

Radio ZS

Volume 79, issue 10 - October 2026 Oktober





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Radio ZS



The Journal of the South African Radio League
Die Tydskrif van die Suid-Afrikaanse Radioliga
“Advancing the Spirit of Amateur Radio Through Innovation”

Volume 79, No 10 October 2026 Oktober

Editor: Dennis Green, ZS4BS radiozs@sarl.org.za

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On the Cover. Two radio amateurs, one lighthouse and an adventure at Diaz Point - turn to page 14.

Op die Voorblad. Twee radio amateurs, een vuurtoring en 'n avontuur by Diazpunt – blaai na bladsy 14.

Disclaimer. The opinions expressed in this publication do not necessarily reflect the official view of the South African Radio League and the South African Radio League cannot be held responsible for incorrect information published.

South African Radio League Suid-Afrikaanse Radioliga

Founded 20 May 1925
Gestig 20 Mei 1925

The National Body for Amateur Radio in South Africa
Member Society of the IARU Region 1
Die Nasionale Liggaam vir Amateur Radio in Suid-Afrika
Lidvereniging van die IARU Streek 1

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What's happening in October

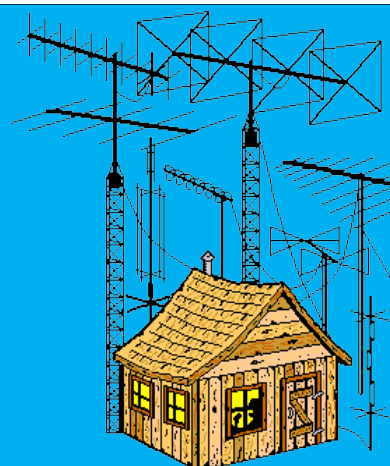
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27 World Tourism Day; the CQ WW RTTY contest 	28	29	30 International Translation Day	1 the SARL 80 m QSO Party	2	3 the East Rand Boot Sale 
4 the AWA SSB Valve QSO Party 1957 - launch of Sputnik 1 (space race)	5 World Teachers' Day	6 Provincial Schools open	7 Draconids Meteor Shower.	8	9 World Postal Day 	10 Radio Amateur Examination 
11 1899 - start of the Anglo Boer War	12 World Migratory Bird Day	13 1884 - Greenwich was established as the universal time	14 Early Morning Coffee QSO Party 	15	16 JOTA	17 JOTA, CQ Hou Koers and BACAR-14 
18 JOTA 	19	20	21 Orionids Meteor Shower and the SARL Wednesday 80 m Club	22 Orionids Meteor Shower	23	24 CQ WW DX Phone contest 
25 CQ WW DX Phone contest 	26	27	28	29	30	31 the SARL VHF/UHF FM Mode Contest

ZS2BL's SA Hamshack

(Ye Olde Radio Shoppe)

Direct importer of a wide selection of SWR metres, HF, VHF and UHF base and mobile antennas. Amateur radio transceivers, antenna analysers, etc.
Affordable shipping costs for out of town customers and subsidized shipping to SARL members.

Check out all my amateur radio goodies at
<http://www.sahamshack.co.za/index.htm>
and contact me on 072 026 8909 or zs2bl@sahamshack.co.za



Silent Keys / Stil Sleutels

They shall grow not old as we that are left grow old
Age shall not weary them nor the years condemn
At the going down of the sun and in the morning
We will remember them."

Hulle word nie oud soos ons wat bly vergrys,
Die jare sal hulle nie raak nog die tyd se eis
En, soos die son sak of die môre ontvou,
Eer hul herinnering – ons sal onthou."

Friedrich "Fred" Ziss, ZS1FZ / DJ3VV
Victor Singh, ZS6DOC
Melanie de Jager, ZR6ME
Jan Schubart, ZS6ARV



Amateur Radio News

4 October 1957 - the Space Age began as the Russians launched the first satellite into orbit. Sputnik 1 weighed just 83 kg and transmitted a beeping radio signal for 21 days. The remarkable accomplishment by Soviet Russia sent a shockwave through the American political leadership resulting in US efforts to be the first on the moon

11 October 1899 – the Anglo Boer War began in South African between the British Empire and Boer Republics of the Transvaal and Orange Free State. The war ended in 1902 with the Treaty of Vereniging in which the Transvaal and Orange Free State became British colonies.

13 October 1884 - Greenwich was established as the universal time from which standard times throughout the world are calculated.

HF Conditions South Africa

Real-time HF propagation intelligence designed for South African amateurs. <https://zs1gfl.ampr.org/HFSA/index.html>

Hierdie bladsy is 'n gratis weerberig vir kortgolf radio, gemaak vir Suid-Afrikaanse radio amateurs. Dit wys met een oogopslag hoe goed die radio bande op die oomblik is. Dit gee die huidige toestand van die son en van die Aarde se magneetveld, wat saam bepaal of langafstand-radioseine goed sal reis of sal wegwyn.

Jy kan sien watter bande die moeite werd is om te probeer, hoe ver seine moontlik kan reik, en watter toestande oor die volgende dag of twee



verwag kan word. 'n Wêreldkaart wys waar dit dag en waar dit nag is, en merk die grys-sone langs die grens tussen hulle — 'n gunsteling plek om verafgeleë stasies te vang.

Alles werk outomaties op, verskeie kere per uur. Tye word in Suid-Afrikaanse tyd en in UTC gewys, geneem van 'n akkurate klok.

Daar is ook 'n bladsy oor QO-100, die amateur radio-satelliet, en 'n gids wat elke term wat op die werf gebruik word, verduidelik.

Die inligting is 'n riglyn, nie 'n belofte nie. Radio toestande verander voortdurend, en geen voorspelling is ooit seker nie.

Kommentaar is welkom, stuur asseblief privaat boodskap aan Georg, ZS1GFL by zs1gfl@gltech.co.za. Hy benodig terugvoer vanaf RSA amateurs.

(Continued on page 6)

(Amateur Radio News from page 5)

There is a repeater operating 400 km above your head right now

Aboard the International Space Station, in the Columbus module (the European module built by Italy), the amateur radio crossband repeater is switched ON — freshly powered back up on 2 September after being stood down for spacewalk operations. It is running right now, passing over your QTH roughly every 90 minutes. Uplink: 145,990 MHz FM with a 67 Hz CTCSS tone and downlink: 437,800 MHz FM. Any dual-band FM handheld or mobile will do with a handheld whip or a little portable YAGI antenna.

Look up the next high pass for your location (any ISS tracker app or website), listen on 437,800 first. When the pass starts, you will hear traffic from stations already working it — the downlink comes with Doppler shift, so tune around slightly. Transmit on 145,990 when there is a gap, give your call and listen for yourself coming back through the orbiting machine. That is it. Your signal goes up, gets retransmitted from space at 25 W and comes down across half a continent. Working the ISS is one of amateur radio's genuine thrills — and it needs no big tower, no amplifier, just timing and a



modest handheld.

HAREC and Certificate of Operating Competence will in future not display a call sign

The Harmonised Amateur Radio Examination Certificate awarded after a candidate has successfully passed the Radio Amateur Examination will in future not carry a call sign. The HAREC and Operating Competence Certificates are life time documents. In interaction with ICASA the authority said that the licence is not a life time document but renewable; "The call sign should therefore not be reflected on the certificate as the call sign belongs with the licence and it can be changed at any time per request by the licensee or by any other cancellation reason."

ICASA also pointed to Regulation 23 (5) that reads, "The Authority will issue call signs to licensed amateur radio stations and no person shall acquire call signs on behalf of a group of persons or amateur radio stations." In the past the SARL provided the certificate and the licence at the same time to the candidate but in future the licence will be issued after the certificate has been issued. The previous arrangement was agreed to overcome the ICASA portal issues which have since been resolved. The SARL will however assist candidates with the necessary information. A PowerPoint presentation is available on <https://mysarl.org.za/about-amateur-radio-menu/> explaining how to apply for a licence.

Morse Code Detectives

The California Historical Radio Society is teaming up with the Girl Scouts of Northern California to offer a series of Junior Detective badge workshops focused on STEAM (Science, Technology, Engineering, Arts and Math) topics.

The first one, coming up on 3 October, will use Morse code as the basis for a programme on coded communications. According to the group's website, "Juniors will learn how detectives and investigators use coded communication by exploring the history of Morse code and creating a custom beaded bracelet or keychain that spells out a secret message in dots and dashes. This hands-on activity strengthens observation, pattern recognition and problem-solving skills while introducing participants to one of history's earliest wireless communication systems. Juniors will earn and receive the Detective badge in this workshop." Junior Girl Scouts are in grades 4 and 5.

The California Historical Radio Society is a museum and preservation organization focused on radio and broadcasting. The organization's Director of Marketing and Partnerships, Michael Toedman, says many of the group's 800-plus members are amateur radio operators and that the museum includes an active amateur shack and club station, W6CF. That is the call sign of longtime ARRL Pacific Division Director Jim Maxwell (SK), whose wife, Trudy, donated Jim's station and library to the society following his passing.

Girl Scout Junior Detective badge





Working Groups and Coordinators

Amateur Radio Today: Hans van de Groenendaal, ZS6AKV artoday@sarl.org.za.

ART Relays: Louis Veldkamp, ZR4DJL and Andy Cairns, ZS6ADY

Awards: Tjerk Lammers, ZS1J

Contest WG: Johan Bezuidenhout, ZS6JBZ; Gerhard Coetzee, ZS3TG; Phillip van Tonder, ZS6PVT; Phillip Fischer, ZS6FY; Danie Schnetler, ZS6DPS

Database: Colin de Villiers, ZS6COL

Forum: Roger Conroy, ZR3RC and Andy Cairns, ZS6ADY

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RAE and Training: rae@sarl.org.za

Regulatory WG: Hans van de Groenendaal, ZS6AKV; Leon Lessing, ZS6LMG; James Archibald, ZS6NS and Peter Leonard, ZS5PL

Reno Faber Station: Philip van Tonder, ZS6PVT

Repeater Co-ordination:

SARL Beacon Project Manager: Brian Jacobs, ZS6YZ

SARL Hamnet: Brian Jacobs, ZS6YZ; Michael Taylor, ZS1MJT; Andrew Gray, ZS2G; Rickus de Lange, ZS4A; Keith Lowes, ZS5WFD; Gert Botha, ZS6GC and Leon Lessing, ZS6LMG

SARL/ICASA Liaison: Hans van de Groenendaal, ZS6AKV; Nico van Rensburg, ZS6QL and Colin de Villiers, ZS6COL

SARL News/SARL Nuus: Dennis Green, ZS4BS; Dave Reece, ZS1DFR; Rory Norton, ZS2BL; Andy Cairns, ZS6ADY; Vivian Dold, ZS6VD; Herman Erasmus, ZS6CTA; Paul Johnson, ZS1S; Irene Myburg, ZS6IEA; Deon Erwin, ZS1ZL; Christo de Witt, ZS3CDW, Hannes Enslin, ZS6JDE and Kevern Burger, ZR2BK

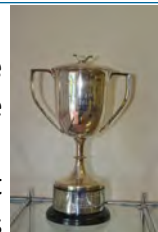
SARL VHF and Above Records: Bernie vd Walt, ZS4TX

Swap Shop: Rassie Erasmus, ZS1YT

Youth/Jeug: Vacant

Radio ZS Awards

The Gary Immelman RA Heritage Award Floating Trophy awarded by the SARL Council for the best article of a historic nature describing an event that occurred more than five years previously or an interesting personality that has played an important part in the development of Amateur Radio in years gone by. Donated by Gary 1993.



