/radioenthusiasts](https://www.facebook.com/radioenthusiasts)



Follow us on Twitter  
[@REnthusiasts](https://twitter.com/REnthusiasts)



10

### 3 Keylines

Don is back from a trip to Ireland and talks about receiver design changes over the years.

### 5 News

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

### 7 Radio Bookstore

Your one-stop shop for hobby-related titles, biographies, reference titles, historical accounts, technical advice and successful building projects.

### 8 MARTS Anniversary

Stephen Small G4HJE reports on a significant milestone in the history of the Medway Amateur Receiving and Transmitting Society.

### 9 The Welsh Hills are Alive with the Sound of... CQ SOTA

Ian Miles 2W0IWM reports on a very successful day of SOTA activations.

### 10 FTM-200DR/DE

Richard Constantine G3UGF takes a look at another new Yaesu on the block!

### 14 The Morse Mode

Roger Cooke G3LDI has the latest bootcamp news, reflects on being inspired to learn Morse and showcases a reader's Jubilee key.

### 16 Antennas & Propagation

Rod Angel G4ZUP offers some lessons from the Bramble Bank.



32

### 22 HF Highlights

Despite the summer 'doldrums' there has been plenty happening in the HF bands, as Steve Telenius-Lowe PJ4DX reports.

### 26 Soldering Jig

Godfrey Manning G4GLM simplifies the fiddly problem of soldering wires together.

### 28 2022 PW 144MHz QRP Contest Results

Colin Redwood G6MXL has the results of the June 2022 2m QRP Contest.

### 32 Amateur Radio in the Public Sector

Don Field G3XTT looks back at the historic birth of a Public Sector Radio Communications Service, with a view to the future.

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



# Keylines

## 38 Radio Amateur Maths

**Tony Jones G7ETW** tackles 'radio maths' a thing if not of joy, then of relative comfort to some, a world of dread for others.

## 42 Amateur Radio on a Budget (Pt 10)

**Daimon Tilley G4USI** discusses the Shack Computer and Software from a budget perspective.

## 46 Kits & Modules

**Geoff Theasby G8BMI** makes a welcome return with two more cheap but handy projects.

## 48 Valve & Vintage

**Philip Moss M0PBM** takes a look at this once popular transistorised communications receiver.

## 50 The World of VHF

After last month's excursion into VHF/UHF history, **Tim Kirby GW4VXE** returns with lots of current news.

## 54 Rallies

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

## 56 Doing it by Design

**Steve Macdonald G4AQB** describes how to build an analogue VFO using modern techniques and components.

## 59 Data Modes

**Mike Richards G4WNC** goes out and about with the X6100 before turning to using Iperf3.

## 62 The All-wave Two

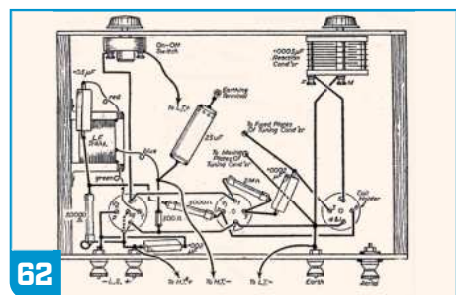
This month we look back at a constructional project that appeared immediately post-war, before all that war surplus equipment started to be available.

## 64 What Next

**Colin Redwood G6MXL** looks at band plans, new questions for the exam and the Direct to Full option.

## 68 Readers' Letters

This month's *Letters* cover 90 Years of PW, the Xiegu GNR1 review and more.



62

**M**y principal activity since putting the last issue to bed was a trip to Ireland with friends from the Bristol Contest Group, to operate in the Multi-One category of the Islands on the Air Contest as EI9E. Our host was **Billy EI7FJ**, who has a great station, well-engineered and with some fabulous antennas. More to the point, he and several fellow EI amateurs who dropped by over the course of the weekend proved to be wonderful company. Only time will tell how we got on but we were very happy to make just over 2,000 contacts as well as having a great time socially, one of the 'perks' of multi-operator contesting.

I should also mention the D4Z (Cape Verde) team, consisting of four Brits, who made over 5000 contacts in the Multi-Two category to set what is almost certainly a new record, while being the first non-European station to win the contest. Again, time will tell once the results become available.

## NHS and HMC

We carry a piece this month about the work **Paul Devlin G1SMP** has been doing to raise the profile of amateur radio in the NHS and broader government circles. Given that amateur radio as a hobby relies on government support and regulation, I consider what Paul is doing to be very positive and I am pleased to see that he is getting support from Essex Ham and others. I look forward to bringing readers more news of Paul's activities as time goes on.

## All-wave Two

Another item this month is a reprint of the *All-wave Two* project that appeared in the October 1945 issue of *PW* (ie immediately post-war). Regenerative receivers worked by feeding back some of the output so it went through the valve more than once, and therefore was amplified more than once. This increased the gain substantially as well as improving selectivity. The trick was to increase the feedback almost to the point of oscillation but not beyond. A variant was the super-regenerative receiver, which took the concept further (I won't try to explain the workings in the space available here). I built one for VHF reception in the late 60s and was able to listen to air traffic control at our local airfield (Sywell, near Northampton) but, looking back, am horrified at the thought that the oscillation from the receiver could well have been playing havoc with the legitimate communications taking place!

Incidentally, the regenerative receiver was invented in 1912 and patented in 1914 by American electrical engineer **Edwin Armstrong** when he was an undergraduate at Columbia University. And it was Armstrong again who came up with the super-regenerative receiver some ten years later. One



advantage of the regenerative concept was the low component count, which would have been important immediately post-war when components would still have been scarce.

The other receiver design still popular among radio amateurs, both before and after the war, was the tuned radio frequency (TRF) approach. This achieved sufficient gain by a succession of amplifying stages but they were all tuned to the frequency being received and keeping the tuning in step at every stage was a challenge even after the introduction of multi-gang variable capacitors.

Which, of course, is why the superheterodyne receiver gradually became predominant. This was yet another invention by Armstrong, in 1918, but achieved limited acceptance in the amateur world because it needed more stages than a regenerative or TRF receiver. This, though, changed after the war when surplus superhet receivers from the military became available in increasing numbers and at affordable prices.

## Adana

In the last issue of *PW* **Mike Edwards**, our Designer, ran a piece (p.18) about Adana printing machines. We've had one reader response (see *Letters*) but it also brought back memories for me. On their 20th wedding anniversary my mother bought my father an Adana machine, which he used for many years for printing tickets, change of address cards, invitations and more. But he also printed many QSL cards for me and my friends, a small selection of which is featured here. I well remember them being spread around the house while drying!

## Don Field G3XTT

Editor, *Practical Wireless Magazine*

Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)

Limited Time – 90th Birthday Offer

# Six issues for just £19.32

In honour of our 90th birthday we are rolling back to 1932, the year we launched. Celebrate this huge milestone with us and receive six issues of Practical Wireless for just £19.32\*, a saving of almost £14.



The front cover of the first issue of Practical Wireless from September 1932

Go to [www.bit.ly/pw90birthday](http://www.bit.ly/pw90birthday)

or call 01778 395161 quoting "PAWI/90BIRTHDAY" today

## SWITCHING TO DIGITAL?

This fantastic offer is also available when subscribing to our digital edition, saving you both money and physical space (allowing for more shack essentials, surely!). For just £19.99 for six issues, read on any device, a week before the shop on-sale day, wherever you may be. Visit [www.pktmags.com/pw90birthday](http://www.pktmags.com/pw90birthday)



\*This offer is only available on direct debit until 15th October 2022. After your first six issues, you will pay just £24.99 which still offers a fantastic saving of almost £8 every six months. For international customers, please visit [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk) for our latest subscription offers.



# Newsdesk

Have you got something to tell our readers about? If so, then email [practicalwireless@warnersgroup.co.uk](mailto:practicalwireless@warnersgroup.co.uk)



## New from Icom

Icom announced an industry first at the Tokyo Hamfair in late August. Based on its SHF project, the IC-905 VHF/UHF/SHF SDR transceiver will not only cover 144MHz, 430MHz, 1200MHz and 5600MHz but 10GHz\* as well. (\*Optional CX-10G transverter required). The transceiver uses a LAN cable between controller and RF module so that the latter can be located at the antenna. Power output is 10W on 144/432/1200MHz, 2W on 2400/5600MHz and 0.5W on 10GHz. And, being from Icom, it features full D-STAR functions (DV/DD mode).

Also showcased at the Hamfair was the IC-PW2 HF/50 MHz 1kW linear amplifier. This includes single-operator, two-radio capability, interfaces for external bandpass filters, a LAN interface for PC control, six antenna sockets and more.

As to the launch date and pricing, Icom UK don't presently have those details but will publish them on their website and social media channels when available. Also, Icom expect to have them at the National Hamfest so make a note in your diary to come along and see them for yourself on the Icom UK stand at Newark. Further details, including downloadable pre-release information for both products, at:

<https://tinyurl.com/ynmtrxfn>

The AH-730 is a new outdoor-mounted Automatic Antenna Tuner from Icom. It covers a wide frequency range from 1.8 to 50MHz. With a 7m (23ft) or longer wire element, all band matching is possible from the 1.8MHz (160m) band to the 50MHz (6m) band (Ground connection is required). The AH-730 emits only 0.3W of RF output from the antenna during the



tuning operation. The low power minimises the risk of interference to other stations while matching the antenna.

The body of the AH-730 is made up of an IPX4 waterproof, high-strength resin. It can be safely installed in a variety of outdoor locations. Additionally, coaxial and control cables can be connected without opening the case. In addition, automatic high-speed tuning in about two to three seconds is possible. Up to 45 matching states can be stored, and when the same frequency is retuned, the matching can be completed in about one second.

The AH-730 Automatic Antenna Tuner is now available to order from Icom Authorised Amateur Radio dealers with a suggested retail price of £570.00 inc. VAT. The AH-730 is compatible with the Icom IC-718, IC-7100, IC-7300 and IC-7610 transceivers.

Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)

**RSGB NEWS:** Steve Thomas M1ACB, RSGB General Manager, writes: "We announced earlier in the year that *RadCom* Managing Editor, Elaine Richards G4LFM, was planning to retire after leading the *RadCom* team for 14 years. Very soon after that announcement, we had to come to terms with the sad and sudden news that *RadCom* Technical Editor, Giles Read G1MFG, had passed away.

"*RadCom* obviously needs a strong team who are focused on continuity but also on developing the future of such a well-respected family of publications. Elaine very kindly offered to delay her retirement so that we could have time to create that future team.

"Working with a professional agency, I led the recruitment team. The President, the current Managing Editor and members of the Board of Directors were all involved to ensure as wide a selection profile as possible. That recruitment process is now complete.

"We are very pleased to announce the appointment of Edward O'Neill M0TZX as *RadCom* Managing Editor and Matthew Smith M0VWS as *RadCom* Technical Editor.

"Ed and Matt are working very closely with Elaine and the rest of the team to ensure a smooth handover in the coming months. I'm very much looking forward to working with both of them, continuing to deliver and develop a *RadCom* suite of publications that supports the future of amateur radio."

#### DV SCOTLAND, PHOENIX UK MERGE DMR NETWORKS:

The DV Scotland and Phoenix UK DMR networks have merged, simplifying integration with other networks, both digital and analogue. With both networks having a wide array of repeaters, reflectors and servers, the two were considered complementary and a natural for such a merger.

The new network now benefits from a variety of DMR, D-STAR and Yaesu System Fusion repeaters as well as Allstar hubs and analogue simplex gateways. Current users will not notice any changes and the new network, DVScotland-Phoenix, will continue hosting a variety of nets accessible by various modes each week. The merger reflects rather a change in the management structure to operate the network.

[www.dvscotland.net/multimode-nets](http://www.dvscotland.net/multimode-nets)

#### MFJ TO CELEBRATE 50TH ANNIVERSARY:

MFJ Enterprises, an amateur radio electronics manufacturer and retailer, will celebrate 50 years in business this October. Martin Jue K5FLU, founded the company in 1972 after building a CW filter kit that sold for less than \$10. Since 1990 the company has made five acquisitions, including Hy-Gain and Cushcraft. MFJ Customer Services and Public Relations Manager Richard Stubbs says the company



## Yaesu FT-710

Yaesu have announced a new HF/50MHz 100W SDR transceiver, the FT-710 AESS, expected September 2022. The new FT-710 AESS is a compact design yet provides 100W output, utilising the advanced digital RF technology introduced in the FTdx101 and FTdx10 series.

#### TX Frequency Range:

1.8MHz – 70MHz (UK, amateur bands only)

#### RX Frequency Range:

30kHz – 75MHz (Operating)

#### Emission Modes:

A1A(CW), A3E(AM), J3E(LSB/USB), F3E(FM) What is not clear from the material we have seen so far is what distinguishes this model from the excellent FTdx10, other than that it is smaller. No doubt more information will be forthcoming in due course and we hope to get our hands on one to review at an early opportunity.

<https://tinyurl.com/yrpbaabp>

continues to grow with the popularity of amateur radio and currently manufactures over 2,000 products.

Jue graduated from Mississippi State University with a bachelor's degree in electrical engineering, and earned a master's degree in electrical engineering at Georgia Institute of Technology (Georgia Tech). He served as a professor of electrical engineering at Mississippi State University from 1972 until 1979, but abandoned his doctorate in 1977 because of MFJ's growth.

#### OCEANIA DX CONTEST 2022:

We have been asked by the organisers to mention the 77th running of the Oceania DX Contest. The phone leg runs from 0600UTC on Saturday 1 October to 0600UTC Sunday 2 October. The CW leg is 0600UTC Saturday 8 October to 0600UTC Sunday 9 October. Exchange RS(T) report plus a progressive contact serial number starting at 001. Full Rules are at:

[www.oceaniadxcontest.com](http://www.oceaniadxcontest.com)



## New from Moonraker

The FireSpot is a way to get access to digital radio covering most common modes such as D-STAR, DMR, Fusion, etc. It can be used wirelessly, but also can be plugged directly into your router via ethernet cable giving it a very reliable and stable connection to the digital platform. The faster quad-core processor gives a quicker boot-up time compared to the common range of hotspots available. It comes complete in a sturdy 3D-printed box and is powered via a micro-USB cable.

The FireSpot comes preinstalled, just hook it up to your router (preferred option) for first setup, enter your details, wireless SSID and password, reboot and away you go. The FireSpot sells for £129.95.

The SWR-300 is designed to measure the transmission power and standing-wave ratio of radios that operate in the frequency range of 120-500MHz and power levels up to 150W. The Moonraker SWR-300 is a compact dual-function test meter to indicate the condition of any antenna system and transmitter with an impedance of 50Ω. The SWR-300 sells for £34.95.

<https://moonrakeronline.com>

#### AMATEURS IN CANADA GAIN EXPANDED

**ACCESS ON 60M:** Amateurs in Canada have been granted a new band for operating, in an official update from Innovation Science and Economic Development Canada. The announcement said that radio amateurs in Canada are now able to use the worldwide allocation on 60m that spans 15kHz between 5351.5 and 5366.5kHz. The band fits between the existing Canadian amateur channelised privileges at 5332, 5348, 5373 and 5405kHz and gives secondary user privileges to transmit at a maximum of 100W and a bandwidth of no more than 2.8kHz on a non-interference basis.

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



Visit our Book Store at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)

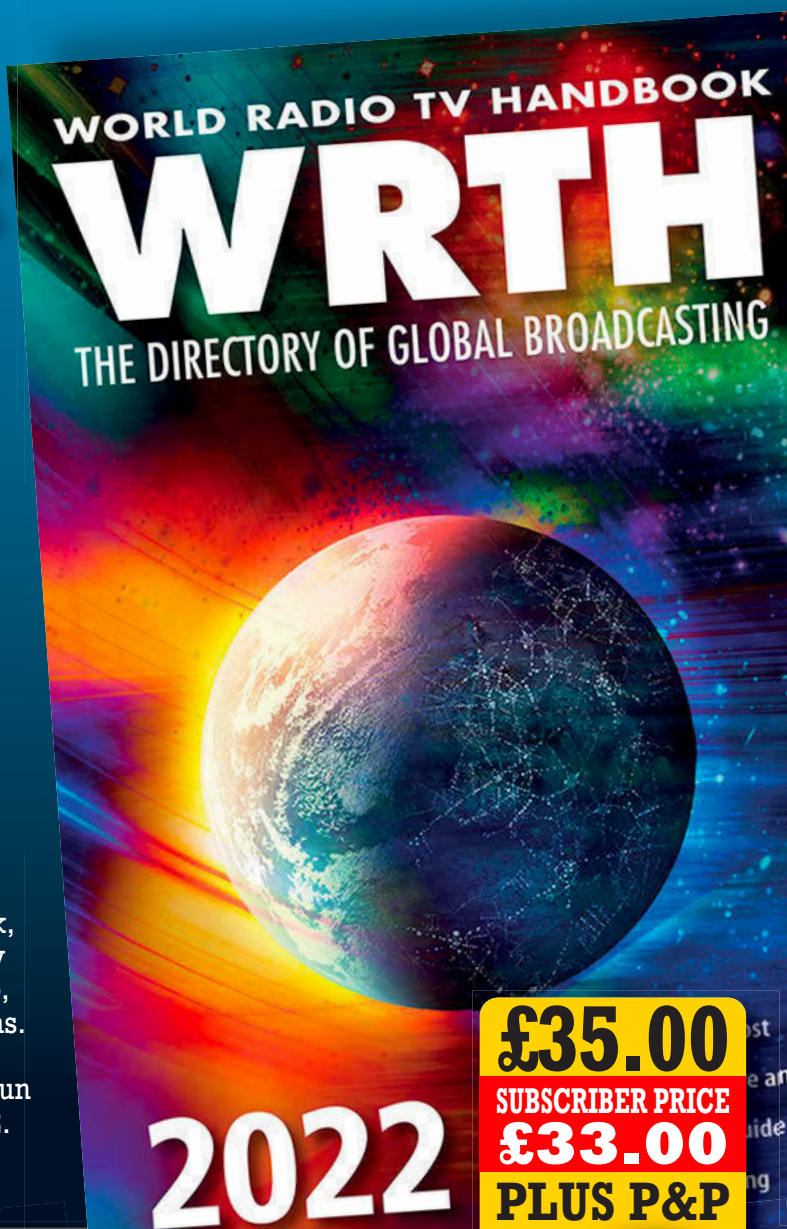
# RADIO ENTHUSIAST BOOKSHOP

## WORLD RADIO TV HANDBOOK 2022

This is the 76th edition of World Radio TV Handbook and this great directory continues to offer a comprehensive guide to broadcasting. With the help of a network of international contributors, WRTH 2022 provides the most up-to-date information on mediumwave, shortwave and FM broadcasts and broadcasters available in any publication.

### WRTH 2022 will have:

- Articles on topics of interest to professionals, listeners and dxers alike including ones on the Further Development of HF Transmitters, Over 75 Years With My Radio by Ullmar Qvick, Technical Monitoring at VOA, the history of KTWR on Guam, and Radio in Lesotho, as well as other articles and regular items.
- Reviews of the latest receivers and equipment, including Icom IC-705, Tecsun H-501, Tecsun PL-330, and ATS25 Si4732.
- Maps fully updated showing global SW transmitter sites



**£35.00**  
SUBSCRIBER PRICE  
**£33.00**  
PLUS P&P

### RadioUser 2021 Archive CD

All issues of Radio User published in 2021 available on a handy CD Rom.

**£47.99 plus p&p**

Subscriber price £23.99 plus p&p



### Practical Wireless 2021 Archive CD

All issues of Practical Wireless published in 2021 available on a handy CD Rom.

**£47.99 plus p&p**

Subscriber price £23.99 plus p&p



**ORDERING IS EASY** or call **01778 395161**  
at: [www.radioenthusiast.co.uk/store/bookshop](http://www.radioenthusiast.co.uk/store/bookshop)

Browse our best sellers at: [bit.ly/bestsellers21](https://bit.ly/bestsellers21)



**Stephen Small G4HJE**  
practicalwireless@warnersgroup.co.uk

**T**he Medway Amateur Receiving and Transmitting Society continues to celebrate their centenary year and on 29 July members past and present, along with partners, foregathered at the Cornwallis suite in Maidstone for the centenary dinner. Reminiscent of the heady days of the 1930s gatherings at the Sun Hotel in Chatham. As with the dinners of the 1930s, they were joined by representatives of the Radio Society of Great Britain (RSGB), **Keith Bird G4JED**, South East Regional Representative and Kent Representative **Dave Lee G8ZZK**. In the 1930s representation was by **John Clarricoats G6CL** the RSGB general manager and close friend of **Bill Nutton G6NU**.

Post dinner, a letter from **Her Majesty the Queen** was read to members and guests wishing a most memorable dinner to all concerned and for a successful series of events marking this special anniversary. A loyal toast was proposed by the Society's President in the centenary year, **Stephen Small G4HJE**.

In his after-dinner address, the President recounted that 1922 had been a most memorable year for radio enthusiasts; **HRH Prince Edward of Wales** had graciously accepted patronship of the RSGB, the BBC had been born, **Admiral of the Fleet Sir Henry Jackson** became president of the RSGB and more locally, four radio enthusiasts had formed the Gillingham Wireless League; **Bill Nutton G6NU**, **Bill Moffatt G2CM** and **Reginald Hammens G2IG** are three names recorded in the Society's extensive archive, the other remains uncertain but it is believed that it was **Stan Howell G5FN**.

In 1925 the Gillingham Wireless League found its first home at Richmond Road School in Gillingham and was reporting 52 radio enthusiasts in regular attendance. In 1928 the name was changed to the Medway Amateur Transmitters Society (MATS) and



## MARTS celebrates Its Centenary in Style

**Stephen Small G4HJE** reports on a significant milestone in the history of the Medway Amateur Receiving and Transmitting Society.

in 1947 this again changed to the Medway Amateur Receiving and Transmitting Society in order to encompass the many new post-war members who were interested in listening to short wave radio and were studying for their transmitting licence.

Also reflected upon was the close association in the mid 1930s with the Chatham MP, **Captain Leonard (Lenny) Plugge**, avid radio enthusiast and flamboyant playboy, who was founder and managing director of Radio Normandy, the first commercial radio station and direct competitor to the BBC. Plugge had graciously presented the Society with a substantial silver trophy to encourage radio experimentation amongst the members. Shortly after, the editor of the *Chatham Observer* had added to the trophies with the Observer Cup.

In closing, members were reminded what **Professor RV Jones** had famously said about radio in those early days when G6NU had founded the MARTS, "there has never been anything comparable in any other period of history to the impact of radio on the ordinary individual in the 1920s. It was the product of some of the most imaginative developments that have ever occurred in physics, and it was as near magic as anyone could conceive, in that with a few mainly home-made components simply connected together one could conjure speech and music out of the air. The construction of radio receivers was just within the competence of the average man, who could thus write himself a passport to countries he could not hope to visit".

Following the President's address, **Kevin Earl G8VJU**, Vice President, was called upon to propose the toast to members past and present of the MARTS and to the club as it enters its second century.

As proceedings drew to a successful close, and before the happy band dispersed, the final event of the evening was to reconstruct a photograph that had been taken of members in 1933. In the contemporary photograph can be seen the Plugge Cup and the Observer Cup.

There is always a friendly welcome for those wishing to visit or join the MARTS and contact can be made via the Chairman, **Roger London G0NRL**  
[g0nrl@yahoo.com](mailto:g0nrl@yahoo.com)



**Photo 1: MATS in 1933.**

**Photo 2: 2022 revisit of 1933 photo!**

**Photo 3: G5FN being presented with the Observer Trophy by the Editor of that esteemed newspaper. In his other hand is the Plugge Cup. In the foreground can be seen Bill Nutton G6NU and just behind John Clarricoats G6CL.**



**Ian Miles 2W0IWM**

practicalwireless@warnersgroup.co.uk

It's fair to say that SOTA or 'Summits on The Air' is gaining ever more popularity in the world of amateur radio. Its inclusive appeal covers not only those radio amateurs who relish the technical challenges of operating a radio outdoors combined with walking the hills and mountains, but also those who love the challenge of chasing summits. This was especially true on Saturday 18 June 2022, when the Welsh hills were truly alive with an event organised by **Ben GW4BML**. His idea was to host a GW SOTA party to promote Summits on the Air in Wales and it proved to be a roaring success!

### A Special Day

This was to be a special day in a number of ways. For a start, it was to be the first GW SOTA party to be held in Mid-Wales with many operators heading out to activate hills in different nearby SOTA associations. It was also to be Ben's Mountain Goat activation for achieving 1000 activator points. To round things off, Ben also organised a BBQ at the conclusion of the activations providing a rare opportunity for chasers, activators and SWLs to socialise in person.

The main focus of the activations was in the GW regions with many operators choosing summits in Mid and North Wales, which were relatively close to the BBQ site. Ben and **Allan GW4VPX** chose to activate GW/NW-061 Y Gofa. Other operators headed out to other summits, including GW/MW-031, MW-018, NW-029, MW-003 and NW-009 to name but a few.

The weather forecast was not looking good with heavy rain promised throughout the day. Luckily, many areas remained dry with only a few unlucky activators getting damp during the hike to their chosen summit.

From mid-morning until early afternoon many of the amateur bands were full of the familiar call of "CQ SOTA". On-air conditions proved to be quite reasonable and many UK and European SOTA stations were entered into logbooks with a great deal of the activity taking place on the 20m and 40m HF bands. As usual numerous successful contacts were made on the 2m FM band.

The number of Summit-to-Summit contacts achieved was truly quite amazing. This was of course without taking into account the large number of chasing stations without whom SOTA would not be possible.

The majority of participants who planned on attending the BBQ shut down their stations around 1300 BST to allow time to travel back to the location of the event, some having had long



## The Hills are Alive with the Sound of CQ

**Ian Miles 2W0IWM** reports on a very successful day of SOTA activations.

descents from summits such as Cadair Idris. The post activation party provided a great opportunity for those attending to meet each other as many had made numerous contacts on air but may not have met in person.

### BBQ Time

The BBQ was a fabulous ending to a well organised day out in the Welsh hills with 27 people attending. Everyone enjoyed the food and much of time was spent chatting and sharing SOTA experiences. The final action of the day was a raffle to raise funds for the running costs of 'Summits on The Air'. Everyone purchased quite a few raffle tickets and many walked away with prizes that had been kindly donated by Spectrum Communications, SOTAbeams and Icom.

The weather finally closed in as the group photos were being taken but a well-planned site was equipped with marquees so everyone remained relatively dry. The event was thoroughly enjoyed by all those who participated, and we all hope it will run again next year. Many thanks to everyone who took part in a great GW SOTA event. **PW**

**Photo 1: Group photo after the event.**

**Photo 2: Robert MW0RWX winning first prize in the raffle (thanks SOTAbeams).**

**Photo 3: Despite the weather, everyone seemed to be having a great time.**



Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)



## Practical Wireless Rating



Neat, nice and easy to use.

# The Yaesu FTM-200DR/DE

**Richard Constantine G3UGF** takes a look at another new Yaesu on the block!

**Richard Constantine G3UGF**  
practicalwireless@warnersgroup.co.uk

**I**n a previous review of Yaesu's current range of mobile offerings I begged the question as to why this manufacturer would wish to introduce yet another model into the VHF/UHF Amateur Radio mix. My first impressions were that they could see some erosion of their traditional markets, from lower cost, lower spec, competitors and like any sustainable business that they needed a new strategy. Designing all new models around a common platform makes a lot of engineering and commercial sense.

Readers familiar with my earlier reviews in this range will easily recognise that the new FTM-200D has the same footprint as its stable mates. It's manufactured on the same, unique to Yaesu, cast alloy chassis that forms the entire heatsink for this 50W max radio. See March issue review of the FTM-6000E.

It also has the same, rear mounted, 'belts and braces', high quality, near silent fan that draws air through the whole of the underside of the radio. A system they call Funnel Air Convection Conduction (FACC). Yaesu seems to be slightly

ahead of the game here in terms of global warming. How long before we need nitrogen cooling systems for our radios... I wonder?

With all the heavy design and engineering innovations done, their common platform puts them in a good place to more than compete with spurious newcomers to market. Side by side with some lower cost and less featured alternatives, you can clearly see the difference in ease of use, design and quality.

## What's in the Box?

As usual the radio arrives with fused DC cable, an 82-page detailed, step-by-step handbook plus a USB firmware, data lead for PC and transceiver pack connection. There's the optional use separation cable for remote mounting of the head/control unit, a metal desk stand and a fist microphone. I've previously muttered about the desk stand being only a piece of bent metal with no weight to it and also the flimsy cover on their otherwise very useful handbooks.

## Here's a Tip

Always curb your initial enthusiasm, photocopy the handbook and invest in a ring binder. It's

standard practice for this reviewer. I copy mine to A4 size, much easier to read and follow, and it's always there as a backup when you lose the original or it falls apart.

Incidentally, if you visit the files section of the Yaesu website, you can download a selection of additional, excellent and separate manuals for the FTM-200D to fill your ring binder, including an advanced manual plus others for APRS, Wires-X and portable digital nodes.

In the past I've chuntered about the provision of only half of what's needed to remotely install the radio in a vehicle or at desk level, as the microphone socket is on the transceiver pack, not the detachable head unit. There's a cable to remote the head unit but no microphone extension lead. Owners will need to buy one or, make up an RJ style lead with a back-to-back extender, to re-connect at the microphone end. Yaesu, why not omit the ubiquitous USB lead (I've got several like it, in a drawer) in favour of a microphone lead?

On the upside, the mounting cradle is very nice and I've not really given it due credit before. Well designed, it's not just a simple, bent metal bracket and screws, like many

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





others. It's a proper slide-in cradle with a lever spring release and the ability to securely lock the radio in place with a screw, one of the best around.

The latest generation SSM-85D, DTMF keyboard, hand microphone, is identical to others supplied in this range. Having used them for quite some time now, I really like them. Subtly backlit keys plus a red TX LED, the microphones sport top-mounted, up-down keys for frequency or memory scanning.

There's a conveniently located MUTE button, for those barking dogs, calls for dinner, small children and unexpected road-rage moments. Nice one. The radio supports Bluetooth as an option.

Four self-programmable function keys and the ability to recall memory channels direct from the keyboard, make it a very useful and convenient tool. By the way, the speech quality is excellent, crisp and clean. The radio supports the snapshot picture function. For this, the optional and dedicated MH-85A11U microphone that connects to the data port on the right side of the head unit is required. To record and display incoming pictures a micro memory card (32GB max) must be installed on the left side of the head unit.

The memory card is an absolute 'must have' for backing up transceiver data, memories, voice recording and playback, GPS log data and GM/Wires-X messages. It isn't included as standard.

The detachable front panel is around 10mm lower in height than the FTM-300D. Cosmetically it looks slightly better for it. The clear and easy-to-see display is the same size with a colour choice of White, Blue or Red. Neither model has a touchscreen.

## Features

The radio has three transmit power levels of 50, 25 and 5W FM output. It's a double-conversion receiver with IFs at 58.05MHz and 450kHz. Receiver sensitivity on both 2m and 70cm is 0.2µV for 12dB SINAD. Higher bands are less sensitive. Internal speaker audio is a very loud and clear 3W, plus a 3.5mm extension socket to the rear.

Features include 1104 Alpha-tag programmable memories. Excellent when like



me you can't remember why you programmed that frequency in the first place. Plus, it has a wideband Rx 108-999.95MHz, and high-speed bandscope covering 61 channels in VFO mode and 21 channels in memory mode. There's a 66 channel GPS receiver for APRS function, 1200/9600 data port to the rear, VOX and recording for both voice and snapshot (micro-SD card required).

Pressing the top right *Band* button allows selection of any one of five bands, for either A or B VFOs. Access or skip option for each band can be selected in the software menu. At my location there's no point in including marine band frequencies on a daily basis, but I like to have them available when I'm travelling.

Automatic Memory scan is interesting as, when in use, it sets itself to whatever mode of transmission is being received.

The bandscope mentioned above, that centres on whatever the dial frequency

**Photo 1:** FTM 200D in cradle with mic

**Photo 2:** Active channel, displaying current setup. **Photo 3:** Remote mount with bandscope showing activity just below 2m calling channel. **Photo 4:** Head unit with current channel set up displayed. **Photo 5:** Transceiver pack internal with mic and speaker.

currently is, proves useful to find activity both simplex or repeater when you're out of your home area.

## PMG Included

First seen in the FT-5D handportable (see *PW* Jan 2022) the radio has the newly available Priority Memory Group (PMG). This allows up to five PMG channels to be registered either from the dial or from a recalled memory, simply by pressing the front panel, *PMG-PW* button, on the right-hand side. This has proved excellent when mobile for a quick logging of an active frequency.

Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)



5

Recalling the *PMG* list allows for manual return to any of the five channels or auto-scanning to monitor for potential activity.

In normal operation the radio has the usual scan-stop, scan and resume, scan limits etc. for both band and memory channels. There's a programmable skip function for selected channels, when memory scanning.

It's worth pointing out that while this model only has one receiver and the display shows both switchable A and B VFOs, monitoring two bands at once can easily be achieved by making use of the fast scanning systems built into the software. Also, when pre-programmed for local use, *PMG* scan function means, most users simply won't be aware of the single RX.

It's all down to how you customise the radio for your requirements and pleasure. In doing this the *F-menu* key is your friend. It works in conjunction with the main dial control and the *SQL-back* button. Manufacturers like to offer a lot of play value these days and the FTM-200D has it in spades.

Most of the buttons on the radio have a dual-press capability, as you can see from the legends. I'll come to the short press on the *F-menu* key in a moment.

A long press on this key reveals the main menu list of up to a potential of 118 features, each with a sub-menu choice. The list is scrolled from the main dial control and the sub-menu choice for each option selected by a push on the control. After selecting the wanted function that can be anything from step rate, mic gain deviation brightness, shift, tone, colour and much more, escape is achieved by use of the *SQL-back* button.

### Now for the Magic!

A short press on the *F-menu*, reveals the current setup for the dial frequency. This is something I've not seen before. It's a great little feature for an easily confused operator like me, always changing things around when researching for a review.

For some reason I had lost access to my local repeater and couldn't understand it – much head scratching and menu scrolling. Shift and CTCSS tone were in place but it didn't work. A quick press on the *F-Menu* immediately informed me that I had the wrong squelch mode selected for the CTCSS to activate. Into the main menu by long press, change mode and back out – brilliant, a self-troubleshooting radio!

Active settings are illuminated in the short press display menu, with non-active settings greyed out. The operator can even change what information is to be displayed, on screen. I love it!

### C4FM – Worldwide System

Of course, the big plus with this radio is that it gives access to the worldwide C4FM Wires-X network. Over the various generations of using and reviewing Yaesu models, I've noted that software tweaks and display presentation changes seem to have made access and C4FM operation easier and easier. I currently have a remote mount FTM-400D in my campervan and I like the big display. However, unlike the review model it only has C4FM digital capability on the A band VFO.

Keeping 2m and 70cm on separate VFOs for convenience means for me that any 2m C4FM repeaters need to be in a memory. Over various reviews I've seen accessing and displaying

C4FM and its many room choices improve. This new radio is a piece of cake. Many repeaters remain far too inactive during daytime hours particularly. On the basis of use it or lose it, activating a 'room' is a great way to ear-wig, start or join a conversation. I've enjoyed having this radio on my office desk dialled into 'America-Link' in the afternoons. The radio's inbuilt GPS system calculates/displays the distance from my location to the active station

### APRS

Automatic Packet Reporting System is another option in this radio and enjoying something of a resurgence right now. As part of the system I do like looking at the electronic compass and graphic display altimeter, ideal for /P, not forgetting the inbuilt clock display. It's not something I've personally had an application for. I can see the benefit for groups of users, handheld to mobile etc indicating course, direction and speed for station location and messaging. As mentioned earlier there's an APRS-specific 56-page manual for this radio on the Yaesu website. It's well worth a read and who knows, it may spark a new interest, once you have the radio.

### Final Words

Having experienced and in some cases owned, the whole of Yaesu's current VHF/UHF model range, plus some earlier models, I find this radio fascinating. It's a mid-range model with some higher-end features and benefits, many more than my editor would possibly allow me space to detail here.

I see Yaesu attempting to future-proof themselves from some of the pretenders to their market. I also see them working to offer amateurs a range of choice and cost options in uncertain economic times. World prices are on the rise for just about everything. A retired radio dealer and importer myself, I know how tough that can be – please support your preferred supplier.

Despite my mutterings about certain things (that's my job), the FTM-200D offers a lot of quality and facility for the money. It has some very slick, user-friendly software and some uniquely Yaesu features. The user experience is very satisfying while making the most of its single receiver design.

It may be of no interest to some but I will own up to being a little biased. I like Bluetooth, especially when mobile. Personally, I'm disappointed that the BU-4 module (circa £30.00) is an add-on and not supplied as standard, but it's not a deal breaker. The radio is neat, it's very nice and once programmed, easy to use. For me it's a very solid 4.5 stars and well worth spending that little bit extra in the mid-range market.

Price at time of press FTM-200DE £349.95. My thanks to ML&S for early provision of this radio. **PW**

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



# Smart New Operating Features

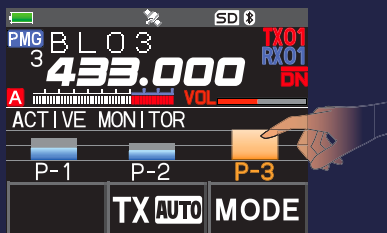


## Touch & Go

Simply Touch the displayed Channel Bar to Quickly Start Communications  
High-resolution Full-colour LCD touch panel, and Ultra-High-Speed PLL Real-time Scope

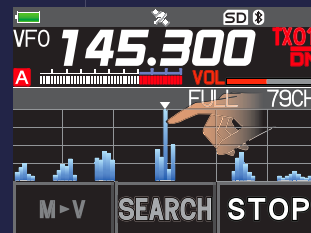
### PMG (Primary Memory Group) Activity Monitor

- Register the current display frequency into PMG with one press of the "PMG" key.
- Simply press the "PMG" key to instantly display the receive status of the registered frequencies in a Bar Graph (Activity Monitor).
- Touch & Go Operation allows quickly starting communication by touching the displayed target channel bar.



### 79 channel Band Scope

- Displays a bar graph of up to 79 channels, in high-speed real time, centered on the current VFO frequency.
- Select the number of channels from 79ch/39ch/19ch by touching the displayed channel number.
- Touch & Go Operation allows immediately moving to the frequency and starting communication by touching a displayed channel bar.



C4FM/FM 144/430MHz DUAL BAND  
5W DIGITAL TRANSCEIVER

## FT5DE



**C4FM**  
DIGITAL CLEAR VOICE  
Clear and Crisp Voice Technology



### Comfortable Grip with Full Flat-Back and Quick Release Holster (Supplied)

- Comfortable size and form with no protrusions provides excellent grasp, even when wearing gloves for outdoor activities.
- Quick Release Holster that easily attaches and releases the FT5DE and allows operation with an excellent hold and feel.



**YAESU**  
The radio

**YAESU UK Ltd**  
Unit 12 Sun Valley Business Park, Winnall Close  
Winchester, Hampshire SO23 0LB

For the latest Yaesu News, visit us on the internet at [www.yaesu.co.uk](http://www.yaesu.co.uk)

Specifications subject to change without notice. Some accessories and/or options may only be standard in some areas. Check with your local Yaesu Dealer for specific details.



**Roger J Cooke G3LDI**  
roger@g3ldi.co.uk

**R**oger Cooke G3LDI has the latest bootcamp news, reflects on being inspired to learn Morse and showcases a reader's Jubilee key.

It really is about time we got some things back on course again, but this Covid pandemic has upset lots of arrangements, some of which may not ever be reinstated.

Bootcamps, **Fig. 1**, have now become established throughout the UK and if you have any information or details about one you are starting, please email me at [roger@g3ldi.co.uk](mailto:roger@g3ldi.co.uk) and I will make sure it has publicity in my column. Please remember however that this is just a bi-monthly column, so plenty of notice is needed.

We have given careful consideration to the start of Bootcamps here in Norfolk and it looks as though there are two starting in the autumn.

## Essex CW Boot Camp 2022

CW Enthusiasts from around the country will be attending Essex CW ARC 6th CW Boot Camp on Saturday 22 October. CW activities will include learning from your peers correct CW procedures; how to send Morse on the straight and twin paddle keys; training on how to increase your speed; the art of head-copying. Early booking is essential as space is limited. If you intend joining the

# Bootcamps are Back!

**Roger G3LDI** has more interesting keys to discuss but starts with news of a self-contained CW transceiver.

event, please submit your details asap to:

[g0ibn1@yahoo.com](mailto:g0ibn1@yahoo.com)

Venue address:

**3rd Witham Scout & Guide HQ**

**Rear of Spring Lodge Community Centre**

**Powers Hall End**

**Witham**

**Essex**

## The Norfolk Amateur Radio Club Bootcamp 2022

This is held at the QTH of **Roger G3LDI** and cannot accommodate more than about 16 people. It is mainly just locals who attend and is less formal than the Essex Group who utilise the local Scout HQ with a larger room. It is a super way of learning though and also good fun with lots of banter.

## The DMX-40 and Other Such Devices!

So far, I have had remarkably little feedback to my comments on this particular piece of equipment and the use that some might try to make of

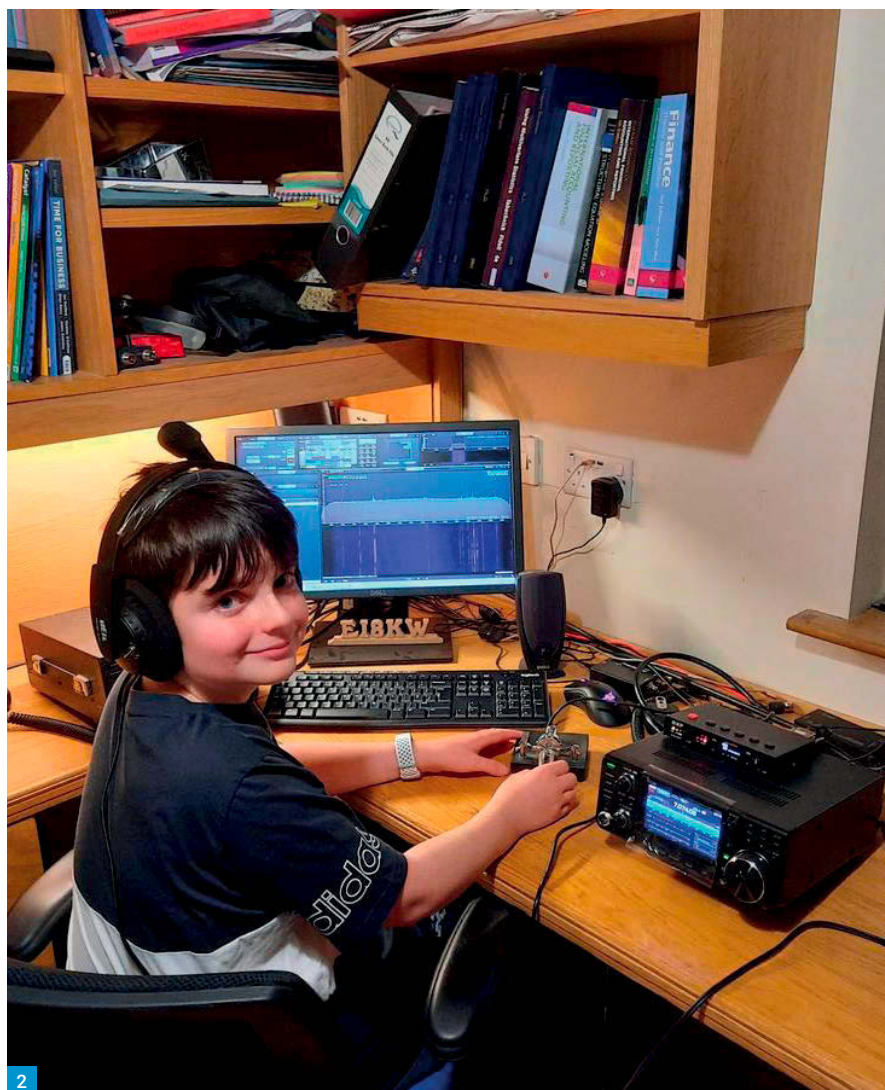
it in order to learn the code. I suspect this would only apply to those who try to become involved later in life when it is difficult to find the time, retain the learning and apply the necessary time needed for practice.

However, I was heartened by the appearance of **Megan EI5LA** at the tender age of 15 using CW like an experienced operator. That was topped last week by **Ryan EI8KW**. This is incredible. There must be something in the water in Ireland I think. Ryan is seen in **Fig. 2**.

*"My name is Ryan Morrison. I am now aged 12. I passed my Morse code exam in June 2020 and passed my radio theory exam and received my callsign in August 2020. I am currently Ireland's youngest radio amateur. Thank you for visiting my web page. If you have made a QSO with me, you can check my logbook below for confirmation. If not, I hope to meet you on the bands in the future I am mainly on CW often on the FISTS frequencies, particularly on 80m 3.558 where I call CQ FISTS. I am also a Straight Key Century Club member SKCC# 23689 and I listen on SKCC frequencies, often 3.550."*

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





**Fig. 1: An NARC bootcamp in progress at G3LDI's home. Fig. 2: Ryan EI8KW.**  
**Fig. 3: G3SMB's Jubilee key.**  
**Fig. 4: The Jubilee key in its presentation box.**

I worked Ryan in one of the CWops CWT sessions so he can be found on those just like Megan. If you hear him on there or indeed on the FISTS frequencies, please have a QSO with him. I did take time out in the CWops session to congratulate him and we had a chat on the key, so he is very capable. I did slow down for the chat to about 20wpm and he coped with that very well.

The younger we can get them interested the better operators they will become.

### A word in your Ear

The above piece about Ryan brought back memories of my youth. Yes, I was young once....

The two words 'inspiration' and 'aspiration' come to mind. I remember seeing a picture of a Morse operator sitting in front of a radio with headphones on, obviously communicating

via that medium. I was about Ryan's age and that picture stayed with me, giving me both aspiration and inspiration. That picture was in a book I borrowed from our local library, as was an article on making a crystal set. Well, the rest is history as you can imagine. However, in those days we had no distractions from our aspirations, so the path was clear.

In this modern age, there are so many distractions for youth, not all of them good either, so the path is very narrow and overgrown. Being a Morse operator is very old hat nowadays I guess, but until they try it and see what fun is available, they will continue to reject it, considering it 'uncool', preferring their mobile phones, Xboxes and the like.

We can only keep trying, but until there are more young ones involved it will still continue to be seen as an "old man's" hobby.

### The Queen's Jubilee Key

I just received this from **Mike G3SMB**. "My Jubilee key has arrived #50/500. **Figs. 3 & 4**. It was packaged in a fairly large black box



with the key and fly lead 'submerged' in black polystyrene. I was a tad surprised that the key itself did not have any packaging, i.e. a plastic bag or some such protection but on inspection it was fine.

"Highly polished chrome, which looks amazing, and with the heavy base it sits very well indeed on the desk. On my key, the pivot arm had some lateral play, which was a bit of a concern initially, but after a little tweak of the tiny grub screw on the top of the arm it settled down with no lateral movement.

"Any adjustments to the user's 'fist' are very easy to do via the two knurled adjusting screws. "I find it very smooth to operate and look forward to using it on a regular basis."

Now what better reason does anybody need to get on the air and enjoy CW? It has its own crest and serial number too! Congratulations Mike, I hope to work you using it some time.

Please continue to send all your comments, offerings and information to me at the address at the top of the column. 73 and May the Morse be with you! Roger G3LDI. **PW**



Rod Angel G4ZUP

practicalwireless@warnersgroup.co.uk

**T**he GB1BB story has been told elsewhere [1], but a short analysis of the contacts made – notably looking at their geographic disposition – provides a good illustration of some basic antenna characteristics, which are entirely predictable but often misunderstood.

Our 'shack' was a metal boat (see header photo, thanks to IoW Radio Society), which had been deliberately grounded on a sandbank some 3km outside the entrance to Cowes harbour. For a little less than an hour, three Foundation-class licensees operated on 70cm (through GB3IW), on 2m FM simplex, and on 40m LSB. Each was using a form of vertical antenna but, as can be seen from **Figs. 1, 2 and 3**, the spread of contacts was very different on each band.

The reasons for this are simply explained for the VHF and UHF cases, but at HF the situation is a little more complex.

### Operation on 70cm and 2m

Bespoke Slim Jim antennas [2] were used for operation on the 70cm and 2m bands. This design is notionally omnidirectional in azimuth, and tends to favour paths with relatively low elevation angles.

Excepting EchoLink contacts (which tell us nothing about antennas or propagation) the difference in coverage between the two bands was simply a function of antenna height. Although

# Antennas and Propagation

**Rod Angel G4ZUP** offers some lessons from the Bramble Bank.

both of our antennas were mounted on the same cabin roof, the 2m Slim Jim was being used for a spread of direct contacts, while the 70cm version was talking directly to only one station: the GB3IW repeater, which is located atop the tallest hill on the Isle of Wight. Our reach on 70cm was therefore determined not by the height of our antenna, but by the height of the repeater antenna.

In the absence of any marked 'tropo' (or 'lift') conditions, this is a standard result, and is the reason why repeaters are usually sited on high ground.

### Operation on 40m

The distribution of contacts on HF showed two separate groups: Those with a reasonably clear line of sight to Bramble Bank, and those much further away (hundreds of km); and almost no one in between. This is also a standard result. However, a closer look reveals a level of intricacy that may surprise anyone who is new to HF – and perhaps even some older hands too.

Firstly, in the close-in group, we had easy contacts with stations in the Southampton area

– the northern end of Southampton Water being about 20km away. At the same time, a 350W station on the south coast of the Isle of Wight (only 18km away) struggled to make contact. What impeded the closer station (which was, incidentally, manned by a very experienced HF operator)? Well, in part, a 200m hill topped with Brighstone Forest. This highlights our first lesson in HF propagation: that, in general, HF ground wave does not go round corners. Our ground-wave contacts were all pretty much line-of-sight, and probably all of them could have been worked on VHF. Quite a few actually were.

The group of more-distant contacts was distributed over ranges from about 300km to 3000km, which is probably the easiest range bracket for beyond-line-of-sight communication. It fits perfectly with the basic picture of sky-wave propagation, **Fig. 4**, that we all learned first.

### More on Sky-Wave Modes

To make contacts over much longer ranges, we need a co-operative ionosphere and an antenna that is capable of radiating (and receiving) signals

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



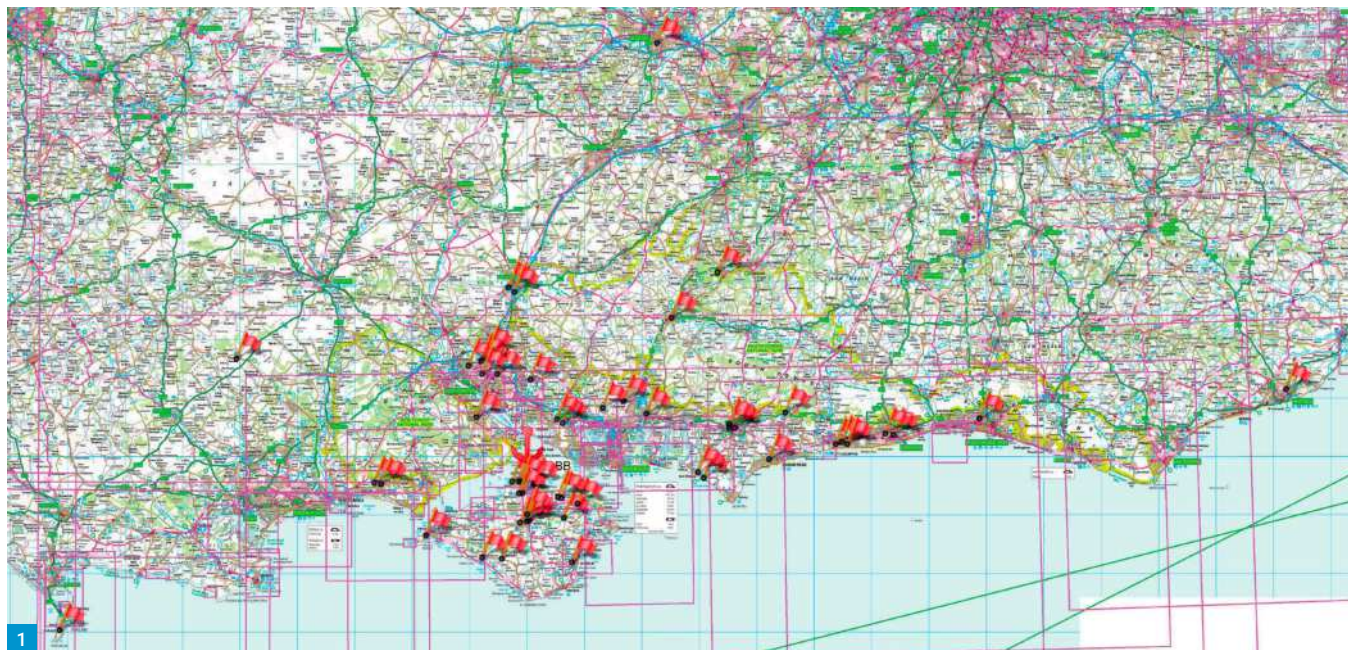


Fig. 1: 70cm contacts. Fig. 2: 2m contacts.  
Fig. 3: 40m contacts. Fig. 4: The basic picture  
of sky-wave propagation. Fig. 5: Propquest  
snapshot of propagation (credit: G3YLA).

at low angles of elevation. This is where big beam antennas on tall towers come into their own – although they are by no means essential for working the DX.

Surprisingly perhaps, making non-line-of-sight contacts at close range (a few tens of km) is even harder. This is because the geometry of the sky-wave ray is in the form of a very tall thin triangle. The transmitted wave arrives at the ionospheric layer with near-vertical incidence – hence the name NVIS – and, at most frequencies, is deflected a little before emerging from the upper side of the layer to be lost into space. If frequency is progressively reduced, a point is reached (usually) where even a vertically-incident ray is returned to ground level. This point is termed the Critical Frequency ( $f_c$ ).

Although  $f_c$  varies with time and place (sometimes erratically) there are tools that can help us to understand what it is, and how it is changing, at any given moment. **Jim Bacon G3YLA's** Propquest [3] is a very useful aid for stations within a few hundred km of the English Channel.

At this point we need to understand that the ionosphere is comprised not of a single refracting layer, but rather of a series of layers, which are labelled (from lower to higher) the D, E and F.

The main effect of the D-layer (which is present in daylight but dissolves after dark) is to hinder not help sky-wave propagation. It absorbs energy, causing severe attenuation of signals, with lower frequencies being affected more than higher frequencies. Most useful refraction happens in the E and F layers.



### The Subtlety of NVIS Propagation

The first challenge of NVIS propagation is to find a frequency that is both low enough to be below  $f_c$ , and high enough to avoid the worst effects of D-layer absorption. Depending on the required plan range, the sweet spot will be either at or very slightly below  $f_c$ .

Assuming such a frequency can be found in one of the amateur bands – usually it can – the

second challenge is to use an antenna that will actually radiate vertically upwards.

In practice, NVIS contacts are typically made on the 80m or 60m bands; sometimes on 40m, if the daytime conditions are particularly favourable, and sometimes on 160m at night. Most simple horizontal wire antennas (dipoles, doublets, and end-feds) of home-station proportions will be suitable, but not verticals. HF vertical antennas



radiate (and receive) at medium angles of elevation, but are usually silent at both very low and very high angles.

### Our 40m Experience Explained

The HF antenna at GB1BB was a base-fed marine MF/HF vertical, about 6m long, which easily tuned 40m with an ATU. Sitting on the world's best ground plane, and fed with 100W, this rig worked well. Our young operator was delighted to make contacts with Lithuania, Germany, Luxembourg, Orkney and Northern Ireland. The absence of any contacts in London and the Home Counties, or in northern France, (all within 300km) might have passed unnoticed but for the post-event plot of contact locations – and that is exactly what we might have expected from an HF vertical antenna.

But what of the marginal contact on the south coast of the Isle of Wight? In the circumstances, it seems most surprising that any contact at all was possible. With the line-of-sight path obscured, this must have been by NVIS and, as we have just seen, vertical antennas do not 'do' NVIS. Further, we might have expected the local  $f_c$  to be below our 7MHz operating frequency.

In fact,  $f_c$  at the time was actually at or slightly above 7MHz – the snapshot from Propquest, Fig. 5, shows this clearly – and while the boat station was using a vertical antenna, the Island station was using a low horizontal end-fed wire. In the event, this combination of a good NVIS antenna, a 350W linear, and a keen pair of ears proved just enough to work the boat station through the extremity of its antenna lobe (well outside the -3dB elevation beamwidth).

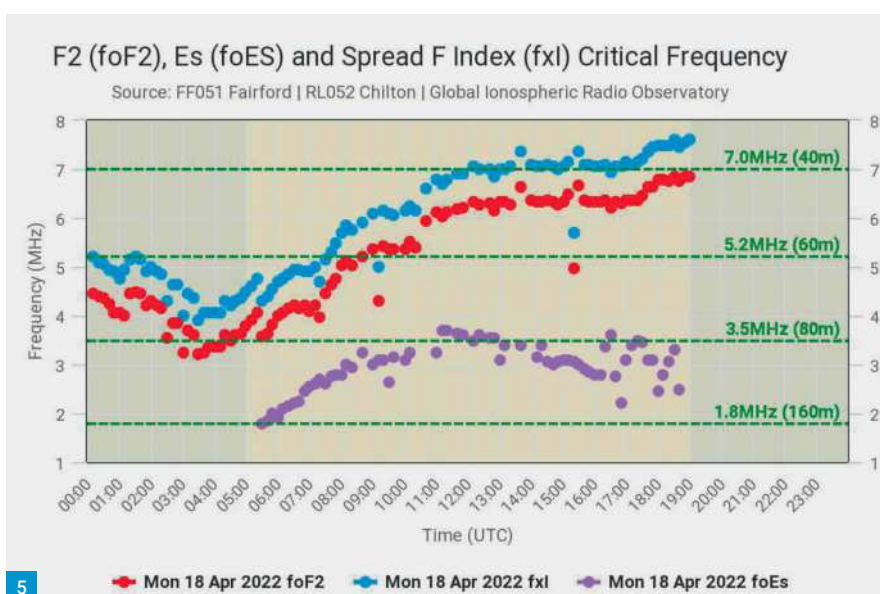
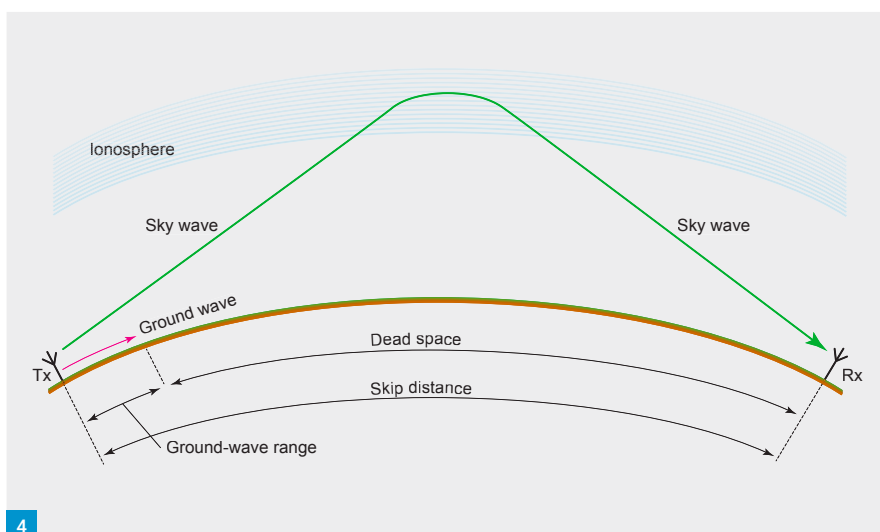
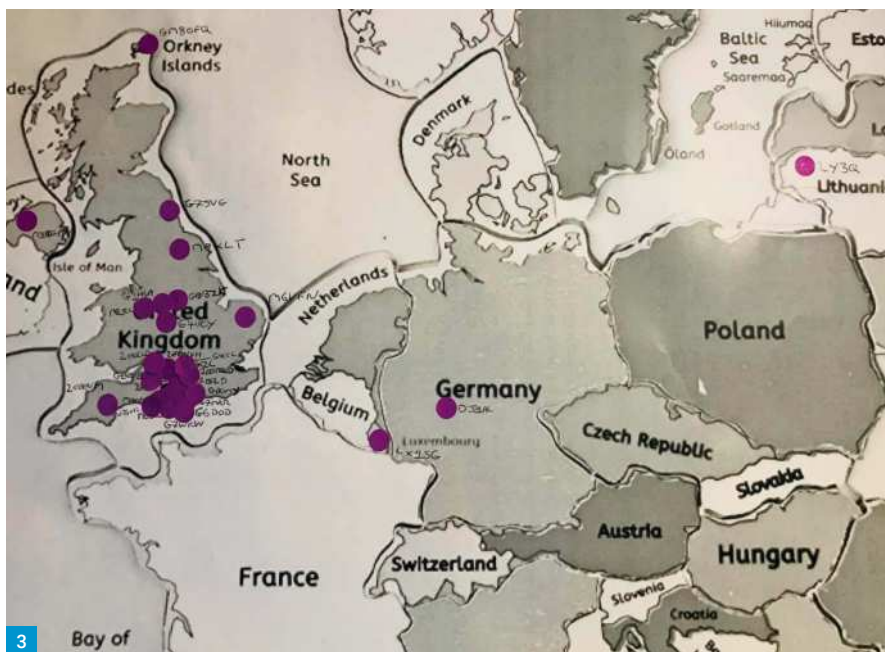
### The Key Lessons in Summary

We might thus conclude that:

- Working relatively nearby stations, over non-line-of-site paths, is comparable in difficulty to working DX;
- In general, HF ground wave does not go round corners;
- Vertical antennas are not suitable for NVIS working, but simple horizontal wires are;
- The frequency needed for NVIS working will be at, or just below,  $f_c$ ;
- Those wishing to use NVIS paths need to track  $f_c$  in near real time, and to be prepared to QSY as necessary.

### References

1. Summary in *RadCom*, Aug 2022. Full report at: <https://iowrs.org/about/bramble-bank>
2. Judd F C (1980). Ultra Slim Jim 2-metre omni vertical aerial. In: *Out of thin air...A Guide to Aerial Theory, Design and Propagation*, IPC Magazines Ltd, Poole, Dorset; and subsequent reprints/updates, PW publishing, 1995 and 2007.
3. Propquest: [www.propquest.co.uk/graphs.php?type=NVIS](http://www.propquest.co.uk/graphs.php?type=NVIS)





# Xiegu X6100

## 10W QRP SDR Transceiver

- HF/50MHz ALL Modes + data
- Power: 10W ext supply, 5W internal battery
- High-res. colour Screen
- Automatic Antenna Tuner
- SWR Scanner and Voice Call

**£579.95**  
IN STOCK!

PRICE MATCH!



FOR A RELIABLE FAST, FRIENDLY SERVICE

# nevada®

### MFJ - HUGE STOCKS!



**MFJ-269D**  
HF/VHF/UHF Analyser  
• Portable and easy to use  
• Covers:  
0.1MHz-470MHz (w/gap)

**£469.95**



**MFJ-949E** Antenna Tuner  
• 300W Tuner  
• With Dummy Load

**£259.95**

#### ANALYSERS

202B..... Noise Bridge 1 - 100MHz.....£89.95

#### MORSE

461..... Morse Reader-pocket sized.....£135.95  
492..... CW Memory Keyer.....£129.95  
550..... Popular Morse code practice key.....£24.95  
557..... Morse code key with oscillator.....£84.95  
561..... Iambic CW Travel Paddle.....£44.95

#### BALUNS

911H..... 1:1 or 4:1 Switchable Balun.....£59.95  
912..... 4:1 Remote Balun box.....£89.95

#### TUNERS

921..... 2m Antenna Tuner.....£174.95  
923..... 2m/70cms Tuner & SWR/Power.....£299.95  
931..... Artificial ground unit.....£149.95  
934..... 300W Tuner + artificial ground.....£359.95  
941..... 300 Watts Versa Tuner II.....£249.95  
945..... 1.8-60MHz 300W manual tuner.....£234.95  
948..... 300W PEP reading ant tuner.....£219.95  
949..... 300W tuner + Dummy load.....£299.95  
959C..... Receive ant tuner + pre-amp.....£179.95  
971..... 200W 1.8-30MHz Portable ATU.....£179.95  
974HB..... 300W Balanced Tuner.....£299.95  
986..... 1.5kW HF differential ATU.....£499.95  
989D..... 1.5kW HF Roller Inductor ATU.....£599.95  
991B..... 150W HF Auto Tuner.....£309.95  
993B..... 150W/300W Auto Tuner.....£395.95  
993BRT..... 150/300W Auto Remote Tuner.....£495.95  
994BRT..... 600W remote Auto Tuner.....£549.95  
998..... 5kW 1.8-30MHz Auto Tuner.....£849.95  
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 300W.....£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 Fibreglass mast.....£224.95  
1904HD..... 25ft Super Strong Fibreglass.....£249.95  
1906..... 33ft Strong Fibreglass mast.....£224.95  
1908H..... 43ft Strong Fibreglass mast.....£359.95

#### SWITCHES

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

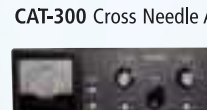
We carry a HUGE range of MFJ Products  
- check our web site for full listing

### COMET - UK IMPORTER



**CA-52HB4**  
50MHz 4 element  
HB9CV Wideband  
Beam

**£129.95**



**CAT-300** Cross Needle Antenna Tuner  
• 1.8-60MHz  
• 300W PEP

**£229.95**

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

#### 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

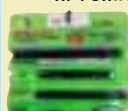
#### VHF/UHF BEAMS

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  
CYA-2414..... 2.4GHz 14 EL15.5dBi.....£119.95

#### ANTENNA TUNER

CA-T10..... 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

#### HF BASE ANTENNA

CHV-5A..... 5 band rotary loaded Dipole 4m long.....£369.95  
CWA-1000..... 5 band 500W Fan Dipole.....£149.95

#### BALUNS

CBL-1000..... 1.7-30MHz 1kW/CW.....£39.95  
CBL-2500..... 1.8-50MHz 2.5kW/CW.....£44.95

#### LOW PASS FILTERS

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

#### DUPLEXER

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.....£49.95  
CF-530C..... 1.3-90/125-470MHz 2xSO239 PL259.....£49.95  
CF-706PL..... 1.3-57/75-550MHz SO239 2xPL259.....£59.95  
CF-706N..... 1.3-57/75-550MHz SO239 N PL259.....£59.95

#### TRIPLEXERS

CFX431A..... 145/433/1296MHz 2xPL259 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

#### DUAL BAND MOBILE ANTENNAS

CSB7700..... 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.....£29.95  
CA-285..... 2m/3.5dBi, 50MHz/Odbi 1.32m.....£25.95

#### 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.....£34.95  
CTC-50M..... Thru window cable/SO-239 assembly.....£45.95  
3D4-M..... SO239 socket/Cable assembly 4m.....£26.95  
3BK-054M..... SO239 w/ 4m miniature cable/PL259.....£29.95  
CS-400P..... Lightning arrestor DX -500MHz.....£29.95

### MORSE KEYS



Iambic Chrome



Benchner BY-1

#### BENCHNER

BY-1..... Iambic Black.....£189.95  
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

#### VIBROPLEX KEYS

Blue Racer Deluxe.....Bug Chrome.....£299.95  
Original Deluxe.....Bug Key Chrome.....£299.95  
Iambic Deluxe.....Single lever Chrome.....£249.95  
Iambic Standard.....Paddle Black.....£199.95  
Iambic Code Warrior Junior.....Satin.....£189.95  
Vibrokeyer Deluxe.....Single lever Chrome.....£249.95  
Hand Key Standard.....Black.....£199.95  
Hand Key Deluxe.....Chrome.....£249.95  
Hand Key 'Camelback'.....miniature travel.....£109.95  
409V Vari-speed arm for Original Bug.....£39.95

#### HI MOUND

HK-808..... Hand Key Deluxe.....£249.95  
HK-705..... Hand Key Affordable.....£45.95  
HK-708..... Hand Key improved action.....£69.95  
HK-709..... Deluxe Hand Key with heavy base.....£79.95  
TC-701..... Budget hand key.....£49.95  
MK-701..... Paddle Key.....£69.95

See the full range of Morse Keys on our Website

### HEIL HEADPHONES



Pro-71C



Pro-Set Elite 6.....HC6 element.....£174.95  
PMS-6 Pro Micro.....Single headset HC6.....£89.95  
PMD-6 Pro Micro.....Double headset HC6.....£199.95  
HTH-Dual.....Lightweight Dual for H/Helds.....£49.95  
HTH-Single.....Lightweight Single for H/Helds.....£29.95

#### SPEAKER SYSTEMS

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!

### YAESU



**Yaesu Ftdx101D**  
HF/50/70MHz 100W Transceiver

- As new condition with:
- Box, Mic, manual & Lead
  - 'Top of the Sherwood performance charts'
  - Comes with our 6 month 'No Quibble' WARRANTY

USED MODEL

**£2599**

### ALINCO



**Alinco DX-10**  
28MHz Multi Mode Transceiver

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

**£189.95**

### SSB



**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  
SP13B..... 50W 2.4GHz (T-Bias).....£499.95  
DCW-2004B..... Sequencer 6/2/70cm.....£279.95

### XIEGU GRN1

NEW



**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)
- £229.95**
- GY03..... Matching 3W speaker.....£39.95

PART EXCHANGE - WE OFFER THE BEST RATES FOR YOUR OLD GEAR, CALL US NOW FOR A QUOTE!

# www.nevadaradio.co.uk



# Nevada - personal callers welcome - for purchase & collection

## XIEGU - NEW PRODUCTS!



### Xiegu G90

20W Portable HF Transceiver

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

**£449.00**



### Xiegu GY03

Powerful communications speaker 3W & connecting lead

**£39.95**

## MIDLAND

### Midland XT-70 Adventurer

LICENCE FREE - 2 Way Radio Pack



- Dual Band PMR/LPD Handhelds
- Pack contains: 2 x radios, Desktop charger, 2 x Earphones, USB cable, Carry Case

**£119.99**

## XIEGU - NEW PRODUCTS!

PRICE MATCH



### Xiegu X6100

10W QRP SDR Transceiver

- HF/50MHz ALL Modes + data
- Power: 10W ext supply, 5W internal battery
- High-res. colour Screen
- Automatic Antenna Tuner
- SWR Scanner and Voice Call
- Built-in Bluetooth/Wi-Fi function

**£579.95**



### 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**

**£499.95**



## FAST AUTO TUNERS

REMOTE - DESKTOP - ZERO POWER

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



**Z-100A**  
Plug and Play operation

Use with Yaesu, Icom, Elecraft, Alinco and Kenwood models using the seven supplied interface leads Covers 1.8 to 54MHz with powers from 0.1 to 125W

**£219.95**



**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**



**Z-817**

Interfaces through the CAT port providing full control of the tuning cycles. Supplied with all cables required to interface to the FT817/818. 2,000 memories store previous settings for fast recall. Ultra low power consumption and truly portable from internal battery power.

**£139.95**



**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**



**AT-200 Pro II**  
250W Auto Tuner

A general purpose tuner ideal for the higher powered 200W transceivers, but will tune from just 5W input. With a bargraph display, two antenna outlets and 4,000 memories, (2,000 per antenna) it learns your favourite frequencies for near instant recall

**£289.95**



**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 and UNUNS with 1:1, 2:1, 9:1 and 49:1 ratios

FROM **£34.95**



IMPORTERS of LDG products

## PALSTAR



**Palstar AT-2K**

2kW Antenna Tuner Built like a tank!

- Covers 160 - 6m
- 6 Way antenna switch

**£699.95**

## ALINCO



**Alinco DM-330MW MkII**

Communications Grade 30A Supply

'Best in Class!'

**£149.95**

DM-330FXE... 30A standard filtered supply... **£129.95**  
DM-30E... 30A (peak) digital display... **£99.95**  
DM-430E... 30A Digital & P/Pole conn... **£109.95**

## SPIDERBEAM



- SPIDERBEAM YAGI KITS
- No compromise design
- Handle 2kW power!
- Lightweight, Portable
- For home or Expeditions

### 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**

## SPIDERBEAM

### 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**  
10 metre Heavy Duty (1.7m retracted)... **£425.95**  
12.5 metre (1.65m retracted)... **£549.95**  
14.5 metre Heavy Duty (2m retracted)... **£589.95**  
15 metre Standard (2m retracted)... **£589.95**

## ROTATORS

### YAESU

G-2800DX... 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**

## TECSUN



**Tecsun H501x**  
Flagship radio with Bluetooth

**£329.95**

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



**Tecsun PL-990x**  
Top of the Range Portable Radio with Bluetooth

**£259.95**

- Covers: LW, MW, FM, SW (1.711-29,999)MHz
- MP3 player via SD port

## AIRSPY



### Airsipy HF+ Discovery

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

**£199.95**



### Airsipy R2

- VHF/UHF/SHF Receiver
- 24MHz-1,800MHz
- 10MHz panoramic spectrum
- 3.5 dB NF (42-1002)MHz
- Tracking RF filters

**£209.95**



### Airsipy Mini

- SDR Dongle
- 24 - 1,800MHz

**£119.95**

## SDRplay



### 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**

MUCH MORE ON OUR WEBSITE 24/7 - BACKED BY FRIENDLY, KNOWLEDGEABLE STAFF



follow us on twitter: @NevadaRadio



follow us on facebook: www.facebook.com/nevadaradio

OPEN: Mon to Fri 9.00am - 5.00pm

Unit 1 Fitzherbert Spur Farlington  
Portsmouth Hampshire PO6 1TT



**023 9231 3090**



# XIEGU G-106

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

**NEW PRODUCT**

**£349**



FOR A RELIABLE FAST, FRIENDLY SERVICE

# nevada®



**Amplifiers you can trust!**



## Acom 1200S

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

**£2999.95**



## Acom 1010

- 700W Valve Amplifier
- Covers: 160-10m

**£1979.95**

### 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.....	£3399.95

### 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

- 270/23cms Transceiver
- The Boss's choice!

**£1899.95**



### Icom IC-705

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

**£1399.95**

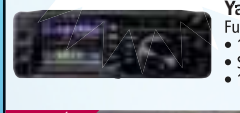
**Full ICOM RANGE in Stock!**

## YAESU Hot products!



- Yaesu FTDX10 HF/6m/4m SDR 100W Transceiver - **A WINNER!** Rated N° 3 in the Sherwood Performance chart!

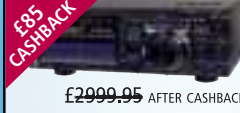
**£1250** AFTER CASHBACK Valid until Sept 30 **£1265.00**



### 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

**£1229.95**



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

**£2999.95** AFTER CASHBACK Valid until Sept 30 **£2914.95**

### Yaesu FTDx-101MP New 200W version

**£4199.95** AFTER CASHBACK Valid until Sept 30 **£4114.95**

## ICOM

### New from ICOM

#### Icom ID-52E

- D-STAR Digital Handheld
- Bluetooth Technology
- UHF Military Airband RX
- Picture sharing function
- Louder audio output
- Waterproof 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

**£349.95**

## DAIWA

### QUALITY PROFESSIONAL METERS from JAPAN at AFFORDABLE PRICES

#### Factory Direct - FULL RANGE IN STOCK!



- CN-901HP Professional grade 1.8-200MHz cross needle SWR/Power meter

**£139.95**



- 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**



- Yaesu FTM-300DE 50W Dual Band Digital Transceiver

**£349.95**



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

**NOW £679.95**



- 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**



- Icom IC-R8600 Wideband Communications Receiver

**£2599.95**



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

**£1124.95**



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

**£259.95**



- 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

## VIBROPLEX End Fed Wires



- 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

## HUSTLER HF VERTICALS

5 BTW

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

Mobiles for HF and CB radio in stock too!

## SIRIO ANTENNAS

### Quality Antennas from Italy!



### WY400-10N

- 70cms 10 element
- Wideband 400-470MHz
- Boom: 2m, Gain: 14 dBi

**SPECIAL!**

**£449.00**

**£99.95**

### VHF/UHF Verticals

CX4-68.....	(68-73)MHz 4m 4.15dBi.....	£69.95
CX440.....	(440-455)MHz pnr 4.15dBi.....	£39.95
CX455.....	(455-470)MHz pnr 4.15dBi.....	£29.95
TORNADO 50-60.....	(50-60)MHz 6m 3.5dBi.....	£59.95

### HF/VHF/UHF Beams

SY3.....	3 el (26-28)MHz 10.65dBi.....	£99.95
SY4.....	3 el (26-28)MHz 13.15 dBi.....	£119.95
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.....	£79.95
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

Gain-Master.....	1/2 wave 5.5m 500W.....	£119.95
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



## DUAL Antennas by YU1CF

### High Performance Beams using Professional 3D EM modelling

PA-50-4-3B.....	4 el 9.2 dBi 2.92m.....	£159.95
PA-50-6-6BG.....	6 el 11.5dBi 5.84m.....	£299.95
PA-50-7-9BG.....	7 el 12.7 dBi 8.68m.....	£359.95
PA5070-7-3.....	6m 3el/4m 4 el.....	£229.95
PA5070-11-6 BG.....	6m 5el/4m 6 el.....	£299.95
PA5070-13-7BG.....	6m 6el/4m 7 el.....	£369.95
PA5070-15-9BG.....	6m 7el/4m 8 el.....	£429.95
PA5070-15-9-2CBG.....	6m 7el/4m 8 el.....	£449.95
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
PA144-432-8-00RA.....	3/6 el rear mount.....	£99.95
PA144-432-9-18-2CBA.....	13/6 el rear mount.....	£119.95
PA144-432-13-7-CBGB.....	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
PA144-432-19-3-2CB.....	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
PA144-432-34-6-2CBG.....	11/23 el 2 conn.....	£289.95
PA144-432-38-6BG.....	11/28 element.....	£299.95
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



## LoRa WAN - Helium Miner Antennas

- 868MHz Long Range • Low Power • Licence free

PA144-11-6BG.....	11 el 5.72m boom.....	£249.95
PA144-12-7BG.....	12 element.....	£289.95
PA144-13-8BG.....	3 el 7.84 boom.....	£339.95
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
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
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
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
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 50239 2kW.....	£99.95
DUAL 6850.....	2EME2-144MHz 1.5kW.....	£269.95

Plus many much more on our web site!

**PART EXCHANGE - WE OFFER THE BEST RATES FOR YOUR OLD GEAR, CALL US NOW FOR A QUOTE!**

# www.nevadaradio.co.uk

**Steve Telenius-Lowe PJ4DX**  
teleniuslowe@gmail.com

**O**n 12 July, the day after this column was completed last month, the solar flux (SFI) leapt up to 165 and the sunspot number (SN) to 134. By 17 July the SFI was 176 and the following day the SN had risen to 166. Both measures then dropped for the remainder of the month but, as **Table 1** shows, despite this the trend is still upwards compared with this time last year.

## Autumn DXpeditions

In the July *HF Highlights* I previewed several DXpeditions that were scheduled to take place this autumn and winter. One was CY0S (Sable Island), scheduled for October. However, the team has been informed by Parks Canada, the authority that controls the island, that the DXpedition has to be rescheduled due to a major project that Parks Canada has on the island during October and November. The DXpedition is now scheduled for 20 – 29 March 2023.

A major DXpedition has now been announced for 5 – 17 October: the F6KOP team (plus guest operators) will be operating as D60AE, **Fig. 1**, from the Comoros. This experienced group of operators is responsible for some of the most successful DXpeditions of recent years including 3B7A, 9LY1JM, FT4JA, FT4TA and many others. Expect good signals with activity on several bands and modes simultaneously.

<https://comores2022.wordpress.com>

## Hexbeam Up

Last month's *HF Highlights* had a photo of my Spiderbeam, looking very sorry for itself, after the push-up mast had fallen over. The antenna was damaged and requires renovation but the mast itself survived unscathed. With the help of **Bert PJ4KY**, **Peter PJ4NX**, **Jim PJ4JR** and **Jim KC2WEK** we replaced the antenna with an MW0JZE Hexbeam, which is now up at 14m high, **Fig. 2**.

Having been off the air for over two months, I was keen to give the Hexbeam a good work-out and its first HF trial was during the IOTA Contest on 30 and 31 July. Conditions were not good on 28 or 21MHz but on 14MHz European signals were strong and I made 472 QSOs on that band.

## The Contest Season

Although there are contests throughout the year, the contest 'season', when most of the major HF events take place, is generally regarded as starting in October and extending throughout the winter. The biggest is the CQ World Wide DX contest and this year the Phone (SSB) event takes place over the weekend of 29/30 October (the equivalent CW contest will be on 26/27 November).

Even if you don't consider yourself a tester,

**1**

# The Jubilee, the IOTA Contest and More

Despite the summer 'doldrums' there has been plenty happening in the HF bands, as **Steve Telenius-Lowe PJ4DX** reports.

it's well worth tuning the bands during these weekends to see what DX you can find. Those taking part seriously in the contest are specifically looking for calls from stations that are not competing, but just giving away some points. Particularly on the second day of 48-hour contests things can get rather slow for testers so, contrary to popular belief, it can be easier for the average station to work the DX during a major contest than it is outside contest periods. With so much activity, pile-ups tend to be divided between all the stations so are often not as fierce or intimidating as you might imagine.

## Queen's Platinum Jubilee

It was good to hear from several readers who responded to my request for details of their operation using the special call signs for the Queen's Platinum Jubilee in June. New contributor **Mark Godden G0ACQ** wrote from Portland in Dorset saying "I am a keen PW reader and always enjoy your HF column... I used the special call **GQ0ACQ/70** throughout the month of June. I managed to complete 1235 QSOs using mainly

*FT8 across all bands from 160m to 6m. Although propagation was generally quite poor, a total of 75 DXCC countries were worked during the month. I was quite pleased with the results and I very much enjoyed taking part in the event. My HF antenna is a very simple inverted-L, fed at ground level through a remote ATU. Power levels were typically quite low, up to a maximum of about 45W."*

Another new contributor, **Chris Pearson G5VZ**, wrote: "I do enjoy your HF column each month in *Practical Wireless*. Until now I haven't had news to send you but, with the recent Jubilee celebrations, perhaps that has now changed... I've been a member of FISTS CW Club for some time... [and] came up with an idea to combine FISTS activity with the Jubilee, encouraging members to apply for a Q-RSL NoV and get on the air. Not exactly a contest but with a strong competitive component and open to all licensed amateurs, not just FISTS members. And because it was such a very special celebration, I suggested to G4YVM, the club's activities manager, that I would provide a commemorative plaque. During the weekend I operated the club call, GQ0IPX (**Fig. 3**), on CW



Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



**Fig. 1:** Look for F6KOP club members operating as D60AE from the Comoros in October.

**Fig. 2:** The Hexbeam at the PJ4DX/PJ4EVA station was raised at the end of July (photo: Jim PJ4JR). **Fig. 3:** Chris G5VZ operating the FISTS club call, GQ0IPX, during the Platinum Jubilee celebrations. **Fig. 4:** David G4YVM with the FISTS Platinum Jubilee celebration trophy. **Fig. 5:** Stations worked on 15m FT8 by ZB2GI during July.

which scored premium points in the activity, being a club HQ station and a Q-RSL. We had entries from UK and Europe and also North America. Because **David G4YVM** wasn't involved in planning or running the event, he felt he was ready to join in for a change. And he was the overall winner." **Fig. 4** shows David with his FISTS Platinum Jubilee celebration trophy. Chris added that the slate was commissioned from, and engraved by, **Pete G0PNM**, President of FOC, the First Class CW Operators' Club.

**Paul Beard G10VK** from Worcester wrote about his experience using the **GQ10VK** callsign. "I wasn't going to apply to use the GQ callsign as I used GB0SOS throughout May for SOS Radio Week, but I'm very glad I decided to participate in the Jubilee celebrations. The GQ callsign certainly boosted the QSO rate. I hope to take part in any similar events in the future, it was great fun. I operated most days on 28MHz SSB, using 200W from my Yaesu FTdx101MP and a 3-element 28MHz LFA2 Yagi with 3.1m boom from InnovAntennas, at 10m above the ground. I made 902 QSOs with 60 countries, including Argentina, Brazil, Chile, French Guiana, Guadeloupe, India, Indonesia, Kuwait, Namibia, Puerto Rico, San Marino, Saudi Arabia, St Helena, US Virgin Islands and Uruguay."

## Readers' News

**Victor Brand G3JNB** reported that it was difficult to work the DX using low-power CW to his vertical antennas: "The mid-summer doldrums, that massive heatwave (40°C in the shack) and a dearth of reasonable CW DX propagation, led me to 'consider my position'. Steve's new book HF DX Basics had arrived and I took notice of the pie chart showing the now overwhelming dominance of FT8 on the DX bands. I had actually tried the mode in the early days but soon dispensed with it since, at the time, CW DX activity was rampant. So, 'if you can't beat em – join em' and I reinstalled the software. The question of how I was getting out was soon resolved when **Dave G4FKI** kindly mailed me a screenshot from PSK Reporter showing that my 15m FT8 signals (25W to the 10m helical) were being decoded around the world! So, for the last week of July I joined the gang and tried my luck. It was interesting to find that some of the same behaviour problems found when chasing distant stations on CW were also



apparent on FT8... Called by a Thailand station, I was part way through the QSO only to find that the operator's computer had switched to working a massive signal that had obliterated me. Nothing new there then. So, for now, I will persevere since it does appear that future DXpeditions may major on FT8 rather than our 'legacy' modes."