The JJ Pienaar Trophy awarded by the Editor for the best article published in Radio ZS during the past year.

The Radio ZS Shield awarded by the Editor to a South African Radio League affiliated Club or member who best supported Radio ZS during the year. Donated by the Port Elizabeth Branch in 1966.

Radio ZS

Radio ZS is a forum for South African Radio League members to share their amateur radio experiments, experiences, opinions and news. Manuscripts with drawings and/or photos are always welcome and will be considered for publication. Articles on e-mail are especially welcome. Material may be submitted in MS Word, Open Office or rtf format, using Calibri 12 pt and English (South Africa). Material may be e-mailed to radiozs@sarl.org.za. The League cannot be responsible for loss or damage to any material. <https://mysarl.org.za/radio-zs-archives/>.

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SARL News Bulletins/SARL Nuus Bulletins

The South African Radio League, ZS6SRL broadcasts a news bulletin every Sunday in Afrikaans and English at 08:15 and 08:30 Central African Time respectively, on HF and various VHF and UHF repeaters around the country. The bulletin is relayed on EchoLink and AllStar Node 53511 by Johan, ZS6JPL.



Die Suid-Afrikaanse Radioliga saai elke Sondag nuus bulletins uit in Afrikaans sowel as Engels om 08:15 en 08:30 Sentraal Afrika Tyd onderskeidelik op HF sowel as op verskeie BHF- en UHF-herhalers. Hierdie uitsendings word ook via Echolink en Allstar Node 53511 herlei deur Johan, ZS6JPL.

Audio bulletins can be downloaded from <https://sarlnnews.podbean.com>, while the text bulletin is available at <https://mysarl.org.za/sarl-news/>.

We invite clubs and individuals to submit news items of interest to radio amateurs and shortwave listeners, in both English and Afrikaans where possible, by uploading the news item at <https://mysarl.org.za/news-inbox/> and/or by sending items to news@sarl.org.za no later than Friday morning preceding the bulletin date.

The weekly radio programme Amateur Radio Today can be heard every Sunday morning at 10:00 CAT. The programme is carried on VHF and UHF repeaters countrywide and is relayed on 7 115 kHz lower sideband by Louie, ZR4DJL. A rebroadcast by Andy, ZS6ADY, can be heard on Monday evenings at 19:30 CAT on 3 620 kHz. Signal reports, comments and suggestions are welcome, send them by e-mail to artoday@sarl.org.za.

In Cape Town, Amateur Radio Today can be heard at 10:30 CAT on the 145,700 MHz repeater, with an EchoLink relay to ZS1DCC-R by Dave, ZS1DFR.

In Bloemfontein, listeners can tune to the 145,7625 MHz repeater at 08:15 and 08:30 for the SARL News and again at 10:00 for Amateur Radio Today.

In Sasolburg, listeners can tune to the 145,6875 MHz repeater at 12:00 for the SARL News.

The weekly SARL News Bulletins

Subscribe at

sarlcommunications+subscribe@groups.io

Get a copy <https://mysarl.org.za/sarl-news/>

The weekly HF Happenings Newsletter

Subscribe at HFHappenings+subscribe@groups.io

Get a copy <https://mysarl.org.za/hf-happenings/>

Die oudio bulletins kan afgelaai word vanaf <https://sarlnnews.podbean.com/> terwyl die teks bulletins by <https://mysarl.org.za/sarl-news/> afgelaai kan word.

Ons nooi klubs en individue uit om nuusberigte van belang vir radioamateurs en kortgolfluisteraars in te dien, indien moontlik in beide Engels en Afrikaans, deur die nuusberig op te laai by <https://mysarl.org.za/news-inbox/> en/of die items te stuur na news@sarl.org.za, nie later nie as die Vrydagoggend voor die bulletin datum.

Die weeklikse radio program Amateur Radio Today kan elke Sondagoggend om 10:00 SAT gehoor word. Die program kan landwyd op VHF- en UHF-herhalers gehoor word en word deur Louie, ZR4DJL, op die 7 115 kHz laer syband herlei. 'n Heruitsending deur Andy, ZS6ADY, kan Maandagaande om 19:30 SAT op 3 620 kHz gehoor word. Ons ontvang graag jou sein rapporte, kommentaar en voorstelle, stuur 'n e-pos aan artoday@sarl.org.za.

In Kaapstad kan Amateur Radio Today om 10:30 SAT op die 145,700 MHz-herhaler gehoor word, met 'n EchoLink-herlei na ZS1DCC-R deur Dave, ZS1DFR.

In Bloemfontein kan luisteraars om 08:15 en 08:30 vir die SARL Nuus en weer om 10:00 vir Amateur Radio Today inskakel op die 145,7625 MHz-herhaler.

In Sasolburg kan luisteraars om 12:00 vir die SARL Nuus inskakel op die 145,6875 MHz-herhaler.

Die weeklikse SARL Nuusbulletins

Teken in by

sarlcommunications+subscribe@groups.io

Kry 'n kopie <https://mysarl.org.za/sarl-news/>

Die weeklikse HF Happenings Nuusbrieff

Teken in by HFHappenings+subscribe@groups.io

Kry 'n kopie <https://mysarl.org.za/hf-happenings/>

Preserving South Africa's Morse Code Heritage

Raoul Coetzee, ZS1C - The CW Activity Club

"A heritage worth preserving for future generations, not through the preservation of equipment, but through the continued teaching and practice of the knowledge, skills and traditions associated with Morse code."

Inspired by the principles of UNESCO's Convention for the Safeguarding of Intangible Cultural Heritage.

Morse code is often regarded as an obsolete means of communication, replaced long ago by satellites, computers and digital technology. Yet, for more than a century, it played a vital role in connecting South Africa with the rest of the world. More importantly, it represents a uniquely human skill — one built on careful listening, concentration, discipline and continual practice.

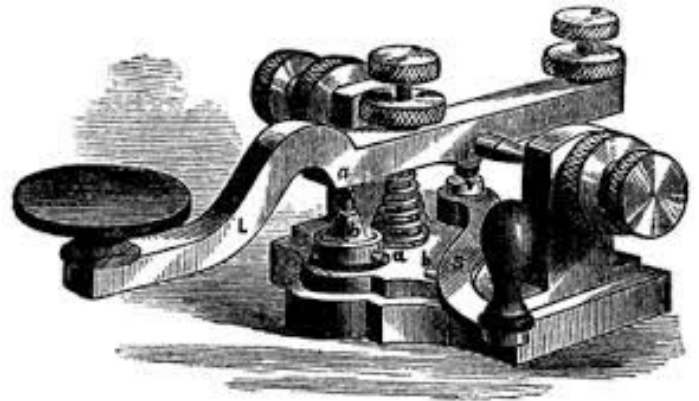
When we speak about preserving Morse code, we are not referring simply to old telegraph keys, radios or museum pieces. We are preserving the knowledge, skills and traditions that have been passed from one generation to the next. Like music, traditional craftsmanship and indigenous languages, Morse code forms part of our intangible cultural heritage.

Before Radio

Long before radio became commonplace, South Africa was linked together by an expanding telegraph network. In many ways, it was the Internet of its day.

During the latter half of the nineteenth century, telegraph lines connected Cape Town, Kimberley, Port Elizabeth, Durban and later the inland republics. Messages that once took days or even weeks to travel could suddenly be delivered within minutes.

Behind every message was a trained telegraph



operator whose skill, accuracy and speed made this remarkable system possible. Their work supported commerce, government administration and emergency communications, helping to shape a rapidly developing country.

Building a Nation

The rapid expansion of telegraph and later wireless communication did far more than connect towns and cities — it helped build South Africa's economy.

As the diamond fields of Kimberley and the gold mines of the Witwatersrand developed, reliable communication became essential for commerce, banking, transport and government administration. Telegraph operators enabled information about markets, shipments, finance and logistics to move almost instantly across vast distances, supporting industries that were transforming the country. It is difficult to imagine the rapid growth of South Africa's mining industry, railway network and international trade without the communications infrastructure that Morse code made possible.

The arrival of wireless communication at the beginning of the twentieth century, pioneered internationally by Guglielmo Marconi, extended these capabilities far beyond the reach of telegraph wires. South Africa's strategic position between the Atlantic and Indian Oceans made it an important link in the global communications

(Continued on page 10)



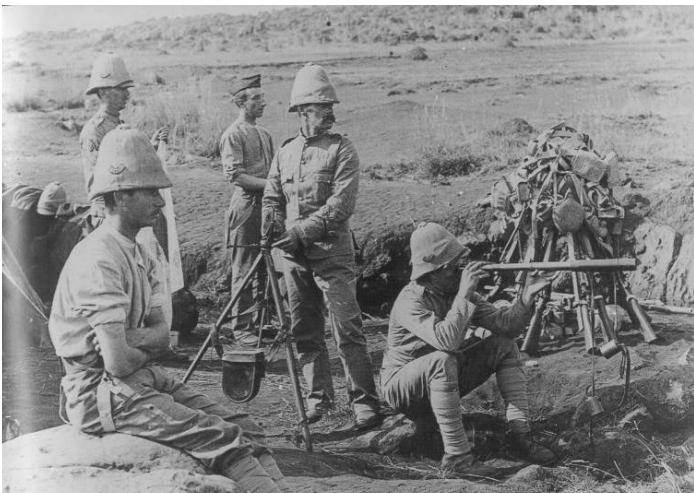
(Preserving South Africa's Morse Code Heritage from page 9)

network. Wireless Morse connected ships with the shore, supported international trade and strengthened the country's role as a gateway between Europe, Africa and the East.

The Anglo-Boer War

The Anglo-Boer War (1899 – 1902) demonstrated just how important telegraphy had become. Both British and Boer forces relied heavily on Morse code for command, logistics and intelligence. Telegraph lines were considered strategic assets and were often targeted because disrupting communications could have a significant impact on military operations.

Today, the story of Morse code during this period reminds us how essential reliable communication has always been in times of uncertainty.