**Neil Clarke G0CAS** sent in his regular 28MHz beacon report: "A beacon that has not been heard for several years, SK7AE 28290, reappeared on 13 July. However, that was the only day it was heard despite further good openings during the rest of the month to Scandinavia. This beacon is reported to be running 100W. There were 20 days with openings in that direction. As expected, openings to Italy and Spain were the most common, with IZ8RVA 28240 heard on all except four days and ED4YAK 28251 logged on 28 days of the month, making it the most heard European beacon throughout July. From central Europe OE3XAC 28188, DL0IGI and DB0UM 28279 were heard on 19, 15 and 11 days respectively. Very short skip Sporadic E conditions took place during the morning of the 7th when GB3XMB 28286 was logged at a distance of only 178 miles. Not quite as short a distance, ON0RY 28207 was heard for the first time this year at 320 miles. Looking beyond Europe 4X6TU 28200 was heard on 24 days while ZS6DN also on 28200 was logged on only six days, all during the later days of the month. Towards South America, LU4AA 28200 was heard on 13 days with PY4MAB 28270 on 14 days. The only beacon to be logged from North America was 4U1UN 28200 on the 4th, 5th, 11th and 22nd."

**Jim Bovill PA3FDR** sent in a report covering the first half of June and the second half of July, between which he was on holiday in Ireland. "DX activity was absent at my location for 28MHz FT4 and low on FT8. My best results were with 21MHz FT4 and FT8 and 14MHz FT4. Most QSOs were



	Aug '22	Feb '22	Aug '21	Difference
SFI:	108	118	72	(+36)
SN:	60	78	0	(+60)

**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.**

with operators from Japan, Brazil and Argentina. Among new South American contacts were Chile (CE1BF, XQ3MCC and XQ5BRC) and Uruguay (CX1RL). I was also able to add a couple of rarer European stations, the Mediterranean island of Corsica (TK4QP) and San Marino (T77C)... Also worth mentioning was the special event station GB0DMC, celebrating the fifth anniversary of the FT8 Digital Mode Club." Jim also welcomed the return of several Ukrainian amateurs back to the airwaves.

**Etienne Vrebos OS8D** gave a nice explanation of why he uses SSB exclusively: "As long I'm still in love with the human voice and accents, such as the beautiful pronunciation of 'eight' in Scotland and especially Northern Ireland (perhaps the main reason I have OS8D and ON8DN as my callsigns!), I won't go on digital transmissions." He also explained that his Hexbeam antenna is now only 6m high: "It goes down very quietly, in five years I lost 4m [in height] – perhaps the aluminium poles weren't secured by good clamps. It's OK, I'm not losing any DX with high power on HF till now as you can see on my monthly reports and if I didn't reach a super DX, it's because I'm not patient enough to wait till I get through. Mostly I call three or four times and leave in the hope they will come back later without a pile-up (it happens once a year!)."

**Reg Williams G00OF** wrote "The beginning of the month was the culmination of the WRTC 2022

Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)



award scheme... [it] ended on 9 July at 1200UTC with the final sprint award incorporated into the IARU HF World Championship Contest, phone and CW, which started at the same time and ended at 1200UTC the following day. The aim was to work the Italian stations with the special award callsigns taking part in the contest. 500 points were required to gain the sprint award. I fell short by 50 points due to time limitations of visiting family staying at the QTH. Nonetheless I did qualify for an award for taking part. Also, on the first day of the month I worked **Bob Walker E51BQ** on Rarotonga on 18MHz FT8, signal reports were good both ways for an early morning contact. Another nice catch was **VK0MQ** on Macquarie Island, 30m FT8. Hoping to work him again on other bands before I request his QSL card via M00XO. He is there until October. 21MHz was open very late into the evening on the 7th, when I managed to work the Russian 7Q5RU DXpedition team on FT8... Lots of North American stations are on 14MHz in the evening where I will hopefully see and work a Montana station to complete my last state for the QRZ All States Award."

**Owen Williams G0PHY** thanked me for the QSO we had during the IOTA Contest at the end of July: "I don't normally operate at that time of the morning (0253UTC) but I woke up and thought I'd try a quick half hour. Apart from PJ4DX I worked HI3SD and AA4V (NA-110) on 14MHz and W4KJ (NA-055) on 7MHz. I had a spell on the run station at G3B at the start of the contest but it was hard to get a run going. The highlight was being called by BX2AHP. It was a rather bitter-sweet moment as it was the first Taiwanese station that I've worked and would have been a new DXCC if I was operating as G0PHY. On the other hand, I probably would not have worked him at the home station as G3B had a SteppIR antenna."

PW's VHF columnist **Tim Kirby GW4VXE** apologised for not having much to report on HF: "I've been keeping my 80m skeds with **Roger GW5NF** and that's been about it! During the IOTA contest, I worked **Don G3XTT** operating EI9E,



**MM0ULK/P** and **Bob M0MCV**. I am very pleased with the addition of 40m 'legs' to the 80m dipole, using a common feeder. It works well for contacts around the UK and Europe. I wondered whether the addition of 40m would affect the tuning very much, but keeping the 40m legs at 70 – 80° to the plane of the 80m legs seems to have reduced interaction. I was recently given a copy of Easy-Up Antennas for Radio Listeners and Hams by **Edward M Noll**. It looks quite interesting – I am sure there is something to try out in there, come the autumn."

**Kevin Hewitt ZB2GI** was active on VHF from the Top of the Rock most mornings throughout July – and operated on 10m SSB and FT8 while waiting for 6m to open! "On 21 July I worked 50+ 10m SSB stations and 150+ 10m SSB stations on the 22nd. I also operated 10m SSB in the evening with **John King ZB2JK**, once from Coaling Island and twice at the Top of the Rock, only to find the band dead."

**Fig. 5** shows a map of the stations worked by ZB2GI from his home station during July on 15m FT8 while using a 5m wire connected via a 9:1 balun.

## Around the Bands

**Victor G3JNB: 14MHz CW:** TR8CR. **18MHz CW:** CX6CF, V85T. **21MHz CW:** 9J2BQ, XQ6CF.

**Jim PA3FDR: 7MHz FT4:** CU8AF. **7MHz FT8:** CQ3KNO. **14MHz FT4:** 5B4AMM, 7K4DHB, 7X3WPL, A65DR, AP2MKS, E22HBS, JA3FQO, JA8KSF, JE2BSJ, JG5RVQ, JK6DXD, JL10XH, K6ND, KC1BUF, KE9RY, KP4JRS, OD5ZZ, VA2KI, W3RJW, WA2IBZ, YM7KK. **14MHz FT8:** HS2AQQ, JA0RUG, JA2ADH, TK4QP, VK6AL. **21MHz FT4:** JA0FIL, JA2HQZ, JA3DAZ. JA4FKX, JA5JWQ, JA6FIO, JE7GXQ, JL1QOC, LU1EEP, N2BJ, PY2RAR, PY5EG, W0ALA. **21MHz FT8:** 9K2YD, A41ZZ, A61BR, BG5GLV, CO8LY, EK1KE, JA0EOK, JA4FKX, JA6VQA, JA7XVZ, JE8NHD, JR3IIR, KP2B, LU3OZ, LW6EQG, NP4TX, PP5HR, PP6EOJ, PU2SWR, PY7ZC, W8JY, WB2PDW, YC1DAP, XQ5BRC. **28MHz FT8:** 7U60I, 9K2HN, CE1BF, CX1RL, LU1FAM, LW6EQG, PY3RK, PY5EJ, PY7ZZ, T77C.

**Etienne OS8D: 14MHz SSB:** 4L7D, 9M8RC, JW/LX1NO, UK8OCU, VK5MRD, YH3BG. **18MHz SSB:** 3D2AJT (ATNO), JL8PZO. **21MHz SSB:** 8N8HQ, 9M2SPN, D4K, D4Z, FR1DI, FY5FY, JI1ICF, PJ2Y, UN1HQ, YH0AC, YH1RI, YH2AA, YH3AL, YH7UJ, YH8AO, YH9LW, ZZ7A. **28MHz SSB:** CX6AV, LU3MCJ.

**Reg G00OF: 10MHz FT8:** NQ7R, VK0MQ, ZL1BQD. **14MHz FT8:** KL7TC, VK7CMV, XE2ML. **18MHz FT8:** E51BQ, HK6BRK, PZ5RA, VA3TPS, VP8ADR. **21MHz FT8:** 7Q5RU.

**Owen G0PHY: 7MHz SSB:** W4KJ. **14MHz SSB:** 5E5R, AA4V, D4Z, FY5KE, HI3SD, KP2B, PJ4DX, TA0TA, VO1NA, W2JV, W4KJ. **18MHz SSB:** PV8AL. **21MHz SSB:** D4Z.

**Kevin ZB2GI: 7MHz FT8:** N2LA. **14MHz FT8:** N0STL. **21MHz SSB:** WA2BOT, ZY8AM. **21MHz FT8:** 7K1PTT, 8J3IPA, 9K2BM, A61FJ, AA0N, AA1SU, AA4M, AB8MO, AB9M, AC2PB, AL7TC, BD6RN, BG0CAB, CO7DSR, DS5TOS, HL2WA, JA0KNM, JA1XEC, JA2QXP, JA3KGF, JA4DND, JA5AQC, JA6BZI, JA7XVZ, JA8EJZ, K3DFL, K4QXX, K5VYT, K6FA, K7KB, PY2OM, PY4NN, PY7PX, VA2KS, VA3PY, VE1DBM, VE4EA, VE6AX, VE7BST, VY2WM, XE1SAX, YB2MM, YB9GV, YC8FKN, YV5LFY. **24MHz FT8:** 5Z4VJ, JA5QJD, JA6BZI, K4YT, KB2AHZ, UN7GN, VA3FF, W1KRI, W3UR, W8BSD, W9NB, X10X. **28MHz SSB:** 4Z5JO, 8B2FTDM, 9K2HS, BG8PM, BH8OCW, EA9E, EC8AZE, EX8BT, FY5KE, PY4YY, TA7I, YC9BGE, ZD7FT. **28MHz FT8:** 3B8CW, 4Z5PT, 5B4VL, 7X2KF, 9K2HR, A61R, BD9BI/O, BH3SCC, BH8ABY, BX6ABC, HS0ZIV, HS2AQQ, PY8WW, VK3AXI, VK5BC, VU2YAP, YB0SAS, YB2MM, YB8JEC, YB9LAI, YG1AEX.

## Signing Off

Thanks to all contributors. Please send all input for this column to

[teleniuslowe@gmail.com](mailto:teleniuslowe@gmail.com)

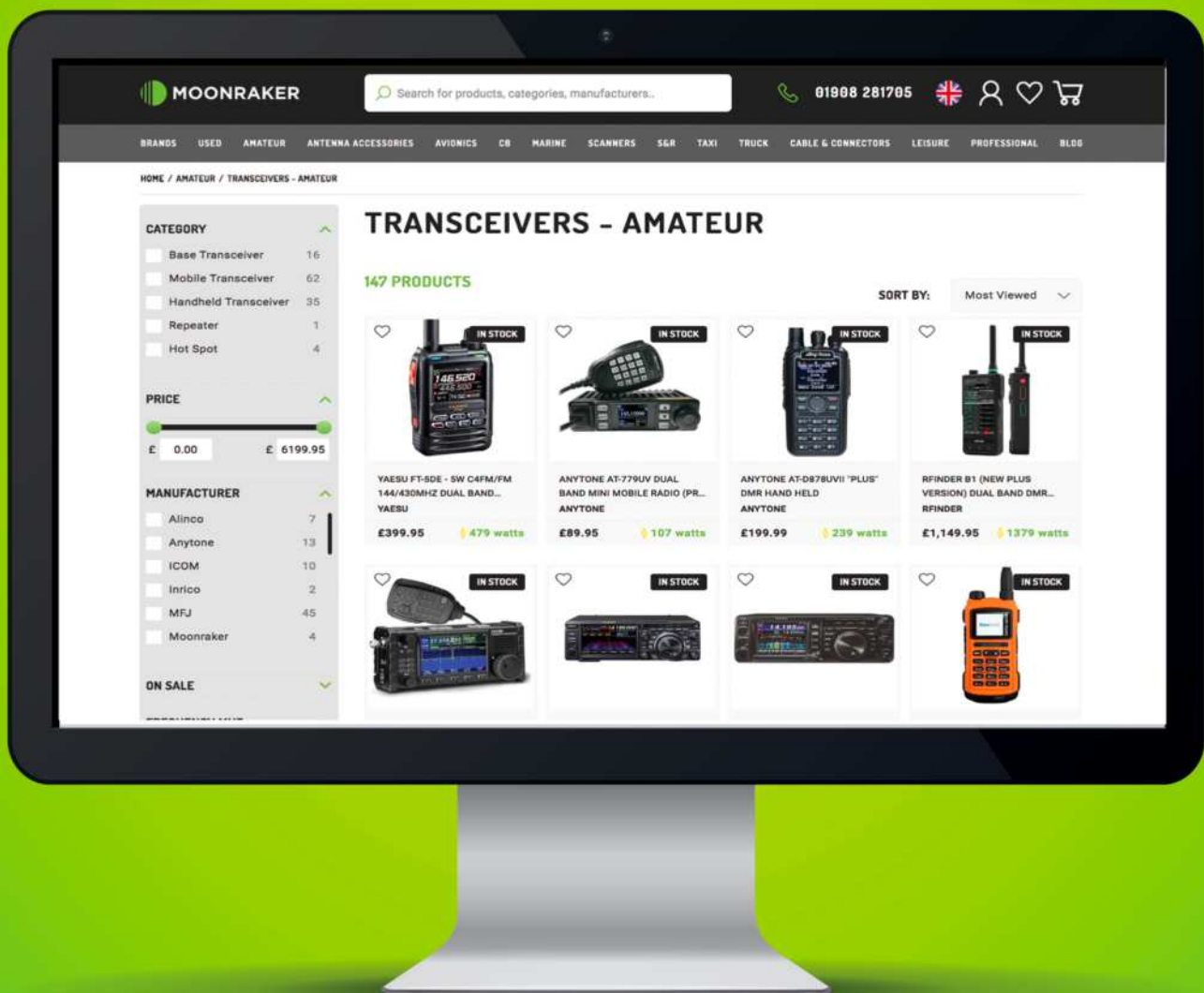
by the 11th of each month. Photographs of your shack, antennas, or other activity would be particularly welcome. For the December issue the deadline is 11 October. 73, Steve PJ4DX. **PW**

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





# THE ONLINE HOBBY RADIO SUPERSTORE



**www.moonrakeronline.com**

T: 01908 281 705 E: sales@moonraker-group.com

SCAN TO SHOP



Godfrey Manning G4GLM  
cgmm2@btinternet.com

**R**eplicating multiple copies of a wiring loom was a tedious task leading to inconsistent results. Eight wires had to be paired up and soldered together endwise, resulting in a four-way harness. This encouraged me to design a better way. I present my ideas that you could draw on, although dimensions and the precise arrangement can be varied to suit your needs and available materials. Basic woodwork is called for, you can see it's far from artistic cabinet making.

A groove with one side sloping towards the other holds the wires in line. The slope allows for a range of wire diameters. A light clamp, made from thin aluminium sheet, rests over the groove and holds the wires in position, ready for soldering. The soldering iron is admitted into a gap within which the joint itself is made. The clamp is held in place by a light friction fit and simply lifts out again when finished. The heading photo shows the general arrangement of the final product, small squares on the scale rule are 1cm.

### Getting in the Groove

Start with a hard wood base and screw on two pieces of hardboard to make the upright side of the groove, **Fig. 1**. The intermediate gap is part of the slot through which soldering takes place and mine came out at 13mm wide. The base extends beyond the groove, offering end wings to enable clamping the jig to the workbench.

To make the sloping surface of the groove, a piece of rectangular-section softwood has one face cut back at an angle. For a consistent result, I made the cut in a tilt-arbor circular saw, **Fig. 2**. If you have one, you might already know my cautionary tale (but decide after reading it!). Professionally I once met a chap with a curtailed fingertip. All he noticed when sawing was a feeling of something brushing his finger, almost tickling. He didn't realise what had happened until he looked. Be warned, push the job through the saw with another piece of wood, not fingers.

Notice the sloping piece is still, well, a piece! If made in two sections, it would be harder to line up such as to assure a linear groove. Screw it to the base in four places, **Fig. 3**, countersinking the screw heads out of the way. The result to date is **Fig. 4**. Only now can the sloper be cut in line with the soldering slot, **Fig. 5**. Whereas you started with four screws, the net outcome is a pair of screws in each of the two halves of the sloper, **Fig. 6**.

### Get Slotted

The base of the soldering slot nearest the front needs a small bevel, otherwise the soldered joint will be resting on a wooden floor. Cut into the base on each side of the slot, **Fig. 7**, then chisel out the waste, **Fig. 8**. I find that a touch with a small coarse general-purpose file makes the rough wood surface smooth. Woodwork is finished.



# Soldering Jig

**Godfrey Manning G4GLM** simplifies the fiddly problem of soldering wires together.

### Clamp Up

Only the lightest pressure is needed to hold the wire down in the slot, although I do call this next part a clamp. Fold the aluminium, **Fig. 9**, so the side of the larger piece is slightly shorter than the width of the sloper.

The internal dimension of the long side needs to be very close to the overall length of the combined slopers. Finally, turn in the far side to match the existing near side. Slid over the sloper, the clamp is snug but needs no force.

To keep the clamp in shape and make handling convenient, a second section forms a narrow band at the back. Drill 1/8in at the centres of the band's end faces, **Fig. 10**, and follow on by marking the corresponding holes in the main section with a 1/8in centre point, **Fig. 11**. Drill these marked holes, line up and join with 1/8in short-length pop rivets.

The front face of the clamp now obstructs the soldering slot and needs to be nibbled open, **Fig. 12**.

### We're There

It's ready to try out and clamping to the bench, **Fig. 13**, aids stability. Two fine solid wires are being positioned in the slot for soldering in **Fig. 14**. Better positioning of finer wires is aided by forceps. Heavier stranded wires are pre-tinned in **Fig. 15**. The clamp tends to rest on top of finer wires but might wedge down the side of those of larger diameter. It matters not, it's just doing its job.

### Bonus!

Pre-twisting the wires before applying solder, **Fig. 16**, arguably adds strength, but at the expense of a longer joint. Accordingly, considerable application of heat was needed.

Luckily, an unexpected bonus is seen in the outcome of soldering these. The insulation is maintained (it usually melts a little near the joint) because the aluminium clamp also acts as a heat-sink.

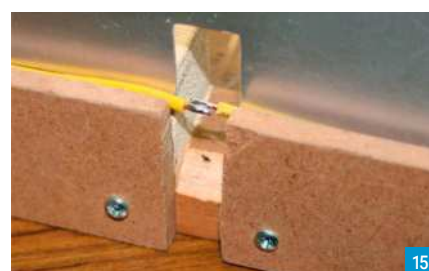
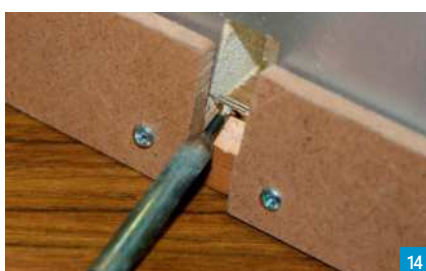
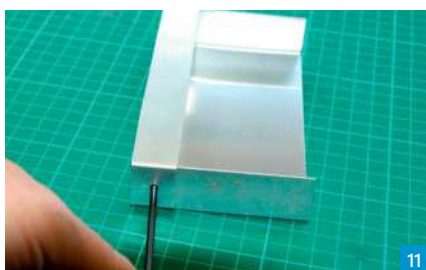
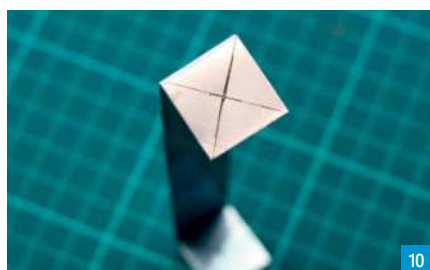
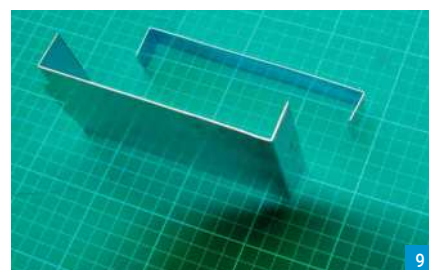
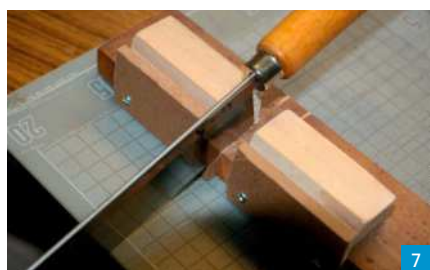
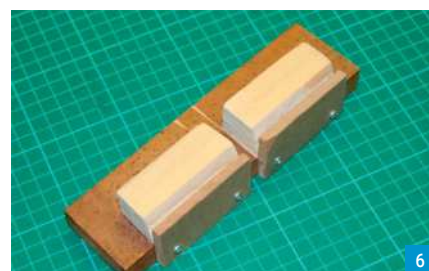
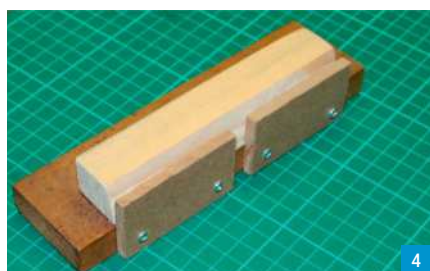
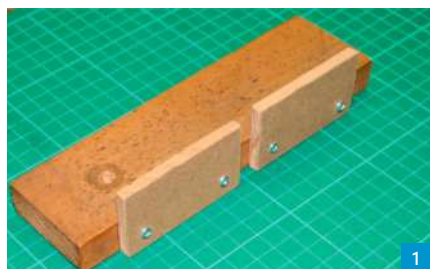
### And so to Bed

Finish off with an insulating cover of heatshrink sleeving. After work, the jig folds up in a compact shape, **Fig. 17**, for storage. **PW**

**Fig. 1:** Getting started. **Fig. 2:** Cutting the sloping surface. **Fig. 3:** Countersinking the screws. **Fig. 4:** The result so far. **Fig. 5:** Cutting the soldering slot. **Fig. 6:** Now with the slot. **Fig. 7:** Opening out the slot. **Fig. 8:** Chiselling out the waste. **Fig. 9:** Folding the aluminium. **Fig. 10:** 1/8in holes at the centres of the band's end faces. **Fig. 11:** Marking the holes in the centre section. **Fig. 12:** Nibbling out the square holes. **Fig. 13:** Clamping for stability. **Fig. 14:** Two fine wires ready to be soldered. **Fig. 15:** Heavier wires pre-tinned. **Fig. 16:** Wires can be twisted together before soldering. **Fig. 17:** The jig folded away after use.

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)

**Colin Redwood G6MXL**

practicalwireless@warnersgroup.co.uk

**2**022 saw 48 entrants submit logs in the 39th Practical Wireless 144MHz QRP contest held on Sunday 12 June. The entrants made a total of 1555 valid contacts with stations in 26 different squares, Fig. 2.

### 2022 Winners

- The overall winner, leading single operator and leading Welsh station is the **Hereford VHF Contest Group GW1YBB/P**, operated by **Steven Clements G1YBB** from Pen-Y-Gadair (800m asl), the second highest peak in the Black Mountains in South Wales IO81KW, **Fig. 4**. He used a Yaesu FT-817 transceiver and a 9-element DK7ZB antenna.
- Runner up, the leading multi-operator and leading English station is the **SADGITS team G4RLF/P**, **Fig. 3**, operating from IO80WX.
- The leading fixed station is **Dave Keston G8FMC** from IO91NW.
- The leading Scottish station is again the **Galashiels and District Amateur Radio Society GM4YEQ/P**, operating from IO85MM.
- The leading GI/EI station is again **Paul Norris EI3ENB/P**, operating from IO62JI.
- The leading GJ/GU station is again **Chris Rees GU3TUX**, operating from IN89VR.
- The leading Isle of Man station is **John Dowling GD0TFG/P**, operating from IO74PC.
- Full details of the results can be found in the tables. As usual certificates will be sent to all the leading stations above and the leading station in each square.
- Check logs were received from **Stewart Wilkinson G0LGS** and **Godfrey Manning G4GLM**.

### Weather

Many participants were greeted by good weather, with blue skies and sun. However, many complained of strong winds, causing a variety of problems. Further north, the winds were stronger. In Scotland **Bill Ward GM0ICF/P** had to contend not only with a continuous gale, but also intense downpours. In South Wales Steve GW1YBB/P thought, "This year's PW Contest was notable for being dry but cold and very windy. The Black Mountains haven't got the memo yet about it being summer! The wind was relentless from the walk up to the walk down. Not as bad as it has been but enough to make pitching my two-pole dome tent interesting on my own. The wind was howling through the elements all day". **Martyn Wright** of the **SADGITS G4RLF/P** team says, "We thought the WX was going to be hot and sunny, so we went armed with suntan cream and lots of water, instead we ended up freezing even with our coats on, the wind was 30mph plus most of the time with no sun".



# 2022 PW 144MHz QRP Contest Results

**Colin Redwood G6MXL** has the results of the June 2022 2m QRP Contest.

### Propagation

From before 0530UTC the DX Cluster was showing English and French stations working into Greece and the Balkans on 2m. Unfortunately, the opening appears to have ended before the start of the contest, with no entrants making any really long-distance contacts via Sporadic E. In fact, there were only six QSOs with stations outside the British Isles. Generally, entrants complained that propagation was not good. **Chris Rees GU3TUX** in the Channel Isles, found, "Conditions poor – just the occasional flash of tropo, which enabled me to work up to GD. Nothing heard from GM or the eastern side of the UK, most unusual. All in all, hard going!" **T G "Robbie" Robertson** of the **Tamworth Amateur Radio Society, G8TRS/P** summed up this year's contest, "Poor – no dx, Wx – very good".

### QRM

In addition to the weather conditions, Bill

GM0ICF/P had dreadful QRM. He doesn't know if this was coming from wind turbines or arcing on pylons. As a result, he had to disconnect his preamp as his transceiver was reading S7-S9 noise with huge pulses at times. He lost at least two contacts due to this. He packed in after an hour.

### Logging Accuracy

There was generally a high level of accuracy, but a few stations lost points due to inaccurate locators, reports and missing /P from some callsigns. I suspect some of these may have been due to errors in transcribing from paper logs to computers or stations not using phonetics (N instead of M for example).

### Jubilee Calls

There were very few instances of entrants working stations who used the GQ, 2Q or MQ prefix and even fewer using the /70 suffix.

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



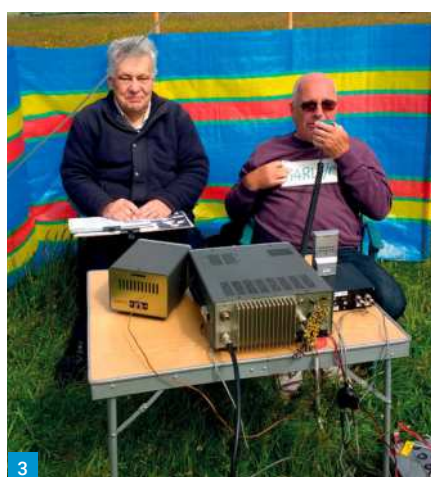
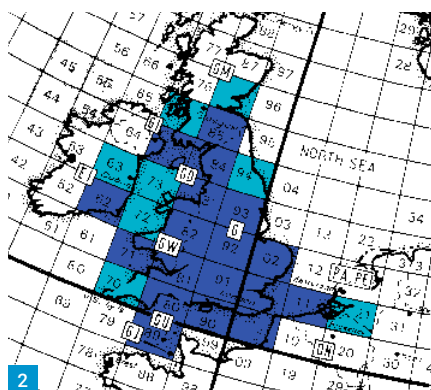


Fig. 1: The antennas at G3NFC/P.

Fig. 2: Map showing locator squares of stations that entered (in dark blue) and other stations worked (light blue). Fig. 3: The S.A.D.G.I.T.S G4RLF/P team also had a good take-off.

Fig. 4: The excellent take-off from the base of the mast at the Hereford Club's single operator entry GW1YBB/P.

## Activity

Gwil Jones GW6PVK/P, found that, "Most of the contacts made this year were in the southern part of the country. The northern part of the UK, especially the north west of the UK, was extremely quiet compared with past years. A lot of activity went after the RSGB backpackers contest had finished, after that it was a slow slog to get the odd contact." Simon Gosby GW8OVZ/P thought that, "There seemed to be less activity than there was last year".

Leading single operator station, Steve Clements GW1YBB/P of the Hereford Contest Group, found that "Conditions did not seem to be great and activity seemed to be down even during the Backpackers contest and confirmed by my lowest QSO count this century. Not one French station worked, though of course I heard some chatting before the contest started!"

Geoff Newstead, the Chairman of Burton-on-Trent ARC G3NFC/P, says that, "This year we operated from some farmland not too far from the

Description	Name/Team	Callsign
Overall Winner	Hereford VHF Contest Group	GW1YBB/P
Runner Up	SDAGITS	G4RLF/P
Leading Fixed Station	Dave Keston	G8FMC
Leading Single Operator	Hereford VHF Contest Group	GW1YBB/P
Leading Multi-Operator	SDAGITS	G4RLF/P
Leading English Station	SDAGITS	G4RLF/P
Leading Welsh Station	Hereford VHF Contest Group	GW1YBB/P
Leading Scottish Station	Galashiels And District ARS	GM4YEQ/P
Leading GI/EI Station	Paul Norris	EI3ENB/P
Leading GJ/GU Station	Chris Rees	GU3TUX
Leading Isle of Man Station	John Dowling	GD0TFG/P

Table 1: Leading Stations.

Square	Name	Call	No. entries
IN89	Chris Rees	GU3TUX	1
IO62	Paul Norris	EI3ENB/P	1
IO71	Simon Gosby	GW8OVZ/P	1
IO74	John Dowling	GD0TFG/P	1
IO75	Bill Ward	GM0ICF/P	1
IO80	SADGITS	G4RLF/P	2
IO81	Hereford ARS	GW1YBB/P	5
IO82	Steve Marsh	G4TCU/P	5
IO83	Gwil Jones	GW6PVK/P	4
IO84	Otley Amateur Radio Society	G3XNO/P	2
IO85	Galashiels And District Amateur Radio Society	GM4YEQ/P	1
IO90	Andrew Vare	G4XZL/P	3
IO91	Dave Keston	G8FMC	6
IO92	Burton On Trent Amateur Radio Club	G3NFC/P	6
IO93	Bern Rhead	G8KVM/P	5
JO00	Southdown Amateur Radio Society	G1KAR/P	1
JO01	Invicta Contest Group	M5IC/P	3
JO02	Cambridge & District Amateur Radio Club	G2XV	1
JO11	Frank L. Laanen	PE1EWR	1

Table 1: Leading Stations.



Club's QTH. This was done primarily to allow some of our older members easy access to the station and to allow some newer licensees to participate. Conditions were generally pretty good with a better-than-expected square count (Fig. 1). We were,

however, plagued with a very high but intermittent broadband noise issue which we have yet to identify and will be the subject of a club meeting soon".

Iain Groom G0FCA/P submitted, "A much reduced log this year. Conditions seemed to be poor

Pos	Call	Name	Single	QSOs	Squares	Score	Locator	Transceiver	Antenna	Ht. m asl
1	GW1YBB/P	Hereford ARS	S	140	23	3220	IO81KW	Yaesu FT-817	homebrew 9 ele	800
2	G4RLF/P	SADGITS		96	24	2304	IO80WX	TS770 + processor and LNA	13-ele Yagi	277
3	G3NFC/P	Burton On Trent ARC		84	22	1848	IO92EQ	Flex 5000A SDR/DEMI TVTR/ MHP 200 masthead	2 X 15-ele LFA Yagis	100
4	G4TCU/P	Steve Marsh	S	91	17	1547	IO82WJ	Yaesu FT-817ND	Homebrew 4-ele Yagi	4
5	GW4IDF/P	Malvern Hills Radio Amateurs Club		74	15	1110	IO81NV	Yaesu FT-817	11-ele Yagi at 6m	425
6	G4XZL/P	Andrew Vare	S	68	14	952	IO90MX	Icom IC-705	Homebrew 9-ele DK7ZB Yagi	270
7	G3XNO/P	Otley ARS		54	17	918	IO84VB	Yaesu FT-991	9-ele Yagi	487
8	GW8OVZ/P	Simon Gosby	S	47	19	893	IO71OW	Yaesu FT-817	7-ele Yagi DK7ZB design	536
9	M0KPW/P	Chris Leviston	S	46	18	828	IO84KF	Icom IC-705	10-ele Yagi	330
10	G4CZB/P	Northampton RC	S	47	15	705	IO92KG	Icom IC-705	9-ele Tonna	195
11	G7UHN/P	Andy Webster	S	46	15	690	IO90OW	Yaesu FT-817, DG8 preamp	6-ele Yagi	225
12	GW6PVK/P	Gwil Jones	S	43	14	602	IO83LC	Yaesu FT-817ND	12-ele Tonna	920
13	G8HXE/P	Keith Haywood	S	41	14	574	IO83RO	Yaesu FT-817	SOTA SB5	380
14	G0SRC/P	South Derbyshire & Ashby Woulds ARG		38	14	532	IO92FT	Yaesu FT-817	6-ele Yagi	101
15	G8FMC	Dave Keston	S	35	15	525	IO91NW	Elecraft K3 + ME2T TVTR	8-ele Powabeam	115
16	G8KVM/P	Bern Rhead		40	13	520	IO93AD	Yaesu FT-817ND	3-ele Quad	488
17	GW8ZRE/P	Dave Hewitt	S	47	11	517	IO83JF	Yaesu FT-817	7-ele ZL Special	261
18	G0KYS/P	Bob Edgar	S	36	14	504	IO80AQ	Yaesu FT-818	3-ele SOTAbcam	550
19	G0BNC/P	Ron Flemming	S	40	10	400	IO91EU	Yaesu FT-897D	DL7KM	198
20	G3UGF/P	Richard J Constantine	S	33	11	363	IO93AS	Icom IC-9700	Diamond 10-ele	433
21	G2XV	Cambridge & District ARC		26	12	312	JO02AH	Kenwood 790A	2 x phased 9-ele Tonna	15
22	G3LVP	Ken Eastly	S	25	11	275	IO81WV	Kenwood TS-850 + TVTR	8-ele Yagi	30
23	GX4WBC/P	Central Radio Amateur Circle		27	10	270	IO92BN	Yaesu FT-817ND	3-ele beam	228
24	G4PGJ	David Ward	S	22	11	242	IO92ET	Icom IC-7100	7-ele LFA	12
25	G4HZG/P	Burton ARC	S	26	9	234	IO93BA	Icom IC-9700	11-ele Tonna	372
26	M0NYY/P	Nick Woodruffe	S	24	9	216	IO81XS	Icom IC-705	Dual 7-ele Yagi - PA144-432-19-3-2CB	253
27	G4BZI/P	Roger Bracey	S	19	10	190	IO93AC	Icom IC-202E	3-ele Sotabeam Yagi	395
27	G6AHX	Simon Evans	S	19	10	190	IO82WA	Icom IC-9700	8 el ZL	10
29	G8TRS/P	Tamworth ARS		17	10	170	IO92EP	Yaesu FT-817/ Icom IC-705	5-ele Yagi	114
30	GD0TFG/P	John Dowling	S	14	11	154	IO74PC	Yaesu FT-857	9-ele Yagi	150
31	M1AEA	Mark Waldron	S	24	6	144	IO82WM	Yaesu FT-817	Diamond X30	219
32	G6EPN/P	Peter Knight	S	18	7	126	IO91DL	Icom IC-705	5-ele Jaybeam Yagi	253
33	M5IC/P	Invicta Contest Group		17	7	119	JO01GH	Icom IC-7400/Q5 TVTR	4 x 3-ele LFA	180
34	GU3TUX	Chris Rees	S	13	8	104	IN89VR	Yaesu FT-817	3-ele Yagi	73
35	G8IBL	Huw G Hallybone	S	10	8	80	IO91QE	Elecraft K3S	2x 9-ele M2	100
36	G0E1Y	Simon Pryce	S	15	5	75	IO82OR	Kenwood TS-2000	10-ele Yagi	77
37	EI3ENB/P	Paul Norris	S	9	8	72	IO62JI	Yaesu FT-847	Diamond A144S10R2 10-ele Yagi	170
37	MX5KR/P	Keighley ARC		12	6	72	IO93AT	Yaesu FT-817	ZL 7-ele Yagi	275
37	G1KAR/P	Southdown ARS		12	6	72	JO00DR	Icom IC-706mkII / Icom IC-705	9-ele Yagi	146
40	G6DXY/P	Timothy Dix	S	11	6	66	IO91TX	Yaesu FT-817	WIMO Portable HB9CV	170
41	GM4YEQ/P	Galashiels And District ARS		9	7	63	IO85MM	Yaesu FT-991A Transceiver (until 1220UTC)	7-ele ZL Special Yagi	360
42	G0FCA/P	Iain Groom	S	12	5	60	IO83VS	Icom IC-7000	5-ele LFA	375
43	M0IMA	Phil Bourke	S	6	7	42	JO01DH	Yaesu FT-817	5-ele ZL Yagi	237
44	GM0ICF/P	Bill Ward	S	6	5	30	IO75OR	Kenwood TS-790E & GaAsFET preamp	HB 5-ele Yagi	160
45	G5H	Invicta Contest Group		6	3	18	JO01GH	Icom IC-706	X50 Vertical	180
46	GW8HEB	Tom Brady	S	5	3	15	IO82KP	Yaesu FT-817ND	SQBM200P MkII Dual Band Vertical	149
47	G1RRR	Keith Bareham	S	3	3	9	IO90CU	Yaesu FT-736R	5-ele Yagi	28
48	PE1EWR	Frank L. Laanen	S	2	3	6	JO11SL	Icom IC-9700	PA-144-9-5A	9

**Table 3: Full Results.**

in certain directions, but did manage GD and GM contacts". He found, "Signals from the south were way down in the noise, but still good to get out and play radio."

## Equipment Problems

At least two groups had significant equipment problems, requiring changing to back-up equipment. **Mike White** of the **Burton ARC G4HZG/P** said that, "Despite operation of all equipment the previous day, there was no output from the transverter into the Flex 5K. I switched the antenna feeder to the Icom IC-9700 and 2m came alive!" He goes on to say that, "The Flex 5K and

transverter functioned perfectly when I tested the following day. No faults could be found! Gremlins?" The Invicta Contest Group managed to burn out their sequencer and had to switch to back-up equipment.

## Leaflet

**Andy Webster G7UHN** on the South Downs Way thought it was, "another excellent day with great weather and I had a steady stream of passers-by who were very interested in what I was up to. I always carry leaflets that explain a bit about the hobby when I'm out operating, very useful when they appear and I'm mid-contact! One of my measures

of success is how many get handed out and today I went through all 20, a new record! I look forward to this one every year and it was a good one today!"

## Duration

Many stations felt that the contest lasted too long. Looking through the logs, it was clear that very few contacts were made in the last hour. The timing will be reviewed before next year's contest, and it is likely that the duration will be reduced by an hour.

## Next Year

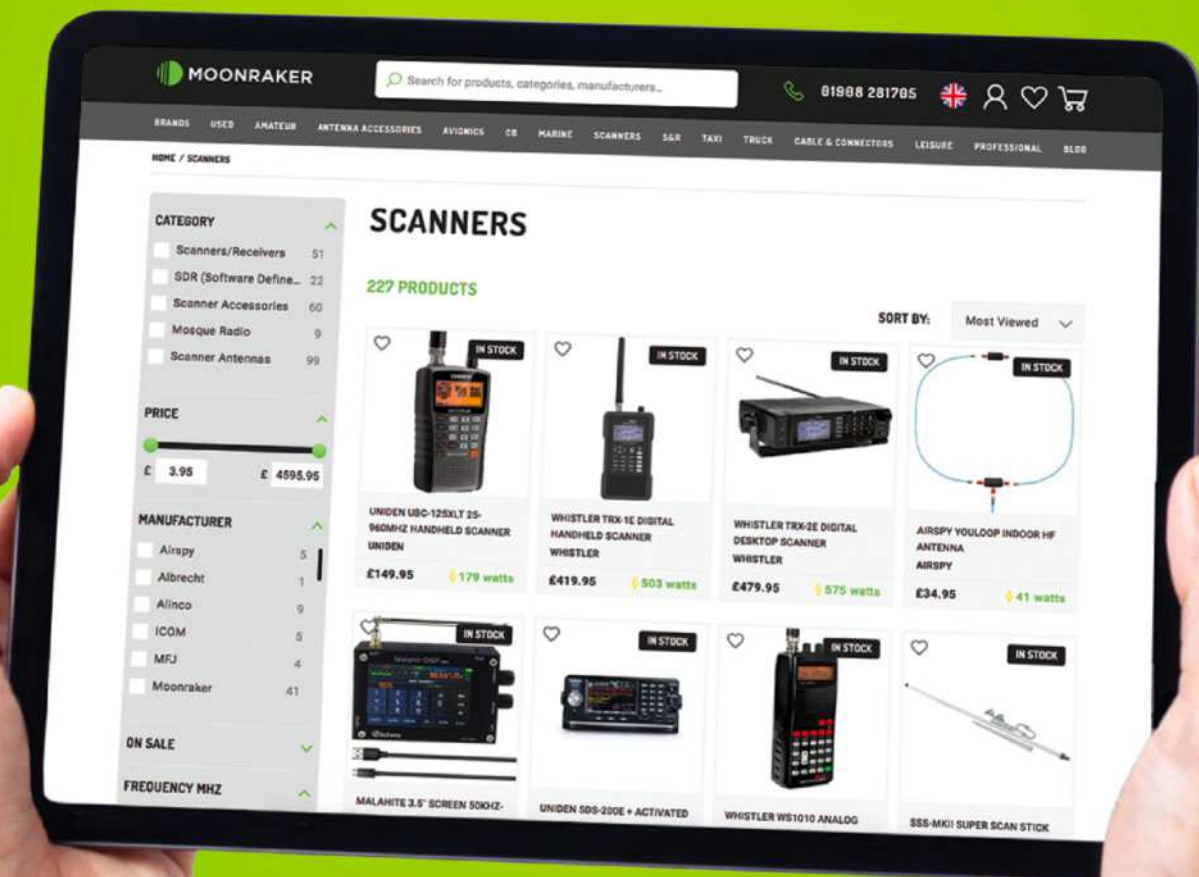
The 2023 PW 144MHz QRP Contest is provisionally scheduled for Sunday 11 June 2023. **PW**

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





# THE ONLINE HOBBY RADIO SUPERSTORE



[www.moonrakeronline.com](http://www.moonrakeronline.com)

T: 01908 281 705 E: [sales@moonraker-group.com](mailto:sales@moonraker-group.com)

SCAN TO SHOP



**Don Field G3XTT**

practicalwireless@warnersgroup.co.uk

In May 2018, **Paul Devlin G1SMP** set up a permanent special event station for the National Health Service, Ofcom issued the call sign GB1NHS, Great Britain 1, National Health Service (see In Focus, August 2018 PW).

The station was set up with the aim of using the amateur radio platform to promote initiatives that improve the health and wellbeing of communities globally. This includes life saving public health campaigns. Paul is employed by NHS Headquarters. The organisation leads and supports the NHS in England, to deliver improved care for patients.

NHS England is the first Government level public sector organisation to adopt amateur radio as part of normal business processes. This came about due to Paul being asked to support the delivery of a global health summit on reducing physical deconditioning. Specifically, related to prolonged periods in a bedded hospital facility. Paul was tasked with supporting and assisting the delivery of an international communications plan.

During the initial project management meeting, Paul highlighted the fact that around 35% of the world's population do not have access to internet or cellphone services, and asked if there was an intention to use radio communications. The answer was no. He then introduced the team to the concept of amateur radio special event stations. No one had ever heard of amateur radio before!

Since the global healthcare summit, Paul has been busy putting GB1NHS on the air as often as possible. He says that *"it genuinely boosts the communications capability of the NHS"*.

### Early Interest in Radio Communications

Paul first became interested in radio communications when he was around seven years old. His dad was employed as an engineer with the Military Transport Service at Whittington Army Barracks in Lichfield, Staffordshire. Paul loved going to work with his dad on a Saturday morning. Unofficially of course. His dad used to get him to hide on the floor in the rear of the car, with a blanket over him, thereby preventing the security detail at the guard house from seeing him. They recognised his dad as a member of staff, so a full vehicle search was not needed. Paul loved sitting and playing in the vehicles that his dad was working on, as well as those parked up in the workshop waiting to be returned to service. His favourite vehicles were those that were equipped with radio communications equipment and very large vertical antennas.

Paul grew up in Polesworth, South Warwickshire. At the age of 12, he plucked up the courage to visit two houses in the adjacent street to where he lived. They both had UHF and VHF antennas installed above the roof. He remembers being



## Amateur Radio in the Public Sector

PW Editor **Don Field G3XTT** looks back at the historic birth of a Public Sector Radio Communications Service, with a view to the future.

frightened to death as he pushed the buttons on the doorbells. Simply asking *"do you have radio equipment, and can I see it please?"* Both amateur radio operators were in and took Paul to see their shacks. They were **Gordon G8XWU** and **Derek G8RFL**. Paul was amazed by what they were doing. Particularly how they made their own equipment.

Aged 13, Paul starts his academic life at Polesworth High School and keen to make his time there as positive and productive as possible. But as he didn't like studying very much, he wasn't sure how. Very early into his high school life, he became aware of some 'special kids' as he calls them. These pupils had the status of Prefect. Trusted assistants to the teaching staff and held in high regard by most pupils and staff.

Paul loved the idea of being a Prefect and asked his form tutor how he could work towards that. His tutor said that unfortunately, he didn't think that Paul would be eligible. Prefects were appointed on the recommendation of the teaching staff. But

the opportunity was only open to pupils who were streamed in academic sets one to five. Paul was expected to be streamed into set seven of eight. The lowest academic sets in school.

Then one day, his chances of becoming a Prefect were significantly increased. He attended morning assembly, a daily routine in his school. The assembly was led by the Deputy Headteacher **Mrs Muggleston**. She wanted to use the time to talk about personal upset and how to be resilient. She described how she had taken a very precious clock to a specialist shop to be repaired. This clock had massive sentimental value to her. The shopkeeper looked at her clock and said that in his opinion, he didn't believe that it was repairable. She had tears in her eyes as she told Paul and his fellow pupils the story.

Following that assembly, Paul built up the courage to go to Mrs Muggleston's office at break time. He explained that he liked radio communications and had taught himself a little bit about electron-

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



ics. He had also learnt to check circuit continuity and solder. He offered to look at her clock to see if there was anything he could fix, while being very careful not to raise expectations too much. Through more luck than knowledge, Paul found a dry joint. A couple of drops of solder later and the clock sprang back into life. Mrs Muggleston was so emotional that she started to cry. Which upset Paul as well, as she had a reputation of being a very strict teacher, who would cane pupils on a regular basis. She asked Paul if there was anything that she could help him with. Paul asked if he could start music lessons as soon as possible and become a Prefect. Both requests were approved. He was the only Prefect in school from set seven. And all thanks to amateur radio.

### The Pandemic Period

Paul is a state registered paramedic. When the pandemic struck, he became extremely concerned about an imminent surge in loneliness and isolation, brought about by lockdowns, people losing their jobs and the breakdown of traditional social networks. He turned to amateur radio yet again. Paul is famous for saying, *"now more than ever, we need to use all modes of communications to improve the lives of our communities"*.

He came up with an idea for a weekend project. The plan was to encourage 200 radio amateurs, who may have been inactive for several years, to find, and dust off their radios. Fire them up and reach out to fellow operators. Just to say hello, how are you doing? And hopefully rediscover the amazing fellowship, and technical interest that amateur radio provides. Paul decided to call the event *"on the air to care"*.

Paul was a District Representative for the RSGB at the time. His work with GB1NHS resulted in him getting to know RSGB General Manager **Steve Thomas M1ACB** and **Heather Parsons**, RSGB Communications Manager. He contacted them to share his idea, with the hope that they would help promote the event.

Within 30 minutes, Heather had suggested using Paul's idea to create a 'call to action'. While Heather liked the idea, she felt that it lacked the potential to create significant interest as 'on the air to care'. Paul, Steve and Heather went on to become co-creators of the RSGB's 'Get on the Air 2 Care' Campaign. This campaign ran for 18 months and resulted in the team being awarded *Amateur Radio Newsline's* International Newsmaker of the year in 2020. It was potentially the biggest, and most successful campaign that the RSGB had ever run.

### The Commonwealth Games Period

The Director of Radio Communications for the Commonwealth Games is a radio amateur. He approached the RSGB during the initial planning phase for the Games, to see if there was an interest in supporting the celebrations and contribut-



ing. One of the major themes was connecting communities. RSGB General Manager Steve Thomas agreed to have an initial conversation, and invited Paul to take part. Paul was an RSGB Director at that time. Building on the success of the 'Get on the Air 2 Care' campaign #GOTA2C, the Chairman had asked Paul to help grow the UK amateur radio community. Paul was absolutely delighted and immediately accepted the opportunity. A few weeks later, the RSGB Board agreed to support the Commonwealth Games. The initiative would be led by Paul, using the experience that he had gained from running other major events.

Another of Paul's duties was to be the Board Liaison Member for the RSGB Regional Teams, including supporting the Regional Forum, made up of regional and district representatives. Unfortunately, disagreements within the group led ultimately to Paul leaving the RSGB Board, leaving him devastated but determined to carry on with achieving his goal. Sadly, though, the Games planning team only wanted to deal with one organisation as far as amateur radio was concerned, namely the RSGB.

Paul is a huge fan of all things 'Disney'. He says that *"just like in your favourite Walt Disney film, there are happy bits, horrible bits, but as the film concludes, all ends well. Except for Bambi of course"*. Paul was attending a meeting at NHS Headquarters, shortly after parting company with the RSGB. He bumped into a colleague that he had previously work with from NHS England's communications team. She said *"hey Paul, just the person. We could do with your radio skills for our*

**Photo 1: The GB1HMG station operating from Birmingham City Centre for the recent Commonwealth Games. Photo 2: The author supervises Kelly Atkins as she operates the Prostate Cancer Awareness special event station using the GB1NHS callsign. Photo 3: Certificate of Special Recognition awarded to Andrew Brown for his prostate awareness campaign.**

*project"*. He asked what the project was, and how could he help. She replied *"it's the Commonwealth Games. NHS England is formally part of the event. I can't believe the coincidence. Are you busy? We are just starting our project team meeting"*. Paul gave apologies to the emergency care meeting that he 'should' have been attending, and swiftly joined the communications team meeting. That meeting led to Paul being introduced to colleagues from HM Government Communications Service, and HM Government Property Services. Six months later, Paul was part of the opening phase of the Games, on air with a special event station from the HM Government building in Birmingham City Centre and at the heart of the Commonwealth Games. The special event station callsign was Great Britain 1 Her Majesty's Government (GB1HMG). Another first for UK amateur radio.

### Moving Forward – What Does the Future Hold?

So, what's next? Following the success of GB1NHS and GB1HMG, Paul has been asked to use amateur radio to strengthen the communications capability of 'all' HM Government departments

Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)

and public sector organisations, as opposed to just the NHS. At the time of writing, he is undertaking a recruitment campaign of a volunteer leadership team to support him in setting up a new organisation. Paul is on a quest to find 'thought leaders and innovators' to join him in this truly historic venture.

The new organisation will have formal links to the HM Government Communications Service. A service that has a membership made up with people who are employed by Government Departments and public sector organisations, with professional objectives to support the delivery of national communications initiatives. Paul's use of GB1NHS for NHS England has been recognised by this group and has resulted in him becoming a member of the Communications Service.

Immediate plans include setting up an amateur radio station at the HM Government Building in Birmingham City Centre in the West Midlands. Paul states that this is an ideal location to base the new organisation. The building accommodates several Government level organisations, including NHS England, NHS Property Services, and Incident Command Centre. Paul intends to use this pilot project to create a process for establishing amateur radio stations in all seven regional Government buildings across England.

While it's very early days, Paul is incredibly excited to be given such an unprecedented opportunity. He has already drafted up the key strategic priorities for the new organisation. They will be:

- 1 Strengthen the communications capability of HM Government Departments, public sector organisations, statutory services, and local communities.
- 2 Build a vibrant, diverse, exciting, and inspirational radio communications community across the UK.
- 3 Support the technological advancement and application of the amateur radio communications platform.
- 4 Recruit an incredibly diverse group of volunteers who are highly action orientated, thought leaders and innovators in their specialist field.
- 5 Be prepared to push boundaries. Think differently and seek the art of the possible.

Paul suggests that the five strategic priorities for the organisation will be delivered through national programmes of work, headed up by director level colleagues. These people will be known as National Innovation Leads. Indicating Paul's drive to attract 'thought leaders and innovators' to the organisation. They will be responsible for facilitating the advancement of the following programmes of work:

- Radio communications hubs
- Media, public relations and major events
- Organisational and people development
- Equality, diversity, and inclusion
- STEM and young people
- Research, training, and development



- Advancing technology in radio applications
  - Engaging Government Departments and public sector organisations
  - National emergency radio communications service
  - Building a vibrant, innovative & inclusive radio communications community
- In terms of infrastructure, Paul intends to use the existing geographic footprints used by Government level organisations. This is basically seven regions and 42 districts. A network of volunteers will be recruited from within this structure to help deliver the strategic priorities, national programmes, and National Emergency Communications Service.

Paul has already recruited his first two director level colleagues. **Pete Sipple M0PSX** will be the National Innovation Lead for Radio Communications Hubs. Pete, founder of Essex Ham and Ham Hub UK, will be the catalyst for inspiring the creation of the regional and district hubs, building on the incredibly successful Essex Ham model. Pete's latest venture, Ham Hub UK, will continue to develop as a national online amateur radio resource. It will also take on a physical form as the national amateur radio hub, linking to the regional and district hubs. It will inspire and support regional and district hubs. Paul is absolutely convinced of the value of the hub model, stating that hubs will play one of the most significant contributions to growing an innovation and vibrant amateur radio community across the UK, sharing knowledge, skills, and resources across local communities. Also providing valuable opportunities for people to get on the air and experience all aspects of amateur radio. By working together, hubs will create the ability to support national events, such as British Science Week.

**Kelly Atkins M6KFA** will be the National Innovation Lead for Media, Communications and Major Events. Kelly is also a member of Essex Ham and Ham Hub UK. Both Pete and Kelly have been avid supporters of GB1NHS since Paul

launched the station in May 2018. They have also supported Paul to develop and operate the Commonwealth Games amateur radio station GB1HMG.

Paul is a massive fan of a concept called organisation development (OD). It's widely used in many sectors such as aerospace, manufacturing, construction, retail, and the military. It is the function of building capability within an organisation to achieve its mission critical goals. The idea being, if you focus on building capability, you are significantly more likely to achieve your key strategic priorities. He also recognises the power of bringing diverse communities together. Organisations that do so are significantly more successful than those that don't.

Paul plans to implement this by creating a Professional Advisory Group. This will contain a team of volunteers who are subject matter experts in their respective fields. They will provide a valuable source of expertise for the senior leadership team, increasing the capability of the organisation to be successful. Paul has asked me to be one of the founding members of the Professional Advisory Group, providing expert advice on media and publication. Paul would like *PW* to be the exclusive media outlet for all amateur radio activities undertaken by NHS England and other HM Government Departments.

Paul's new organisation will be called the British Radio Communications Service and will have a strapline of "Connecting communities, improving lives". It will be in start-up phase by the time you are reading this article. This initiative has the potential to be one of the most significant, genuinely innovative, developments in the history of UK amateur radio. We wish Paul and his new team every success with their ventures. If GB1NHS is anything to go by, we think they have what it takes to pull it off. Please keep an eye out for how things develop in future editions of *PW*. For further information, please contact

**Paul@HamHub.UK**

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



**ML&S**

SAFE ONLINE SHOPPING. E&OE

Wessex House, Drake Avenue, Staines, Middlesex TW18 2AP.  
**MARTIN LYNCH & SONS LTD**  
THE WORLD FAMOUS HAM RADIO STORE  
**0345 2300 599** E-mail: sales@hamradio.co.uk

**www.HamRadio.co.uk**

# More NEW products from the Lynchy Stable

**STOP PRESS!!  
Buddipole Killer?**

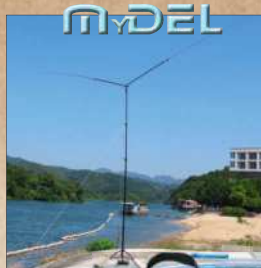
**NEW MyDEL JPC-7  
Portable Shortwave  
Antenna**

MyDEL JPC-7 (Dipole Version) covers 40-6m, 100W PEP. All contained in a small carry case for ideal portable use. Beautifully manufactured to a very high standard.

**JPC-7: £339.95**

See MLandS.tv for our full video review of this antenna.

See: [HamRadio.co.uk/JPC](http://HamRadio.co.uk/JPC)



**NEW**



**New MyDEL JPC-12  
Portable Shortwave Antenna**

**MyDEL**



MyDEL JPC-12 (Vertical Version) covers 40-6m, 100W PEP. All contained in a small carry case for ideal portable use. Beautifully manufactured to a very high standard.

**JPC-12: £199.96**

See MLandS.tv for our full video review of this antenna.

See: [HamRadio.co.uk/JPC](http://HamRadio.co.uk/JPC)



**NEW**

**MyDEL SV4401A**

Handheld Vector Network Analyser. 4.4G VNA with 7" Capacitive Touchscreen. £389.95

**NEW**



**Create RC5A-3P Antenna Rotor - Rotator**

CREATE antenna rotator, AZ angle 370°, motor snail gearing, PC compatible.

Antenna rotator 110/230VAC 150VA, maximum vertical load 700kg, horizontal load 1000kg, rotating torque 155Nm, brake torque 1960Nm, worm gear at motor, variable speed 75-110 sec., reversing delay 3sec., mast diameter 48-63mm, 360° scale, preset, weight 7kg rotator and 2kg controller, needs 7 core cable (0.75mm2 up to 50m length, 1.25mm2 up to 80m length). £959.95



**New to ML&S  
Windcamp Gipsy**

5-55MHz Portable dipole in a bag!

HF Portable dipole antenna. The antenna is design for operation in the 5-55MHz frequency range. The operating frequency is continuously adjustable giving you a full-size portable, horizontal dipole antenna. The antenna was designed with portable operation in mind. Windcamp wants to maximize your portable operating experience. £71.95



**It's NEW! The M&P UltraFlex 7 "Sahara" in white**

Ultraflex 7 and 10 sahara (white).

£2.00 per metre.

**Purchase 100m+**

**and get 10% off!**



**NEW**

**Elad FDM-S3 SDR**

Not brand new but back in stock after long delay in component shortages.

Still one of the ultimate SDR receivers available today.

- 9kHz-108MHz
- Twin antenna input
- 8 low & high bandpass filters
- 3 stage attenuator
- Selectable Pre-amp
- 4 independent receivers scanned simultaneously
- 24MHz bandwidth
- Sampling rate up to 122.8MHz variable
- Optional GNSS antenna
- Free FDM-SW2 software
- Compatible with Simon Brown's SDR Console

For more details see [HamRadio.co.uk/FDMS3](http://HamRadio.co.uk/FDMS3)



**Radio Analog PTRX-9700**

Exclusive to ML&S

**£279.95**

You've all been very patient waiting for RA to finalise the design & production of the Panadapter interface for the Icom IC-9700 - Wait no longer!



**NEW**

**Yaesu FTM-200DE**

50W VHF/UHF Dual Band C4FM/FM Mobile Transceiver.



**NEW**

- 50W Stable High RF Power, with Heavy Duty Heat Sink with FACC (Funnel Air-Convection Conductor)
- The speaker delivers 3W of clear and crisp receive audio which has been specifically tuned for radio communication.
- 2-inch Full-color display provides high visibility and highlights the frequency of the operating band with selectable color - White, Blue or Red.
- The front panel of the FTM-200DR/E is detachable and can be mounted at the most desirable operating position. £349.96

**DigiRig Mobile**

Tiny new digital modes interface

- Combines audio codec, serial CAT interface and PTT switch
- Supports full featured CAT interface: PTT, bands, tuning etc. (not just VOX based PTT)
- Uses a single USB connection to computer minimizing the cables mess
- Serial computer aided transceiver (CAT) port can be configured for logic levels, RS-232, CI-V or TX-500
- Works with all major OS flavours: Windows, MacOS and Linux
- Permanently available independently from CAT port an open-collector PTT switch controlled by RTS signal of the COM port to interface Handies/Mobiles etc.
- Auxiliary connection points to CM108 codec
- Uses widely supported CP2102 serial interface & CM108 audio codec

For more details see [HamRadio.co.uk/DigiRig](http://HamRadio.co.uk/DigiRig)



**NEW**

**CG Antenna BL-49:1 Un-Un 600W**

Tested by our own Richard 2E0SXX

Hi Power Matching Transformer suitable for Multi Band End Fed Half Wave antennas. Ideal for home or field use. All you need to do is add 10m to 40m of antenna wire - the Messi & Paoloni Dipoflex wire is ideal. £69.95



**NEW**

**New! MyDEL Solid Brass Key**

MyDEL Morse Code CW Paddle Key

A compact but solid paddle capable of standing up to the rigors of portable operation as well as providing excellent service in the shack. Contact spacing is adjusted easily, without tools, via the large thumb-screws on either side of the paddle body. Spring tension is fixed for a light, precise action.

£109.95



**MyDEL**

**FOLLOW US ON TWITTER AND FACEBOOK HamRadioUK**

You can now order from ML&S for delivery on a Saturday or Sunday!

Order before 2pm as late as Friday of each week and see it delivered at the weekend.



**Watch our YouTube Channel on www.MLandS.TV**

Web purchases: Just select Saturday or Sunday at the check-out.

Or call to place your order for Saturday or Sunday delivery on 0345 2300 599



**MARTIN LYNCH  
& SONS LTD**

THE WORLD FAMOUS HAM RADIO STORE

Wessex House, Drake Avenue, Staines, Middlesex TW18 2AP. E-mail: sales@hamradio.co.uk. Opening Hours: Mon - Fri: 8.30am to 5pm. Sat: 9am to 4.30pm.

SAFE ONLINE SHOPPING. E&OE



**ML&S**

www.HamRadio.co.uk

**0345 2300 599**

International Tel: +44 1932 567 333

Call the team to discuss our excellent part exchange deals or if you have unwanted gear you want to sell.

**YAESU**

ML&S Officially The Largest UK  
Dealer & Distributor of Yaesu  
Musen Products



This month's Featured  
Yaesu Radio

**Yaesu FT-3D**

2/70 Dual Band FM/C4FM  
Handie.

Now only £299.95

**Yaesu FTM-6000E** Dual Band 50W 2/70 FM Mobile Transceiver ..... £239.95

**Yaesu FTM-3000E** 50W C4FM/FM 144/430MHz Dual Band Digital  
Mobile Transceiver ..... £349.95

**Yaesu FTM-2000E IN STOCK** Single RX C4FM Mobile ..... £349.96

**Yaesu FTM-400XDE** Dual Band transceiver for 144/ 430MHz  
with the new C4FM/FDMA Digital Mode ..... £399.95

**Yaesu FTdx101D & MP** Our current favourite Base Station from  
Yaesu. Choose between 100W & 200W versions.

Give Tony, my Sales Manager, a call on 0345 2300 599 for a  
super trade-in deal.

**Yaesu FTdx10 HF+6+4m Hybrid** SDR Base Station  
..... New LOW price. Only £1350.00

**Yaesu FT-891** HF/6m Base/Mobile ..... £679.95  
**FT-891+FC-50 Bundle**

Buy an FT-891 with an FC-50 Auto-Tuner and save! ..... Just £869.95

**Yaesu FT-818ND** 6W QRP 160m-70cm  
All Mode Transceiver with FREE Legpegs ..... £624.95

**Yaesu FT-5DE** IPX7 Dual C4FM RX Handie ..... £399.95

**Yaesu FT-3DE** Latest 5W C4FM/FM Handie ..... £299.95

**Yaesu 70DE** C4FM/FM 144-430MHz Dual Band Handie ..... £169.95

**Yaesu DR-2XE** C4FM Repeater. In stock at special prices ..... £CALL

**Yaesu FT-65E** VHF/UHF 2m/70cm Dual Band FM Handie ..... £84.95

**Yaesu FT-4XE** 5W VHF/UHF FM Portable Transceiver ..... £62.95

**Yaesu M-70** Desktop Microphone ..... £129.95

**Yaesu M-90MS** Microphone Stand Kit ..... £169.95

**Choose ML&S for  
the Big Three**

For full specifications,  
photographs, reviews, shipping  
details and special offers see

**www.HamRadio.co.uk**

or call the team on

**0345 2300 599 for advice**

**KENWOOD**

ML&S Officially Appointed UK Sole  
Distributor & Repair Workshop for  
JVC-Kenwood's Ham Radio Products

This month's Featured Kenwood Radio  
**JVC-Kenwood TS-890S**



Finally back in stock but in very limited  
numbers. Call now to secure your order.

**Kenwood TS-990S** 200W HF/50MHz Transceiver ..... £6199.95

**Kenwood TS-890S** The excellent TS-890S is finally back in stock  
but in very limited numbers. Call now to secure your order.

**Kenwood TS-590SG** 160-6m Base with ATU ..... £1499.95

**ICOM**

ML&S Stock the Full Range of New  
Icom Products

Icom Prices Increased May 2022.

If you see it cheaper elsewhere then CALL!

This month's Featured Icom Radio  
**Icom IC-7100**

HF/6m/4m/2m/70cm  
Base & Mobile  
Transceiver including  
D-Star with remote  
control head unit.



Now only £1124.95

**Icom ID-52E** The NEW Kid on the block, 2.3" display D-Star etc.  
It's a beauty! ..... £549.99

**Icom IC-705** IC-705 5W QRP ..... £1399.95

**IC-705 Bundle** Discount offers available. See Web for details.

**Icom LC-192** Multi-function Backpack. **MyDEL MP-705** 8 Amp  
PSU. **mAT-705Plus** Micro Auto-Antenna Tuner. **VS-3** Bluetooth  
headset. **Nifty MB-705NF** Mount your Icom IC-705 at the correct  
angle for table top use. **Prism IC-705** Cover.

**MyDEL QRAB** Quick release antenna bracket. **MyDEL IC-705**  
Carry Cage. **MyDEL Z-Mount**. Tilt Stand. **BP-272 & BP-307** Spare  
battery packs.

**Icom AH-705** Random wire auto tuner for IC-705 ..... £309.60

**Icom IC-7300** 100 Watt - HF/50/70MHz TRANSCEIVER with SSB /  
CW / RTTY / AM / FM ..... £1299.99

**PTRX-7300**

High quality RF interface module for the IC-7300 ..... £199.95

**PTRX-9700 NOW IN STOCK** ..... £279.95

**FREE SHIPPING QUOTE 'RCFREE'** in checkout

**Icom IC-7610** Brilliant Dual Band Transceiver ..... £3299.95  
With **FREE SP-41** base speaker

**Icom IC-9700**

Base Station 2/70/23 all mode including D-Star ..... £1899.95

**Icom IC-7100** HF/6m/4m/2m/70cm Base & Mobile Transceiver  
including D-Star with remote control head unit ..... £1124.95

**Icom IC-R8600** New 100kHz-3GHz Receiver with SDR technology  
from IC-7300 ..... £2599.96

**Icom ID-5100**

Latest 2/70 D-Star Touch Screen Transceiver ..... £639.99  
Deluxe Version also available

**Deals on Yaesu Speakers & Microphones!**

These speakers reproduce the high quality output sound these  
receivers generate and thereby providing clear and crisp audio  
for reliable communications on all HF and V/UHF.



**Yaesu SP-10** £109.96  
External Speaker for  
FT-991A/FT-991.



**Yaesu SP-30** £94.96  
Desktop loudspeaker, optically  
and electrically matching to the  
FTdx10 transceiver.



**Yaesu SP-20** £129.95  
External Speaker for  
FTdx3000D/FTdx1200.



**Yaesu SP-101** £139.96  
Desktop External Speaker.  
Maximum input: 7W.  
Impedance: 8 Ohm.



**Yaesu M-70**  
**Desktop Microphone.** £129.95  
Desktop Microphone for the family  
of Yaesu HF transceivers. The M-70  
utilises a directional condenser  
microphone element which is  
specially tuned the frequency  
response to create clear and crisp  
audio for radio communication.



**Yaesu M-100**  
**Dual Element**  
**Microphone.** £329.95  
Features a hybrid  
design integrating  
both a high-quality  
Condenser and Dynamic  
element.

**Yaesu M-90D**

**Desktop Microphone.** £179.95  
Equipped with both a  
round 8-pin jack and  
an 8-pin modular jack.  
Supplied microphone  
cable (round 8-pin to  
8-pin modular) can be  
connected to either jack  
of the M-90D. The M-90D  
does not require the SCU-53.



**Yaesu M-1**  
**Reference Microphone.** £599.95  
The ultimate, high-quality, innovative  
desktop microphone, dedicated to the  
most discriminating  
Ham Radio Operators.  
It features combined  
Condenser and  
Dynamic microphone  
elements.

**Save £10 on each using code YSPOA at checkout**





**SOMETHING FOR THE WEEKEND...**

Sign up to our mailing list at [HamRadio.co.uk](http://HamRadio.co.uk) for weekly updates, bargains, news and much more!

**Have you watched [www.MLandS.TV](http://www.MLandS.TV) yet?**  
Every week there's something new.



- Buy stuff (any stuff) via our website & get 1% CREDIT back on the money you spent after VAT
- You can use the CREDIT the next time you order via our website, or you can save your CREDIT for future purchases
- The CREDIT won't expire for a whole 12 months so you will have more than enough time to use it
- It's simple and it's FREE. You spend money with us via our website and we give you money back to spend on our website on further purchases.



For more information on our FREE MONEY offer see [HamRadio.co.uk/CREDIT](http://HamRadio.co.uk/CREDIT)

## ML&S are ALWAYS adding new manufacturers and products to our vast range



The original & the only 2+4M Handie – available from ML&S – Who else? The Wouxun KG-UV8G is our best selling 2m & 70cm Handie in the U.K, so we persuaded the factory to offer the 2m+4m version as a 'ProPack' with all your favourite accessories and placed them inside a presentation box.

**Wouxun KG-UV9K 2m + 70cm Handie Pro Pack £144.95**

Now with 8.33 step for Airband Channel Spacing Changes. (Radio only: £79.95)

**Wouxun KG-UV8G 2m + 4m Handie Pro Pack £149.95**



Pro Pack Bundles include:

- KG-UV9K or KG-UV8G Transceiver
- Two batteries
- Two belt-clips
- Software and transfer data cable
- Fast charger dock and Power Supply
- Hand speaker mic
- Battery eliminator
- Manual
- Wrist strap
- Leather case
- In-car charger
- SMA-PL259 adaptor
- Hands-Free kit

**The New KG-UV9D Mate £139.95**

**Wouxun KG-UV980PL £279.95**

with FREE Shipping

**Hear those weak signals with bhi DSP noise cancelling products**



**PARAPRO EQ20**

**PARAPRO EQ20-DSP £259.95**

Four product options are available.

The basic EQ20 and EQ20B can be used with the bhi Dual In-Line and Compact In-line noise cancelling units.

**NES10-2MK4** New NES10-2MK4 amplified DSP noise cancelling speaker. £119.95

**Dual In-Line** Dual channel amplified DSP noise eliminating module. £179.95

**New DESKTOP MKII** Amplified DSP base station speaker – 10 Watts audio. £199.95

**New NEDSP1901-KBD** Pre-wired low level retrofit audio DSP noise cancelling module. This module replaces the popular NEDS01061-KBD that many Yaesu FT817/FT-818 users have installed over the last 18 years. £119.95

**Compact In-Line** Compact DSP noise cancelling module with improved DSP algorithm giving even better noise elimination. £179.95



**New! Bhi NCH**  
Active Noise Cancelling Headphones. £39.95



**New! Bhi Wired Stereo**  
Communications Headphones. £19.95

*Sangean Products in store now!*

**SANGEAN**

**NEW MODEL!! Sangean WFR-39**

- FM-RDS/DAB/Internet Radio
- ATS (Auto Tuning System)
- Station Presets (99 FM/99 DAB/250 iRadio)
- Spotify Connect for Music Streaming
- Cloud Music (Podcasts/Amazon Music/Deezer/Napster/Qobuz/TIDAL)



**Small & Compact!**

Width: 166.2mm  
Height: 108.3mm  
Depth: 104.5mm  
Weight: 1600g

**£159.95. Stock due October 2022. Order NOW for FREE UK delivery**

**ATS-909X2 £214.95**

The Ultimate SSB / FM / SW / MW / LW / Air / Multi-Band Receiver.

The Discover 909X is the perfect world band radio to roam the globe with.



**ML&S Now UK Distributor for Sangean**



**Antenna Disconnect**

**£115.00**

Reduce the chance of station damage from lightning.



**Dual Antenna Disconnect**

**£190.00**

Reduce the chance of station damage from lightning surges.

**METROPWR FXMASTER**

**£299.95**

8-band equalizer with adjustable noise gate.



See [www.HamRadio.co.uk](http://www.HamRadio.co.uk) for our full range of Sangean products



**Radiosport Headsets**

Whether for DXing, contesting, field day, or casual everyday use we think you'll agree Radiosport headsets have the features you want. ML&S are proud to have been appointed their distributor and have stock today.

All headsets are supplied with GEL Cushions giving extra comfort and FREE cloth covers.

RS10SL	Listen only stereo lightweight headset for CW ops.....	£131.94
RS20S	Deluxe Dream Edition Stereo Headset only no boom.....	£169.95
Mini-XLR	Lead set for any radio (Yaesu/Kenwood/Icom/Flex/Elecraft).....	from £69.95
PTT-FS-RCA	Foot switch with 7ft cable with phono plug.....	£54.95
PPT-HS-RCA	Hand PTT Switch, 7 foot cable with phono plug.....	£64.95
RS60CF	Deluxe Dream 10th Anniversary Edition Stereo Headset with boom..	£239.95

How about an additional 3.5mm socket on the opposite ear cup to allow "lathering" of another headset for a logger or maybe just an additional pair of ears?



**DMR DUAL BANDERS from TyT & Anytone**



**TyT MD-UV380**

Dual Band VHF/UHF DMR Handheld.....

**Anytone AT-D578UVIII-Plus**

Dual Mode (Digital + Analogue).....

**Anytone AT-D878UVII Plus** ..... NOW ONLY £199.95

**Anytone AT-779UV**

Digital DMR Dual-band Handheld.....

**Anytone AT-778UV** ..... £99.95

**ML&S are the sole UK distributors for the DVMega Range of products**

**DVMega EuroNode Hotspot.**

Use your Radio everywhere anytime. The EuroNode is the most complete and multi-deployable hotspot at the moment. It has standard WiFi, and a LAN connection is available. £149.95



**DVMega** is a collective name for digital voice and data related kits and modules. C4FM, DMR and D-STAR is supported with more digital voice and data modes added all the time.

**DVMega Globetrotter**

is a powerful digital voice communication tool that allows you to communicate from anywhere to anyone with just a simple internet connection. £139.95



**DV Dualband (VHF/UHF) radio shield**

This shield is compatible with Arduino UNO or MEGA. This module has a 10mW UHF and VHF transceiver on board. In combination with an Arduino you make your own stand-alone dual band hot spot. This module, together with the AMBE3000 forms the basis for a self-assembly D-Star kit transceiver. Just £119.95

**DVMega Cast** is a AMBE3000 based Multimode IP radio for DMR, D-Star and Fusion. The DVMega Cast is compatible with Ham radio networks like BrandMeister, DMR+, YSF, FSC, REF, XRF, XLX, DSC etc. £319.95



**DVMega DVstick 30**

USB-stick facilitates the use of a PC to communicate on Dstar, DMR and C4FM! Just install BlueDV and use the PC-microphone & speakers to communicate to reflectors/talkgroups. Ideal solution to use on a laptop whilst travelling. Just £89.95



**New! AR600XL Only £199.95**  
Programmable Antenna Rotator. Ideal for lightweight V/U beams.



**Tigertronics SL-USB £99.95**

ALL sound card Digital and voice modes are supported by the SignalLinkTM USB. This includes traditional modes such as RTTY, SSTV and CW (to name a few), as well as today's hottest new modes like PSK31, FT-8 and WSPR.



Buy with your required lead and get a discount off the bundle price.



**MyDEL Headphone Stand**

**£11.95**

Ideal to hang up your Heil, Radiosport or other headsets on your operating desk.

Made of aluminium alloy, with a cushioned rubber part to prevent the headphones from slipping.



**ML&S Appointed Sole UK Distributor for CW Morse Keys!**

There are over 35 different keys to choose from including Camel Back, Straight Keys, Micro Keys, Lightweight Keys, Heavy Duty Keys, Paddle Keys, Navy Keys & even Bullsseye Keys. With such a huge & colourful range to choose from there's bound to be a model (or two!) to suit CW enthusiasts worldwide.



**FROM ONLY £19.95**



**Heil Sound**

ML&S are the official UK importer for Heil SOUND



Pro-Set 7 Headphones.....	From £239.95
Pro-Set 6 Headphones.....	From £134.95
Pro-Set IC Headphones.....	£169.95
Pro-Set Elite 6 Headphones.....	£174.95
Pro-Set Elite IC Headphones.....	£189.95
Pro-Set 3 Headphones.....	£109.95
PR-781 Microphone.....	£189.95
PR-40 Microphone.....	From £299.95
PR-40 Microphone New All Black Version.....	£299.95

You can now order from ML&S for delivery on a Saturday or Sunday!  
Order before 2pm as late as Friday of each week and see it delivered at the weekend.



**Web purchases:** Just select Saturday or Sunday at the check-out.  
Or call to place your order for Saturday or Sunday delivery on 0345 2300 599

Tony Jones G7ETW

Charles.jones125@yahoo.co.uk

From my time teaching, I know that every course has students who consider themselves 'hopeless at maths.' If this is you, I'd like to help by offering a little tuition aimed at refreshing your maths skills and boosting your confidence. If you are a tutor, I hope this may help you too, by showing ways in which maths can be made real using topics from amateur radio.

## Maths - or Arithmetic?

Generically people refer to anything involving computation and numbers as 'Maths', but there is 'Arithmetic' as well.

If I say,  $3x + 13 = 55$ , that's Mathematics (well, Algebra technically). Anyone with Maths skills sees that  $x$  must be 14 instantly.

If I say  $65 + 37$ , that's Arithmetic. Most people instantly see the sum is 102.  $65 - 37$  is harder to calculate because it involves 'carrying a ten' downwards, and  $37 - 65$  is a step too far for some because the answer is negative.

Let me see if I can demystify all this. I'll start with Arithmetic and work my way up to Maths.

## Symbols

Table 1 shows the five fundamental 'operators' in Arithmetic, and any calculator will have these.

Since the invention of spreadsheets, we have two more symbols, see Table 2. Other symbols are commonly used, Table 3.

## Positive and Negative Numbers

Numbers can be positive or negative, and there are some rules. Again, it is easier to show examples than explain, see Table 4. Signs on positive numbers are not usually shown ( $65 + 37$  means  $+67 + +35$ , for example) but for clarity I've included them.

Arithmetic at Foundation and Intermediate mainly uses positive numbers, but component tolerances are a good example where negative numbers come in. A 100kΩ resistor with 2% tolerance can range from 2kΩ minus to 2kΩ plus.

And yes, that is right; multiplication of two negative numbers does result in a positive.  $-4 \times -4$  ('minus four squared') really is 16.

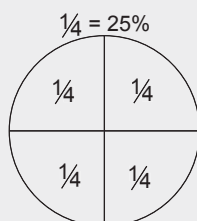
## Division and Fractions

If I have a piece of wire one wavelength long, and I cut it into four equal pieces, each piece is one (wavelength) divided by four (parts) long, otherwise expressed as  $\frac{1}{4}$  or one quarter. Americans still say 'one forth', an abbreviation for 'one fourth part'. This is a 'fraction', Fig. 1a.

When using uncommon fractions in speech – not halves, thirds, tenths etc – people usually say something 'over' something else. A fraction has three parts a line, a 'numerator' above the line, and a 'denominator' below.  $\frac{17}{19}$  means seventeen divided by nineteen, but in speech that's 'seventeen over

# Radio Amateur Maths

Tony Jones G7ETW tackles 'radio maths' a thing if not of joy, then of relative comfort to some, a world of dread for others.



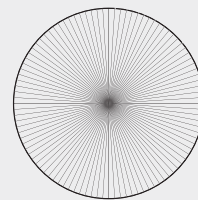
The whole divided into 4 pieces

1a



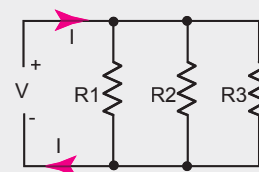
How many toes?  
10, 12, 1010?

2

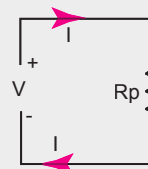


The whole divided into 100 pieces

1b



3a



3b

nineteen'.

A common fraction in radio maths is  $\frac{22}{7}$ , which is an approximation to pi, a constant we first meet in connection with circles. 22 is the numerator and 7 is the denominator and, unlike the usual less-than-one meaning of a fraction eg 'since I went part-time I'm earning a fraction of what I was',  $\frac{22}{7}$  evaluates to more than one – just over three in fact.

Many scientific calculators have a value for pi to save people typing it in, and this is 3.1415927, spoken as 'three point one four one five' etc. This too is an approximation although it seems more accurate because it is a decimal number.

## Decimal Numbers

To explain decimal numbers, let's stick with my quarter - wavelength wire. Another way to express  $\frac{1}{4}$  is 0.25, but why?

In short, because  $\frac{1}{4}$  has the same value as  $\frac{25}{100}$ . See Fig. 1b. I have multiplied both the numerator (1) and the denominator (4) by 25, to give me a new fraction of the same value but with a denominator which is a 'power of ten'.

## Powers of Ten

Powers of ten can be positive, meaning the quantity represented is greater than one, or negative, indi-

cating a quantity between zero and one. To explain this, I need to touch on number 'bases'. Base ten is how we count in normal life but other bases exist, such as binary (base 2) and octal (base 8). See Fig. 2; the number of toes I have is '10' in decimal, 12 in octal and 1010 in binary.

Table 5 illustrates positive powers of ten and Table 6 negative ones. Hopefully this will now make sense.

1V is 1000mV and can be expressed as 'ten to the power of 3' mV.

1mV (one thousandth of a Volt) can be expressed as 'ten to the power of minus 3' V.

## Back to Fractions and Decimals

Converting  $\frac{1}{4}$  to  $\frac{25}{100}$  may not seem like progress – after all, I still have a fraction – but by



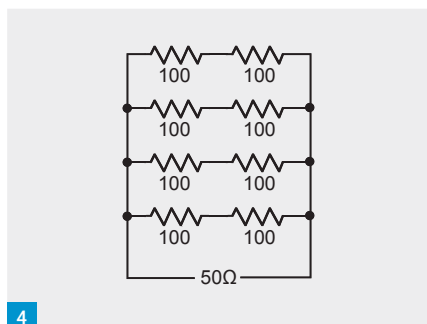


Fig. 1:  $\frac{1}{4}$  (Fig. 1a) is the same as  $25/100$  (Fig. 1b). Fig. 2: 10, 12 or 1010? Depends on the base to which we are working. Fig. 3: 3 resistors in parallel (3a) and the equivalent overall resistance (3b). Fig. 4: Using 100Ω resistors to make a 16W 50Ω dummy load. Fig. 5: Fan dipole for 20 and 40m. Fig. 6: Wavelength vs. frequency. Fig. 7: Reactance vs. frequency for an inductor. Fig. 8: Reactance vs. frequency for a capacitor.

'moving the decimal point' I can convert that to a decimal number.

First give everything a decimal place. 25 becomes 25.0 and 100 becomes 100.0

Drag the decimal place one number to the left, top and bottom. We get 2.50 over 10.00

Do this again, giving 0.25/1.000

1.000 is just one. So  $\frac{1}{4}$ , expressed as a decimal number, is 0.25.

In this case I moved the decimal point two places, but this is usually done in sets of three places eg frequencies in kHz (as shown on a schedule) are usually expressed in MHz (as seen on a radio) with three decimal places.

Table 7 shows how 14250kHz is converted to MHz, a '3 higher' power of ten.:

## Fractions: Multiplication and Division

Imagine a farmer dies, leaving four sons. One son, himself a father of two, is then killed in a freak tractor accident.

Original split: the farm was divided four ways. Each son got a quarter.