Connecting the Oceans

South Africa's geographical position at the southern tip of Africa placed it on one of the busiest maritime routes in the world. For much of the twentieth century, ships travelling between Europe, Asia, the Americas and Australia depended on Morse radio communications while passing the Cape.

Cape Town Radio became one of the world's most respected coastal radio stations, maintaining a continuous watch over the South Atlantic and Southern Oceans. Its operators handled commercial traffic, weather information, navigation warnings, medical assistance requests and emergency distress calls. For countless seafarers, these skilled radio operators were the reassuring voices at the other end of the key when

help was needed most.

Many former ship radio officers later became amateur radio operators, bringing with them a wealth of knowledge and experience that helped preserve the art of Morse communication.

Aviation, Railways and the Military

Morse code also found an important place in aviation. Before satellite navigation, pilots identified radio beacons by listening to their Morse code identifiers, confirming they were following the correct navigation aid. Even today, some of these beacons remain in service as reliable backup navigation aids.

South African Railways relied on telegraph communications for many decades. Long before computer's controlled railway operations, telegraph operators played a vital role in train dispatching and the safe movement of rail traffic across the country.

Generations of military signal operators also learned Morse code as part of their training. Accuracy, concentration and the ability to copy messages under difficult conditions were essential skills, making Morse an integral part of military signalling for many decades.

The Amateur Radio Community

While commercial and government services gradually adopted newer technologies, amateur radio operators continued to keep Morse code alive.

For well over a century, amateur radio enthusiasts have taught, practised and enjoyed Morse code, passing their knowledge from experienced operators to newcomers. Today it remains one of the few communication methods that requires no common spoken language. A simple key and receiver allow people from



(Preserving South Africa's Morse Code Heritage from page 10)

different cultures and countries to communicate with one another.

In South Africa this tradition continues through clubs, mentoring programmes and on-air activities that encourage newcomers to discover the enjoyment of CW.

More Than a Historical Skill

Learning Morse code develops careful listening, concentration, memory and self-discipline. It encourages patience and continuous improvement — qualities that remain valuable regardless of advances in technology.

Some studies have suggested that practising Morse code may provide cognitive benefits, particularly in areas such as memory and mental processing, although research in this field continues.

A Heritage Worth Preserving

South Africa has every reason to be proud of its Morse code heritage. From the early telegraph operators and railway dispatchers to maritime radio officers, aviators, military signallers and today's amateur radio community, countless South Africans have contributed to this remarkable tradition.

Preserving Morse code is not about resisting modern technology. It is about recognising that some skills have a value far beyond their original purpose. Morse code represents dedication, discipline, technical knowledge and a shared international culture that has connected people



across continents for more than 180 years.

If we continue to teach it, practise it and share its history, we will ensure that this unique part of South Africa's heritage remains a living tradition rather than a forgotten chapter of our past.

Whether you are an experienced operator or someone hearing Morse code for the first time, we invite you to become part of this remarkable living heritage.

The Region 1 General Conference

Delegates to the Region 1 General Conference (18 to 24 September) will discuss Paper VI26_C3_03 Establishing Morse Code as an Intangible Heritage.

To date, VERON (the Netherlands) and UBA (Belgium) have received certificates from their Heritage authorities for Morse Code. The DARC (Germany) are busy with the process.

What about the SARL? The SARL Secretary is busy discussing the matter with the Department of Sport, Art and Culture and the National Heritage Council. It is a slow process.

Can artificial intelligence help improve your contesting skills?

John Myers, WG8X, wrote in the current newsletter (www.portcars.org/wp/newsletter/) of the Portage County (Ohio) Amateur Radio Service newsletter that he was inspired to give it a try after a mention of using AI to examine contest logs by Hal Kennedy, N4GG, at last May's Contest University in Dayton.

Myers wrote that he gave ChatGPT a link to the rules for the North American QSO Party and "asked for guidance as to how to maximize my score." He reported that the response, "personalized to my own situation, was nothing short of amazing. It broke down the 12-hour contest into smaller bite-size nuggets showing me when to spend time on a band or move."

Myers said AI also provided impressive after-contest analysis and suggested that it might also help other contesters as well.



SANDTON AMATEUR RADIO CLUB PRESENTS

LESOTHO - EASTERN CAPE - FREE STATE

SOTA EXPEDITION 2026

1 - 11 OCTOBER 2026

MOUNTAINS | RADIO | EXPLORATION | FRIENDSHIP

*More
than just
a summit*

RARE PLACES
REAL SIGNALS
A BIGGER PICTURE

LESOTHO
EASTERN CAPE
FREE STATE

*Summits
to on air*



11
DAYS



15
SOTA SUMMITS
(10-POINTERS)



12
FIRST ACTIVATIONS



> 105 km
ON FOOT



~7,200 m
OF CLIMBING



~2,300 km
BY ROAD



180
MAXIMUM
SOTA POINTS
(INCLUDING SEASONAL BONUS)

THE EXPEDITION

In **October 2026**, **Brandon ZS6LZ**, **Johan ZS4AA** and **Theuns ZS4TDR** will set out on an amateur-radio expedition linking some of the highest and least-activated mountain country in Southern Africa. The expedition is an initiative of the **Sandton Amateur Radio Club**, with a wider team of operators providing remote support throughout the trip.

THE OPERATORS



Brandon ZS6LZ
(7P8LZ in Lesotho)
Hiking, scrambling
and activating summits.
On the way to 1,000
SOTA points.



Johan ZS4AA
(7P8LL in Lesotho)
Hiking, scrambling
and activating summits.



Theuns ZS4TDR
(7P8TR from Lesotho base)
Transport, safety, logistics,
information relay, spotting
and POTA activations
en route.

THE ROUTE

The expedition begins in the Lesotho high country around Sani, moves south into the Eastern Cape escarpment, includes a three-day, two-night self-contained traverse by Brandon and Johan, then continues through the Rhodes area and north and west into the Free State, via Zastron and Fouriesburg, for the final summits.

KEY OBJECTIVES

- Fifteen 10-point SOTA summits, with twelve first activations.
- Kwa Duma, ZS/EC-017 — highest SOTA summit in the Eastern Cape region.
- For Brandon, Kwa Duma will be the ninth of the ten highest summits across South Africa's ten SOTA regions.
- Maximum 180 SOTA points (with seasonal bonus).
- Brandon needs 134 points to reach 1,000 and become South Africa's third SOTA Mountain Goat.

REMOTE SUPPORT TEAM

Sandton ARC members **Graham ZS6GL**, **Keith ZS6Hi**, **Mark ZS6MDX** and **Matt ZS6MDV**, together with SOTA veterans **Sid ZS5AYC** and **Adele ZS5APT**, and **Christ ZS4CGR**, will listen out for the expedition, assist with spotting and safety monitoring, and provide propagation and other information from home. Much of this will be relayed through Theuns, who can pass information to Brandon and Johan over 2m and 70cm while they are on the move.

ON THE AIR

- Main station: Yaesu FT-891.
- Traverse: Elecraft KX2.
- Antenna: linked dipole (40m, 30m, 20m, 15m, 10m).
- Back-up: EFHW.
- 7P8TR from Lesotho base (POTA and DX contacts).
- 7P8LZ and 7P8JL in Lesotho.

WHY OCTOBER?

It's about as late in the season as we can attempt the expedition while still benefiting from SOTA's three-point seasonal bonus. That turns a number of the major peaks into 13-point activations, but also means operating in unpredictable high-mountain weather.



SUMMITS
ON THE AIR
EXPLORATION
ACTIVATION
COMMUNITY

*Difficult places.
Great company.
Real radio.*



SANDTON
AMATEUR RADIO CLUB

COMMUNICATE | EXPLORE | SUPPORT

LESOTHO
EASTERN CAPE
FREE STATE
SOUTH AFRICA
AND BEYOND



LESOTHO – EASTERN CAPE – FREE STATE
SOTA EXPEDITION 2026
 MOUNTAINS • RADIO • FRIENDSHIP • ADVENTURE
1 - 11 OCTOBER 2026



SOTA
Summits on the Air

*Lesotho
Eastern Cape
Free State
South Africa*

*More
Than
a Summit*

CHASER'S DIARY

PLANNED ACTIVATIONS
2 - 11 OCTOBER 2026

Fifteen SOTA summits are planned over nine operating days, including 12 first activations.

Brandon ZS6LZ and Johan ZS4AA will operate as 7P8LZ and 7P8JL while in Lesotho. Theuns ZS4TDR / 7P8TR will be active from the Lesotho base and on POTA activations along the route, and will join Brandon and Johan on the two previously activated drive-up summits.

Date	Planned summit	SOTA ref	Points	Activation status	Operators
Fri 2 Oct	Baneising	7P/SB-001	13	Previously activated	7P8LZ • 7P8JL
Sat 3 Oct	KaNtuba	7P/BB-005	13	First activation	7P8LZ • 7P8JL
	Mqatsheni	7P/BB-014	13	First activation	7P8LZ • 7P8JL
Sun 4 Oct	Bitso Lebe	7P/BB-017	13	First activation	7P8LZ • 7P8JL
Mon 5 Oct	Kwa Duma	ZS/EC-017	13	First activation	ZS6LZ • ZS4AA
Tue 6 Oct	Thaba-Kholo	ZS/EC-025	13	First activation	ZS6LZ • ZS4AA
Wed 7 Oct	Sekibinyana	ZS/EC-019	13	First activation	ZS6LZ • ZS4AA
	Dooiemanskran	ZS/EC-020	13	First activation	ZS6LZ • ZS4AA
Thu 8 Oct	Ben Macdhui	ZS/EC-001	13	Previously activated	ZS6LZ • ZS4AA • ZS4TDR
	Scobell's Kop	ZS/EC-029	13	Previously activated	ZS6LZ • ZS4AA • ZS4TDR
Fri 9 Oct	Bell Kop	ZS/EC-099	10	First activation	ZS6LZ • ZS4AA
	Eagles Crag	ZS/EC-088	10	First activation	ZS6LZ • ZS4AA
Sat 10 Oct	Aasvoëlberg	ZS/FS-006	10	First activation	ZS6LZ • ZS4AA
Sun 11 Oct	Ventersberg	ZS/FS-029	10	First activation	ZS6LZ • ZS4AA
		ZS/FS-217	10	First activation	ZS6LZ • ZS4AA
TOTAL (15 SUMMITS)			180	12 first activations • 3 previously activated	



PLEASE LISTEN OUT

Activation times are intentionally not published at this stage. Weather, terrain and progress between summits will determine when we reach each activation zone, particularly during the three-day Eastern Cape traverse. Alerts will be refined closer to the expedition and the Sandton ARC support team will assist with live spotting and updates on SOTAwatch.