After the tragic accident, one quarter is subdivided two ways. Each of these children gets half of one quarter, which is one eighth.

The rule for fraction multiplication is: multiply the numerators together and the denominators together. The new fraction is the numerators 'product', divided by the denominators product.

$(1 \div 4) \times (1 \div 2)$  becomes  $(1 \times 1) \div (2 \times 4)$ , which resolves to  $1/8$  or one eighth.

This calculation, because it only requires multiplication, is not too bad but dividing fractions is something lots of people struggle with. What is one fifth divided by one twentieth? Many would say that doesn't even mean anything.

It does, though, if you keep in mind that fractions are about sharing things. This question becomes how many twentieths (of some whole thing) can

Symbol	How we were first taught	How we learned later	Name of process
=	Makes	Equals	
+	Add	Plus	Addition
-	Take away	Subtract	Subtraction
×	Times	Multiplied By	Multiplication
÷	Sharing	Divided by	Division

Table 1: The five fundamental 'operators' in arithmetic.

Symbol	Where on keyboard	Means
*	Shift and 8	Multiply
/	Same key as ?	Divide or Over

Table 2: New operators as used in spreadsheets, etc.

Symbol	Meaning	
%	Percent	Part (share) of 100
<	Less than	4.9 is < 5 but 5 isn't < 5
<=	Less than or equal to	Anything up 5 is <= 5
>	Greater than	5.1 is > 5
>=	Greater than or equal to	Anything from 5 up is >= 5
=	Equals	Only 5 = 5
:	A ratio, eg '1.5 to 1' written as 1.5: 1	Shows how two things vary with each other
( and ) [ and ]	Open and Close brackets	The sum $2 \times 3 - 2$ can produce different answers depending on which order the operations are applied. Using brackets eg $(2 \times 3) - 2$ this means $6 - 2$ because brackets come first. Google BODMAS for more information

Table 3: Other commonly used symbols.

come out of one fifth (of the same whole).

Think back to a cake. We're talking about twentieths, so there must be twenty slices. The cake has five eaters, so twenty slices are shared five ways and each person has four pieces.

If my deconstruction did not help, there is an easy way out.

Convert all parts of the sum to decimal numbers.  $1/5$  is 0.2 and  $1/20$  is 0.05. 0.2 divided by 0.05 is 4, something any calculator can handle.

## Final bit of Fractions: Addition and Subtraction

Students learn that three identical resistors in parallel have a resultant resistance of  $1/3$  of any one. This is actually a special case of fraction addition; the general case is far more useful.

Fig. 3a shows three resistors. The currents through the resistors are  $V/R_1$ ,  $V/R_2$  and  $V/R_3$  and the total current drawn  $I$  is the sum of these three currents. Now see Fig. 3b, a simplified circuit with a resistor that draws the same current.

$$V/R_p = I \text{ and } V/R_1 + V/R_2 + V/R_3 = I$$

Two things equal to the same thing must be themselves equal.

$$V/R_p = V/R_1 + V/R_2 + V/R_3$$

Dividing by  $V$  on both sides (this is covered in Rearranging Formulae later) gives us  $1/R_p = 1/R_1 + 1/R_2 + 1/R_3$ . This is the 'proper' formula for

resistors in parallel.

Now let  $R_1$ ,  $R_2$  and  $R_3$  have the same value – call it  $R$ .

$1/R_p = 1/R + 1/R + 1/R$ . These fractions have the same denominator, so the numerators can be added giving us  $1/R_p = 3/R$ .

Inverting both sides gives  $R_p = R/3$ , the special case in the syllabus.

This is not just a 'radio sum', to be got right in an exam. For example, eight 100Ω 2W resistors configured as in Fig. 4 makes a very useful 16W 50Ω QRP dummy load. I made a 112W 2:1 VSWR version for testing meters.

## Fan-Dipoles

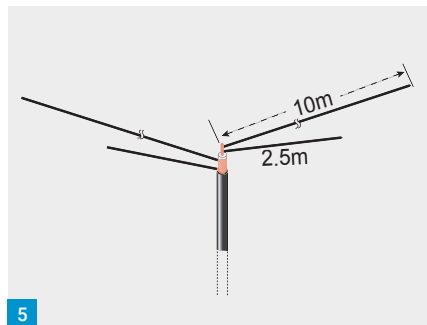
Fig. 5 shows a fan dipole with half-wave dipoles for totally different bands – say 40m and 10m.

The 10m dipole when used on 10m constitutes a perfect 50Ω load but on 40m is a horrible 1000Ω load, and vice-versa.

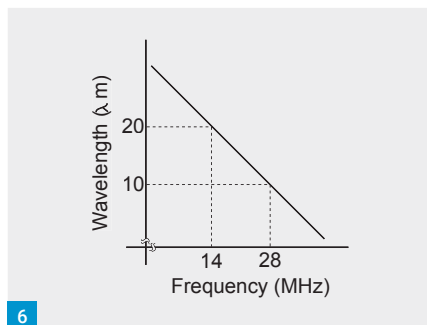
One might think that the joint antenna would be unusable on either band, but the dipoles are in parallel and their 'resistances' add in parallel. (I'm simplifying here a bit; the 1000Ω is not going to be purely resistive.)

$$1/R_p = 1/50 + 1/1000$$

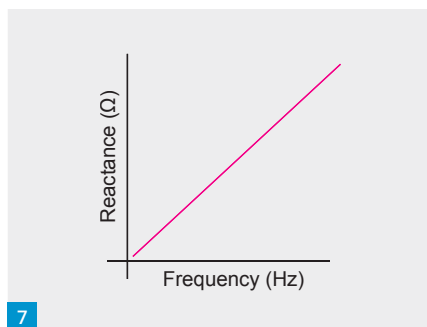
$R_p$  comes out 47.6Ω, so on either band this is a near-perfect antenna. It is as if the radio 'cannot see' the unwanted dipoles.



5



6



7

## Percentages

Going back to my cake, imagine it is a rather large one and it is cut into one hundred pieces as in Fig. 1. Each slice is one percent (1%). Percent is Latin, and literally means 'part in a hundred'.

To calculate a percentage of anything, divide the part by the whole and multiply the result by one hundred. A Foundation exam has 26 questions, with a pass mark of 19. The pass percentage is  $(19/26) \times 100$  which is 73%.

To convert a percentage to a number, multiply the whole by the percentage then divide the result by a hundred. With a pass percentage is 73%, the Foundation pass is  $(26 \times 73)/100$  which is about 19. The answer is not precisely 19 because the percentage is not precisely 73%.

The biggest problem with percentages comes when there is a need to calculate percentages of percentages. Politicians and journalists often get this spectacularly wrong.

Imagine the headline: 'Income tax to rise by 30%.' Tax is 20% now, so we would be paying 50p in the pound, right? When in doubt, substitute your farm animal of choice.

No-one reading 'Pig herder with 20 pigs increases stock by 30%' would think there would

Operation	Example with 10 as a positive number	Result	Example with 10 as a negative number	Result
Addition	$(+10) + (+15)$	25	$(-10) + (+15)$	5
Addition	$(+10) + (-15)$	-5	$(-10) + (-15)$	-25
Subtraction	$(+10) - (+15)$	-5	$(-10) - (+15)$	-25
Subtraction	$(+10) - (-15)$	25	$(-10) - (-15)$	5
Multiplication	$(+10) \times (+15)$	150	$(-10) \times (+15)$	-150
Multiplication	$(+10) \times (-15)$	-150	$(-10) \times (-15)$	150
Division	$(+10) / (+15)$	0.667	$(-10) / (+15)$	-0.667
Division	$(+10) / (-15)$	-0.667	$(-10) / (-15)$	0.667

**Table 4: Using signs on numbers for clarity. In practice, signs on positive numbers are usually omitted.**

Positive powers of ten	Means	Value	In speech
10 to the power of 0	1	1	Unit
10 to the power of 1	$1 \times 10$	10	Ten
10 to the power of 2	$1 \times 10 \times 10$ or 10 'squared'	100	Hundred
10 to the power of 3	$1 \times 10 \times 10 \times 10$ or 10 'cubed'	1000	Thousand
10 to the power of 6	$1000 \times 1000$	1000,000	Million

**Table 5: Positive powers of ten.**

Negative powers of ten	Means	Value	
10 to the power of 0	1	1	Unit
10 to the power of -1	$1 \div 10$	0.1	Tenth
10 to the power of -2	$1 \div (10 \times 10)$	0.01	Hundredth
10 to the power of -3	$1 \div (10 \times 10 \times 10)$	0.001	Thousandth
10 to the power of -6	$1 \div (1000 \times 1000)$	1000,000	Millions

**Table 6: Negative powers of ten.**

Frequency in kHz shifted by	Decimal places Result	New unit	Equivalent to	
14250	1	1425	Tens of kHz	Hundredths of a MHz
14.250	2	142.5	Hundreds of kHz	Tenths of a MHz
14.250	3	14.25	Thousands of kHz	MHz

**Table 7: Converting kilohertz to Megahertz.**

now be 50 pigs. The confusion comes from forgetting what 20% means – 20 units of 1 part in a hundred. 30% of 20 units of anything is 6 units, so the new tax rate would be 26%. I think journalists do know this, but a headline saying 'tax to rise by 6%' would not sell as many newspapers!

## Ratios

Ratios are a kind of fraction, and are all around us: eg. scale models, inclines on road-signs.

A ratio defines how one quantity varies with another. The Vesper, a drink **James Bond** creates in *Casino Royale*, is described as 'three measures of Gordon's, one of vodka and half a measure of Kina Lillet'. So, the Gin to Vodka ratio is 3:1 and the Gin to Kina Lillet ratio is 6:1.

A ratio has no units. The first place we usually encounter them in amateur radio is VSWR. A VSWR

of 3:1 tell us we have a problem, but this '3' isn't Watts or a percentage of anything.

Decibels (without units) are ratios too. Adding 3dB doubles something, subtracting 3dB halves it. So, we're adding to multiply, subtracting to divide. There is a good reason for this, but it's too much for this piece. It comes back to powers of ten – but fractional ones!

## Rearranging Formulae

The first real formula a student encounters in Ohm's Law, which is usually expressed as  $V = IR$ .

'V' is straightforward enough, as is '='. But what does 'IR' mean? Up to know, I've been using  $\times$  for multiply and  $\div$  for divide, but in mathematical equations – we're in maths now – this is not what one sees.

I'll come back to  $V = IR$ . This is a good time to



Expression	Means	Value If $x = 5$
$10x$	10 times $x$	50
$10/x$	10 divided by $x$	2
$10 + x$	10 plus $x$	15
$10 - x$	10 minus $x$	5

**Table 8: Mathematical shorthand.**

revisit my opening equation, which was  $3x + 13 = 55$

Firstly, what is an equation? It is something that tells us something about something we don't know –  $x$  in this case, the traditional unknown. By 'solving' an equation, we can find out what  $x$  is.

In Algebra, ' $3x$ ' is an 'expression' and it evaluates to a number. It's a kind of shorthand. See **Table 8**.

To get a value for  $x$  in  $3x + 13 = 55$  we have to rearrange (alter the form of) this equation making sure not to distort its truth. The rule is: whatever is done to one side must be done to the other.

I can add 100 to both sides, for example, resulting in  $3x + 113 = 155$ . This equation is still true, but does not tell me anything more about  $x$ . But subtracting 13 from both sides does help, because that gives me  $3x = 42$ .

I can now divide both sides by 3, and that solves the equation.  $x = 14$ .

The same mathematical methods can be used to rearrange  $V = IR$

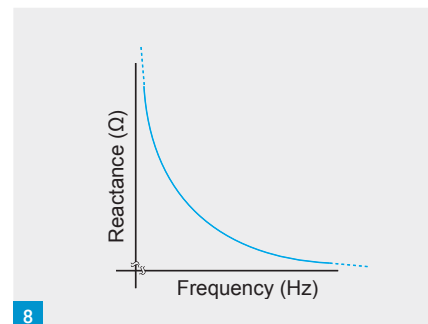
to solve for  $I$ , divide both sides by  $R$ , giving us  $V/R = I$

to solve for  $R$ , divide both sides by  $I$ , giving us  $V/I = R$

### Types of Relationships

See **Fig. 6**. Students meet this at Foundation. Doubling the frequency (14MHz to 28MHz say) halves the wavelength, from 20m to 10m. This is a 'linear inverse' relationship, so called because (when graphed like this) it is a straight-line plot with a downward-sloping line.

Now see **Fig. 7**. This is a graph of reactance vs frequency for an inductor. This is a 'linear proportional' relationship, because the line slopes upwards from left to right. As frequency increases, so does reactance.



8

Now look at **Fig. 8**. This shows how reactance varies with frequency for a capacitor, and this is not a straight-line graph. Reactance falls off rapidly as frequency increases, and approaches zero for higher frequencies. This is actually a 'reciprocal' relationship; reactance depends on  $1/\text{Capacitance}$ .

### Conclusion

That was a bigger job than I thought, but I think there is good, useful stuff in there. I tried to get the level right – for some readers I will just have been filling in gaps and refreshing knowledge while for some whole sections may be new territory.

For the Full licence there is lots more maths to explain, most of it very radio specific. If there is a demand for that, I'm happy to write some more. **PW**



[www.sotabeams.co.uk](http://www.sotabeams.co.uk)

All items shipped from our UK factory. Prices exclude p&p.

## Crimp Tool for Powerpole Connectors



Powerpole connectors in various pack sizes:

Pack of 5 connectors

15A or 30A £5.30

45A £7.50

Pack of 12 connectors

15A or 30A £11.00

45A £15.00



(1 connector = 1 black shell + 1 red shell + 2 contacts)

## The Carbon-6 Ultra-light Mast



£44.95

A carbon-fibre telescopic mast, ideal for lightweight end-fed wire antennas.

Extended length 6 metres

Packed length 43cm

Weight just 315g

Small enough to fit in a rucksack, tall enough to support your antenna.

A highly portable light-duty mast.

**Daimon Tilley G4USI**

practicalwireless@warnersgroup.co.uk

In this month's *On a Budget* we are going to look at computers and software for the shack. I am sure very few of us these days operate without a computer in the shack, although it is by no means necessary, unless you are operating digital modes. However, computers can be a really great shack accessory.

First, let us consider what use we may put the shack computer to, then consider what type of operating system we may choose, before looking at what our options are on a budget. We will also touch on portable computing with our radios, and finally we will take a look at budget/free software that will turn your computer into an invaluable operating aid.

### How Might we use a Computer in the Shack?

If we wish to make use of a computer in our operating, then there is a lot of scope, from minimal to being an integral part of our station, depending on our needs.

At the basic level, a computer logging program is often helpful and these now often perform a much wider range of functions than merely logging a contact. The beauty of a computer log is really that it is a bespoke database of our contacts, and databases can be manipulated and mined for all sorts of information. Whether it is checking if you have worked a particular callsign before, when and in what band/mode, checking your list of DXCC entities worked, your furthest contact, number of States, grid squares, parks, SOTA summits, IOTA squares, etc., your computer log can do all this for you and more. With my own preferred logging software, I can enter a callsign and see not only if we have worked before, but the software will 'fetch' the operator's name from QRZ.com, and provide a link to the QRZ page. It always amuses me, how when I speak to a station for the first time and I use their name, before they give it, they almost always then proceed to give their name! Habit, I guess.

In addition, my logger shows me the distance and bearing to the callsign, and will control my rotator to automatically point my beam and show their position on a map. I can also use it to interface to my rig, which has two benefits. First it will auto-populate the band and mode in the logbook entry and will also allow CAT control of my rig. I can monitor my status in any number of chosen awards if I choose, I can automatically 'spot' a station, posting details of the contact into the DX Cluster network, can see propagation predictions by band, and access the DX Cluster network to see what DX is on each band by mode. Merely clicking on the DX spot will take my rig directly to the correct frequency and mode. Finally (phew!) I can manage my log in a contest environment,



## The Shack Computer

**Daimon Tilley G4USI** discusses the Shack Computer and Software from a budget perspective.

providing automatic sequential numbers, and integrate into CW keyer software, or populate my log directly from, for example, WSJT-X.

It is clear then that there is some very sophisticated logging software, which goes much farther than just logging, and therefore if you use just one piece of shack software, a good logger is probably the most useful item you can download.

Other uses for your shack computer include satellite tracking software, access to reference material on the internet, using the computing power to make calculations on your next project, designing a PCB or breadboard layout, or even reading your favourite radio magazine!

As we move to more integration, we may use our computer to run one of the many digital modes, anything from SSTV to RTTY, PSK31, WSJT-X, and many other modes, including WSPR etc.

But perhaps the epitome of computer integration is in the use of the computer as a key component in your receiver or transmitter chain. For example, my RSP1a SDR receiver cannot function without a computer running software to interpret and present the RF being received into an intelligible form. Similarly, many SDR transceivers also rely on computer processing power to operate. It won't appeal to everyone, but there are some advantages, and I used to very much enjoy operating my QRP SDR via my computer, before I replaced it.

### What Operating System?

An operating system (OS) is "system software that manages computer hardware, software resources, and provides common services for computer programs" – Source: Wikipedia.

The choice of your OS is critical, and in some senses, determines the choice of your computer. Let us start with the two most common types of OS in use in a typical domestic setting – Windows and MacOS.

Windows, by Microsoft needs no introduction. Some people love it and some hate it! I have been in both states in my time around computers and now I tolerate it! Very common and widespread, it is fair to say that there is probably a greater range of radio-related software available on the Windows platform than any other, and this in part, is probably driven by the saturation of the domestic computer marketplace by Windows machines. Because of its predominance it also means that Windows machines are quite affordable.

When I retired from my primary career in 2015 I made the move to Apple products, including the Apple Mac. Mac's are typically more expensive than Windows products, on a similar performance basis, and Apple are very adept at 'tying you in' to their brand. However, when returning to radio a few years later, after nearly a quarter of a century absence, I soon realised the limitations of available radio software on this platform. That

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





2

is not to say that there is not some good software, but there is definitely less of it.

A relatively new entrant to the market has been Google's Chromebook range. Providing good performance at a keen price, the Chromebook laptop has become very popular, particularly among students and others with a keen eye to price. Sadly, though, the amount of amateur radio software available makes a Chromebook a comparatively poor choice as a shack computer.

My fourth and final category are some of the Linux based OS's. Examples include Ubuntu, Debian, or even Android – yes – this is a Linux based system.

I have played around with a few of these, and actually had some success in giving old Windows laptops, which had become slow and bloated, a new lease of life by completely erasing their hard drive and overwriting with Ubuntu. Indeed, an Ubuntu-based old Windows laptop was my main shack PC after leaving the Apple OS behind, until I discovered the magic of the Raspberry Pi, running its own Linux OS called Raspbian.

When my Ubuntu laptop finally reached end of life, it was a Raspberry Pi 3B that replaced it and became my main shack computer for a couple of years. While the radio-related software range for Raspberry Pi is not as extensive as for Windows, there is a surprising amount of free radio and other software available. Be aware, though, that there is a bit of a Raspberry learning curve to get some software set up, but it can be worth it. The Raspberry Pi remained my main shack computer until I bought an SDR transceiver, and I discovered that the software I wanted to use was only available on Windows! It brought me full circle, and now a Windows PC is at the heart of my shack, but it is still supported by a Raspberry Pi. In fact, I must have half a dozen Raspberry Pi's around the place, all fulfilling different functions.

If I were to sum all this up, it would be that if you want maximum choice in software, then my pecking order for the OS of a new computer would be Windows, followed by a Linux OS, fol-

lowed by a Mac, followed by a Chromebook.

That all said, if you don't mind hacking around, you could buy a cheap new Chromebook and then install Linux on it to replace Chromium as your OS – it is absolutely possible, but that is another story!

### Options to Buy on a Budget

So, based on my top two preferences of Windows and Linux, let's take a look at budget options, starting with Windows.

It is not my intention to undertake reviews here – the market is too big and too fast changing, with a bewildering array of options. Suffice to say that you could buy a decent desktop Windows PC for between £400 - £500 that will be more than adequate for shack/normal domestic use. Just Google around and you will find plenty (too many?) options.

For a laptop, expect to pay a little more for a comparable specification machine.

But this is *On a Budget* so why pay nearly £500 for a new machine? (*I now use a Beelink Mini PC, available on Amazon for just £195 – ed*) When I wanted a Windows PC to run my SDR software two years ago, I started looking around on a well-known auction site. I ended up buying a refurbished HP desktop machine, with a fresh install of Windows 10, an Intel i5 processor a 120GB SSD drive and 8 Gb of RAM, for, wait for it, £90 including courier! This was a cracking purchase and the machine is still serving me very well as my main computer for both the shack and other work, including quite intensive Computer Aided Design (CAD) software. Now that is what I call a good deal. Even now it shows no sign of needing replacement or upgrading.

Obviously, there is some risk in this approach. In my case I reviewed the seller ratings carefully and took a risk, but there are still quite a few small computer shops around in our towns who offer these sorts of machines, with the added peace of mind of you being able to doorstep them if you need to.

Staying with Windows, you might also wish to

de	dx	freq	cq/dx	snr	speed	time
EA5WU	+ G4USI	7029.3	CW CQ	13 dB	12 wpm	2115z 08 Nov
IK4VET	+ G4USI	7029.3	CW CQ	5 dB	12 wpm	2115z 08 Nov
HG8A	+ G4USI	7029.4	CW CQ	9 dB	12 wpm	2114z 08 Nov
HA1VHF	+ G4USI	7029.3	CW CQ	12 dB	11 wpm	2114z 08 Nov
ES5PC	+ G4USI	7029.4	CW CQ	12 dB	12 wpm	2114z 08 Nov
A6PX	+ G4USI	7029.3	CW CQ	11 dB	12 wpm	2114z 08 Nov

Photo 1: PowerSDR software for Windows.

Photo 2: µBitz with internal Raspberry Pi.

Photo 3: RBN reporting of the author's signal on 40m CW.

Photo 4: WSPR spots with 38mW!

upgrade an existing machine. Again, that is not really in the scope of this article but is worth considering. Often a fresh install of Windows (or a Linux OS) and maybe upgrades to RAM and your hard drive, by replacing with a Solid-State Drive (SSD) can eke out the lifespan of a machine.

Moving to Linux, apart from loading a Linux OS onto a machine to replace Windows or Chromium etc., then a good budget option is a computer from the Raspberry Pi stable. The Raspberry Pi is a great British success story. Based in Cambridge, but with truly global reach, the Raspberry Pi Foundation has produced a long line of winning products.

If you are looking for the closest product they do to a traditional computer, you could not go wrong with a Raspberry Pi 400 – a complete computer built into small keyboard. For just £99 you get a kit containing the Pi 400 integrated into a keyboard, an (RFI quiet!) PSU, mouse, 16GB SD card and a HDMI cable. The Pi 400 can actually drive two HDMI monitors. It is ready to go straight out of the box, but you can improve it by adding a cheap SSD hard drive, rather than relying on the SD card. All you need to provide is a monitor or two.

In actual fact my Pi 400 is doing nothing more than acting as a driver for a monitor, and displaying my weather station data and other web pages I use often. I also have several Raspberry Pi Zero's acting as CCTV cameras, camera server, ADS-B receiver, All-Star node and more. At less than £10 each the Raspberry Pi Zero is not powerful enough to act as a stand-alone computer but it has a multitude of uses around the shack. Other Raspberry Pi products are available, and perhaps the Raspberry Pi 4B is the closest relation to the Pi 400. At only £35, this has all the processing power of the Pi 400, but is a bare PCB of a computer. You need to add a PSU, mouse, keyboard, SD card and case, as well as monitor to use it.

You may ask why you might want to buy a 4B over a Pi 400? Well, there are plenty of potential uses. For example, I built a Raspberry Pi 3b

(its predecessor) into my Ubitx HF transceiver go-box, to provide digital modes without needing a laptop when portable (PW August and September 2019). I also have a 4B built into my current multi-purpose go-box, driving a Bluetooth keyboard and mouse combo along with an old laptop display. Finally, I have a 3B which is the heart of a 7in Raspad – a Raspberry Pi touchscreen tablet.

### That's the Computer, now what about Software?

As before, software is an area with huge choice, but I am going to give you a flavour of some of my favourite free/cheap software, along with (my understanding) of the OS platform it runs on.

A note of caution – please do your own research making a purchase decision based on software availability. Software changes rapidly and my knowledge may not be the latest or most accurate – you have been warned!

**Logging software** – Log4OM (Windows); Logger 32, CQR Log (Linux), N1MM+ Logger (Windows)

**Digital modes** – WSJT-X (Windows, Linux, Mac); FLDigi (Windows, Linux, Mac); MMSSTV (Windows); JS8Call (Windows, Mac, Linux); JTDX (Windows, Mac, Linux)

**Satellite tracking** – SatPC32 (Windows); Gpredict (Windows, Linux)

**Morse Tutors** – G4FON, RufzXP, Morse Runner (Windows)

**SDR Software** – PowerSDR (Windows); SDRUno (Windows, Mac, Linux); GQRX (Linux, Mac); SDR#, HDSDR, SDRConsole and SDR Angel (Windows); CubicSDR (Mac)

**Antenna Modelling** – MMANA-GAL (Windows); MOXGEN (Windows); EZNEC (Windows)

**CAT Control** – Omnirig (Windows); FLRig (Windows, Linux)

It might be worth mentioning at this point that it is possible to run some Windows software on other OS platforms using emulator platforms. An emulator is software that runs on, for example, Linux, but emulates or mimics Windows. This will then often allow Windows software to run. I do not have personal experience of this, but it can be done.

**Internet based radio tools.** There exist within the web some wonderfully handy amateur radio tools, accessible regardless of your operating platform. Here are just a few:

**Propagation monitoring/signal reporting** – the Reverse Beacon Network (URL below) is a wonderful site that will report where your signal has been heard, when you call CQ on CW, RTTY or PSK modes. I use it frequently when calling CQ on CW and it reports back where I have been heard, on what frequency, my CW speed (WPM) and the signal-to-noise ratio (SNR) at the receiving station.

[www.reversebeacon.net](http://www.reversebeacon.net)

PSKReporter (URL below) does the same but for just about any digital mode, including WSPR, and a similar service just for WSPR is available at the second link below:

[www.pskreporter.info](http://www.pskreporter.info)

[www.wspr.rocks](http://www.wspr.rocks)

Finally, the international beacon network (below) provides information on frequency and operating times on a worldwide network of propagation beacons, so that you can try to hear them in your location.

[www.ncdxf.org/beacon](http://www.ncdxf.org/beacon)

**Callsign databases** – Surely everyone knows qrz.com? If not, then what are you waiting for? This is probably the biggest online searchable ham database of callsigns there is, as well as providing a useful news site.

[www.qrz.com](http://www.qrz.com)

**DX news** – DX World and 425DXNews (URLs below) are just a couple of plentiful sites in this category. There are also a number of live DX Cluster reporting sites. Mine is now integrated through the excellent Log4OM software, but I used to use DX Watch, which I can recommend. The Finnish DX Summit is the original such site and has some useful filtering facilities.

[www.DXWorld.net](http://www.DXWorld.net)

[www.425dxn.org](http://www.425dxn.org)

[www.dxwatch.com](http://www.dxwatch.com)

[www.dxsummit.fi](http://www.dxsummit.fi)

**Contest Calendars** – There are lots, but I use this one:

[www.contestcalendar.com](http://www.contestcalendar.com)

**WebSDR's** – One of the great advantages of the internet is to listen to other people's receivers, no matter where they are in the world. A great resource for this is:

[www.websdr.org](http://www.websdr.org)

And as a final online nugget – I just love browsing the World Radio History site, which contains literally thousands of digital back copies of your favourite radio magazines, including PW back to June 1922 – the very first edition. You can get lost for hours in here!

[www.worldradiohistory.com](http://www.worldradiohistory.com)

### What about Portable Computing?

As you can imagine, anything you can do on your shack computer can be done by the equivalent machine out and about, with the laptop as the most obvious choice.

However, given the power of the computers we carry around in our pockets, namely our phones, what can we do with them? Well, we have the same OS platform issues here as we did before. Is your phone Apple or Android based? Each has software that the other does not, but some radio software (apps) are cross-platform.

I don't want to get into too much detail, but these are the apps I have installed on my Android phone for radio use in the field:



QRZ Assistant (from QRZ.com); Repeater Book; SOTA Spotter; CW Trainer; TabLog; NKCCluster (DX); Heavens Above (Satellites); NCDXF Beacon; PocketPrefixPlus, AmsatDroid; APRSDroid; EasyQTHLocator; Robot36; Echolink; POTASpots; SDRTouch; Look4Sat; DroidStar; and MorseExpert.

These apps are also therefore available on my Android tablet.

Until just the last few weeks, the highly popular FT8 digital mode was not available to use on a phone or tablet, but now an enterprising amateur has cracked it with an Android-only app called FT8Radio. I have not tried it personally but there are some YouTube videos demonstrating its successful use. At the moment functionality is a little limited, and there are a limited number of radios supported, but this includes a good number of popular portable QRP sets. If FT8 portable is your thing, why not check it out?

### Remote Operation

An article about computing in radio would not be complete without mention of remote operation, that is operating your station from anywhere else in the world. Some major manufacturers now offer software bespoke to their products, such as ICOM and FLEX, but it is achievable without purchasing proprietary software. For more information and ideas, see my PW article on the subject from May 2020.

### And Finally...

No *On a Budget* article is truly complete without a real money saving idea. Before you take your old laptop to the recycling centre, have you considered recycling it yourself? Many older laptops will contain a number of 18650 Li-Ion cells. By (carefully) dismantling these you can test the individual cells and often you will find most of the cells are still fine. You can re-purpose these into portable power banks for QRP and other use. In addition, old laptop screens can, with the addition of a suitable hardware driver, make cheap second monitors for dedicated use – perhaps monitoring the DX Cluster, for example.

If you have an old laptop doing nothing, hang onto it until the next instalment, when I will guide you through how to re-use these two components. **PW**



# Would you like "noise free" audio? Get a bhi noise cancelling product!

# bhi

## ParaPro EQ20 audio DSP range with parametric equalisation



- Greatly improved audio for those with hearing loss
- 20W audio and parametric equalisation on all units
- Separate DSP noise cancelling and \*Bluetooth versions
- Two separate mono inputs or one stereo input
- Use with passive speakers or headphones
- Basic EQ units EQ20, EQ20B\* (use with your Dual In-Line, Compact In-Line or In-Line Module)
- DSP noise cancelling versions EQ20-DSP, EQ20B\*-DSP

\*Denotes Bluetooth on input  
EQ20B-DSP QST Dec 2019 review "easy-to-use device that improves the audio clarity of amateur signals"

### Dual In-Line



- Fully featured flexible dual channel DSP noise cancelling unit
- 8 Filter levels 9 to 40dB
  - 3.5mm mono or stereo inputs
  - Speaker level and line level inputs
  - 7W mono speaker output and line level output
  - Headphone socket - Suitable for all types of radio incl' SDR
  - Easy to use controls for quick and easy operation
  - Enjoy clear "noise-free" speech

### NES10-2MK4

- 5W amplified DSP noise cancelling speaker
- 8 to 40dB noise cancelling and up to 65dB tone reduction
- Includes latest bhi DSP noise cancelling
- Single switch switch for off (audio bypass), power on and DSP filter on
- LEDs for Power, filter on and audio overload
- Headphone socket



bhi HP1  
wired headphones

### New In-Line Module



- 8 noise cancelling levels 8 to 40dB - Tone reduction up to 65dB - Bespoke 5W audio amplifier with latest bhi DSP noise cancellation - Audio bypass feature - 3.5mm mono inputs and outputs - Headphone socket - Audio input overload feature - DC power 10 to 16V DC - Compact unit, 135mm x 65mm x 46mm - Replacement for ANEM MKII and NEIM1031MKII

### Compact In-Line



- Powerful audio processor
- Unique DSP noise cancelling technology
- Low latency of 32mS
- Remove noise and interference
- Hear weak signals clearly
- Rotary encoders perform all functions
- Easy to use with "real time" adjustment
- Use with headphones or a loudspeaker
- 3.5mm line level and speaker level inputs

### DESKTOP MKII

**Includes the latest bhi DSP noise cancelling technology for even better receive audio!**

- 10W Amplified DSP noise cancelling base station speaker
- Easy to use controls
  - 8 DSP filter levels
  - "Real time" adjustment
  - Suitable for all radios incl' SDR
  - Headphone socket
  - Speaker level and line level input sockets



**Celebrating 20 years helping customers around the world get the best from their receive audio!**

bhi Ltd, Burgess Hill,  
RH15 9RR, UK

Tel: 01444 870333 - [www.bhi-ltd.com](http://www.bhi-ltd.com)



EA & O

**Geoff Theasby G8BMI**

geofftheasby@gmail.com

This is as near to a foolproof SWR meter as I have encountered in 50+ years. Supplied by kitsandparts.com to a design by W8DIZ, it is available from the usual sources for about £10 ready built, or as a kit. If you buy the kit, please note there are four surface-mount capacitors to build in, but being quite large are easy to fit if care is taken. The rest are through-hole components.

**kitsandparts.com**

Using toroids instead of directional couplers, **Figs. 1 and 2**, it is the size of a large postage stamp, is easy to set up, and gave me 3:1 while spread out on my bench, but a much more acceptable 1:1 into a dummy load when properly boxed up, **Fig. 3**. This held good for the HF bands, beyond which I did not go. Topband wasn't good either, but **Owen Duffy** says (URL below) that poor results at 1.8 MHz seems inherent in the design.

My wife thought it would look nice as a pendant, so if your module insists on not working, there is an alternative to the bin...

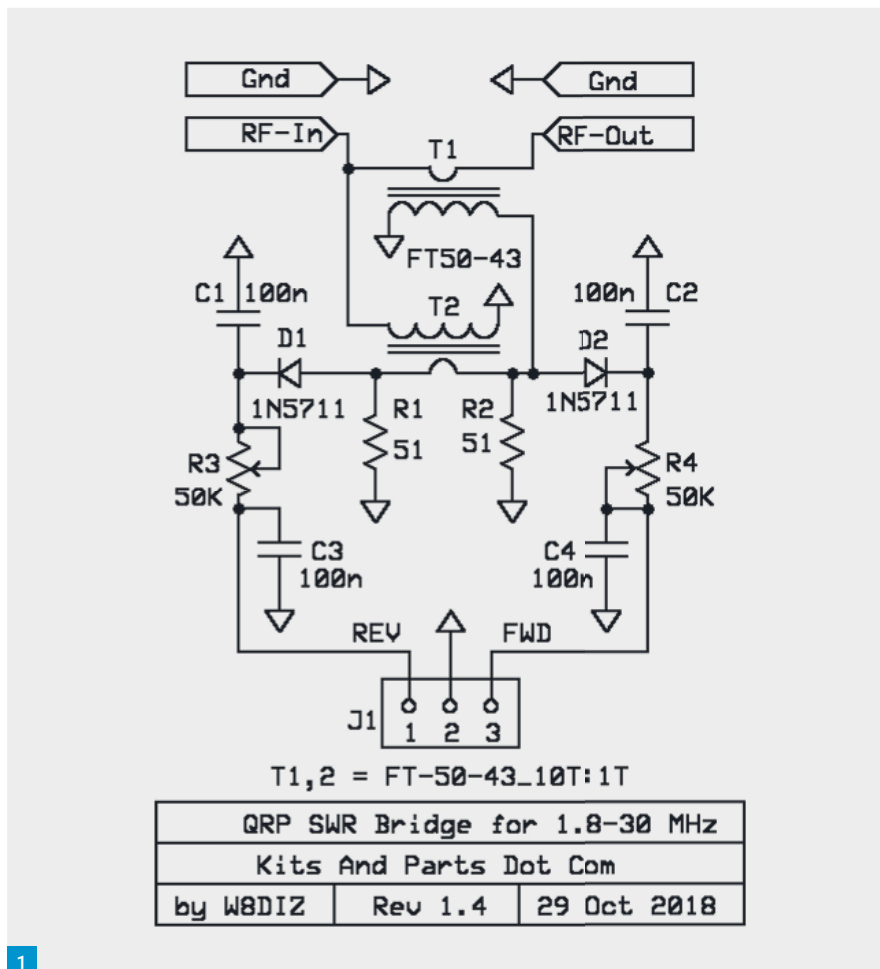
**owenduffy.net**

To make the boxed up circuit small, I used an external meter with a reversing switch. 50µA to 1mA should be fine, with a 100kΩ potentiometer in series to set the full-scale deflection on Forward.

## DeskMike from 'Bitz'

Finding difficulty in using a hand microphone, I considered a desk mike. I had restored an ICOM SM-6 (Bought at Newark Hamfest) for use with the FT-290 and it works very well. I rebuilt a CB desk mike to working order, but that one had an electret mike element, so was not suitable for the transmitter in use, which required only a PTT line and audio. Finally, I found a homebrew hand microphone that came with my Ten-Tec Argosy, and not used up to now. Over the years I have squirreled away various bits, some of which appeared as a solution looking for a problem. Until now. One was an old 'gooseneck' flexible tube, and I discovered quite by chance, that an SO239 type socket would fit it. I equipped the box with a momentary switch for PTT, and a miniature toggle switch for longer 'overs', and retained the Shure 444 insert for possible future use. Mounting an SO239 socket on the diecast box, with a matching right angle fitting, I screwed on the gooseneck, with a B/B coupler containing a SO239 socket at the top. I mounted it on a piece of plasticard, attached it to the top of the gooseneck and added a 3.5 mm audio jack socket to expand its usefulness. See photo, **Fig. 4**. In other circumstances, it could be a high-tech shillelagh...

Several types of goosenecks are available from the usual online retailers, or some kind of cantilever but this was built at zero cost, all from the 'spares box'. **PW**



1

# Easy SWR Bridge and a Desk Microphone

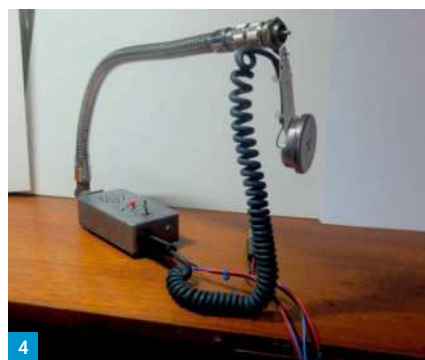
**Geoff Theasby G8BMI** makes a welcome return with two more cheap but handy projects.



2



3



4

**Fig. 1:** SWR bridge circuit.

**Fig. 2:** The completed PCB.

**Fig. 3:** The finished project.

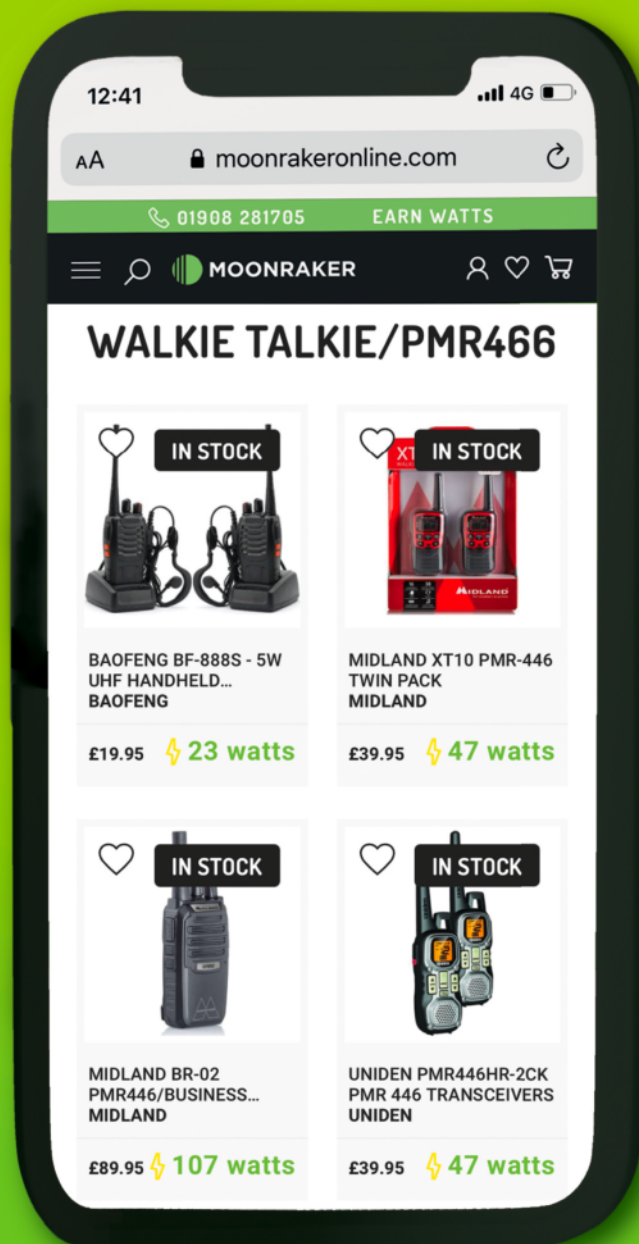
**Fig. 4:** The desk microphone.

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





# THE ONLINE HOBBY RADIO SUPERSTORE



**www.moonrakeronline.com**

T: 01908 281 705 E: sales@moonraker-group.com

SCAN TO SHOP



**Philip Moss M0PBM**

practicalwireless@warnersgroup.co.uk

This small, compact receiver was kindly given to me by the then Chairman of the British Vintage Wireless & Television Museum, Dulwich. I am known there for my interest in such things, which makes me really the only one, though we now have a small collection of such radios, including several 'iconic' ones, to use an over-used expression.

### Overview

The radio is intended for battery operation, using six D-cells, though a mains PSU was available, which will fit in the battery-box. There was also an external supply for 12 and 24V DC. I didn't have it, and as I had no intention of buying one, built my own in the space, leaving a connector for an external DC input, also. The radio has distinct Eddystone features from times gone by (as if this set wasn't itself from such a time). I first encountered one around 1975, though probably the Mark1. By this I mean the rack-handles, which all the pre-Marconi take-over sets had, and the scale which was adopted a very long time ago, a few very old sets having semi-circular scales.

The radio has five bands, and as is usual Eddystone practice, Band 1 is the highest frequency. Coverage is as follows: Band 1 18 to 30Mc/s, Band 2 8.5 to 18Mc/s, Band 3 3.5 to 8.5Mc/s, Band 4 1.5 to 3.5Mc/s, Band 5 550 to 1500kc/s. Calibration accuracy is said to be 1% on all ranges. Temperature stability is <1:10,000 per degree C. Sensitivity is quoted as >15dB SNR for 5µV input for bands 1-4, falling to >15dB for 15µV on band 5, although that is measured via a 400Ω resistor. Image rejection is quoted as 20dB at 18Mc/s and 50dB at 2Mc/s. The product of only one tuned RF amplifier.

The Mk 2 version added additional features: a fine-tuning control, using a varicap diode across the local oscillator (LO) tuning capacitor, and I thought also a stabilised supply for much of the RF circuitry, especially the LO, but it turns out that this was on the Mk 1, and I had previously been mis-informed. However, the use of a shunt diode wastes valuable battery power. If they had used a series-regulator circuit, no current would be wasted. The resultant voltage would be lower (it is anyway at 6.5V), but then the oscillator could be designed to run say at 5V.

Mine has been modified to have a transistorised supply to the LO, and while it is inelegant the way it's done, I have left it as it seems to do no harm. As it happens the whole supply is now regulated by a 7809 IC regulator in my mains PSU. Other changes in the Mk 2



## The Eddystone EC10 Mk 2

**Philip Moss M0PBM** takes a look at this once popular transistorised communications receiver.

are the inclusion on the left-hand side of the tuning scale of a signal meter, in the opposite bottom corner to the rotary logging scale, marked 0 to 100, with every digit marked with a dash on the scale, for use in conjunction with the 1 to 500 bottom line on the tuning scale. On the subject of power consumption, it consumes 36mA with output power less than 50mW and 180mA at 0.5W, with another 90mA for the dial lamps. These are only on if holding down the non-latching switch. I have wired across that as power is from the mains.

### The Circuitry

The aerial input is for either 75Ω balanced or unbalanced, for band 1 to 4, and 400Ω for band 5, again bal/unbal. These are stated as nominal so I would guess they were not very stable with frequency. A device is fitted for earthing one input socket for unbalanced use, and there is a high-impedance terminal for use on all bands, intended for short telescopic aerials. There is an available option kit of a specific aerial and fitting kit. The Hi-Z input is coupled by a 3pF capacitor directly to the tuned circuit, as is typical, thus bypassing the aerial transformer primaries. All the input circuits are the same configuration – double-wound transformers, with an impedance step-up into the tuning capacitor, but a tap

for the transistor's base. There are two opposed-parallel DD006 diodes across the balanced aerial input terminals to protect the RF amplifier against excessive voltage. All have a trimmer capacitor. All RF/IF transistors are OC171s, including the BFO. These were useable at least up to band 2 VHF, ie our FM broadcast band. The IF is the very typical 465kc/s. The RF amplifier is used in common-base configuration.

After two stages of IF amplification, the signal is detected by an OA90, which is also the automatic gain control (AGC) detector. The AGC line is fairly low impedance, so it can also drive the S-meter. The operation of the AGC isn't immediately obvious. The positive voltage derived is fed back to the first IF transistor (remember these are PNP transistors) where it counteracts the forward bias, thus reducing the current through it. That much is very conventional. However, there is a diode between the decoupled supply to that transistor's collector, and a tap on the primary of the first IF transformer. The supply to the mixer is also decoupled. Without AGC applied, the difference in these two supplies is such as to reverse-bias the diode, so it is effectively not there. When AGC cuts the current in the IF amplifier transistor, the supply to it increases as the voltage across the decoupling resistor

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



**Photo 1: The EC10 Mk 2.****Photo 2: Underneath view.****Photo 3: Rear view, showing both PCBs.**

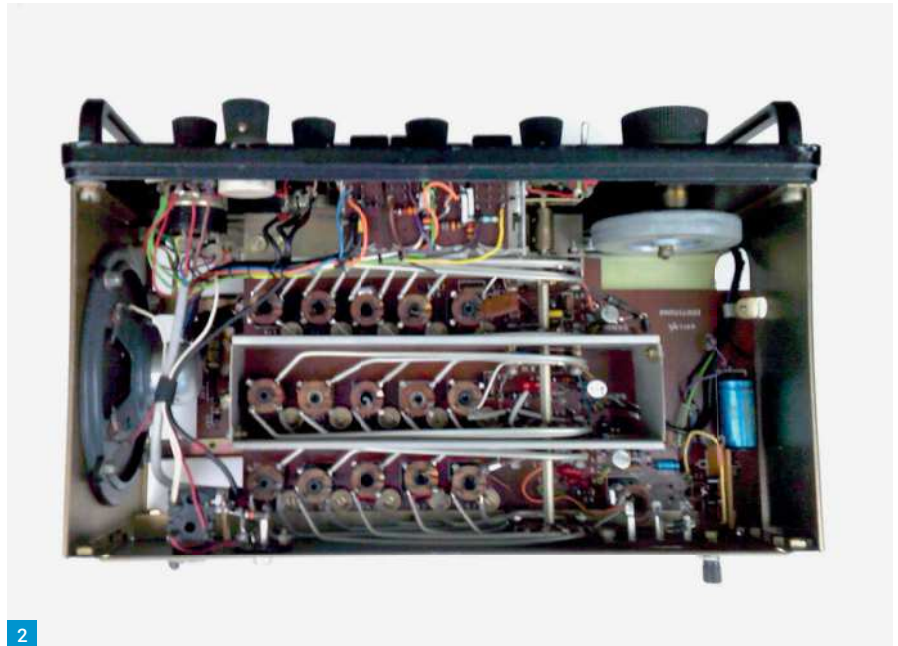
falls, the diode begins to conduct, and damps the signal across the first IFT in association with the diode's series resistor, the diode being an OA70. The AGC action is not good compared to valve sets of the time. An 80dB increase in input results in <12dB increase in output, taken at 6 $\mu$ V and 20Mc/s on range 1. All three IFTs have tuned primaries and have taps to match the collector Z into the tuned circuit. They are also taped on the secondary to present a low-Z to the transistor bases. The first two IFTs have tuned secondaries. The last IFT is not tuned on its secondary, and is a step-down to match into the load of the detector circuit. The bandwidth is stated as being down 6 and 40dB down at 5 and 25kc/s respectively. As ever, the circuits are too large to include: they would occupy three pages.

The controls are as follows, from the left, below the tuning scales: RF gain and on/off switch, AF gain, BFO pitch: marked with a 'u' on the LHS, and 'l' on the other: showing whether the BFO is running above or below the carrier frequency. Next is the large knob, predictably the tuning, which is flywheel loaded, and drives the rotary logging scale above. The step-down ratio is 110:1. The lower controls are Fine Tune, and the push-buttons are Filter (a selectable approximate 1kc/s AF filter for use when receiving CW), then BFO on/off, AGC on/off, and the non-latching dial lamp switch. The toggle, and Mk 2 addition, is the standby switch. This does not do the obvious and interrupt the supply to all but the oscillators, but merely desensitises the set. It has a spare pair of unconnected contacts for wiring to a transmitter for Rx/Tx changeover, there is a hole with a grommet for taking out a pair of thin wires. There is no headphone socket on the front, unlike the Mk 1, it is now on the rear, where next to it is added a phono socket for AF out to auxiliary equipment, connected before the volume control. The use of a rear 'phones socket is not very convenient.

The set came with photocopies of the original manual, and the Mk 2 supplement: they didn't rewrite the manual for the Mk 2 radio.

## Construction

The set is constructed on two PCBs. The bottom PCB carries only the front-end circuits, thus only three transistors. It is however a complex board, for all the HF coils are on it. Despite being PCB construction, all the wiring to the coils and wafer switches is hard-wired, and because the aerial circuits float, there



are two connections there. Also, because the secondaries are tapped, there are two more, so four wires per coil and three per interstage coil. A basic arrangement would only have two connections needing switching, with two earths, not needing switching. The LO switching using double-wound transformers is again more than usually complex. Getting all the wiring done onto the correct tags on the wafer would take considerable concentration, methinks! The wiring uses the same translucent sleeving that is reminiscent of the valve construction. Indeed, the whole assembly does, the difference being that sheet metal is used to screen the coils, not a diecast chassis. The rest of the circuits are on

the upper PCB, with seven transistors.

The tuning drive isn't simple, either. There are a lot of pulleys in there, and the reduction gear, with the typical double wheels with spring loading to prevent backlash. The cabinet is welded steel, finished in grey metallic paint. The speaker is a 5in Audax.

## Work

This radio worked straight off, so no repairs were needed. I checked the signal-to-noise ratios (SNRs) and found they were generally not quite up to specification but not far off and I decided to leave it alone. The type of carbon-

**Continued on page 53**

**Tim Kirby GW4VXE**

Longworthtim@gmail.com

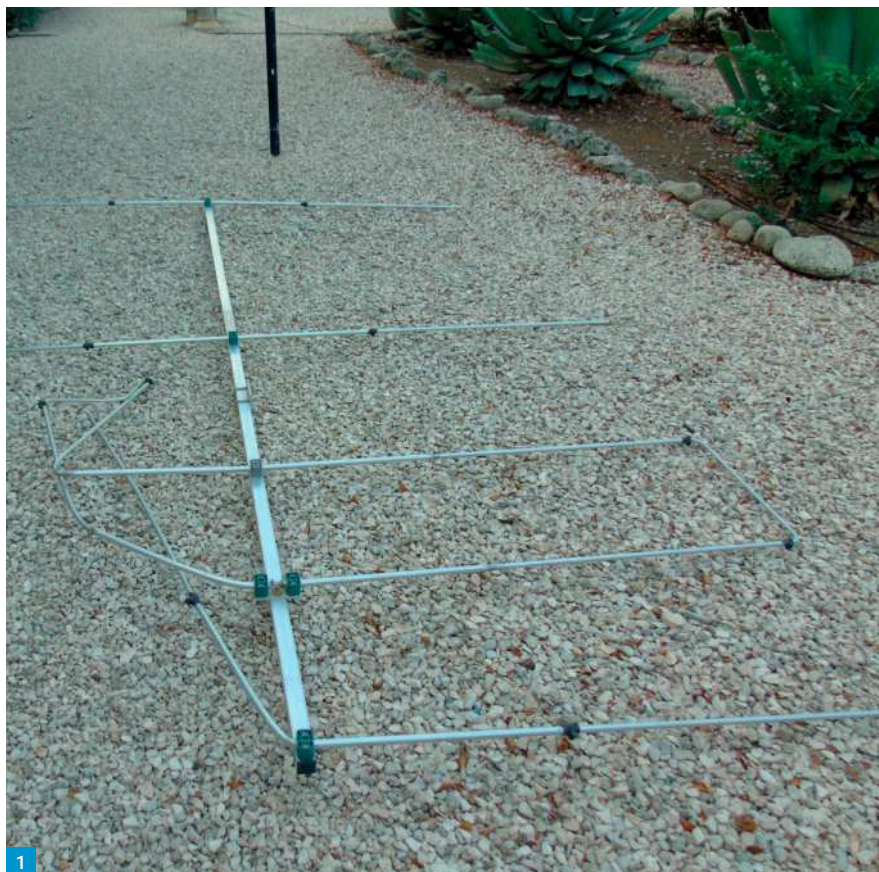
In the satellite section of this column, I often report on schools contacts being made from the International Space Station, where astronauts answer questions posted by schoolchildren. These are quite fun to listen to, but it is some time since an astronaut on the ISS has made 'random' contacts with individual amateurs.

**Commander Doug Wheelock** made very many contacts back in 2010 and Italian astronaut **Luca Parmitano** made a few contacts in 2019, but since then, there has been little activity.

Recently though, **Kjell Lindgren**, who holds the US callsign **KO5MOS**, has changed all of that and has been making contacts when the spacecraft is over land masses. He started off making contacts with North America but more recently has been active on passes over Europe. I was a little late to the party, but became aware that a number of friends, including **Dave MOGIW** and **Peter GOABI**, had made contacts with NA1SS, operated by Kjell. The ISS always approaches us from the west, which puts me at a huge advantage as I can 'see' and hear signals from the ISS as soon as it pops up over the horizon across the sea. I decided to monitor all the likely passes towards the end of the astronauts' work day. Peter GOABI suggested that it was worth calling NA1SS as he'd noticed that Kjell would sometimes be close to the radio and would answer if he was called. For several days, I tried this without success and was beginning to lose hope! However, on 2 August, I tried a call around 1930 UTC, just as the ISS rose above my western horizon and to my surprise Kjell replied and we made a brief exchange. Later on in the pass, though, a wonderful QSO took place between **Isabella**, the 8-year-old daughter of **Matt MOLMK**. Isabella had been practising how to send a greetings message for several days prior to the pass and I can confirm she was absolutely word perfect! Kjell took some time out to have a longer QSO with Isabella, which was great to hear. Subsequently, Isabella sent a photo of her in Dad's station to the NASA ISS team and asked for it to be forwarded to Kjell and very quickly had a nice photo back with Isabella's photo superimposed on a shot from the ISS' cupola! It was a really good to hear – how many eight year olds get a chance to talk to an astronaut in space? Well done Isabella, Matt, Kjell and the NASA ISS team. You can hear audio from the contact at:

<https://tinyurl.com/yckvn8vs>

Currently, Kjell is due to return to Earth in late September or early October. Hopefully there



# Contacts with the International Space Station

After last month's excursion into VHF/UHF history, **Tim Kirby GW4VXE** returns with lots of current news.

will be opportunity for some more QSOs with NA1SS before then.

QSL cards are available for contacts with the ISS. European stations should send a QSL with details of the contact to **Christophe Candébat F1MOJ**, ARISSE Europe QSL Manager, 19 Chemin des Escoumeilles, 66820 Vernet les Bains, France. You'll need to send a self-addressed envelope with adequate postage or at least 2 IRCs. Full details at:

<https://www.ariss.org/qsl-cards.html>

## VHF/UHF NetsListing

Don't forget, you can find the UK's best listing of VHF/UHF nets at the URL below, with new nets being added as we are told about them. If you'd like to add a VHF/UHF net that you are aware of, please drop me an email with the details.

<https://tinyurl.com/3zu64s6e>

**Table 1** has this month's random selection from the listing:

## Decoding FT8 on Android Devices

**Jef VanRaepenbusch ON8NT** has been experimenting with a new app for Android, capable of decoding FT8 signals. The app was developed by **Dhiru VU3CER**. Jef has successfully run the app on both a Nokia smartphone and a Samsung Galaxy tablet. He has connected to his radios using a ZLP Electronics MiniProSC interface and a USB/OTG cable between the interface and the smartphone/tablet. Jef has it working well with his IC-7300 and IC-703. However, he has had problems with the IC-9700, which receives fine won't transmit. Jef wonders if anyone else

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





has had any success transmitting from the app using an IC-9700. The app costs €10.

### The 8m Band

**Roger Laphorn G3XBM** (Cambridge) writes "On 8m (40.680MHz USB dial) FT8 I have been spotted in 14 countries. I am still hoping to be spotted in the USA, although this will have to be by F2 rather than Es now. I suspect my QRP is just not enough, although I have worked the USA on 10m SSB with far less ERP.

"My free PDF G3XBM Project Scrapbook is now available and this took me a lot of time last month. The link is:

<https://tinyurl.com/y56vjhd6>

"This was a labour of love having had years of fun building and experimenting. Some of my projects and antennas were VHF/UHF. My aim is definitely not to make any money. If anything comes in it will go to the local foodbank!"

Do have a look at Roger's scrapbook, it's really good!

In addition to a new 28.205MHz beacon, **Peter G8BCG** has now obtained permission for a further two beacons in the Mid Cornwall Beacon and Repeater Group GB3MCB beacon cluster (IO700J). The new beacons will operate 24/7 on 40.050MHz and 60.300MHz initially under an Innovation and Research licence. This licence is for one year but hopefully is a 'foot in the door' for a more permanent arrangement. It is hoped that the three beacons will be operational by mid-September. All three RF-Zero based beacons are now built and undergoing soak testing incorporated into a

Day	Time (local)	Frequency	Description	Area
Every	0830	144.275 USB	Rugby ARTS	Warwicks
Sunday	0830	50.220 USB	Cheltenham ARA	Glos
Sunday	1930	MB7INP	Pembrokeshire Radio Society	Wales
Sunday	2100	145.325	Echelford ARS	Middlesex
Thursday	2000	145.3875	Flight Refuelling ARS	Dorset

**Table 1: This month's selection of VHF/UHF nets.**

single 4U case together with the controls, AC supply and DC input giving options for battery/solar power. This has been a very expensive project and a crowd funding exercise will be launched shortly to help recover some of the capital costs.

Here at **GW4VXE** (Pembrokeshire), I've listened a few times on 40.680MHz FT8 using nothing more than my V-2000 antenna to receive on. On 26 July, I heard my first amateur signals from EI9KP (IO54) and S5/M0MPM. Next day on the 27th, I copied 9A2Y (JN83). It's certainly well worth listening on the band and seeing what you can copy.

### The 6m Band

6 August was quite special in terms of 50MHz propagation. Just as it seemed as if the DX season was coming to an end, an excellent opening to the west coast was experienced by a number of operators, allowing contacts with VE7DAY (CO70) among others. However, **Mark Turner EI3KD** (Cork) experienced some astonishing propagation to allow him to work

NH6Y for WAS on 50MHz. Well done Mark! KH6HI was also heard by some during the opening.

Jef ON8NT caught some nice openings. He lists only stations worked outside Europe or 'special' activity. Highlights from his log include 7X2TT (JM16) EA9ACF (IM75), 7X2KF (JM06), EA8BFB (IL38), K4PI (EM73), OY1DZ (IP62), OD5KU (KM73), EA8DBM (IL18), EA8JK (IL18) and EA8/DF4UE (IL38). All QSOs on FT8.

**Steve Telenius-Lowe PJ4DX** (Bonaire) writes "When my antenna mast toppled over while we were visiting the UK back in June, the 6m beam landed directly on top of the neighbour's fence. The driven element in particular was badly damaged, see **Fig. 1**. It may be repairable with locally-sourced aluminium: time will tell. In the meantime I have put up an MW0JZE Hexbeam with two elements on each band, including 6m. The Hexbeam works surprisingly well on 6m. On 26 and 27 July the band was wide open for many hours on both days into Europe and even the Middle East.. I worked no fewer than seven 50MHz 'ATNOs' (All Time New Ones):

Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)



4Z1UF, ER5GB, LX1JX, OM5XX, R6KA and RW5C, TA1CM and TA4/PE2M and YO5BRZ. On the 27th I also decoded no fewer than three 9K2 stations in Kuwait and later discovered that **Abdallah 9K2GS** had also decoded me, though we did not complete a QSO. Kuwait is 11,750km from Bonaire – not bad on a two-element beam!

"Many stations in Spain, Portugal, Italy, France, Germany and even Poland were worked, plus the following highlights: 406AH, 5B4ALJ, 9A7Y, CU3AC, E77DD, EA6NB, EI2CN, EI4KF, G4RRA, G8BCG, G14OWA, G100TC, GW4SKA, HA0UZ, HB9FAN, HB9RYZ, LZ1ZL, LZ2TWY, M0DEP, OE3GCU, OE4WHG, OE6IMD, OE6MDF, OK1TNM, OK2AF, OK7PK, ON4ATW, ON6CC, OZ1JVX, OZ6FH, PA5Y, PA0RDY, S50A, S57TW, SM6MUY, SM7FJE, SV1AHP, SV1CDM, SV1DH, SV1RK, SV8KOU, SV8MQP, UR3QCW, UR9QQ, YU1TA and Z3Z2M.

"The following day, 28 July, the band was dead most of the day but, at 2118UTC, G1SDX appeared on an otherwise completely empty band followed by G7RAU, EI2CN and G0CER.

"Yet another opening on 5 August, although of much shorter duration than the ones on 26 and 27 July, brought QSOs with Poland, Austria, France, Italy, Hungary, Portugal and another 6m new one: Corsica (TK5MH). I'm now at 107 DXCC worked and 98 confirmed on LoTW on 50MHz."

**Kevin Hewitt ZB2GI** (Gibraltar) operates both from his home QTH on the western side of the rock and from the top of the rock, to be able to work to the East. From home, Kev made over 200 QSOs on FT8 into the USA, Spain, Germany, Andorra, Eire, France, England, Jersey, Wales, Canada and Romania. Kev uses an IC-7300 with a monoband whip on a broom handle poked out of the window.

From the top of the rock, **Fig. 2**, Kev made over 400 QSOs, including around 25 into Japan. During his portable operations from the top of the Rock, Kev also made around 130 QSOs on SSB, mostly around Europe.

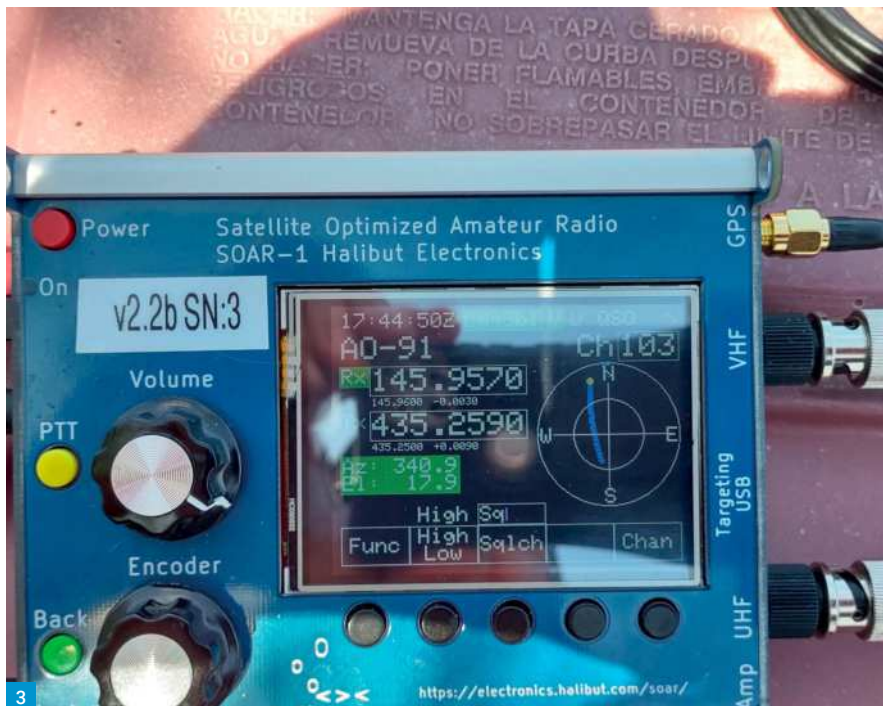
**Roger Greengrass EI8KN** made a few QSOs during the Perseids meteor shower, using MSK144, although he says none of the QSOs were particularly spectacular.

Highlights of the GW4VXE log include HI3T (FK49), HI8RD (FK49) and ZF1EJ (EK99) on 24 July, PJ4EVA and FG8OJ on 27 July, NN4X (EL98) on 28 July, 7X2KF (JM06) on 1 August, VO1CH (GN37), VO1HP (GN37), VE1CHL (FN85) and VY2MI (FN86) on 12 August.

## The 4m Band

**Jon Stow G4MCU** (Hockley) caught a 4m Es opening on 22 July when he worked EA4LU (IM68) on SSB.

Jef ON8NT runs 10W and a halo antenna and has made a very good number of contacts. Highlights of his log include ZB2GI (IM76), EA9IB (IM85), 9H1CG (M75), EA8AVI (IL28),



OH2MA (KP31), ES2MC (KO29), LA3WMA (JP43), EA8BFK (IL38), UN3M (LO61), 5B4AIF (KM64), ER5GB (KN45), EA9QD (IM75) and UR5FLF/MM.

Kev ZB2GI runs his IC-7300 and a monoband whip, with a counterpoise, both attached to a broom handle deployed out of the window and made over 30 QSOs through the month. The highlights were EI7BA (IO51), G14SNA (IO64), ON8NT (JO11) and CU3AC (HM68). From the top of the Rock, Kev made around 40 QSOs with the highlights being MM0ABM (IO75) and EI8JK (IO51).

Roger EI8KN made a few MS QSOs on the band during the Perseids with QSOs into PA, DL, S5 and OZ.

## The 2m Band

Jef ON8NT (Aalter) had a 'near miss' on 20 July when he spotted a 2m Es opening towards Greece. He saw SV2DSJ (KN10) but unfortunately was not able to make a contact. During the same opening, I noticed Keith G4FUF (JO01) calling an LZ station during the opening, but I got the impression it was fairly fleeting. During the 2m activity contest on 5 July, Jef worked G8DMU/P (IO94) and MW1LCR/P (IO81). During the 2m FT8 activity period on 6 July, the highlights were M1AEC (IO82), GW4FRX (IO82), GW4HDF (IO81), MW3ASG (IO81), and G16ATZ (IO74).

**Simon Evans G6AHX** (Twynning) took part in the 144MHz Low Power and WAB contests on 30 July. Among the ten stations he worked was GB22GJ in Jersey. During the RSGB's Activity Contest on 2 August, Simon worked 18 stations with the best DX being F1MKG (JN08)

**Fig. 1:** It's always sad to see a mangled Yagi. This is Steve PJ4DX's 6m Yagi, in need of a little straightening. **Fig. 2:** Kevin ZB2GI's 70MHz portable station at the top of the Rock of Gibraltar. **Fig. 3:** Patrick WD9EWK has been trying out a prototype of a new radio from Halibut Electronics, the SOAR.

at 428km, although Simon was particularly pleased with a QSO with EI8KN (IO62) over a very difficult path.

It was really good to hear from **Carl Gorse 2E0HPI** (Sunderland) for the first time in a while. Carl wrote, "This August I took the chance to a week's holiday camping in Ullswater in the Lake District National Park.

"I only had my trusty Yaesu FT-65 and the homemade whip antenna. I took a hike up Loadpot Hill, Wainwright GLD-102, WAB NY41 and Trig reference TP4497.

"I managed to work a few, including 2E0LDF/P, GM1VLA, 2E0XUP and GM4WHA and out of the blue I could recognise an Irish voice and knew straight away it was **Esther G1OAZA** and **Ian G1OAZB** operating portable on Great Orme WAB SH78 and Trig TP0174 as GW0AZA/P. The contacts also came as a P2P (Park to Park contact) for the WWFF program GFF-0008 to GWFF-0059. I also tried to activate Hallin Fell SOTA G/LD-043 but only managed one QSO, with **Tony GM1VLA**."

Roger EI8KN made a handful of MSK144 QSOs during the Perseids meteor shower, working OK1UGA (JO80), SF6F (JO67), OE1ILW/P (JN77) and IV3GTH (JN65).

**David Johnson G4DHF** (Spalding) writes, "I have a radio permanently installed in my car and



went out /M for a few hours over the nights of 12 and 13 August, operating MS from I084VS. I have a short homebrew 5-ele Yagi on my car and can run about 130W output on 2m. Although the Perseids were not particularly spectacular this year, they were still good over a number of days, I found. Even with my very modest equipment, signing /M, I completed with, F6BEG (JN25), LA0BY (JO59), OZ7UV (JN65), SP2ERZ (JO94), S50C (JN76), IV3NDC (JN65), S51AT (JN75), IV3GTH (JN65), DJ6AG (JO51), S57VW (JN76), DL8YE (JO32), S55AW (JN75), IW2HAJ (JN45), S58M (JN76), LY2R (KO15), S540 (JN75), 9A7W (JN85), 9A2TE (JN85), F4EZJ (JN05), 9A5M (JN95) and S50TA (JN76). For many, I084 was a new square. I used FSK441 as I found that stations were more able to decode the weaker bursts from my lower power, providing greater sensitivity than MSK.

"Earlier on 2m, from home on 21/7, I worked EA8CXN (IL18), EA8JK (IL18) and EA8CSB (IL18) via tropo on FT8, all over 3000km distance. These events are rare for me living in the Eastern Midlands as the sea ducting from the South usually dissipates when it meets the UK land mass. I also completed with the Market Reef Expedition, OJ0DX (JP90) via MS on 27/7."

At GW4VXE, although my 2m beam is down, I managed to work EA8JK (IL18) on FT8 by tropo using my vertical on 20 July. There was an Es opening to the EA5/EA7 areas on 22 July and I was pleased to a good number of stations using the same vertical.

## The 70cm Band

During the RSGB 70cm activity contest on 12 July, Jef ON8NT worked M0LMK (JO01), G4CLA (IO92), G4FEV (IO92), G4RUL/P (JO00), G6VOV (JO02), G7LRQ (IO91) and G0XDI (IO91). Next day during the FT8 Activity session, Jef worked M0LMK (JO01), G4NBS (JO02), G0BIX (JO01), 2E0DUE (JO01), G4BRK (IO91) and M0IEP (IO91).

## The 23cm Band

Jef ON8NT uses 10W from an IC-9700 into a Wimo Flat Panel antenna and worked G3XDY (JO02) during the RSGB Activity contest on 19 July followed next day on FT8 with contacts with G4BAO (JO02) and G4DDK (JO02).

## Satellites

Many thanks to **Patrick Stoddard WD9EWK** (Phoenix) who as ever, has plenty of interesting news from the satellite scene in the USA. He writes, "On 11 August, the new Kenwood radio in the Russian segment of the ISS was activated as a packet/APRS digipeater on 145.825MHz. This means that the ISS is supporting both voice and packet communications. The two stations don't appear to be interfering with each other. I have been using my Kenwood TH-D74 handheld

radio to work the digipeater on 145.825MHz from one VFO, while using the other VFO to hear the crossband repeater's downlink around 437.800MHz. The crossband repeater IDs as NA1SS, and the packet digipeater as RS0ISS.

"A little while back, I was asked to test a prototype 2W 2m/70cm FM transceiver designed for satellite operating. The radio is called SOAR (Satellite Optimized Amateur Radio, **Fig. 3**), made by Halibut Electronics. Halibut Electronics is the new company founded by **Mark N6MTS** in California. SOAR is intended to make satellite operating easier, by automating functions that are usually done manually by satellite operators, and reducing the amount of kit required to get on the satellites. SOAR can also be used like a handheld radio, working FM repeaters and simplex, complete with CTCSS tones. SOAR is not large; about 125 x 100 x 28mm (about 5 x 4 x 1.2in), excluding items like connectors and knobs sticking out of the SOAR.

"SOAR has a GPS module, which is used to set the clock and determine your location. With updated Keplerian elements, it is capable of showing a satellite's track in real time, adjust the uplink and downlink frequencies to compensate for the Doppler effect, and start an audio recording. It has separate 2m and 70cm antenna ports – perfect for those using 2m/70cm Yagis like the Arrow, or other two-antenna solutions. SOAR will also record audio during satellite passes automatically, or the recorder can be manually activated. More information about SOAR is available at:

<http://electronics.halibut.com/soar>

"Testing so far has been promising. I have used the SOAR prototype on different FM satellites, and even made a contact with NA1SS through the ISS crossband repeater. N6MTS mentioned he never tried working the satellites, in part due to the amount of equipment required. With the SOAR, Mark has made his first satellite contacts. Mark and I worked each other through the ISS crossband repeater on 3 August. Both of us used SOARs.

"In the next few weeks, Halibut Electronics plans to ship the first 100 SOARs in its early adopter program, before the radio goes into full production."

At GW4VXE, as well as the NA1SS QSO, I was interested to make my first transatlantic QSOs using the ISS crossband repeater, including VO1NC (GN38) and VE1CWJ (FN85). For the first time in several months, I tried out RS-44 and was pleased to work KE9AJ (EN50), W2GDJ (FN32), NA1ME (FN54), WA2FHH (FN13), W8LR (EM79), VE6WQ (DO33), GM4ILS (IO87) and SM/LA9XGA/P (JP62).

That's it for this month! Thanks to everyone who has been in touch. Please keep your news coming, on any aspect of VHF/UHF and microwave operation. See you next month. **PW**

## Continued from page 49

composition resistors used may well have changed value a long way, and perhaps checking and replacing with modern intrinsically low-noise types would have an effect. The trouble with that is that in transistor circuits you cannot just measure them in-situ, both because there are potential dividers which mean there are two paths for current, not just across the R under test, but also because of turning on transistor junctions. I could even try a newer RF amplifier transistor, but I think leaving it alone is more sensible. If it were in poor condition, I may have thought differently. Digging about on PCBs is likely to lead to lifted tracks on these older sets. I find modern PCBs on fibreglass remarkably forgiving.

So, the PSU was the only thing I did. It is fairly conventional, but I used the positive regulator IC, 7809, 'upside down': I regulated the positive then connected that to the ground, as being all PNP transistors, the supply is negative rail. I also made provision for external low voltage AC or DC input using a bridge rectifier, which also acts to prevent reversal of the supply.

There is only one interesting point about my PSU. As I pushed it into the back of the set there was an awful hum. At first I thought I had messed it up by putting the transformer at the wrong end so it could induce hum into the audio transformer. Wrong, nothing to do with it. I had heard of modulation hum, but not previously encountered it. I tried a small capacitor I had replaced in a valve set across the mains transformer secondary and like magic the hum went. The capacitor leaked but at the low volts here it is fine. The transformer was a little too deep. There was a danger of a short to the radio, so a piece of Perspex was added over it, and under each of the PSU's retaining screws, an aluminium washer a couple of mm thick was placed, held in position by double-sided tape.

## Conclusion

Compared to the valve Eddystones, this set has a poor specification, electrically. It lacks the selectable bandwidths in the IF, its signal-to-noise ratio is poor, and the audio output is small. Also, its AGC effectiveness is poor. However, it may also be said, try picking up any valved set with one or two fingers around the handles, or running them off six D-cells! And it is small and light. While modern semiconductor sets can proverbially wipe the floor with it, for its time it was probably a very good performer in its class. It also takes up little space, and is elegant enough to be allowed in the lounge where there are non-radio enthusiasts to be negotiated with. As such while I prefer my valve sets, including some very nice broadcast receivers, I am glad to have acquired this one, and would have been prepared to pay a few quid for it. For Eddystone enthusiasts, it is needed to complete the vintage range. **PW**

# Rallies & Events

All information published here reflects the situation up to and including 19th August 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](http://www.radioenthusiast.co.uk) has the latest updates, please check it regularly. To get your event on this list, e-mail full details as early as possible: [wiessala@hotmail.com](mailto:wiessala@hotmail.com)

## 3 September

**G-QRP CLUB AND TELFORD & DISTRICT ARS CONVENTION:** Harper Adams University Campus nr. Telford, Shropshire TF10 8NB (See also the entry for 4 September). Featuring the famous G-QRP 'Buildathon'.

**Martyn G3UKV: 01952 255 416**

**John M0JZH: 07824 737 716**

[www.gqrp.com/convention.htm](http://www.gqrp.com/convention.htm)

[www.telfordhamfest.org.uk](http://www.telfordhamfest.org.uk)

## 4 September

**ANDOVER RADIO CLUB BOOT SALE:**

Wildhern Village Hall, SP11 0JE (just north of Andover). Open for sellers at 9 am and buyers at 10 am. Costs are £8 per boot and £2 for buyers. The tables in the hall are £10. Organised by Andover Radio Amateur Club.

<http://www.arac.org.uk>

[arac@arac.org.uk](mailto:arac@arac.org.uk)

## 4 September

**TELFORD HAMFEST (AND CONTINUED G-QRP CONVENTION):** Harper Adams University (HAU); TF10 8NB (See also the entry for 3 September). There will be presentations by three excellent speakers.

**Martyn G3UKV; Tel: 01952 255416**

[www.gqrp.com/convention.htm](http://www.gqrp.com/convention.htm)

[www.telfordhamfest.org.uk](http://www.telfordhamfest.org.uk)

## 9-11 September

**67TH WEINHEIM VHF CONFERENCE:** The traditional Weinheim VHF Conference has been organized by committed radio amateurs (on a non-profit and voluntary basis) since 1956. It sees itself in its tradition as a meeting place for everyone interested in radio and electronics. amateurs from all over Europe present their experiences at this forum, provide information on innovative developments and share their know-how [...].

<https://tinyurl.com/4rk6cym>

<https://ukw-tagung.org>

## 9-12 September

**IBC 2022 CONTENT AND TECHNOLOGY SHOW:** The event will take place in Amsterdam.

<https://show.ibc.org>

## 11 September

**CAISTER LIFEBOAT RADIO RALLY:** Caister Lifeboat Station, Caister on Sea, NR30 5DJ. The entrance is via the car park on Beach Road; admission is free for the public. Doors are open from 9 am to 2 pm (8 am for sellers). Inside tables £10 each, outside £5 each. Raffle, onsite cafe, gift shop, museum.

**Zane M1BFI: 07711 214790.**

[m1bfi@outlook.com](mailto:m1bfi@outlook.com)

## 11 September

**RIPON RADIO RALLY:** Hugh Ripley Hall, Ripon, North Yorks, HG4 2PT, 100 m west of High Skellgate traffic lights B6265. Traders from 7 am to 9.30; tables £10 each. Doors are open at 10 am. £3 per person. The Bring-and-Buy is upstairs: if you can't carry it, don't bring it! Donation £1 per item to a local charity, sold or not.

<https://www.g4sjm.co.uk/contact-us>

## 25 September

**WESTON SUPER MARE 7TH RADIO & ELECTRONICS RALLY:** The Campus Community Centre BS24 7DX; 10 am to 2 pm.

<https://tinyurl.com/2p986v6t>

## 25-30 September

**EUROPEAN MICROWAVE WEEK 2022 (MILAN)**

<https://tinyurl.com/y49mv8j6>

<https://www.micomilano.it/en>

## 2 October

**WELSH RADIO RALLY NEW VENUE:** Llanwrn High School, Farm Rd, Newport, South Wales NP18 2YE. Doors open at 10 am. (BB | TS).

[www.gw6gw.co.uk](http://www.gw6gw.co.uk)

## 7-9 October (Friday to Sunday)

**THE RSGB CONVENTION**

<https://tinyurl.com/265yh44r>

## 14-15 October

**THE NATIONAL HAMFEST:** George Stephenson Pavilion, Newark & Nottingham Showground, Lincoln Rd, Winthorpe, Newark, Notts. RG24 2NY Local and international traders; B&B |

Books | CBS | Clubs | RSGB | SIG).

Tickets can now be purchased online.

<http://nationalhamfest.org.uk>

## 16 October

**HORNSEA ARC RALLY:** Driffild Show Ground, Driffild, East Yorkshire YO25 9DW.

[www.hornseararc.co.uk](http://www.hornseararc.co.uk)

## 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](mailto: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](http://www.hackgreen.co.uk)

[coldwar@hackgreen.co.uk](mailto: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 Secretary via email:

[m0omc@m0omc.co.uk](mailto:m0omc@m0omc.co.uk)

<https://tinyurl.com/yckypn5v>

## 19 November

**THE ROCSDALE & 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).

**Roz Worrall: rozallin@gmail.com**

**Dave Carden G3RIK:**

[dave@cardens.me.uk](mailto: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](mailto:rally@chippenhamradio.club)

[Chairman@g3vre.org.uk](mailto: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.

**Andy G0KZT: 07729 866 600**

[bazaar@catsradio.org.uk](mailto:bazaar@catsradio.org.uk)

## 27 November

**BISHOP AUCKLAND RAC RALLY:**

Spennymoor Leisure Centre, High St, Spennymoor DL16 6DB: Radio, old and new, computers & electronics. The rally 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).

**Bob Dingle, G0OCB: 07710 023 916**

[g4ttf@yahoo.co.uk](mailto:g4ttf@yahoo.co.uk)

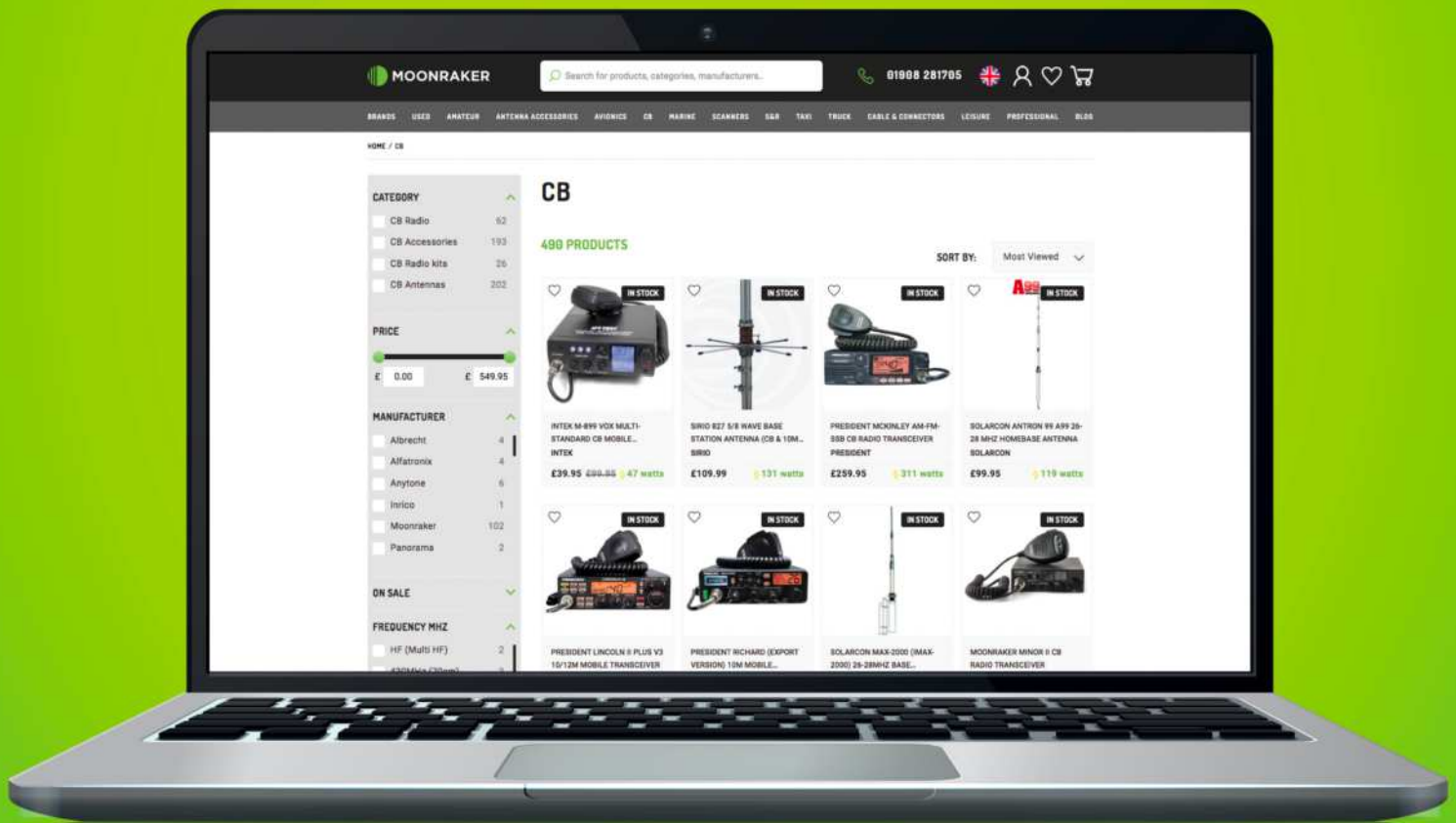
**BA** Buildathon **BB** Bring-and-Buy **CBS** Car Boot Sale **CR** Catering/Refreshments **D** Disabled visitors **FM** Flea Market **FP** Free Parking **LB** Licensed Bar **L** Lectures **MS** Meeting Spaces **RF** Raffle **RSGB** (RSGB) Book Stall **RU/PW** RadioUser/ PW in attendance **SIG** Special-Interest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

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





# THE ONLINE HOBBY RADIO SUPERSTORE



**www.moonrakeronline.com**

T: 01908 281 705 E: sales@moonraker-group.com

SCAN TO SHOP





**Steve Macdonald G4AQB**  
practicalwireless@warnersgroup.co.uk

**W**e have come a long way since the times when building a VFO for a receiver or transmitter required careful coil winding, variable capacitors, silver mica capacitors and frequency drift. I spent many happy hours aligning VFOs, trying to get them stable and to tune in a linear fashion for use with a mechanical drive. Nowadays accurate multiband VFOs can be built easily using an Arduino or similar microcontroller and programmable clock generator.