LIKELY HF BANDS

40m • 30m • 20m • 15m • 10m

CALLSIGNS

Lesotho: 7P8LZ • 7P8JL • 7P8TR

South Africa: ZS6LZ • ZS4AA • ZS4TDR

AN INITIATIVE OF THE
SANDTON AMATEUR RADIO CLUB
ZS6STN

SUPPORTING SUMMITS ON THE AIR AND PARKS ON THE AIR

73 and see you on the frequency!

Two Radio Amateurs, One Lighthouse and an Adventure at Diaz Point

Michael Rudloff, V51Q - Radio Active Group, Namibia

How a Simple Lighthouse Idea Became an International Radio Adventure

The idea was actually quite simple - why not activate Lighthouse NA-004, a lighthouse that had never been put on the air by amateur radio and connect it with radio amateurs around the world?

That simple idea brought two members of the Radio Active Group, Michael "Mike" Rudloff, V51Q and Mathias "Mat" Müller, V51F together for an expedition to Diaz Point near Lüderitz, in Namibia. Their goal was to activate the lighthouse under the international Lighthouse/Lightship Weekend (ILLW) designation NA-004 during the weekend of 14 and 15 August 2026.

While Mike and Mathias were planning their expedition to Diaz Point, colleagues from the NARL were once again preparing to activate the lighthouse in Swakopmund under the call sign V51NAM.

At that point, nobody knew that what was supposed to be a straightforward radio weekend would turn into a little adventure involving improvisation, difficult weather, technical failures, a shipwreck and even a hyena.

The preparations for Diaz Point had started months before the event.

The campsite was booked well in advance and everything appeared to be confirmed. For the portable radio operation, an additional mast was specially constructed, including a custom-designed sliding carriage system. The antennas were carefully selected to provide maximum flexibility

during the expedition.

The planned station system consisted of:

- ◆ Antenna OptiBeam OB11-5 mounted on a 12-metre mast, covering 10 – 20 metres including the WARC bands
- ◆ Multiband vertical antenna with a small SteppIR
- ◆ Home-built 40-metre vertical antenna with elevated radials
- ◆ The radio stations included:
- ◆ Icom IC-7300 with linear amplifier
- ◆ Icom IC-756Pro3 with linear amplifier
- ◆ Wi-Fi router
- ◆ Monitors
- ◆ Laptops

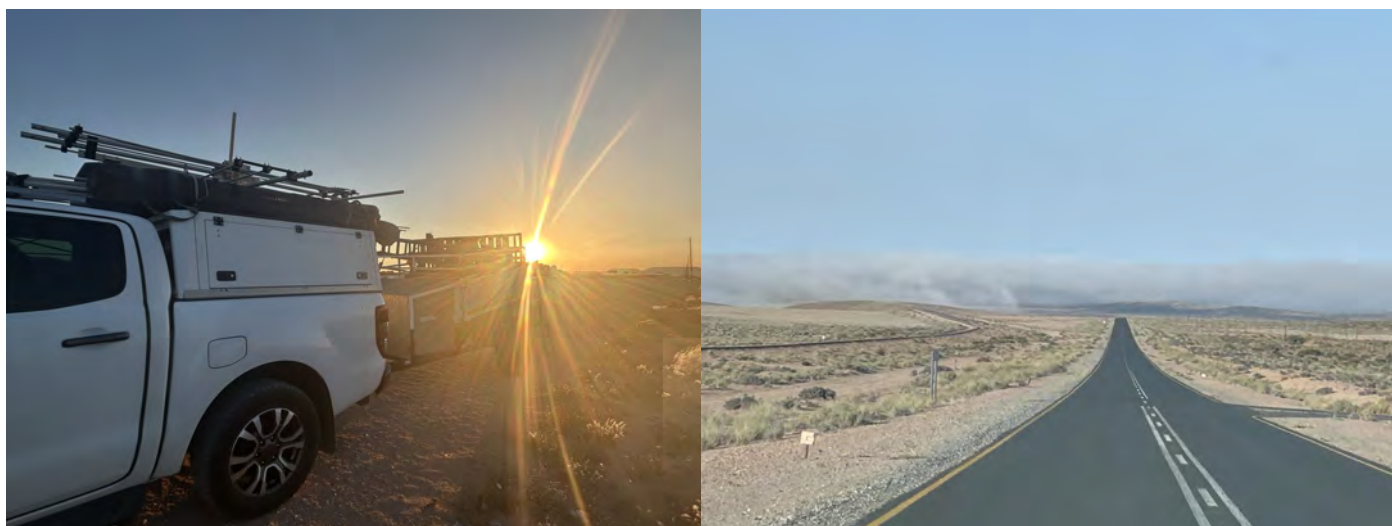
The operation would cover SSB, CW and FT8.

Of course, a portable amateur-radio station requires much more than radios and antennas. And then came the first surprise.

Only a few days before departure, Mike V51Q received an e-mail from the campsite manager. The message was short, 'The campsite was being renovated and could no longer be used.' For most people, that would have been enough to cancel the trip. Mike saw it differently. His response was essentially, "No problem. We have tents. The beach is big. We'll make a plan. Don't worry." And with that, the problem was considered solved.

The equipment was gathered and the large trailer was collected. Then came the major task:

(Continued on page 15)





(An Adventure at Diaz Point from page 14)

loading everything. Two generators - a 9 kVA and a 3 kVA unit had to be loaded, along with a freezer, the 12-metre mast, two OZ tents, large quantities of coaxial cable, tools and countless other pieces of equipment. The radios, amplifiers, monitors, laptops and cables had already been packed into our Field Day boxes and were loaded into the car. Finally, the mast sections, antenna elements and the partially assembled centre boom section of the OptiBeam OB11-5 were loaded and securely fastened. The vehicle was packed to the absolute limit. There was no room left.

At 16:15 on Wednesday, 12 August 2026, we finally set off. Destination: Lüderitz – Diaz Point – Lighthouse NA-004. With the heavily loaded vehicle and trailer, speeds of more than 100 km/h were simply not an option. At around 22:30, we reached our first overnight stop in Keetmanshoop.

The battle plan was simple - Shower, Sleep, Wake up at 05:00, Leave at 05:30.



It was already Thursday. We continued through the barren Namibian landscape towards Lüderitz. About 50 kilometres from our destination, however, a thick wall of fog suddenly appeared. Our enthusiasm immediately dropped to S1. Shortly after midday, we finally reached Lüderitz. We first filled the fuel containers for the two generators and then headed out for the final kilometres towards Diaz Point. About 30 minutes later, we arrived completely exhausted. Not only because of the long drive. But also, because of what we saw when we got there. We got out of the vehicle and looked around. Something was missing. Actually, several things were missing. Where was the campsite? Where were the bungalows? Where was the tent area? Where were the outdoor bathrooms? And most importantly - **“WHAT EXACTLY WAS BEING RENOVATED HERE?”**

(Continued on page 16)





(An Adventure at Diaz Point from page 15)

Mathias and I went to investigate. Opposite the former campsite was a small tuck shop, like an old-fashioned general store, with a small restaurant serving tourists travelling to the Diaz Cross. After a short conversation with the owner, the situation became clear. The campsite had apparently been closed or effectively insolvent for almost a year. There was no renovation. Almost everything had been removed or demolished. There was - No running water, No showers, No toilets, No washing facilities, Nothing!

The e-mail we had received had not prepared us for a campsite under renovation. It had prepared us for something much worse: There was practically no campsite left. Fortunately, we were lucky. The owner of the tuck shop listened to our story and kindly offered us the use of his facilities during our stay. At least we had basic support.

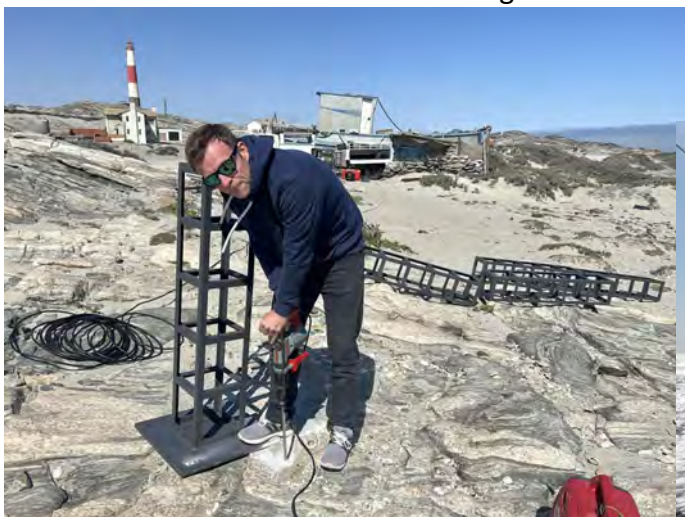
After a short discussion, we decided to find ourselves a comfortable spot on the former campsite and begin setting up. One thing was certain: We had come to activate Lighthouse NA-

004. And we were not going to let a non-existent campsite stop us.

First, all the mast sections were unloaded, together with tools, the small generator and a Hilti drilling machine. About six meters from the ocean, at low tide, we found a suitable granite rock. That rock would become the foundation for our antenna mast. Then the hard work began. Using the Hilti drill, we drilled 20-millimetre holes into extremely hard granite. It took almost one and a half hours to complete the holes. The first mast section was then installed with its 20-millimetre base plate and custom sliding carriage system. Two more mast sections followed. The tower was now approximately one-third of its final height.

We now needed quite urgently to find a secure spot to sleep and operate. It could not be too far from the mast because our coaxial cable had to reach the radio station. And then we found our new home. An old shipwreck. Inside the wreck was an old ship's cabin a tiny two-person cabin. For our expedition, it was almost perfect. First, it needed cleaning. The rubbish and debris were removed and the cabin was thoroughly cleaned. Then we

(Continued on page 17)





(An Adventure at Diaz Point from page 16)

moved in with all our equipment. Mathias started assembling the radio shack and setting up the 40-metre and SteppIR antennas. I concentrated on the mast.

By around 18:30, after climbing up and down the mast countless times, the mast finally stood at full height. The 40-metre antenna was installed. The SteppIR antenna was ready. Then the Radio Active flag was raised together with the sliding carriage. Our first-day objective had been achieved. Now it was time for dinner.