## Digital VFOs

While searching for information about an Arduino Nano based VFO, I stumbled across a video by JF3HZB of a wonderful digital VFO with an analogue display. This display looks very much like a traditional mechanical VFO that would have been used in older transceivers.

This whet my appetite to find out more and have a go at building one of these VFOs. After further searching for more information about this project I found very little apart from a link to JF3HZB giving the circuit and software sketch downloads. I

# Building an Analogue Display Digital VFO

**Steve Macdonald G4AQB** describes how to build an analogue VFO using modern techniques and components.

did later find a couple of sites, one from Australia and one from the USA, by other amateurs who have built and developed one of these VFOs. There are two versions of the VFO, the first is for Basic Tuning and the second uses Adaptive Step Control. The hardware is the same for both versions.

I decided to build the Adaptive Step Control version because this enables tuning without having to add a separate frequency step and bandwitch.

The JF3HZB VFO uses an ESP32 DevKitC microcontroller along with an Si5351a programmable clock generator. The display gives a choice of 1.8in TFT (ST7735 Type) or OLED (see circuit diagram, **Fig. 1**).

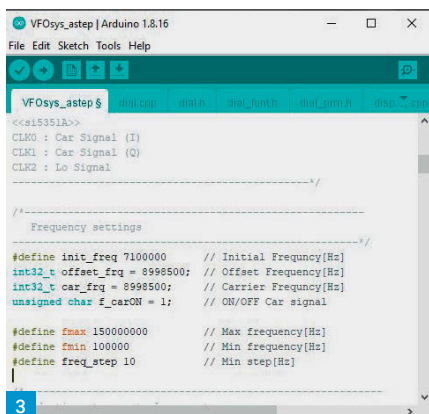
In the past I have built Arduino Nano VFOs and am familiar with the Arduino IDE, but have never used an ESP32 for this purpose. The Arduino IDE can be used to edit and upload the sketch to the ESP32, but it is important that you download and install the board drivers first for the different versions of ESP32 processors. I used the 38-pin ESP32 DevKitC as shown in the original diagram, but it is possible to use the smaller 30-pin ESP32 microcontrollers with adjustments to the pin connections.

## Construction

Construction requires an ESP32 DevKitC Microcontroller, Si5351a Clock Generator, TFT or OLED Display and a suitable Rotary Encoder.

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)

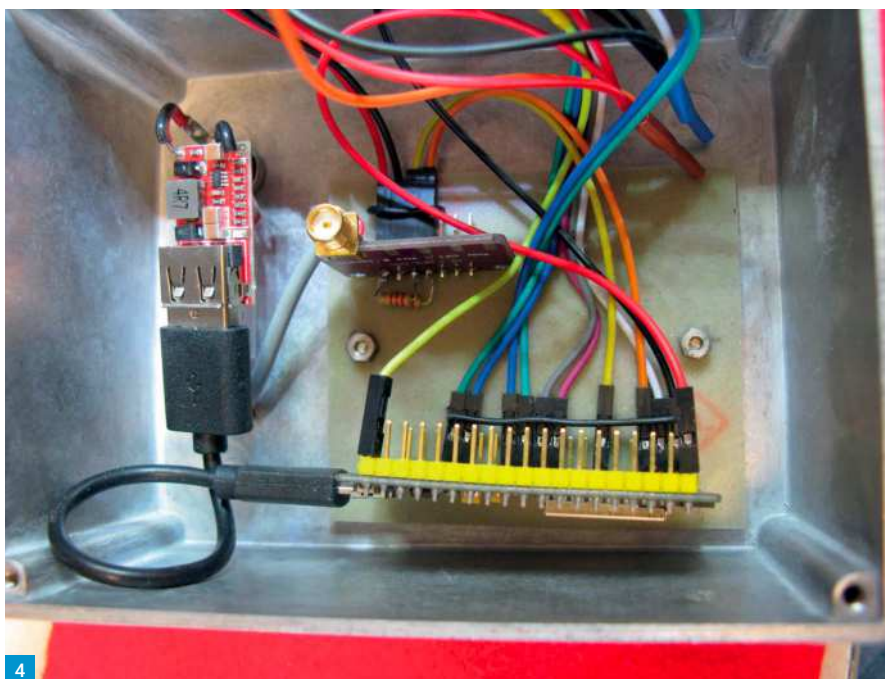




Although using a breadboard may be preferred by some, I chose to wire the modules by using female-to-female DuPont connectors. As the wiring is fairly simple, it is easy to see and follow the connections as well as making later adjustments easy if required. The DuPont connectors used are 20mm long, later I reduced the size of these to 10mm so that the project would fit neatly into a diecast box, **Fig. 2**.

When wiring the boards, check carefully the pin numbers and labels on each module as you connect them and always recheck before powering up. The ESP32 board provides 3.3V VCC, which is the same as the Si5351a and OLED. If using a 1.8in TFT, there is usually a link on the board for 5V or 3.3V. This needs to be set to 3.3V. Initially, I used a cheap 24-pulse Rotary Encoder Board, which was adequate for test purposes.

If you are using a TFT display, make sure that you are using an SPI ST7735 (128x160) type. Unfortunately, there are many variations of TFT. The most common way of identifying the different types seems to be by the colour of the plastic



**Fig. 1: Circuit of the JF3HZB VFO.**

**Fig. 2: Wiring the modules using DuPont Connectors.**

**Fig. 3: Lines from the sketch for changing.**

**Fig. 4: Working display of the VFO.**

**Fig. 5: Mounting the modules into the box.**

**Fig. 6: View of the inside of the box.**

**Fig. 7: Completed JF3HZB VFO.**

tab on the protective film. The one that I used had a Green protective tab.

Once the hardware has been constructed, the next step is to program the ESP32 by uploading the Sketch.

## Programming

I found that programming was the trickiest part of the VFO project. Here are the steps that I took to upload the software required to complete the working VFO.

First, you will need to have installed a copy of Arduino IDE and libraries on your computer. You can find it here:

[www.arduino.cc/en/software](https://www.arduino.cc/en/software)

Arduino IDE is used to upload the software that you need to the ESP32. You will also need to install the ESP32 library of boards. To do this, start up Arduino IDE and select 'Tools', 'Boards', 'Board Manager'. Search for ESP32 and install. When installed go back to 'Boards' and select ESP32 Arduino. You will see a list of boards, select the board that you are using, in my case ESP32 Dev Module.

Next, go to github.com (URL below), select the version that you want to make, either VFOsys or VFOsys-astep. Click the 'Code' button on the left, this takes you to another screen. Select the Green 'Code' button on the right and select 'Download zip'. Unzip and save the file on your computer.

<https://tinyurl.com/ynzsts7a>

You now need to open the Sketch that you have saved on your computer into Arduino IDE. The Sketch file is the one ending with .ino. When it is loaded, you may want to make some changes to the code in order to set the offset frequency and initial start-up frequency, **Fig. 3**.

When you are ready, select 'Sketch', 'Verify/Compile'. The code will now be compiled and show up any errors. This may take a few minutes.

Once compiled, connect a suitable USB lead from your computer to the ESP32 board USB socket.

Go to 'Tools' and select 'Ports', choose the port that you are using. If you are not sure which port is in use, disconnect the USB lead and look again at the listed ports. The active port will not show. Plug the USB in again and it will reappear.

Go to 'Sketch' and 'Upload' (This will take a few minutes to first compile again and then upload).

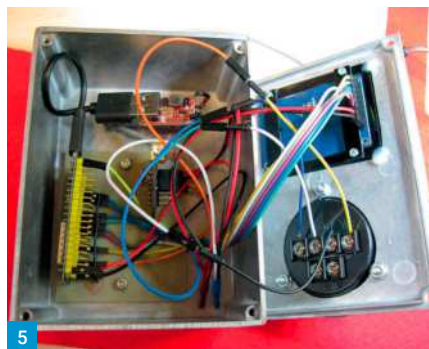
If everything is correct, the VFO Dial should burst into life when upload has completed, **Fig. 4**.

If you find that the display is not working correctly or that the display is showing incorrect colours, it may be because of the type of TFT you are using. I have read on one of the websites that if this happens, you may need to make some changes to the software. Details are on this website:

<https://tinyurl.com/mryjk54w>

## Testing

First of all check that the display is working correctly and the Rotary Encoder moves the display frequency up and down. Connect an oscilloscope/frequency counter to each of the outputs of the si5351a clock generator board (CLK0, CLK1, CLK2). Make sure that the



## Parts List

- ESP32 DevKitC (38 Pin) Microcontroller
- Si5351a Clock Generator
- TFT Type SPI ST7735 1.8in 128x160 or OLED
- CNC Rotary Encoder 100 pulse
- 4 x 2.2kΩ 1/4W Resistors
- DuPont Female-to-Female Connectors (20mm and 10mm)
- SMA Sockets
- Power Socket
- Standard Diecast Box 120x95x57mm
- Single sided Copper Clad board approx. 70x50mm
- 12V to 5V Buck Converter (if required)

frequencies correspond to those in the software taking account of any offsets. I only used the CLK2 (Local Oscillator) signal for my project.

## Rotary Encoder

On the circuit diagram, it is recommended that a 40-pulse rotary encoder is used as a minimum. I tested mine with a 24-pulse encoder and found that it is too slow. I decided to look for an alternative and came across some very nice 100-pulse CNC Rotary Encoders. These are available in two sizes, 60mm and 80mm, either Black or Silver and are very reasonably priced. They are made of solid aluminium and are quite heavy, ideal for a VFO project. Connecting to the CNC Rotary Encoder is straightforward, simply connect to A, B, VCC and GND marked on the encoder. I connected the VCC to 3.3V and found that it does not require the two pull-up resistors shown on the circuit. It is also easy to remove the detents (clicks) making the drive very smooth. This link shows a video of how it is done:

<https://tinyurl.com/26mssbww>

The CNC Encoder works a treat and really shows how useful the adaptive step control can be, especially when changing bands.

## Mounting the VFO

Now that we have a working VFO it needs to be mounted in a screened box. I used a standard diecast box size 115 x 90 x 55mm. To mount the modules I used a piece of single-sided copper clad board bolted to the base of the box (copper side underneath). Small holes were drilled in order to make wire loops to hold the DuPont



connectors where they connected to each of the ESP32 and si5351a boards. Later, spots of hot glue were applied to hold everything still. The loops are soldered to the underside of the copper-clad board, **Fig. 5**.

I reduced the length of the DuPont connectors to 10mm and also added a buck converter to provide the 5V to the ESP32 USB from a 12V supply. The TFT Display and Bezel is mounted to the front panel using spots of hot glue, **Fig. 6**. On the back is a single SMA socket for the LO output and a 12V power socket.

## Conclusion

The JF3HZB VFO provides a very smooth and accurate digital/analogue display. The VFO works at frequencies up to 150MHz. The CNC Rotary Encoder looks and feels like that used on an expensive transceiver, **Fig. 7**. The VFO could also be integrated into a larger project such as a multi-band receiver or transceiver.

I'm sure that anyone with skills in program-

ming can further develop and customise this project and add other useful features such as band switching. It can be used to drive an SDR receiver or transceiver by using the clock outputs (CLK0 and CLK1) for I and Q. I have tried to keep this project as simple as possible so as not to put off anyone wishing to try building one of these. My thanks to **Ross G6GVI** for helping me out with the software.

## References

T.J. Uebo JF3HCB, Main Project Software and Circuit:

<https://tinyurl.com/ynzsts7a>

SADARC (Australia):

<https://tinyurl.com/mryjk54w>

WA2FZW – It's not just another Digital VFO:

<https://tinyurl.com/mpmb67rh>

Removing the detent (clicks) on the CNC Encoder:

<https://tinyurl.com/26mssbww>

JF3HZB Video of the VFO:

<https://tinyurl.com/2p847vhw>



**Mike Richards G4WNC**

practicalwireless@warnersgroup.co.uk

I recently had the opportunity to play with a Xiegu X6100 transceiver, so thought I would see how it fared as a Data Modes rig. The Xiegu X6100 is a wonderfully compact SDR rig measuring just 200 x 80 x 65mm, complete with an integrated battery, **Fig. 1**. It has up to 5W of RF output and covers all the bands up to 50MHz. It looks like an ideal candidate for a portable, holiday or hill-topping rig. With the ever-increasing RF noise from household tech, I love going out to a remote location to operate with a QRP setup. I'm very fortunate in living close to the New Forest and my favourite spot is the old Stoney Cross airfield just off the A31. It's a wonderful flat hilltop location with a clear take-off in all directions and plenty of room to find a quiet spot to operate. My favourite antenna is a simple 3-band wire antenna from SOTABEAMS. These antennas are brilliantly designed and include winders for the guys, antenna, and feeder. Other than the telescopic fishing pole, everything fits neatly in a small pouch, **Fig. 2**. I like the entire station to be battery-powered, so I don't have to stay close to the car battery.

For computing, I use a Raspberry Pi 4B as it works very well with Data Modes software and can run for many hours on a phone charging power pack. The display was a bit more challenging, and I initially used a Lilliput 7in HDMI monitor that I occasionally use with my camera, **Fig. 3**. This can be powered by one of the common F970 batteries. The monitor supports 1080p video but the 7in screen is really a bit too small for comfortable operation and I think 10in is the minimum size for most operators. The best 10in video solution I've found is a 10.1in tablet. Android tablets seem to have gone out of fashion, so second-hand ones can be had for around £50-£80. I use a Samsung Galaxy Tab A6 with a 10.1in screen and it works very well. I bought this one boxed and in mint condition for £80. In addition to boasting a good quality screen and integral battery (10+ hours life), the tablet has a touchscreen so you can use some, but not all, of the touch facilities with the data modes software. The limitation occurs because the data modes software is not programmed for touch, so doesn't respond to touch operation of the controls. However, you can control the mouse with the touchscreen and the virtual keyboard will work, once an input field has been selected. That said, I prefer to stick to a separate keyboard and mouse combo. My favourite is the Artek HW086 because it is a compact keyboard yet retains full-size keys with good action. Both the keyboard and the mouse use an integrated Lithium battery that lasts a very long time and charges quickly. I've found the tablet's touchscreen to be useful for zooming into the main panel of WSJT-X so it's a bit easier to read on the 10.1in screen, **Fig. 4**. If you decide to go the tablet route, stick with one of the main



## Xiegu X6100 Data Modes Transceiver

**Mike Richards G4WNC** goes out and about with the X6100 before turning to using Iperf3.

manufacturers such as Samsung or Sony because some of the low-end tablets keep the price low by using awful displays. The Samsung screens are excellent with plenty of brightness and contrast for use outside. I'll explain how everything links together in the next section.

### Connecting the Station

In case you get inspired to try out some data modes hill-topping, I'll run through how I set up my station. The first rule is to make sure all the batteries are fully charged, including any spares, before you set off! I've shown a block diagram of the complete portable station in **Fig. 5**.

I begin by using my smartphone to provide a Wi-Fi hotspot. This has several functions:

- It provides access to internet time for the Raspberry Pi so I can use the WSJT time-critical modes

- It gives internet access for PSK Reporter, WSPR and other tools.

- Provides the network to view the Pi screen on the tablet.

Unless you start downloading videos, the mobile data demands from this application are very light.

Before you can use the tablet as a screen for the Pi, you will need to load a VNC (Virtual Network Computing) viewer app on the tablet. The best one to go for is RealVNC as this matches the server that's provided free with the Raspberry Pi. This server is preinstalled and activated on my Data Modes microSD cards (g4wnc.com). You will find full instructions on using RealVNC with the Raspberry Pi here:

<https://tinyurl.com/5c27xf8c>

To link the Pi, tablet and phone via the hotspot proceed as follows:

- Activate the Wi-Fi hotspot on your phone. For Android this is under Settings – Network & Internet – Hotspot and tethering. Switch the hotspot to on. At this point you might consider changing the hotspot name and password to something that's easy to remember.

- Move to your tablet and go to Settings – Connections and make sure the Wi-Fi is switched on. You should also see a list of the available networks with your hotspot listed.

- Click on the name of your hotspot and enter the Wi-Fi password to connect. That should complete the connection.

- Move to the Pi and select the Wi-Fi icon at the top right. You should see your phone hotspot listed. Click on that hotspot and enter the password to connect.

That completes the network setup. All the details should be remembered, so subsequent use will be simpler.

With the network sorted, the next step is to connect the Xiegu to the Pi. This is simple and requires a single USB-A to C cable. This connects from one of the Blue (USB-3) ports on the Pi to the DEV USB-C socket on the side of the Xiegu, **Fig. 6**. The Xiegu has an integrated USB hub and provides a soundcard for the audio and a virtual serial port for CAT control. This allows full CAT control, so you can change bands and modes from within the data modes software. The link also helps ensure accurate logging as the operating frequency and mode information is automatically transferred to the log. The next step is to configure the data software to work with the Xiegu. The latest WSJT-X

Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)

Fig. 1: Xiegu X6100 compact transceiver.

Fig. 2: SOTABEAMS 3-band antenna.

Fig. 3: My portable station with a 7in display.

Fig. 4: Samsung Galaxy Tab A6 as a 10.1in Pi display.

Fig. 5: Block diagram showing the interconnections for my portable station.

Fig. 6: CAT & Audio connection on the Xiegu X6100.

includes a radio definition for the Xiegu X6100 so I was able to select that in the Radio tab of the WSJT-X settings. The remaining settings for the radio were as follows:

Serial port: /dev/ttyACM1

Baud rate: 19200

Data bits, Stop bits and Handshake: Default

PTT Method: CAT

Mode: Data/Pkt

Split: Fake it

Don't forget to press the green button to confirm operation before you leave the Settings panel.

These settings can also be used for other data software such as FLDIGI.

The only other equipment I take with me is a NanoVNA that's been calibrated for the HF bands. I use this to check that the antenna is providing a good match before I start operating.

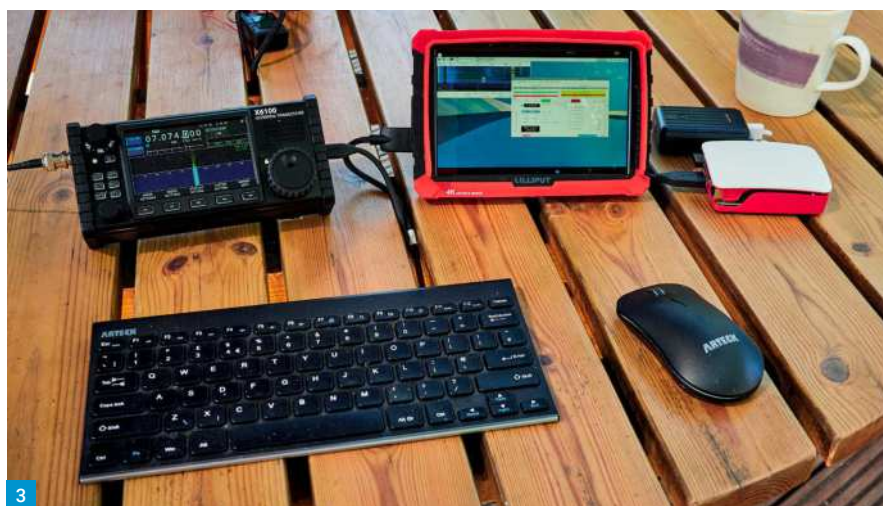
### Iperf3 in Practice

Last month I briefly introduced you to the versatile Iperf3 network speed measurement utility. As I've recently installed a new Wi-Fi-6 capable Mesh system at home, I wanted a simple way to check the available speeds from various parts of the house and garden. For this, I needed to run iperf3 on the router. While this can be done on some routers, unless you're familiar with router operating systems, it's best avoided. An alternative solution is to connect a computer directly to one of the Ethernet ports on the rear of the router. An ideal computer for this task is a Raspberry Pi-4B because it is compact and the 4B supports full Gigabit Ethernet. To simplify the testing, it's useful to configure the Pi so that it automatically starts its iperf3 server when it boots. There are many ways to do this, but the simplest is to create what's known as a Cron job. The Linux Cron utility provides as a simple way to automatically run routine tasks. It's often used by sysops to run system backups and other clean-up operations outside normal working hours. However, Cron also supports running a task whenever the computer reboots. It is this facility that we'll use for iperf3. Here's a step-by-step guide to installing iperf3 on the Pi and creating a matching Cron job to start the server each time the Pi boots.

1. Open a terminal session and enter: `sudo apt install iperf3 -y`
2. When installation has completed, enter: `crontab -e`
3. If asked, choose Nano as the editor
4. Scroll down to the end of the file using the arrow keys and add the following new line: `@reboot /usr/bin/iperf3 -s -D`



2



3

5. To close and save the file enter: `Ctrl X` then `Y` followed by `Enter`

6. Before closing the terminal session, you need to take a note of the Pi IP address. You can find that with the command: `hostname -I`

Once the Pi has rebooted, you are ready to check the link speed to your router from anywhere on your home network. To start a basic speed test on a Windows PC do the following:

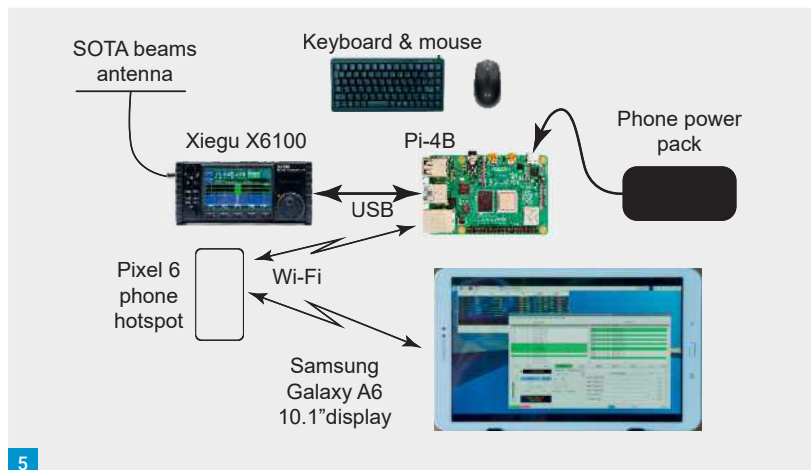
1. Use File Explorer to navigate to the folder where



4

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)





5

you expanded the iperf3.exe file

2. In the address bar, enter: cmd followed by Enter

3. This will open a Windows terminal session in the iperf3 folder

4. Enter the iperf3 command, i.e. : iperf3 -c 192.168.1.82 (NB change this to your Pi IP address)

5. The basic speed test will run and you should see the progress and results.

iperf3 can run both TCP and UDP speed tests. TCP is the fully error corrected internet protocol where repeat requests are sent for any missing packets. This carries a speed penalty, so it's common for speed critical applications such

as IQ streams, video content, etc. to use UDP datagrams. These have no error correction, so damaged packets (datagrams) are lost and discarded. To test UDP speeds we just add a couple of options to the command line as follows:

```
iperf3 -c 192.168.1.82 -u -b 1G
-u forces a UDP based test whilst -b 1G set the testing bandwidth to 1Gbps
```

The report at the end of the test will show the speed and the number of datagrams that have been lost. With the 1Gbps setting, you may well see a high loss figure. In that case, you can reduce the test speed by changing 1G to 100M



6

(Mbps) or 10M. This will let you find the optimum sustainable UDP speed for the link.

The commands I've shown so far measure the speed for the remote computer to the Pi. To measure the opposite direction just add -R at the end of the command.

I've found the tests very helpful and managed to locate a cable fault between my shack and the router. One wire had come loose in the Ethernet socket so the link had dropped back to 100Mbps instead of 1Gbps.

iperf3 is available for just about all PCs, phones and tablets and you can get further details and downloads from the iperf3 website at: [iperf.fr](http://iperf.fr) **PW**

## Make a one cell mobile phone using your radios



**\$990.00 Aus**  
overseas enquiries welcome

### Radtel connects your phone line to your base radio

- Radios with a keypad mic or handsets can now use the phone line to make and receive calls.
- The Radtel seamlessly controls the conversation in each direction with fast accurate vox switching.
- Features auto level control, 12 volt DC operation and front panel LED display.

For more information please visit  
[www.hotech.com.au](http://www.hotech.com.au)

## Antenna Collection Archive



A PDF archive of  
Practical Wireless  
antenna reprints  
since 1981

From  
**£14.99**  
plus P&P

Buy it now from [bit.ly/antenna-collection](http://bit.ly/antenna-collection)



## Bowood Electronics

Unit 10 | Boythorpe Business Park | Dock Walk | Chesterfield | S40 2QR

**01246 200 222**

[sales@bowood-electronics.co.uk](mailto:sales@bowood-electronics.co.uk)

[www.bowood-electronics.co.uk](http://www.bowood-electronics.co.uk)

PASSIVE COMPONENTS | SEMICONDUCTORS  
OPTO | PCB MATERIALS | ENCLOSURES | ETC

Don Field G3XTT

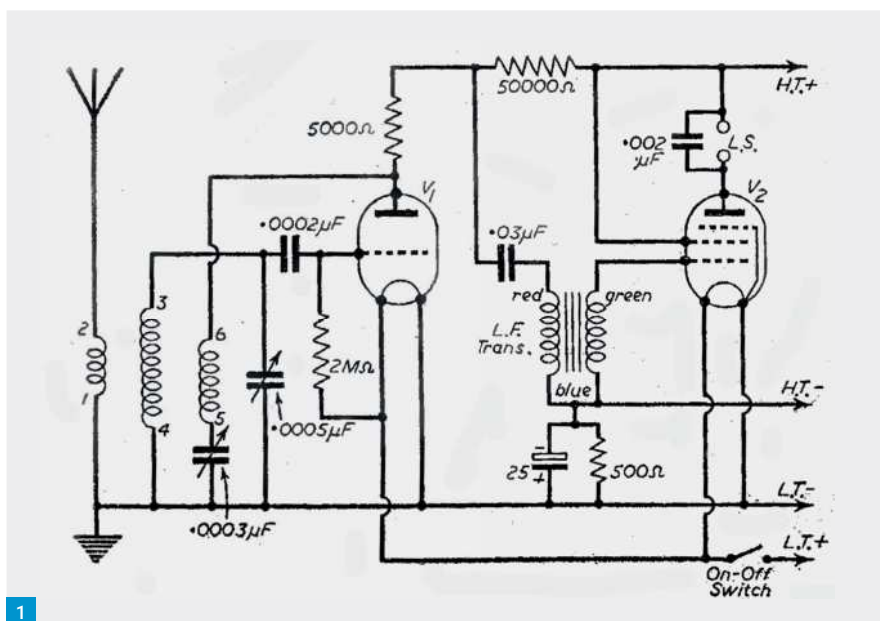
practicalwireless@warnersgroup.co.uk

This is a straightforward receiver which will provide speaker reception of the more powerful radiations on medium and short-wave bands. 'Phones can be used for distant listening and practically any frequency can be tuned by inserting a suitable coil. A refinement is provided in the form of automatic bias, which simplifies battery connections considerably. The circuit is shown in Fig. 1. With reception on the higher wavebands in mind a .0005 mfd. tuning condenser is used, and this should be of the type fitted with a good slow-motion drive, or an exterior drive can be added to it. A pentode output stage is used, fed from the detector by means of a parafeed transformer to secure maximum gain with stability. A resistor is used instead of a reaction choke, and this will be found satisfactory over all the wavebands used. The coils have a separate coupling winding to reduce aerial damping, and details of the number of turns used will be found in the Table.

### Construction

The chassis is 5 1/2 in. by 7 3/4 in, and the runners are approximately 2 in. deep. The top is made from a piece of 3-ply as also are the front and back runners. The two side runners are of thicker material (about 3/8 in being suitable) to permit of the top, front and back being screwed to them. Reference to Fig. 2 will show the arrangement of these pieces.

Two holes are drilled in the front runner, each about 1 1/2 in. from the outside to accommodate the on/off switch and reaction condenser. Five holes are drilled in the back runner for speaker, aerial and earth terminals; and the battery leads. The speaker and aerial terminals are insulated from the wood with suitable washers; but this is not required with the earth terminal. Three holes will also need to be drilled for the valve-holders, as shown in Figs. 2 and 3. When the chassis is completed it should be sand-papered round and given a coating of quick-drying paint. A suitable colour is grey. When dry, the valve-holders are secured in position with small bolts, positioning the sockets as in the diagrams. A component-mounting bracket is also fixed centrally near the front for the tuning condenser. The switch and reaction condenser



## An All-wave Two

Constructional Details of a Receiver for the Reception of Medium and Short Waves.

are mounted on the front runner, and the L.F. transformer upon the side runner as shown. All other parts are suspended in the wiring. The finished appearance should be as in Figs. 4 and 5.

### Wiring

This should be carried out as in Fig. 2. Only two leads pass through the chassis, the moving plates of the tuning condenser going to the earth terminal and the fixed plates to the grid condenser. Insulated sleeving is used if there is any possibility of wires touching. The 25 mfd. condenser is connected to one of the bolts holding the component-mounting bracket (which will be connected to earth via the tuning condenser) to hold it secure.

The leads from the transformer will be long enough to reach to the connecting points, and care must be taken not to pull them or they may come adrift from the bobbin of the component. Soldered joints will be needed at some points, but, if tinned-copper wire is used, and the iron is sufficiently hot and clean, no difficulty should arise. A trace of some

suitable flux should be put upon the joints before soldering.

There are only four battery leads, and 3 ft lengths of flex can be used, fitting the ends with spade terminals and plugs. All the leads pass through a hole in the rear runner.

The aerial terminal has no connection below the chassis, but a flexible wire goes from it to the top terminal of the coils (see Fig. 6). This terminal is used because the coils are made up on old valve-bases and otherwise the aerial coupling winding will have to be omitted, or the reaction coil connected to earth, which would give particular disadvantages, especially on short waves. The only alternative is to use valve-bases with more pins, if they are to hand, although the top terminal does not present much difficulty in actual use.

### Coils

Winding details of these will be seen in the Table. All windings should be in the same direction and the ends connected as shown in Fig. 4, where the ends are numbered to agree with the numbers shown in Fig. 3. The

**This month we look back at a constructional project that appeared immediately post-war, before all that war surplus equipment started to be available. No author was identified so this was possibly a joint effort by members of the PW team.**



Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



Fig. 1: Theoretical circuit of the All-wave Two.

Fig. 2: Wiring Diagram of the All-wave Two.

Fig. 3: Top of chassis layout, showing positions of tuning coil and valve holders.

Fig. 4: Rear view of the chassis.

Fig. 5: Sub-chassis layout and wiring.

Fig. 6: Coil and tappings.

reaction and aerial coupling windings are approximately  $\frac{1}{4}$  in. from the central grid winding, and all the ends of the windings are taken through small holes into the former. Point 2 is connected to the terminal, mounted upon a disc which is a push-fit in the top of the former, and the other points are taken down through the valve-pins rind soldered in the usual manner.

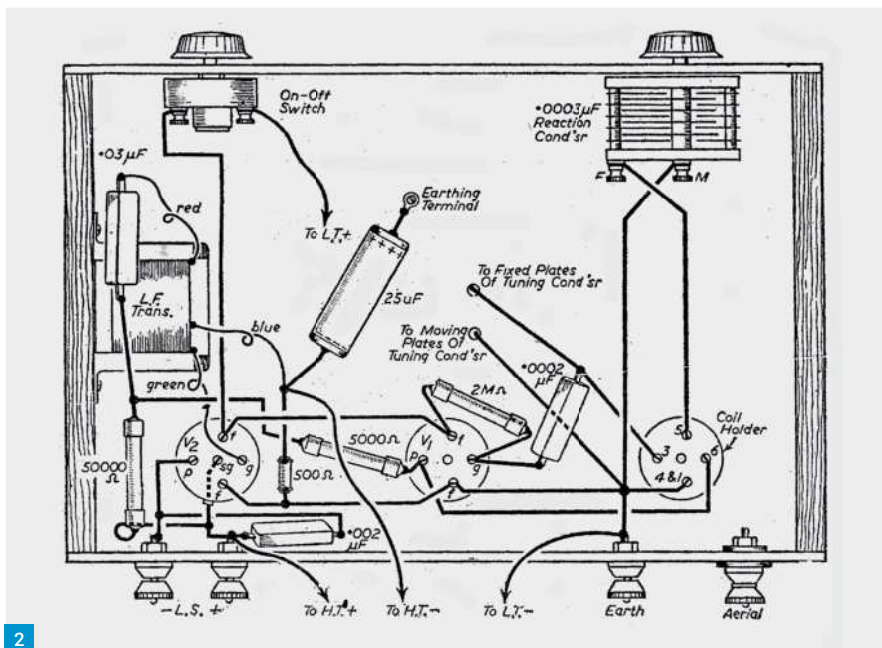
Windings details are for a former  $1\frac{1}{8}$  in. in diameter. The actual size may vary with the valve bases used, but is not very critical. If a larger size is used, and it is found that a coil will not tune to a sufficiently low wavelength, then a few turns can be removed from its windings. Ebonite or Paxolin tube is suitable for the coils, although the use of a ribbed former for the short-wave coils will give some slight improvement. Ribs can be made by gluing slips of insulating material around the former, and this is particularly recommended if the tubes are made up from glued brown paper, or are of cardboard.

## Operation

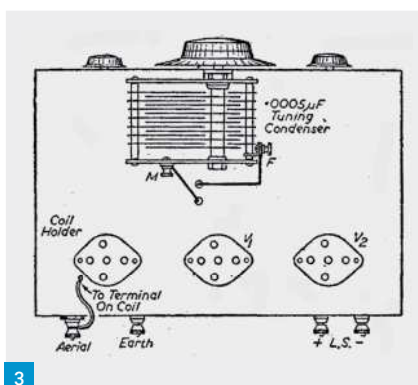
When completed the valves should be inserted – the HL2 type in the central holder and the 220HPT in the holder by the speaker terminals. A speaker is then connected. It must be of the high-impedance type, such as a moving-coil model with output transformer for pentode valve. The aerial used should, for preference, not be too long; if it is, a pre-set condenser should be connected in series with it.

Stations will be found by tuning with the central control, the reaction control being turned to bring volume up to maximum if required. On the short-wave bands the reaction control will be rather critical, and it should be kept so that the receiver is almost upon the point of oscillation. If this is not done very few short-wave signals will be picked up. It will probably be best to try the medium-wave band first (using the coil with most turns); with the short-wave coils there should be no difficulty in picking up the more powerful American stations off the 19- and 25-metre bands at satisfactory loudspeaker volume in the late afternoon and evening.

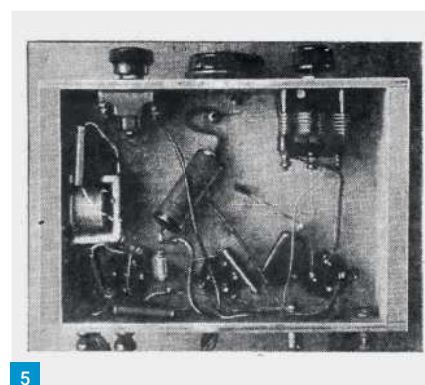
The grid bias will be automatically right for whatever H.T. voltage is used, but if more economical running is required, and a loss of volume can be tolerated, the bias resistor may be increased from 500 to 700 ohms. **PW**



2



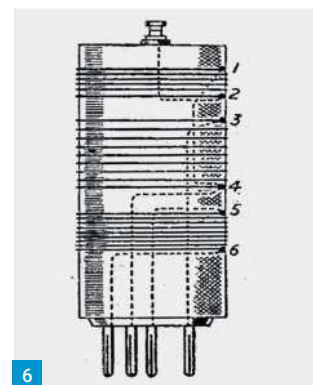
3



5



4



6

	Grid winding	Reaction	Aerial coupling
Coil 1	5 1/2 turns 18 S.W.G. wire spaced by diameter of wire.	4 1/2 turns 30 S.W.G. close wound.	2 1/2 turns of 30 S.W.G. wire spaced slightly.
Coil 2	12 turns 20 S.W.G. wire spaced by diameter of wire.	9 turns 32 S.W.G. close wound.	5 turns of 30 S.W.G. wire spaced slightly.
Coil 3	20 turns 22 D.C. C. S.W.G. wire close wound.	14 turns 32 S.W.G. close wound.	7 turns of 32 S.W.G. close wound.
Coil 4	90 turns 32 S.W.G. enam. close wound.	50 turns 36 S.W.G. close wound.	20 turns of 36 S.W.G. close wound.

Table: Coil Data

Read more radio news and reviews at [www.radioenthusiast.co.uk/news](http://www.radioenthusiast.co.uk/news)

**Colin Redwood G6MXL**

practicalwireless@warnersgroup.co.uk

I want this month to look at band plans, before reminding those taking any of the exams that the syllabus now includes questions related to the new EMF regulations, and concluding with the announcement of a new Direct to Full exam – an optional alternative to the current three-level exam route.

### Introduction

The Licence Schedule defines what powers and frequency bands different licence categories are permitted to use by Ofcom, our regulator. Band plans are voluntary plans, albeit within the overall context of the Licence Schedule, agreed by and between national radio societies, describing good practice. They are not compulsory but help to ensure that our on-air activity takes place in an orderly manner. What do I mean by this? Think of the Licence Schedule being a bit like the Highway Code for amateur radio, setting out the government regulations. But it doesn't cover every eventuality – for example, it sets out maximum speed limits on different types of road but while it doesn't say you shouldn't drive below 30mph on a motorway, common sense says that wouldn't be appropriate.

A full set of the current 2022 UK band plans can be downloaded from:

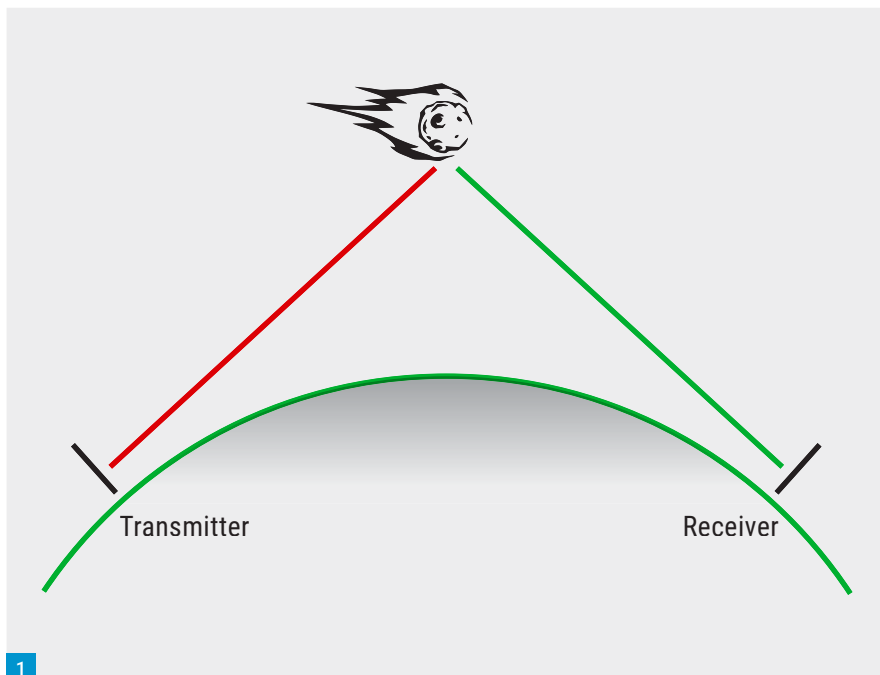
<https://tinyurl.com/yckpcsnk>

### Basics

In most cases, band plans follow the principle of Morse Code (often termed telegraphy or CW) in the lowest frequency part of the band. Moving up the band, data modes are usually the next highest, with SSB in the higher parts of the band. There are exceptions. For example, in the 30m (10MHz) band, there is no SSB due to the limited frequencies available. By convention, lower side band (LSB) is used on bands below 10MHz, and upper side band on bands above 10MHz. Having covered the basics, I'll look at a few more specific aspects of band plans.

### Data Modes

Band plans generally allocate parts of the bands to data modes (often termed Machine Generated Modes or MGM in band plans) without specifying particular types of data mode. This can make finding particular modes a little difficult. However certain frequencies have been adopted for PSK31, FT8 and FT4 on many bands. I've produced a simplified chart covering the main HF bands that I have on the wall by my operating position in my shack. As can be seen in **Table 1**, it doesn't cover every data mode, but it covers the most popular modes and I find



## Band Plans and More

**Colin Redwood G6MXL** looks at band plans, new questions for the exam and the Direct to Full option.

it works well for me. If you want to use SSTV or RTTY for example, you'll need to look-up the appropriate band plan on the RSGB website.

### Beacons

A small segment of many bands is assigned to beacons. Beacons are transmitters that transmit their callsigns and often locators on a specific frequency continuously or according to a set pattern. The idea is that beacons provide a way of assessing propagation. They can provide a useful indicator of when a band that has been closed starts to open as propagation improves. In order for amateurs to be able to hear beacons, we all need to avoid transmitting on beacon frequencies, even if we can't hear any beacons ourselves.

### VHF/UHF/SHF

From 50MHz (6m) and above, the band plans become more complex, with numerous modes, including FM, various digital voice (DV) modes, repeaters and gateways, along with satellites, all laying claim to a piece of the band in addition to the more traditional CW and SSB modes and data modes. I'd suggest referring to the detailed RSGB band plans before operating on these bands. It is worth noting that band plans evolve as technology changes, and primary user needs change. It is certainly worth checking for changes at least once a year.

### Calling Frequencies

Calling frequencies are spot frequencies where stations wishing to make a contact can call CQ. Having established contact, the stations find a clear frequency and QSY to the clear frequency, vacating the calling frequency for other stations to call CQ. This is common practice on the FM channelised parts of the VHF/UHF bands.

### Centres of Activity

Centres of activity are exactly what they state. They are frequencies on and around which stations can operate (including calling CQ). Centres of Activity are commonly found on the CW and SSB parts of the VHF/UHF bands. Those with long memories may recall that 144.300MHz in the SSB part of the 2m band used to be designated an SSB calling frequency, with stations changing to a clear frequency having established contact (as above). These days it's a centre of activity, so there's no longer a need to QSY from the 144.300 MHz once contact has been established. Essentially it means that these days operating on the CW and SSB parts of the VHF/UHF bands is more like the custom and practice on the HF bands.