The cast-iron three-foot pot came out. Firewood, meat, vegetables and the rest of the ingredients followed. While Mathias was already entering the first QSOs into the logbook, I temporarily became "Q the Cook." Starting a fire at Diaz Point was not exactly easy. The wind never seemed to stop. After a small modification to our setup, however, we managed to get the fire going. The goulash began to cook. Two hours later, dinner

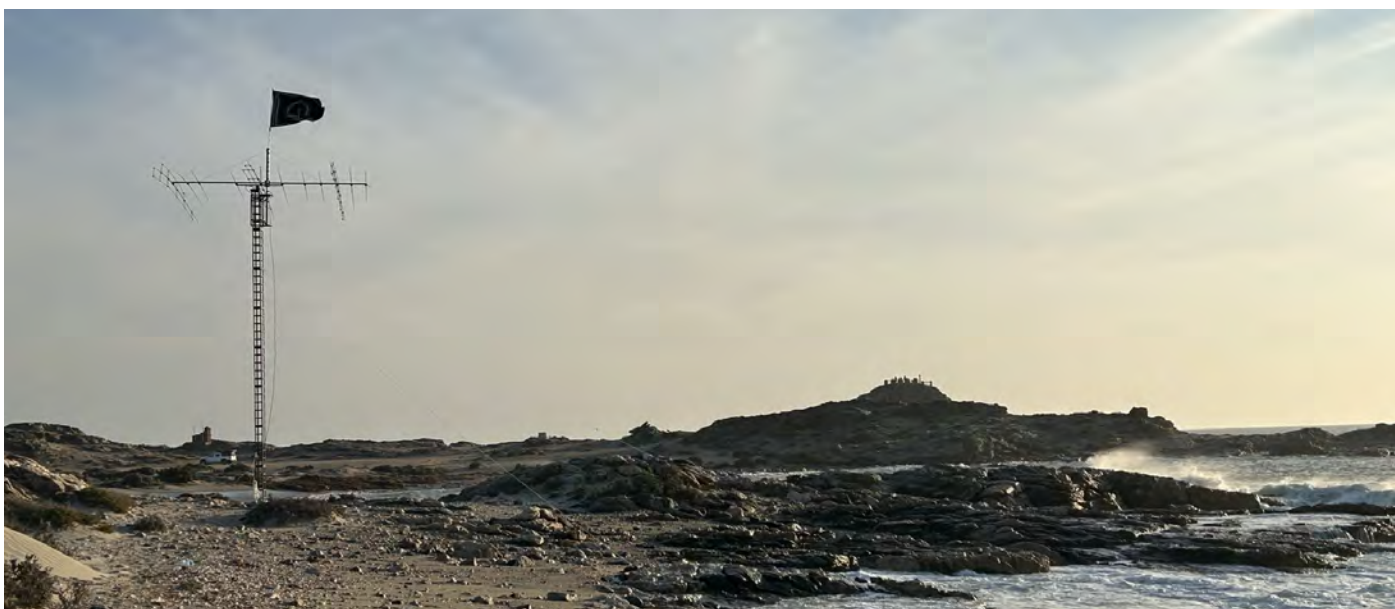


was ready.

Meanwhile, a cold-weather front was moving in. Outside, conditions were becoming increasingly unpleasant. Inside our tiny two-person radio cabin, however, the atmosphere was excellent. Mathias' gas heater kept us warm. The hot goulash took care of our hunger. And on 15 and 40 meters, the bands were alive. QSOs were being logged one after another. Everything seemed perfect. Then suddenly...

Darkness. Very great Darkness. The entire station went dead. No electricity. The 3 kVA generator had stopped. But why? We had no choice but to go outside into the cold. The generator was inspected. Nothing obvious was wrong. The tank was almost full. We restarted it. Power returned. Everything was working again. Back to the radio! But only about 20 minutes later, right in the middle of a pile-up, it happened again. Everything went dark. AGAIN...! This time,

(Continued on page 18)





(An Adventure at Diaz Point from page 17)

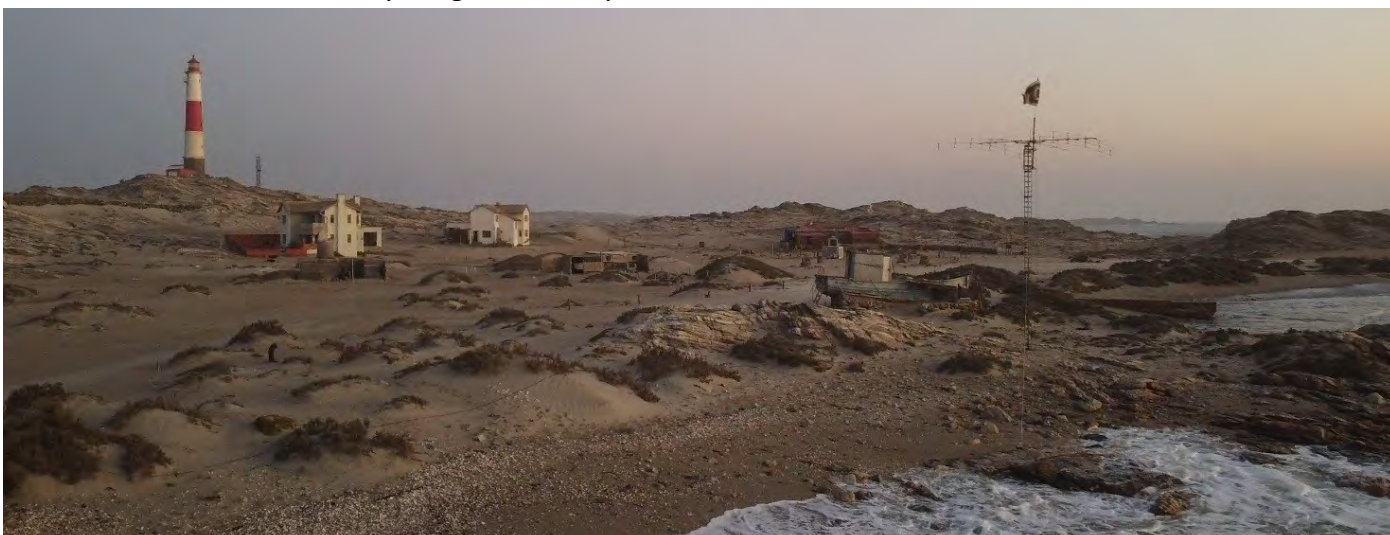
however, the 3 kVA generator refused to start. Our mood became considerably darker as well. Dense fog, cold temperatures and darkness did not make the situation any better. There was only one solution. The big brother had to take over and the 9 kVA generator was started. From that point onward, the power supply ran perfectly.

The night passed quickly. Far too quickly. By early Friday morning, the 40-metre band was already busy. A few more stations were worked and then came the next challenge: Get the OptiBeam on top of the tower into the air. The sliding carriage was lowered and the antenna boom was attached. Then the real work began. Element by element, the antenna was assembled onto the boom. Once everything was ready, the

entire antenna assembly had to be lifted the mast using the sliding carriage. Nearly six hours later, the job was finally complete. The OptiBeam OB11-5 stood proudly approximately 12 meters above the ground and the Radio Active flag was flying wildly at the top of the mast. The mast was additionally guyed and secured in all directions. Then came the moment of truth. The antenna analyse showed an SWR between 1:1 and 1:1.3 on all five intended bands. Perfect!

Only a few final changes were needed inside the shack. Then it was time. Under the event call sign V55LH, Lighthouse NA-004 was activated for the first time by amateur radio. The main objective of the entire project had been achieved: Connect Diaz Point Lighthouse with radio amateurs around

(Continued on page 19)





(An Adventure at Diaz Point from page 18)
the world.

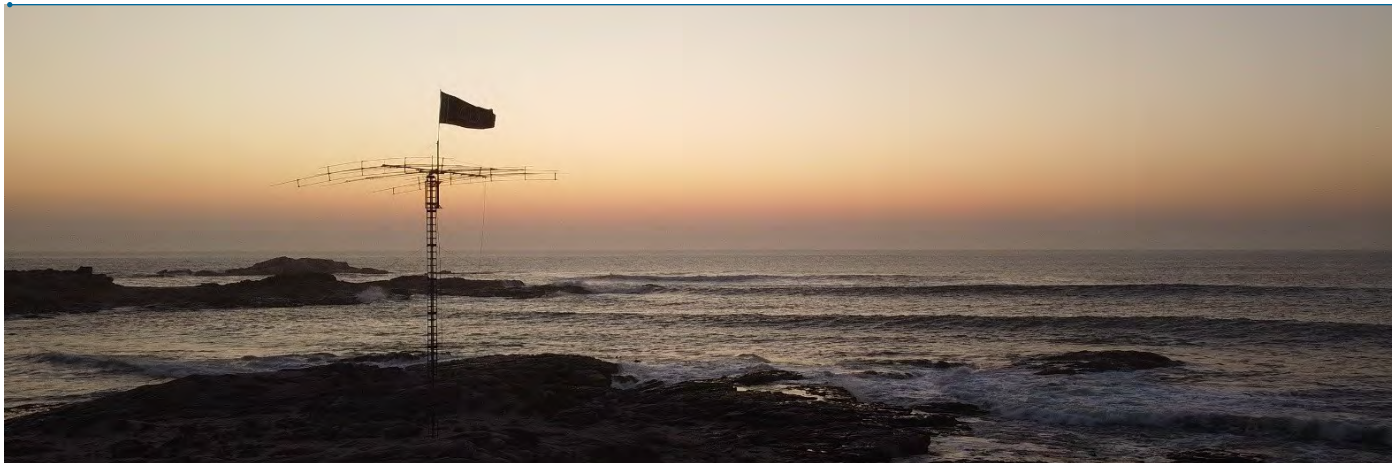
Then things really took off. One pile-up followed another. The 10-metre band was open. Shortly afterwards, 20 meters opened. FT8 was running in parallel on 15 meters. V51Q and V51F were completely in their element. V55LH was being heard and spotted around the world. Contacts came from every direction: Europe. The United States. Brazil. Asia. Japan. Australia. Mathias and I had our hands full. Also, our "Lighthouse neighbours" in South Africa were

heard (S7 – S9) and quite busy. Mat and I managed to have a few nice QSOs with them. Of course, we were also thinking about our colleagues from the NARL in Swakopmund operating V51NAM. Several attempts were made to contact them. Unfortunately, without any success. We could not even find a V51NAM spot on the major DX clusters. *A great pity.*

Meanwhile, sparks were literally flying at the "**Diaz Point Shipwreck Radio Shack.**" Thanks to good radio conditions, hot goulash and the gas

(Continued on page 20)





(An Adventure at Diaz Point from page 19)

heater, we continued operating until around 03:00 in the morning. Then sleep was no longer optional. It was necessary.

At 05:00 on Saturday morning, the alarm went off. Only a few minutes later, V51Q and V51F were back on the air under V55LH for the Greyline DX. Australia and the United States were coming through on 40 meters. Later, we moved to 15 meters. And that was how the entire Saturday continued. One band opened after another. Then came another pile-up. And then another. During the few quiet moments, we used the drone to capture aerial footage, checked the antennas and refuelled the generator. The weather, however, showed no intention of improving. It remained: Windy, Wet, Cold and Foggy. The fog became so thick that it seemed to whip sideways directly into our faces. But we refused to stop.

At around 23:00, we were once again in the middle of a pile-up. Suddenly, Mathias noticed an

unusual smell. Hot oil. The smell was coming into our tiny cabin. What was happening now? Where was it coming from? And please... Don't let it be the generator! Armed with flashlights, we went outside to find the source. The cold and fog hit us immediately. The smell was clearly coming from the bow of the shipwreck exactly where the generator was located. The generator was smoking... #\$\$! As we approached, we saw petrol and oil spraying from the machine. It was immediately obvious. A connecting hose between the engine and the fuel tank had been torn off. And it was gone. But who or what had done it? The tracks found next to the generator gave us the answer. A hyena. And judging by the evidence, not a small one. Our mood dropped literally below sea level. (S-3). We had no third generator. Was this really going to be the end of our international lighthouse operation? At that moment, there was nothing more we could do. We went to bed.

(Continued on page 21)





(An Adventure at Diaz Point from page 20)

At 06:00 on Sunday, 16 August, the alarm went off. The plan was clear: Giving up was not an option. The solution was only about 120 meters away. The owner of the tuck shop, affectionately known as “Boetie,” would have to help us and after a short telephone call, he promised to organize a generator. There was just one problem. He could only bring it to us around midday. Well... Better than nothing. To fill the next four or five hours, Mathias and I explored the surrounding area. We took photographs and videos, visited the old German ruins, inspected the lighthouse itself and explored the numerous abandoned buildings of the former military base.

Then, finally, it happened. Just before 13:00, Boetie arrived with a generator. Fifteen minutes later, V55LH was back on the air. And once again, the pile-up started. Our world was back in order and the Radio Active Group was back in action. We operated whenever the bands were open. SSB, CW, FT8. The pile-ups continued. We repeatedly attempted to contact the NARL team in Swakopmund under V51NAM, but unfortunately every time without success.

V55LH continued operating almost continuously until early Monday morning. The demand was enormous. Then, shortly after 03:00

in the morning, the station was finally shut down. This time, voluntarily. The adventure was over. Two exhausted but extremely satisfied radio amateurs finally went to sleep.

The ILLW 2026 activation at Diaz Point had been a complete success. Throughout the event, we received numerous reports and messages via radio, the internet and mobile phone. Again and again, we heard and read the same comment: V55LH was incredibly strong. Some stations reported signals reaching as much as 40 dB over S9. For a portable station operating from a former campsite, inside an old shipwreck cabin, next to the Atlantic Ocean, that was something special.

Then came the final challenge: Taking Everything Down! The next morning, neither of us really wanted to get up. There was one final task waiting for us. The worst one. Everything had to come down. Everything that had taken many hours to build now had to be dismantled, packed, loaded and secured. After a light breakfast, we started. As during the setup, we divided the work. Mathias took care of the radio shack and the smaller antennas and I handled the OptiBeam and the mast. By around 17:00, everything had finally been dismantled, packed, loaded and secured. Before leaving Diaz Point for the last time, however, we

(Continued on page 22)



(An Adventure at Diaz Point from page 21)

made one final visit to the famous Diaz Cross. And, of course, we took a few more photographs.

The Long Journey Home! At 18:30, we were back in the completely packed vehicle and heading towards Windhoek. We drove until we were approximately 20 kilometres from Keetmanshoop, where we stopped at a roadside rest area. We slept for about two and a half hours. After that, Mathias and I took turns driving. We made several breaks and eventually arrived safely back in Windhoek at around 08:30. Almost 1,000 kilometres of driving had left us exhausted. But we were also extremely satisfied.

What began as a simple idea "Let's activate the lighthouse at Diaz Point by amateur radio." turned into a small but extraordinary adventure. There was - no campsite, no water, no showers, no toilets, a failed 3 kVA generator, a cold-weather front, strong winds, dense fog, a second generator failure and a hyena acting as an unwilling saboteur.

But there was also something much more important: Teamwork, Improvisation, Technology,



Humour and above all: A passion for amateur radio. With V55LH, Lighthouse NA-004 at Diaz Point was activated by amateur radio for the first time and connected with radio amateurs across the globe.

The project also attracted attention from another audience. Many tourists visiting the Diaz Cross stopped by our radio station. They wanted to know what we were doing and asked a lot of questions. They were fascinated by the antennas, radios, computers and the idea that two people sitting beside an old shipwreck could communicate with people thousands of miles away. Some visitors even saved the Radio Active Group Namibia social media Facebook page on their phones and said they were looking forward to future updates.

And whenever people asked us the same question "Why do you go to all this trouble?" We always had the same answer - Because we have an enormous amount of fun doing it...

AND BECAUSE WE CAN!



The NR-1 Antenna Noise Blanker

Kostas, SV3ORA



I am Kostas, SV3ORA, from Greece and the designer of the NR-1 Antenna Noise Blanker. The NR-1 is a noise blanker that operates directly on the antenna signal. It can significantly reduce strong impulse noise, such as power-line interference, without requiring the separate noise antenna typically used by QRM eliminators.

You can find the project here <http://grp.gr/nr1/>.

Since many radio amateurs suffer from impulse-type interference, I wonder if the NR-1 might be of interest to your members. Would you be willing to mention it to them, include a short announcement in your club newsletter, or suggest another appropriate way of letting your members know about it?

There are several demonstrations and reports

from radio amateurs around the world who are already using the NR-1. YouTube demonstrations www.youtube.com/playlist?list=PL0KwxiKZqJ1TzQpsc3voh5CR1c30WLD

NR-1 manual http://grp.gr/nr1/sv3ora_NR-1_Antenna_Noise_Blanker_manual_EN.pdf

The main NR-1 page also contains user reviews, magazine publications and additional technical information.

For those interested in purchasing a unit, the NR-1 is available from Elisys in Greece, with worldwide shipping <https://shop.elisys.gr/products/nr1/>

Thank you for your time and I would be very pleased if you could share the NR-1 with your members.



Modulation

Scott Freeberg, WA9WFA

first published in On the Air, July/August 2026

Amateurs talk about using different amateur radio modes, such as CW, phone or digital, but these modes are more than just names for ways of getting on the air — they are different ways of modulating a radio wave.

The term *modulation* defines a method where intelligence or information is added to a radio wave. The radio wave, or RF *carrier*, contains no intelligence or information until it is *modulated*, or modified, using a format that is understood by both the transmitting and receiving stations. The modulated carrier is then transmitted across the airwaves where it is received at a receiving station and de-modulated to recover the intelligence. You use several of the popular modulation methods daily, including CW, SSB, FM, RTTY and AM. They are all different ways to modulate a carrier.

Continuous Wave (CW)

Continuous wave using Morse code is the most basic form of modulation in our hobby. A radio signal itself carries no intelligence or information until it is modulated by turning on and off in a pattern that is recognized by both the transmitting and receiving stations. In amateur radio, Morse code is that recognized pattern of dots and dashes. While the term *CW* is an abbreviation for *continuous wave*, today it more commonly refers to a radio carrier that is turned on and off (modulated) using the Morse code format.

A CW radio carrier can be 3 kHz wide but you only need perhaps 500 or 800 Hz of bandwidth to hear and understand the message, so it is very bandwidth efficient. It is also power efficient because the transmitter is turned on only when a

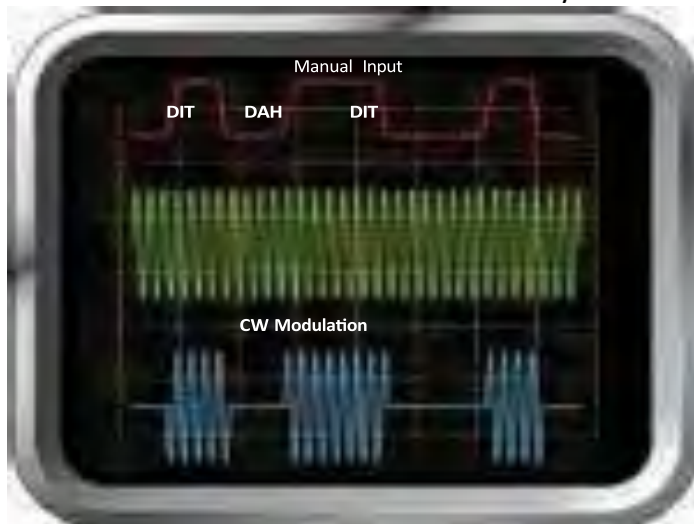
dot or dash is sent, otherwise the carrier is off most of the time.

Amplitude Modulation

Amplitude modulation (AM) is used to transmit voice intelligence over the airwaves and as the name suggests, the RF signal *amplitude*, or variation in the strength or intensity of the radio wave, is modified by your voice while the RF carrier frequency remains constant. When you speak into your transceiver's microphone, the voice audio is converted to electrical signals that are added or *mixed* with the RF carrier prior to transmission. The mixing process creates a radio signal with an RF carrier and two audio *sidebands*, commonly referred to as *upper sideband (USB)* and *lower sideband (LSB)*, depending on which side of the carrier it is on. Both sidebands carry the same audio voice information. When an AM signal is viewed on a frequency spectrum analyser, the carrier is in the middle and the sidebands are on either side.

AM requires a lot of power because the transmitter is on 100% of the time during a transmission, even when no one is talking. It would be like holding your Morse code key down for 5 or 10 minutes at full output power. It also occupies a much wider bandwidth than CW, on the order of 6 to 9 kHz wide that provides a wonderful high-

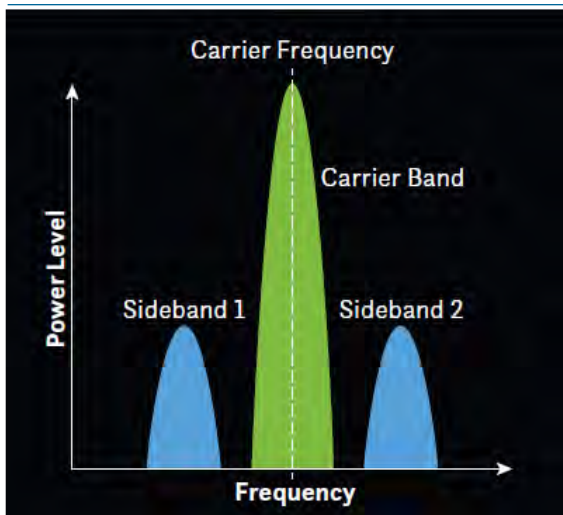
(Continued on page 25)



CW modulated by the Morse code letter "R."



In AM modulation, the carrier frequency remains constant and the signal amplitude changes.



(Modulation from page 24)

fidelity audio that is easy to listen to.

Single Sideband Suppressed Carrier

Single sideband (SSB) suppressed carrier is a form of amplitude modulation that is further modified by removing or suppressing both the RF carrier and one of the two sidebands, leaving just a single sideband to carry the intelligence. An RF carrier is still required to transmit the signal across the airwaves, but the carrier power is directly proportional to your voice amplitude. When you speak, your voice is not at a constant amplitude the whole time. Voice amplitude rises and falls as you speak and there are many pauses in between words and sentences or taking a breath. The transmitter carrier output follows all these changes, so there is full power applied when speaking and no output during the pauses. It is only transmitting when you are actually talking and generating voice signals in the microphone.