### Talk-Back

When operating on the microwave bands, it is common practice to make initial contact using a 2m or 70cm frequency to assist in setting up

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



**Fig. 1: Meteor Scatter. Fig. 2: Exam Routes with the new Direct to Full options in red.**

contacts. Typically, this initial contact will include reporting on the strength of signals as highly directional antennas are rotated at each end in turn to align with the station you are trying to work. If the VHF or UHF antenna is also directional and shares the same stub-mast as the microwave antenna, then as you align the talk-back antenna for optimum signal strength, the microwave antenna should also be reasonably well aligned. You may still need to adjust the direction very slightly because microwave antennas tend to have a much sharper beamwidth than a typical VHF antenna. Amateur television operators also use talk-back to set up vision-only television contacts.

## Satellites

Parts of some bands are designated for satellite use. Those parts of the 10m, 2m, 70cm, 23cm and satellite allocations in the microwave and SHF bands should not be used for earth-to-earth contacts. What can seem a dead part of the band can spring to life as a satellite emerges above the horizon! There's plenty of band space to make terrestrial contacts without spoiling the fun for satellite operators.

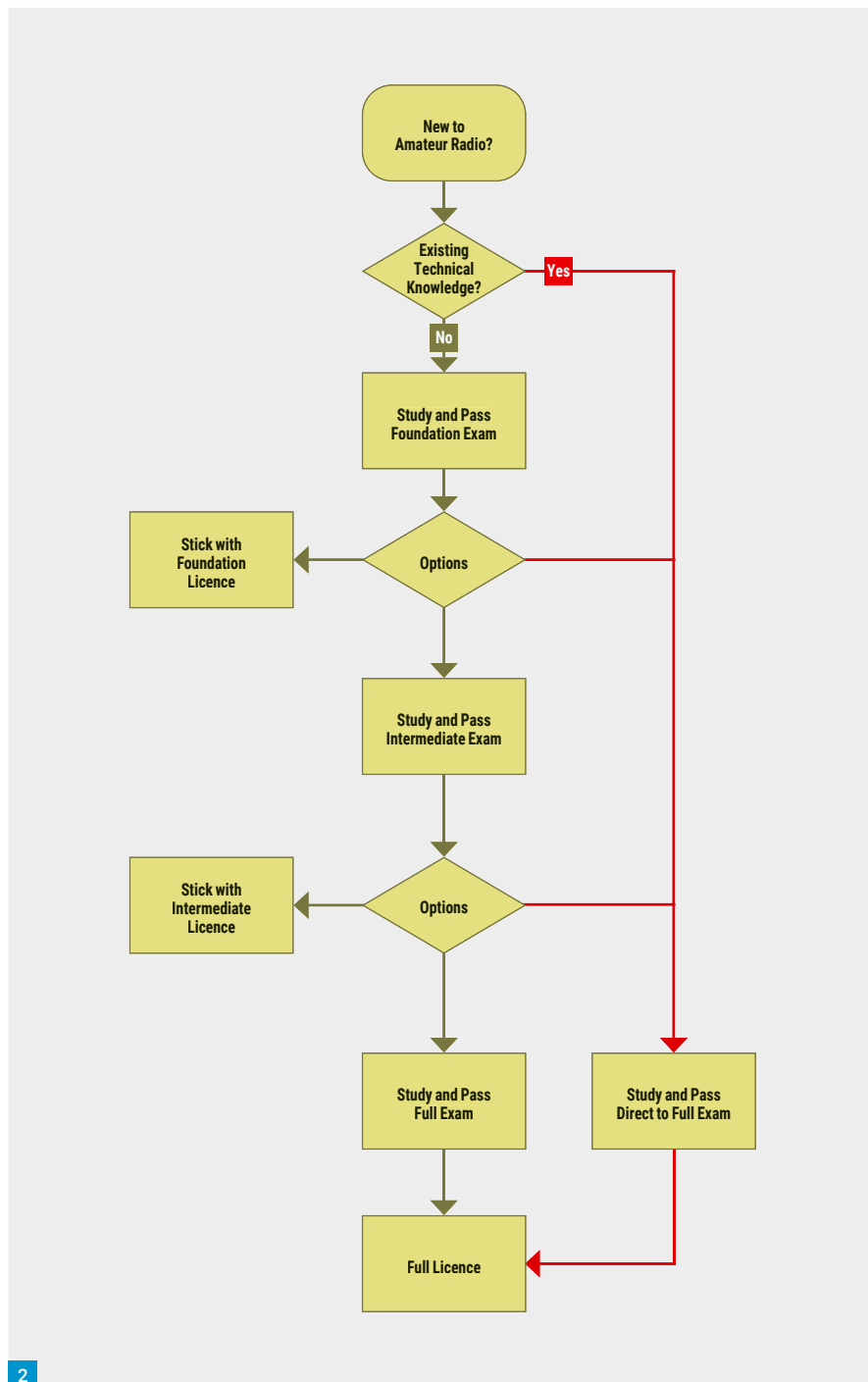
## MeteorScatter

Several bands (6m, 4m, 2m, 70cm) have parts allocated to meteor scatter (MS) in their band plan. In this mode, stations seek to make contacts by bouncing their signals off the ionised trails of meteors as they fly through the higher parts of the earth's atmosphere, **Fig. 1**. Some meteors are visible as shooting stars. There are times each year when there are regular meteor showers with large number of meteors over a few days, **Table 2**. In addition, some amateurs also make 'random' meteor scatter contacts at other times. Those seeking to make MS contacts listen for very weak signals that may last for as little as a fraction of a second up to perhaps ten seconds or so. Before modern software was available amateurs used to record Morse on a reel-to-reel tape recorder, and then play it at a very fast speed. The receiving station would then play back a recording, made at high speed, at a slow speed to read the Morse. While SSB can be used where there are long bursts, these days, most operators use computers. The MSK441 data mode (part of the WSJT-X program) is popular on the 6m band with FSK441 generally preferred for 2m. More information on meteor showers in general can be found at:

<https://tinyurl.com/yc5fnvb7>

The RSGB also have an excellent video at:

<https://tinyurl.com/2p9cuxbh>



## Internet Gateways

On some of the VHF/UHF band plans you'll see there are allocations for internet gateways. These enable amateurs to make contacts with distant stations using an amateur band to the local gateway, and then from the internet gateway onwards via an internet link to a distant internet gateway. Many amateurs won't consider any contacts partially or wholly enabled over the internet as 'proper amateur radio' (they don't count for most awards), but for amateurs with no possibility of erecting any antennas, internet gateways can be an effective way of continuing

their hobby and staying in touch with fellow enthusiasts.

## EMF Regulations

A reminder to anyone taking any of the amateur radio exams that from 1 September 2022, the exam syllabus for the Foundation, Intermediate and Full Licence exams has changed to incorporate questions on the recently introduced EMF regulations. The combined syllabus (version 1.5) for all three exam levels can be found at:

<https://tinyurl.com/4kueu6sa>

CW		Mainly data modes					Mainly Phone (Italic = LSB)	
			PSK31	FT8	FT4			
1.810	1.838	1.838	1.838	1.840		1.843	1.843	2.000
3.500	3.580	3.580	3.580	3.573	3.575	3.600	3.600	3.800
7.000	7.040	7.040	7.070	7.074	7.048	7.053	7.053	7.200
10.100	10.140	10.140	10.142	10.136	10.140	10.150	(none)	(none)
14.000	14.070	14.070	14.070	14.074	14.080	14.099	14.101	14.350
18.068	18.095	18.095	18.097	18.100	18.104	18.109	18.111	18.168
21.000	21.070	21.070	21.070	21.074	21.140	21.149	21.151	21.450
24.890	24.915	24.915	24.920	24.915	24.919	24.929	24.931	24.990
28.000	28.070	28.070	28.120	28.074	28.180	28.190	28.225	29.300

**Table 1: Simplified band plans for the main LF and HF bands. Note that the satellite section of the 10m band from 29.300MHz to 29.510MHz and the FM section of the band 29.520MHz to 29.700MHz have both been excluded.**

The RSGB have updated their training books for all three levels as well as the *Exam Secrets* book to reflect the revised V1.5 syllabus which incorporates the new EMF regulations. In the meantime, Essex Ham have updated their training slides for their Foundation course. These can be found at:

<https://tinyurl.com/6vr5eh74>

The Bath Distance Learning Team are finalising the changes for their Intermediate and Full training courses.

## New Direct to Full Exam

The RSGB has recently announced that from January 2023 a new online exam will be available in the UK for those wishing to jump straight to a Full Licence as an optional alternative to going through the current three-level Foundation, Intermediate and Full exams, **Fig. 2**. This alternative route into the hobby is aimed primarily at those who already have a technical background or who are currently studying or have previously studied relevant science, technology, engineering and maths (STEM) subjects at A Level or higher. In common with the current three-level exams, there are no mandatory practical requirements (no Morse assessments, construction or actual operating). The new Direct-to-Full exam will also be an option for those who have already passed their Foundation or Foundation and Intermediate exams. The new exam does not replace the current Foundation, Intermediate and Full exams, and there are no plans to drop them.

The new exam comprises two sections, both of which must be passed in their own right in one exam sitting that lasts 2½ hours. The first section covers Licensing Conditions and Operating and has 18 questions with a pass mark of 14. This section covers material that is likely to be new to those with an electronics or RF background but without an amateur radio background. The second section covers all remaining aspects of the Foundation,

Shower Name	Date of Maximum	Normal Date Limits
Quadrantids	3rd-4th January	28 Dec-12 January
Lyrids	22nd-23rd April	14th-30th April
Eta Aquariids	6th May	19th April-28th May
Delta Aquariids	30th July	12th July - 23rd August
Alpha Capricornids	30th July	3rd July -15th August
Perseids	12th-13th August	17th July - 24th August
Draconids	8th-9th October	6th-10th October
Orionids	21st-22nd October	2nd Oct - 7th November
Taurids	Southern: 10th-11th October	10th September-20th November
	Northern: 12th-13th November	20th October-10th December
Leonids	17th-18th November	6th-30th November
Geminids	14th-15th December	4th-20th December
Ursids	22nd-23rd December	17th-26th December

**Table 2: The main meteor showers with their predicted dates for 2022. For future years, these should be considered good indicative dates.**

Intermediate and Full syllabus (i.e. Technical, Transmitters and Receivers, Feeders and Antennas, Propagation, EMC and Safety). It has 57 questions with a pass mark of 36. I'd anticipate many of the questions appearing in the new exam will be of a standard expected at the Full Syllabus level, so it may be unwise to expect many questions at Foundation or Intermediate level.

The RSGB has no plans to produce a separate training book for this new exam, and suggests that candidates use the existing three books. At the time of writing in early August 2022 the RSGB had not published the cost of sitting the Direct to Full exam or any mock papers. It is not yet clear whether any clubs or online training providers will be offering courses aimed at the Direct to Full exam. I'd encourage anyone thinking of going for the new exam to read the new Direct to Full Syllabus. If in doubt, then I'd suggest following the current Foundation, Intermediate, Full route. The Direct-to-Full syllabus can be found at:

<https://tinyurl.com/4ks2zrh5> **PW**

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



# Specialist Dealers

## Kit Suppliers

**Phoenix Kits**  
Kits for the Radio Enthusiast

A wide range of low cost but High Quality Kits with a leaning towards CW enthusiasts and QRP Operators.

Wide Range of Morse Tutors, ATU's, and much more!  
Most items available Built or in Kit form

Supplier of the 'FMT' Morse tutor and the versatile uCPO Practice Oscillator  
(Reviewed in Sept Practical Wireless)

[www.PhoenixKitsOnline.co.uk](http://www.PhoenixKitsOnline.co.uk)  
sales@phoenixkitsonline.co.uk

## Mid Glamorgan

**SANDPIPER AERIAL TECHNOLOGY**

Unit 5, Enterprise House  
Cwmfach Industrial Estate, Aberdare  
Mid Glamorgan CF44 0AE

Tel: (01685) 870425 Fax: (01685) 876104

A full range of transmitting & receiving antennas available for the amateur commercial market.

[www.sandpiperaerials.co.uk](http://www.sandpiperaerials.co.uk)  
e-mail: sales@sandpiperaerials.co.uk

## Somerset

**LINDARS RADIOS**

'A Modern Company With Old Fashioned Values'

**USED AMATEUR RADIO EQUIPMENT PURCHASED AND SOLD**

[www.AmateurRadioSales.co.uk](http://www.AmateurRadioSales.co.uk)  
**01935 474265**

## Scotland

**TENNAMAST**  
General Mast Fabrication

Radio Masts | Masts | Boat Cradles | Trailers

**A complete range of Multi purpose Masts**  
The best of Scottish engineering!

Tel: 01505 503824  
[www.tennamast.com](http://www.tennamast.com)  
sales@tennamast.com

## TO ADVERTISE IN PRACTICAL WIRELESS

Contact Kristina Green Telephone 01778 392096  
[kristina.green@warnersgroup.co.uk](mailto:kristina.green@warnersgroup.co.uk)

## South Yorkshire

**LAMCO VINE**  
antennas

**LAM Communications Ltd.**

5 Doncaster Road  
Barnsley  
South Yorkshire  
S70 1TH

**01226 361700**  
sales@hamradio-shop.co.uk  
[www.hamradio-shop.co.uk](http://www.hamradio-shop.co.uk)

/lamcomms

## Suffolk

**www.itender.co**

Monthly communications tenders!

Ex Police Service

General comms company stock

**Contact: 07788 498962**

TOP PRICES PAID FOR ALL YOUR VALVES, TUBES, SEMI-CONDUCTORS AND ICs.



Unit 4, Daux Road, Billingshurst, West Sussex RH14 9SJ  
Tel: 01403 785600 Fax: 01403 785656

[www.langrex.co.uk](http://www.langrex.co.uk)



SCAN HERE TO GO TO OUR WEBSITE

SCAN HERE TO GO TO OUR WEBSITE

## TechnoFix UK

Linear Amp Switching (PTT) Cables

Faster, safer Tx/Rx switching for your amplifier. Selected cables with opto-isolation. Automatic band switching cables for SPE and Acom 'S' amplifiers.

For these and other great items go to  
[technofix.uk](http://technofix.uk) or  
[www.technofix.co.uk](http://www.technofix.co.uk)

## Classified Adverts

### Wanted

**VINTAGE FIREWORK COLLECTOR.** Do not light the blue touch paper and burn British Heritage, private collector will pay cash and collect from anywhere, licensed explosive storage.  
Call Tony on 07956 506300

### Valves

**VALVES AND ALLIED COMPONENTS?** For free stock list and/or advice, Please contact me:  
[Geoffdavis337@Gmail.com](mailto:Geoffdavis337@Gmail.com)  
Telephone 01788 574774

**TO ADVERTISE IN CLASSIFIED ADVERTS**  
Contact Kristina Green Tel: 01778 392096  
Email: [kristina.green@warnersgroup.co.uk](mailto:kristina.green@warnersgroup.co.uk)

### Repairs

**REPAIRS TO RECEIVERS, TRANSMITTERS ETC.** New/old, valve/transistor. Call 07903 023437 for details. [www.kent-rigs.co.uk](http://www.kent-rigs.co.uk)

### For Sale

**CTCSS ENCODER AND DECODER KITS.** DTMF kits and modules. Pic development kits. <https://cstech.co.uk>

**DISCLAIMER** Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. Practical Wireless advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The publishers of Practical Wireless wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

## Bargain Basement

### For Sale

**YAESU FRG7 Receiver SW**, full working condition, buyer collects £190 ono.  
Tel: 01795 538599

**PALSTAR LA30 Ferrite Loopstick Antenna**, uses active electronics to give high selectivity and gain, the tunable pre-selector ensures best possible weak signal reception and interference rejection. Included is ferrite stick for mw 0.5 - 1.700 Mhz As new, 18 months old. £350.00 Or sensible offer.  
Contact: [peterhawkes7@gmail.com](mailto:peterhawkes7@gmail.com)

### Wanted

**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 0114 2316321 or Email: [peter.tankard@gmail.com](mailto:peter.tankard@gmail.com)  
**SHEFFIELD**

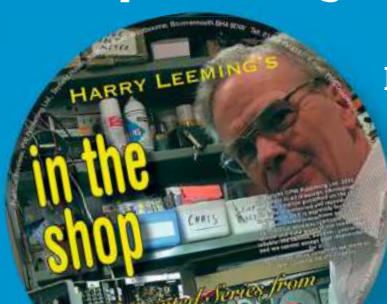
### TO ADVERTISE IN BARGAIN BASEMENT

Contact Kristina Green on 01778 392096  
[kristina.green@warnersgroup.co.uk](mailto:kristina.green@warnersgroup.co.uk)

## Bargain Basement adverts cost £5.00

By email Firstly email your advert's wording to [kristina.green@warnersgroup.co.uk](mailto:kristina.green@warnersgroup.co.uk) and then call 01778 392096 to make your payment. By POST Send your advert to: Bargain Basement, Practical Wireless, Warners Group Publications plc, West Street, Bourne, Lincs. PE10 9PH Please write your advert in BLOCK CAPITALS up to 30 words, plus 12 words for your contact details and send it together with your payment of £5 (subscribers can place their advert free of charge as long as they provide their sub number or mailing label). Cheques should be made payable to Warners Group Publications plc, credit card payments also accepted. Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. No responsibility will be taken for errors and no correspondence will be entered into on any decision taken on any of these conditions. The Publishers of Practical Wireless also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

## Harry Leeming's In The Shop



A collection of Harry's long-running In The Shop series from PW.

From **£14.99** plus P&P

Buy it now from [bit.ly/theshop-collection](http://bit.ly/theshop-collection)

# Your Letters

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

## Congratulations and Your Letters

Dear Don,

First of all, congratulations to *PW* for reaching its 90th anniversary. Who'd have thought it 90 years ago, that *PW* would emerge into the 21st century still singing and dancing! It's either a miracle, or fate. But of course, it's the dedicated readership and its contributors that has kept *PW* continually current. Here's to another 90 years of battling the strings and arrows of Mother Nature and battling those who would like to consign our beloved hobby into a footnote of history.

Secondly, this issue truly was a romp through nostalgia. Some of the names of our peers were again resurrected. A look back at the early days on VHF was instructive if only because in such a short time, this segment of operating has been transformed almost beyond avarice. But of course, it was back in the late 1940s/1950s and the 1960s that VHF took a small leap forward. Then, up popped up those satellites. What fun that was. And still is. If you're into that sort of thing. And who can forget trying to contact one of those ham-radio astronauts as they whizzed overhead in a Space Shuttle. And who ever thought we'd have 'waterfall' displays on transceivers? And handhelds so small they could slip down the back of a settee and never be seen again. Or a fully functioning HF rig (with or without a 'waterfall display') that can be hidden in a trouser pocket. Ditto, a telescopic HF antenna.

And yes, our hobby will be doomed if it 'stops changing and evolving'. But what some of us have to do is to stop taking amateur radio too seriously. It's only a fun hobby, not a professional life and death struggle. Or a 'them and us' scenario.

**Ray Howes G4OWY/G6AUW**  
Weymouth, Dorset

## 90 years of PW

Dear Don,

I enjoyed your canter through 90 years of *PW* and in particular the references to the great **F J Camm** and **F G Rayer** in the September issue. You rightly mention that amateur radio was in the early days also covered by other publications and two of the most notable that kept going for many years were of course *Wireless World* and *Radio Constructor*.

*Wireless World* was the most highbrow by far, and a university degree was often desirable when reading its articles. They had some fine writers,

## ★ 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

## Another Great Issue And a Thank You

Dear Don,

I've received my copy of *PW* for September – yet another great issue with much of interest. I'm particularly pleased to see that **Joe M1MWD** is back in print – always a favourite contributor of mine.

I was very interested in the article by **Steve G0FUW**. It's fascinating to read how people became interested in the hobby, and it's quite fun to see that his inspiration seemed closely to match my own. I was always interested from boyhood, but spent a great many years as an SWL.

When I was considering become licensed in the years running up to retirement, I too, Like Steve, was inspired by the writings of **George G3RJV**. After reading his *QRP Basics* book, I

joined the G-QRP Club, whereupon an email exchange with **Tony G4WIF** convinced me to have a go at obtaining my licence. With the considerable help of my mentor, **Bob M0HAF**, I got both my M6 and 2E0 licences.

Enter Steve G0FUW, when I opted to sign up with the Bath Based Distance Learning Scheme. I cannot recommend this route to the Full Licence more highly. The support was superb. As a result, I passed the exam and obtained my M0 callsign at the first attempt.

I am sure that Steve, like George before him, will leave an unforgettable mark on the world of amateur radio, that amongst others, they've both done so much to assist and advance.

**Guy Howard M0ISK**  
Kettering, Northants

notably **Marcus Scroggie** who contributed superbly written monthly articles on the fundamentals of radio under the pen-name 'Cathode Ray'. The magazine also included some excellent constructional articles, among which I still remember the detailed account of a fine miniature valve-based transmitter by the late **CHL Edwards G8TL** in the March 1956 issue.

The small-format *Radio Constructor* was also very successful in its day. But despite its excellent constructional articles, I chiefly remember the magazine for its long-running series *In Your Workshop* about the trials and tribulations of a service engineer Smithy and his hapless assistant Dick. The articles covered, often in humorous fashion, some of the finer points of receiver design; the writer was the magazine's technical editor **J R Davies**, who had formerly been in charge of the sub-assembly factory of Ferguson Radio Corporation. I particularly recall an episode in which Dick built himself a radio after work, surreptitiously using a jar of components he found in a corner of the workshop. It didn't work, which

served him right as it was a jar of reject parts Smithy had put on the shelf for later disposal!  
**Roger Dowling G3NKH**  
Lymm, Cheshire

*(Editor's comment: Thanks Roger, I'm glad you enjoyed our look back at PW's history. I too used to be a regular reader of Radio Constructor, and enjoyed the In Your Workshop pieces although I had no idea who the author was. I still have some bound copies of the magazine in my library, including one which I chose as a school prize when schoolfriends in the same position were choosing 'worthy' novels and the like!)*

## Review of the Xiegu GNR1 Digital Audio Noise Filter

Dear Don,

Interesting review of the Xiegu GNR1 Digital Audio Noise Filter in the September edition of *PW*. Could I possibly suggest that it would have been more use-

Sign up to our FREE email newsletter at [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)



ful had **Daimon** been able to make some recordings that could be listened to online? It's really not that hard to do these days. Also, Daimon is wrong in his description of the Elecraft K2 noise reduction. It is variable, not fixed as stated in the article. There are four different customisable settings available for both SSB and CW, which enables a trade-off to be made between NR and voice distortion. I admit that the user interface is a little convoluted, but it is described in the K2 DSP manual. For VHF/UHF work at my QTH, I found the K2 DSP to be better than a K3, which I borrowed on a few occasions.

**Paul Wilton M1CNK**  
Eastleigh, Hants

*(Daimon Tilley G4USI replies: Many thanks for your comments. I never thought of the audio recordings – it is a good idea which I will bear in mind for the future. Thanks also for the K2 tip. If you read RadCom, where I write the HF column, you will see I mention the K2 purchase in the current edition. I have only had it a few weeks so am still getting to grips with it. It does have the KDSP2 fitted, but the instructions are as clear as mud so I had kind of glossed over them. Looking again now, I can see that there are four levels of NR. I am going to have a play with it now, so thanks for pointing that out. Feedback from readers is not that common, but is very welcome, so thanks for taking the time to put metaphorical pen to paper.)*

## Adana QSL Cards

I never printed a QSL card, but here's mine printed for me by my grandfather when I was 15, using the Adana Eight-Five which I now use. I recall that it was grandpa's idea to print the card using Adana's 'Electric Blue' ink because it seemed appropriate. I still have the half pound tin, half full. It has a very nostalgic smell.

These days *PW* readers might expect a more accurate frequency than just '28MHz' but my Codar receiver didn't have digital readout. I suppose it shows ten metres must have been active in 1970.

Once I got a licence I used cards ordered from the RSGB, so A7262 refers to my membership number as an SWL. The Nigerian station had run out of his own cards so wrote on mine and sent it back, which is the only reason I have one left.

I relinquished the licence in my early 20s as became less active and discovered printing, but my call sign was G4CBP.

**Alan Brignull**  
Wivenhoe, Essex



**Bernard Nock G4BXD's** view regarding safety, and indeed he replied in the subsequent issue. At least so far no-one has advocated throwing out all the electrolytics because they are bound to be duff (they usually are not).

G3LLL suggests that we should not pass on AC/DC radios because they are intrinsically dangerous. I disagree. These are an important part of our heritage in radio. Generally, they are not the kind of set that interests me. I like high-performance ones, but one man's preference is neither here, nor there. Even then some are AC/DC, take several Eddystone's as examples, or the apparently superb RCA AR8516L.

It could be said that when passing on, these sets should go with a written warning: but that applies to all vintage gear, including don't leave on when one isn't about, because of the fire risk: but then you should have seen a brand-new TV they had next door. Luckily the landlord came in to do some

## Vintage Gear

**Dear Don,**  
Noting **Harry Leeming G3LLL's** letter in the September *PW*, it is clear that there are many views and opinions as to what to do with vintage gear. In April's edition of *PW*, I took issue with

# Commemorating the military and human aspects of this famous chapter of WWII



## The Blitz in Colour

This 132-page special collectors' magazine – written by Andy Saunders, the former editor of *Britain at War* and also editor of *The Battle of Britain in Colour* – covers all the military and human aspects of the Blitz. It doesn't just look at London, it looks at all the UK cities attacked. It looks at the aircraft used, the losses and the heroic stories. It uses hundreds of original images which have been colourised to bring them to life.

**Over 180  
colour photographs**



Available to purchase from all good newsagents. Order online at [militaria.ma/blitzincolor21](http://militaria.ma/blitzincolor21) or call 01778 392489

work, and only the carpet was damaged. There was little left of the set.

On the question of connection, there wasn't a 'right way round' because most of these sets were used with reversible two-pin plugs. Further, as I understand it the DC mains was run with three wires, positive, negative and neutral, and one side of the street had +Ve as live, the other -Ve, with the two currents approximately cancelling out in the neutral. The chassis had to be connected to -Ve, whether it was the live or neutral, for the set to work.

There is another issue. One is more likely to work on the set switched off, at first, to take it out the cabinet, and the novice to do anything. Now, there is a nasty catch here if it isn't unplugged. It was often the case that the neutral was switched. This may seem absurd, as it leaves the whole set live when off, if the chassis side does indeed go to neutral. The reason, but not one may argue the justification, for doing this is that when on there is no voltage between chassis and mains, and therefore no electrostatic hum-field behind the volume control to induce hum into the audio.

When servicing these sets I replace capacitors that are connected to the outside world with Y-rated components, those specifically designed for safe operation between live and earth, and to fail safe. One may choose not to connect the pick-up input at all as it is very unlikely to be needed. With true AC sets, ie double-wound mains transformer, I add an earth connection to the chassis, and an in-line mains fuse holder and sensible value fuse.

My conclusion? There is danger in everything, and the need is to understand and control it.

**Philip Moss M0PBM**  
Surbiton

*(Editor's comment: Thanks Philip. Many enthusiasts, radio amateurs included, continue to enjoy collecting and refurbishing old radio and TV sets and thank goodness they do. Otherwise, a major part of our heritage would be lost. As you rightly say, the challenge, especially in these days of low voltages and solid-state equipment, is to understand what you are dealing with and treat it with due respect. That said, I feel sure many of us 'old hands' have frequently encountered electric shocks over the years but it's certainly not to be recommended!)*

## Magnetic Loop Antennas

Dear Don,

Further to **Ray Howes G4OWY's** observations on *Magnetic Loop Antennas* (Your Letters, Sept 2022), one approach for overcoming the inconvenience of having to continuously retune while changing frequency on receive is not to use them as receive antennas. A separate, compact wideband receive antenna, such as an E-Probe or active loop, will offer excellent receive performance leaving the loop for transmit use only.

Furthermore, by adding an auto-tune function to the loop, operation can be made completely transparent. An auto antenna switch/sequencer is needed to prevent RF from going into the active

antenna but there is nothing here (including auto tuning) that a humble Arduino or similar couldn't handle.

**Ron Taylor G4GXO**  
Culgaith, Cumbria

## Proposed ANFR encroachment on Amateur Radio spectrum

Dear Don,

Once again 2m/70cm/23cm are under threat from the French ANFR (National Frequency Agency) who plan to use the amateur bands for communication at the 2024 Olympics. This thin end of the wedge is being applied again from France.

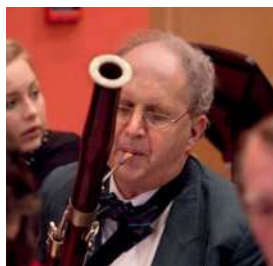
It looks as though there is little that can be done other than to protest to the RSGB who in turn can then protest to the UK licensing Authority. Will or can UK and European amateurs be able to organise enough to prevent the absorption of these vital bands.

**Martyn Board G8GUS**  
Lee-on-Solent, Hants

*(Editor's comment: Thanks Martyn. Yes, we covered this in our News on p.11 of the September issue of PW. Hopefully the situation will be no different to the London Olympics, where the bands were 'borrowed' for the duration and subsequently returned. The problem, of course, is that it leaves a legacy of radios covering those frequencies and in the hands of non-hams. I don't see any way we can prevent it any more than we were able to do here.)*

# Next Month

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



**/M STANDING STILL:** Bernard Nock G4BXD tries operating portable – from home!

**THE FACE BEHIND THE CALL:** This month features a well-known author, Alexander McCall Smith, recently licensed as MM7CMY.

**THE HEXBEAM REDUX:** Steve Telenius-Lowe PJ4DX gives his Hexbeam a new lease of life.

**A FRESH START WITH AMATEUR RADIO:** Richard White G6NFE continues with his quest to restart in the hobby from a new location.

**THE GERMAN QUAD:** Mark Foreman G7LSZ/SA6BID has a design for a no-traps multiband HF antenna to make from wire and bits of plastic.

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

**PRACTICAL WIRELESS** [www.radioenthusiast.co.uk](http://www.radioenthusiast.co.uk)

OCTOBER 2021 THE UK'S NUMBER ONE AMATEUR RADIO MAGAZINE

**WORLD OF VHF** | The Exciting Changes Occurring in VHF DXing

**CHINESE NEW GEAR TEST**  
Three HF transceivers from the Xiegu range reviewed

**PRACTICAL** A look at Semiconductors  
An introduction to diodes, plus building a basic 'cat's whisker'

**HISTORY** America  
A look at the life of ARP

**The Latest News**  
Featuring reports from around the world

The publishers reserve the right to change content according to circumstances.

**NOVEMBER 2022 ISSUE**  
ON SALE 13<sup>TH</sup> OCTOBER 2022  
AT ALL GOOD NEWSAGENTS



MARTIN LYNCH & SONS LTD. THE WORLD FAMOUS HAM RADIO STORE

# YAESU FT-818ND

# ML&S

[www.HamRadio.co.uk](http://www.HamRadio.co.uk)

SAFE ONLINE SHOPPING. E&OE



**0345 2300 599**

Wessex House, Drake Avenue, Staines,  
Middlesex TW18 2AP

E-mail: [sales@hamradio.co.uk](mailto:sales@hamradio.co.uk)

Opening Hours: Mon - Fri: 8.30am to 5pm.

Sat: 9am to 4.30pm.

International Tel: +44 1932 567 333

**HAVE YOU WATCHED ML&S TV YET?**

Every week there's something new. One simple URL



[www.MLandS.TV](http://www.MLandS.TV)



**FOLLOW US ON TWITTER AND FACEBOOK**



**HamRadioUK**



**Imagine having all the  
Ham Bands TX & RX in  
your pocket.**

**Well, now you can.**

**By owning a new all band  
160m-70cm 6W Yaesu FT-818ND  
Portable Transceiver from ML&S.**

**Who else?**



For more information see  
**[HamRadio.co.uk/FT818](http://HamRadio.co.uk/FT818)**

Why not add a new MyDEL JPC-12 (vertical) or JPC-7 (dipole)  
portable antenna for the ideal 'Go Anywhere' Ham Station?

# *Carries the Yaesu genes for true RF performance*

- SDR circuit emphasizes Receiving Performance
- Powerful RF Front-End & Low Noise Oscillator Enable Phenomenal Multi-Signal Receiving Characteristics\*
  - RMDR : 113dB+      • BDR : 127dB+
  - 3rd IMDR : 102dB+      • TX Phase Noise : -143dBc/Hz
- Band-Pass-Filters dedicated for the amateur bands to eliminate out-of-band unwanted signals
- Built-in High-speed Automatic antenna tuner
- Effective QRM rejection by Dual-core DSP
- AESS (Acoustic Enhanced Speaker System) with included SP-40 speaker to create High-fidelity audio output
- 3DSS, real-time 3-Dimensional Spectrum Stream presentation
- High Resolution 4.3-inch TFT Colour Touch Panel Display
- VMI (VFO Mode Indicator) shows the current operating mode
- "PRESET" Mode functions most suitable for FT8 operation
- Equipped with the External Display terminal

\*Multi-signal receiving characteristic: 14MHz band/2kHz separation

\*TX Phase Noise: 100W, CW mode

- 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.
- FT-710AESS includes External Speaker SP-40.



**HF/50MHz 100W  
COMPACT SDR TRANSCEIVER w/ SP-40**

***FT-710 Aess***  
**Acoustic Enhanced Speaker System**

**YAESU**  
The radio

**YAESU UK Ltd**  
Unit 12 Sun Valley Business Park, Winnall Close  
Winchester, Hampshire SO23 0LB

For the latest Yaesu News, visit us on the internet at [www.yaesu.co.uk](http://www.yaesu.co.uk)

Specifications subject to change without notice. Some accessories and/or options may only be standard in some areas. Check with your local Yaesu Dealer for specific details.



# The Blitz

IN COLOUR



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



# SAMPLE



## Warners Group Publications

The Maltings  
West Street  
Bourne  
Lincolnshire  
PE10 9PH  
Tel: 01778 391000  
Fax: 01778 392422  
[www.warnersgroup.co.uk](http://www.warnersgroup.co.uk)

## Publisher

Rob McDonnell  
[robm@warnersgroup.co.uk](mailto:robm@warnersgroup.co.uk)

## Editor

Andy Saunders  
[andy.saunders@warnersgroup.co.uk](mailto:andy.saunders@warnersgroup.co.uk)  
Tel: 01753 770712

## DESIGN

Head of Design and Production

Lynn Wright

Designer

Mike Edwards

## MARKETING

Marketing Manager

Katherine Brown

[katherine.brown@warnersgroup.co.uk](mailto:katherine.brown@warnersgroup.co.uk)

Tel: 01778 395092

Marketing Executive

Luke Hider

[luke.hider@warnersgroup.co.uk](mailto:luke.hider@warnersgroup.co.uk)

Tel: 01778 395085

## ADVERTISING

Sales Executive

Kristina Green

[kristina.green@warnersgroup.co.uk](mailto:kristina.green@warnersgroup.co.uk)

Tel: 01778 392096

## PRODUCTION

Production Manager

Nicola Glossop

[nicola.glossop@warnersgroup.co.uk](mailto:nicola.glossop@warnersgroup.co.uk)

Tel: 01778 392420

Production Assistant

Charlotte Bamford

[charlotte.bamford@warnersgroup.co.uk](mailto:charlotte.bamford@warnersgroup.co.uk)

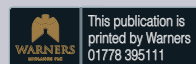
Tel: 01778 395081

## DISTRIBUTION

Warners Distribution

Andy Perry

Tel: 01778 391152



Reproduction in whole or in part without written permission is prohibited. All rights reserved. Dates, information and prices quoted are believed to be correct at time of going to press but are subject to change and no responsibility is accepted for any errors or omissions. Neither the editor nor the publisher accept responsibility for any material submitted, whether photographic or otherwise. While we endeavour to ensure that firms and organisations mentioned are reputable, the Editor can give no guarantee that they will fulfil their obligations under all circumstances. Whilst every care has been taken to compile current valuations, the publishers cannot accept liability for loss, financial or otherwise, incurred by reliance placed on the information herein.

**DISCLAIMER:** The views expressed by contributors and advertisers are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. They will however investigate any written complaints.

# 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 21<sup>st</sup> 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 80<sup>th</sup> 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

### 6 NO LONGER AN ISLAND

The first air attacks on Britain, the first 'Blitz', involved Zeppelin airships and Gotha bombers during the First World War which raided the country in terrifying bombings and brought the civilian population into the front line.

### 12 BEACHFRONT BROADSIDE

Apart from air raids during the First World War, the German navy also carried out a number of shelling attacks against British coastal towns. One of the towns bombarded with lethal effect was the port of Lowestoft on the east coast.

### 14 TIMELINE

We look at a timeline of German air and missile attacks against the British Isles across the period of the Second World War in operations which were conducted from October 1939 through to March 1945.

### 16 THE FIRST OF MANY

During the course of air attacks against the British Isles a great many Luftwaffe aircraft were either shot down or crashed due to other causes and we look at the very first German aircraft brought down over Britain during October 1939 near Humber, Scotland.

### 22 ROOF OVER BRITAIN

Britain's anti-aircraft weapons formed an important part of the defence of the country, and we take a detailed look at the various types of weaponry employed by the Army's Anti-Aircraft Command and how those defences were deployed.

### 30 THE BALLOON BARRAGES

Iconic 'symbols' of the Blitz on Britain were the silver barrage balloons which could be seen bobbing in the skies over London and other cities on the end of steel tethering cables and providing another line of defence against raiders.

### 36 'PUT THAT LIGHT OUT!'

The work of Britain's civil defence teams cannot be praised highly enough and we pay tribute to the amazing service of Air Raid Wardens, Ambulance crews and the Fire Services during the dangerous days of air attacks conducted against Britain.

### 40 TAKE COVER!

Sheltering from air attack was a daily part of life in wartime Britain and air raid shelters came in a variety of forms – from domestic shelters in gardens and homes to elaborately constructed public shelters or the ad-hoc arrangements established in London's Underground stations.

### 48 BLACK SATURDAY

On 7 September 1940, the Luftwaffe launched a massive daylight attack on London which then ran on into the following night. From then on, until the spring of 1941, the city – and many others in Britain – were attacked almost on an almost nightly basis.

### 54 OTHER CITIES

The Blitz did not just involve London, however, and in a photographic montage we glimpse how other cities the length and breadth of the British Isles fared under sustained and ferocious German air attacks.

### 56 MOST RAIDED TOWN

The seaside resort of Eastbourne earned the unenviable distinction of being the most raided town on the south coast. The attacks involved random bombings, fighter-bomber attacks and hits by V1 missiles. It also saw bravery and fortitude, include from a young Girl Guide.

### 64 THE NIGHT FIGHTERS

Initially, Britain's night fighter defences were primitive and poorly organised, but the RAF very quickly expanded its night defence capacity with new aircraft and technology in the face of the German threat.

### 68 THE LONE WOLF

Flight Lieutenant Richard Stevens was a one-man killing machine during the early days of the Blitz and became its highest-scoring night fighter pilot – his successes all achieved when flying a Hurricane and using his extraordinary night vision.

### 72 ATTACKERS & DEFENDERS

The aircraft used by both sides are highlighted in a section which includes stunning colour profiles of the various fighters and bombers used by the RAF and Luftwaffe in air operations over Britain.



### 86 SINKING THE EMPRESS

The Blitz against Britain was not limited to attacks on land targets. Shipping was also targeted by the Luftwaffe as Germany sought to tighten its stranglehold. Here, we look at the story of the sinking of the liner SS Empress of Great Britain during October 1940.

### 90 THE 'MARIE CELESTE'

The mysterious arrival of a crewless Junkers 88 bomber at Godstone in Surrey during the Blitz is featured in a fascinating colourised photograph.

### 92 OBJECTS FROM THE BLITZ

A look at some of the iconic everyday objects that are associated with the Blitz and the stories hidden behind them.

### 96 THE GERMAN BOMBS

A plethora of German bombs and missiles were rained upon Britain by the Luftwaffe during the Second World War, and we spotlight some of the main weaponry that was employed during these air attacks.



## 101 FIREBOMB FRITZ

The most destructive weapon during the Blitz was the incendiary bomb which had the capability of setting fire to great swathes of towns and cities.

## 106 OPERATION STEINBOCK

During the first months of 1944, the Luftwaffe launched mass attacks in the 'Baby Blitz'. It saw massive losses by the attackers, only serving to weaken Germany's depleted air arm at a critical time.

## 108 STRANGE FINALE

Just as the Luftwaffe's main Blitz ground to a halt, so the drama of the most bizarre arrival of any German aircraft in Britain unfolded in Scotland when a pilot baled-out into captivity. He was none other than Rudolf Hess, Hitler's Deputy.

## 111 JETS OVER BRITAIN

German technology was highly advanced during the latter stages of the war, such that the Luftwaffe was sending its early jet aircraft over Britain.

## 112 'DIVER! DIVER! DIVER!'

With D-Day on 6 June 1944, the war seemed to be drawing towards its final stage, but a few days later the Germans launched their devastating V1 Flying Bomb attacks on London and the south-east in a potent reminder that the war was far from over.

## 118 BIG BEN

Following on from the V1 attacks came the utterly terrifying V2 rocket assault. The British code-named them 'Big Ben' incidents. The missiles – against which there was no defence – fell randomly and without warning, causing massive damage and loss of life across London and southern England until early 1945.

## 124 TRACES OF THE BLITZ

Eighty years on from the catastrophic events of London's Blitz, the city still bears scars and reminders of its darkest of days. We take a virtual tour to see what traces can still be found hidden in plain sight.

## 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**

## 128 THE GRIM TOLL

The enormous civilian casualty toll across Britain from air attack was a terrible one. We pay tribute to all of those who lost their life during the Blitz on Britain between 1940 and 1945.





# ‘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 warned 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.’*



## THE FIRST BLITZ



10722 IS THE GERMAN AIR RAID ON GREAT YARMOUTH, JANUARY 1915. MR. CLIS WOUNDED BY A BOMB, AND HIS RUINED HOUSE, AT LANCASTER ROAD CORNER, ST. PETER'S PLAIN.



**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 during World War, the Zeppelin was a source of awe, wonder and fear.

**Above Left** In 1915

attacking Britain

their own way

developed

swung

**Ab**

**READ THE  
FULL  
FEATURE  
HERE**





# 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:



## ATTACK FROM THE SEA

**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. ■



# 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

BLACKOUT TIME  
TO-NIGHT IS AT

The Cities : The Aircraft : The Heroes : The Losses

CONTAINING OVER 180 COLOUR PHOTOGRAPHS

[illegible][illegible]

**IF YOU WOULD PREFER A PAPER EDITION PURCHASE HERE**