Since only one sideband is transmitted, the result is a narrow 2 to 3 kHz transmitted bandwidth, compared to a typical 6 to 9 kHz AM signal bandwidth. This means that many more SSB stations can operate in the same frequency band than was possible with AM.

Recall from our AM discussion the modulator creates two sidebands, but which sideband do you use? An HF upper/lower sideband convention evolved over the years where lower side-band is generally used on the 40 to 160-metre bands while upper sideband is used on 30 to 10 metres. The new 60-metre (5 MHz) band is an exception where USB is used. Today's modern transceivers automatically select the correct sideband per the convention but also lets you change to the

Which Sideband Are You On?

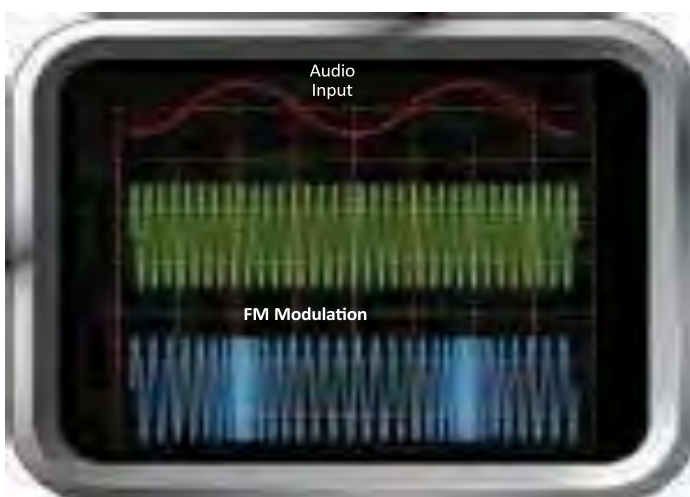
Sidebands are mirror images of each other, so it does not matter which sideband is used for communicating, provided the receiver is operating on the same sideband. Amateurs use lower sideband (LSB) on some frequencies and upper sideband (USB) on others as a matter of tradition. Early radio designs used a 9 MHz intermediate frequency (IF) circuit that made it easier and less expensive to use LSB for frequencies 7 MHz and below and USB on frequencies 14 MHz and above. Advances in technology have made this unnecessary. Today most commercial, maritime and military communication systems that use SSB use USB only.

opposite sideband to avoid interference.

Frequency Modulation

Frequency modulation (FM) is where the signal amplitude remains constant while the RF carrier frequency is modulated in proportion to your voice. This is directly opposite of how AM works. FM has an advantage over AM because it tolerates atmospheric noise, lightning crashes and interference better than AM. Also, when two FM stations are transmitting at the same time, only the stronger station will be heard, unlike AM where both stations are heard and are interfering with each other. FM is a power-intensive modulation because the transmitter carrier is on the whole time the microphone button is pressed, even when you are not talking.

You use FM modulation all the time when operating on 2 metres (144 MHz) and 70 cm (440 MHz) simplex and repeaters. You might be surprised to learn that FM is also used on 10 metres as well. FM is not found on any of the other



In FM modulation, the signal amplitude remains constant and the frequency changes

(Modulation from page 25)

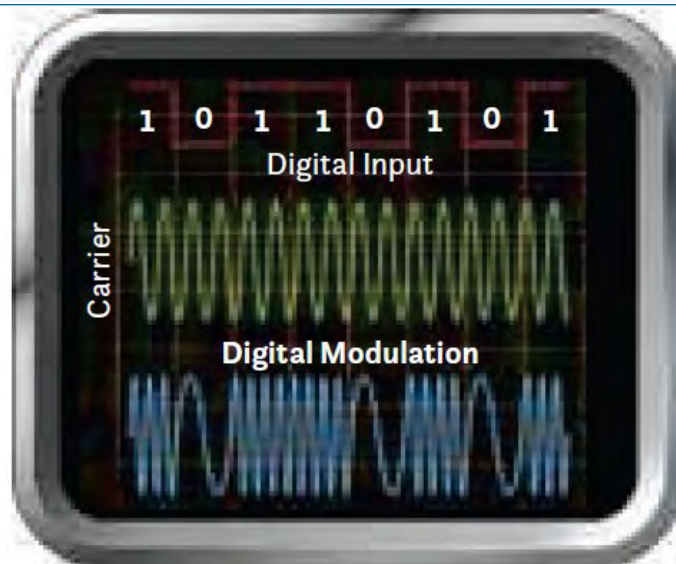
HF bands.

Digital Modes

The popular digital modes like WSPR, Radio Teletype (RTTY), Slow Scan TV (SSTV) and others, all use single side-band modulation to transmit information over the airwaves, but instead of voice, audio tones are transmitted. Computers and commonly available software convert computer-generated digital signals into tones using Audio Frequency Shift Keying, or AFSK for short. AFSK tones are fed into your SSB transceiver microphone input and sent over the air, just like a voice transmission but using tones. The single sideband AFSK signals are received at the receiving station where another computer decodes and displays the information on a computer screen.

Where the Modulation Magic Begins

There are other modulation techniques, both old and new, but the ones discussed here are the main forms that are used. All radio carriers need to be modulated for intelligence and information to be passed between a transmitting and receiving



In the digital modes, a computer converts data into audio tones of varying frequency or pitch that are then injected into the audio circuits of the transmitter to be sent over the air.

station. Without modulation, an RF carrier is just there, doing nothing, communicating nothing. The moment modulation is added, the wonders of radio communication come to life and we can communicate our thoughts all over the world.

“Someday” ... it will happen to us all

Woody Collett, ZS3WL

Thanks for Marinus, ZS6MAW and Thys, ZS1TBP for providing me with the text for this thought-provoking document in so that I could type it out and share it with a wide audience. The author thereof is unknown and we all take something away from this for our betterment.

If you are an Old Timer in your 70's or 80's and beyond, stay with me for a couple of minutes.

You probably remember when you were young. Your hands did not shake, your knees did not hurt, you could climb a tower, stay awake all night working DX, then go to work the next morning and somehow do it all over again the next day.

But that was “BACK THEN!”

We did it all... then “something” happened... the years started disappearing. The children grew up, then the grandchildren came. Friends started passing away! Your parents disappeared from family photographs and became the people in the photographs. And one by one those all too familiar call signs stopped answering.

I hate those two words. Because a call sign is not just letters and a number - it makes one think! The guy that called you every Sunday morning...

The friend that helped you put your first antenna into a tree. It is someone you argued with about antennas for 30 years

It was the guy who always finished with “73 old man, catch you tomorrow.”

Until Someday Happened...

Maybe it is that something the only an Old Amateur can truly understand! You can spin across



(Someday from page 26)

a frequency that you have not been on for years and suddenly remember exactly how someone sounded there... Just for that split second.

Some of you reading this may have buried your best friend, some have buried a brother, some have buried a child. And some of you have had to do the unimaginable... you buried the person that you promised to grow old with.

You came home afterwards. Opened the door and the house had never sounded so quiet

There were two coffee cups.... alas now there is only one

Two pillows... now there was only one person sleeping in that bed!

And maybe late one night when you could not stand that silence anymore you walked into the shack.

With a "click" you turned on the power supply. The display illuminated that dark room... static emanated from the speaker.

Then suddenly you reached for the microphone and for a little while listened.

Maybe Amateur Radio did not just entertain us, it was life BACK THEN.

Not because radio waves are a powerful medicine... but because its purpose is powerful.

There was a net tomorrow... someone was expecting you. Twenty meters might open. There is still an antenna that needs fixing, One more country to work... one more friend to talk to. And sometimes life gets very quiet

We spend our lives telling our families about

our radios. "Don't touch that one." "That amplifier is worth a small fortune." "You won't believe just how rare that QSL Card is"... But someday our families will stand in that shack without us!

They will look around and probably have absolutely no idea what half of it does... they see radios, microphones, CW keys, amplifiers, coax... and boxes of connectors we were definitely going to use "SOMEDAY." Then maybe your daughter or son will pick up that old microphone and then REALIZE and appreciate the bigger picture!!

They will look at the worn spot on the Chair. And suddenly it will not be an old radio room anymore, it was Dad's room.

Eventually those radios will go elsewhere. The tower may come down; the antennas will disappear from the skyline... Someone else will own that amplifier that you saved for years to buy. Someone might buy your favourite radio at a Hamfest and never know anything about the man who loved it... They will not know about the Christmas morning that you snagged a rare station... They will not know about the friend whose voice came through the speaker every morning for 25 years... They will not know about the night you sat in the chair with tears running down your face... and another amateur stayed on frequency talking to you until you were okay... To them it is an old radio, but to you it is priceless.

And eventually... your call sign will become quiet, no more QRZ... no more CQ no more "73 Old Man, catch you in the morning"

(Continued on page 28)



OLD TIMER®

(Someday from page 27)

Somebody will type you call sign into a computer and see those two fateful letters... SK!

But what I want every amateur reading this is to remember this:

You are here TODAY! Your radio still turns on, your microphone is still sitting there, your friends can still hear your voice... call the guy you have not talked to lately... check into the Net, work the DX, tell the same story already told 50 times and when another Old Timer tells his storey for the 51st time. Listen to it again... because SOMEDAY you will miss that story and SOMEDAY you will miss that voice.

I am 61 now... And I have started to understand something that I could not understand when I was 30. We were chasing life. Every sunrise after an all-night contest. Every tower we climbed. Every antenna we built. Every Ham fest Breakfast, Every QSL Card, Every argument as to whose antenna was better... Every "73," every "catch you tomorrow." They were little pieces of a lifetime and we did not know it while it was happening!

So tonight go into your shack... But Do Not Immediately Turn On The Radio. Sit here for a minute. Look around. Look at that old CW Key. Look at those QSL Cards... Look at the photographs... Remember the voices that used to come though the speaker... Remember the guys

who are not answering calls anymore. And if your eyes get a little wet... it means you were lucky enough to have people in your life worth missing.

Then turn on your radio... listen to the static... find a clear frequency, reach for the microphone, press the PPT and call "CQ CQ CQ CQ."

Because somewhere tonight there may just be an 82-year-old amateur, sitting all alone in a quiet house. His wife is gone; his friends are disappearing, his Children live hundreds of kilometres away and that radio might be one of the few things left connecting him to the outside world. Then he hears your CQ call, he reaches for his microphone and for the first time today he has someone to speak to. Think about that, your signal may have travelled a thousand kilometres... but the most important distance it travelled was to the old man's speaker.

That is amateur radio and that is what we really have been building all these years!

Not towers... not stations, not DXCC totals... and "someday" yes, the radio will go silent, but not tonight! Tonight we are still here, tonight there are still friends waiting... so go on and turn on that radio... It might be the last chance you may get because "SOMEDAY" your call sign will not be heard anymore.

"73, Old Man!" ... "73"

CQ Hou Koers is die Voortrekkers se nasionale amateur radio kommunikasiedag en vind plaas op Saterdag 17 Oktober 2026. Ja, dieselfde naweek as JOTA as ook die BACAR-14 lansering! Gesels per amateur radio met ander Voortrekkers en Padvindings van regoor Suid-Afrika, Namibië en selfs die wêreld. Leer meer oor 'n interessante stokperdjie wat uitstekend is vir weerbaarheid en puik inpas by dit wat Voortrekkers doen in terme van diensbaarheid.

Kontak Andries Visagie, ZS6VL by andries.visagie@gmail.com vir meer inligting oor CQ Hou Koers en om jou hulp aan te bied om 'n Voortrekker Kommando op die lug te sit.



Die
Voortrekkers

An 80-Metre Portable Vertical

David Cutter, G3UNA

first published in QST, November 2025

In this article, I describe my design for a nearly quarter-wave vertical that can stand alone or serve as the building block for any array of several phased verticals (see the lead photo).

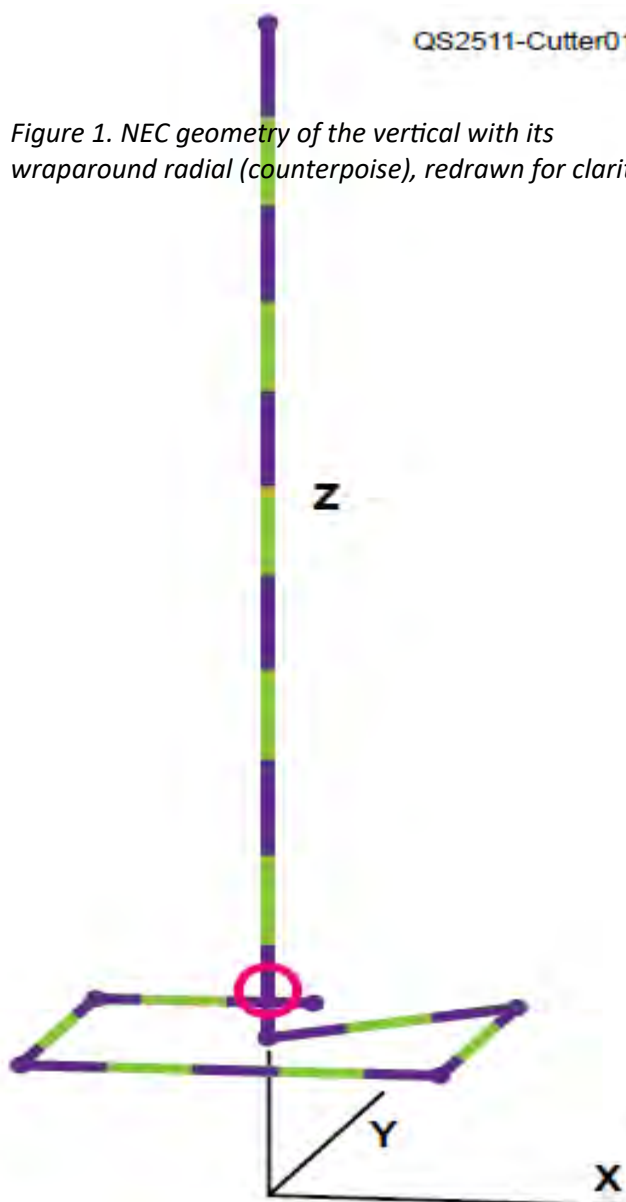
General Outline

This antenna uses a short, vertical element supported by an 18-metre telescoping fiberglass pole. The vertical part is a bit less than a quarter wave. The antenna is off-centre fed at the base, with one raised wraparound radial providing the second leg, which makes up an approximate half wave of 40,52 metres at 3,52 MHz for each element (see Figure 1). A stable 50 Ω feed-point impedance is easily achievable for a single element at that frequency and no matching devices are



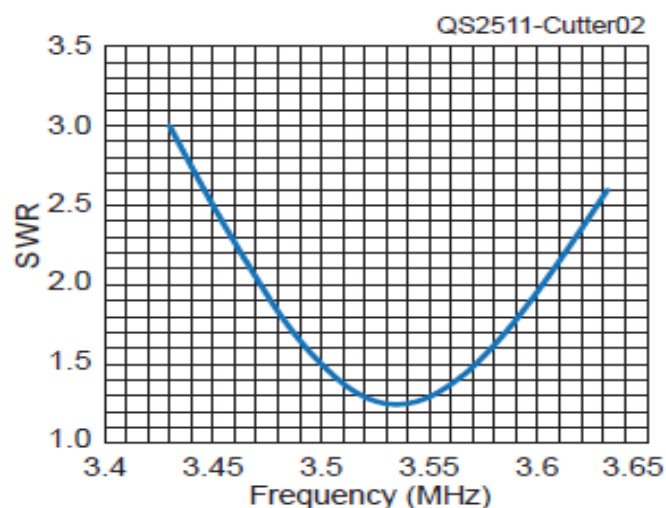
QS2511-Cutter01

Figure 1. NEC geometry of the vertical with its wraparound radial (counterpoise), redrawn for clarity



The single vertical. The derrick pole is on the ground to the right of the mast base and the wraparound radial is strung between the lower mast guys.

required (see Figure 2) this measurement was taken with about 1 metre of coax from the choke to my RigExpert AA-230PRO. I strung the radial out around the lower guy cords and trimmed it back



QS2511-Cutter02

Figure 2. The SWR curve for a single vertical

(An 80-Metre Portable Vertical from page 29)

until I achieved a dip at 3,52 MHz. It is secured to the guy cords with black tie wraps. Use a choke close to the feed point to mitigate common-mode current typical of off-centre-fed antennas.

I made this antenna from large twin loud-speaker cable, as it was the largest wire I had on hand, with the aim to achieve the best bandwidth. It consists of PVC-covered twin figure 8 wires of 76 strands of 0,2-millimetre copper-coated aluminium. I cut the vertical section to 16 metres to fit the pole and I joined both pieces to provide a thicker wire diameter. I estimated it to be #10 AWG. The lower end of the vertical is joined to the feed-line coax's inner conductor in a weatherproof box about 1,75 metres above ground. There is an approximately 27-metre single piece of the twin wire attached to the outer coax and strung to the lower guy cords at about the same height above ground. This length is a slight overestimate to allow for on-site trimming, you can allow more if you feel the need. You can also fit a static bleed resistor inside the box.

Common-mode suppression is essential to maintain a good lobe pattern in an array. I attached the choke at the feed point and I tied the feed coax to the pole down to ground level. I can tune it by adjusting the length of the radial and its height above ground. If the droop in the radial becomes an issue, then it can be tied back to the main pole with fishing line. This stabilizes its position and influences tuning. The end of the radial will have a high voltage, so it needs to be suitably terminated and insulated against accidental contact. I use a two-position terminal block, one half to hold the wire and the other half to hold mono-filament cord for support to the next guy. The total weight of wire is 1,06 kilograms. There are no ground radials, enabling easy installation and removal.

Mechanical Design

This design focuses on simplifying deployment, making it possible for one person to erect and take down this antenna (see Figure 3). In this regard, it is only slightly more complicated than regular pole erection and it is also designed to reduce operator fatigue and fumbling during inclement weather. There is minimal need for on-site tool usage, requiring only a nut driver to fit the mast clamps. See additional mast details at www.arrl.org/qst-in-

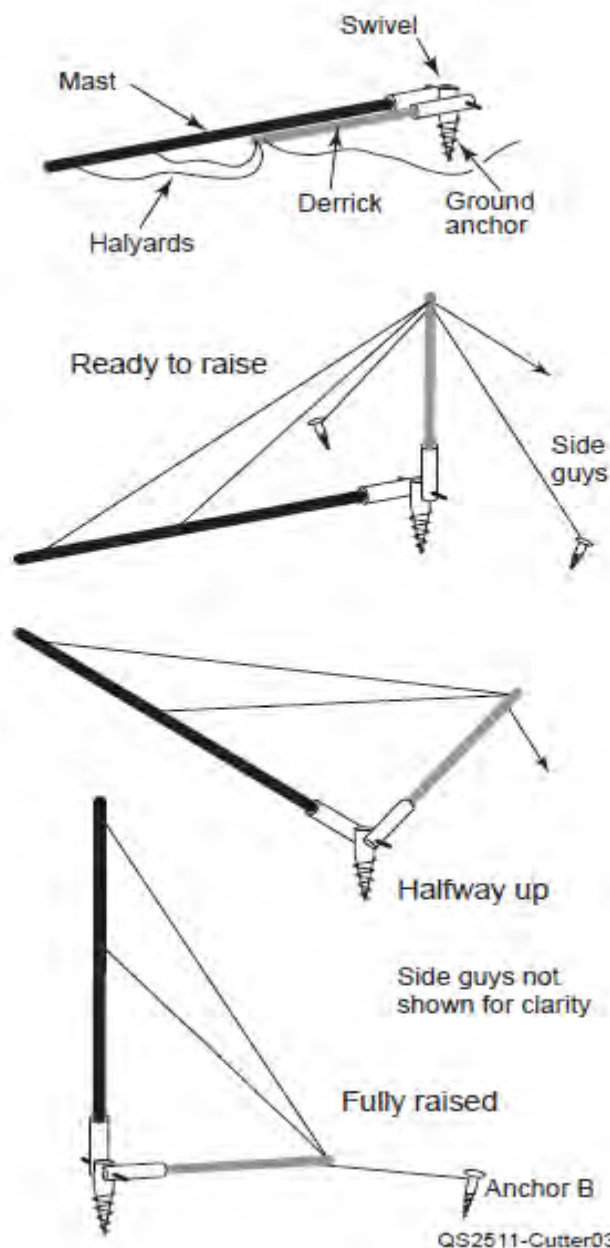


Figure 3. The one-man erection system using the falling derrick method. As the derrick pole is pulled down, the mast is pulled up

depth. Central to the design is a purpose-made swivel device (see Figure 4) for which no special tools are required; most should be able to make it in a modest home workshop. It comprises six parts and the falling derrick technique.

To assemble the swivel, you will need a ground screw with a cross bar; these are often available as temporary flagpole mounts. One of the PVC pipes should have a 68-millimetre diameter and a length of 150 millimetres to receive the falling derrick pole. The other PVC pipe should have a diameter of 95 millimetres and a length of 150 millimetres to receive the mast. Two R-pins suitable for 12

(Continued on page 31)

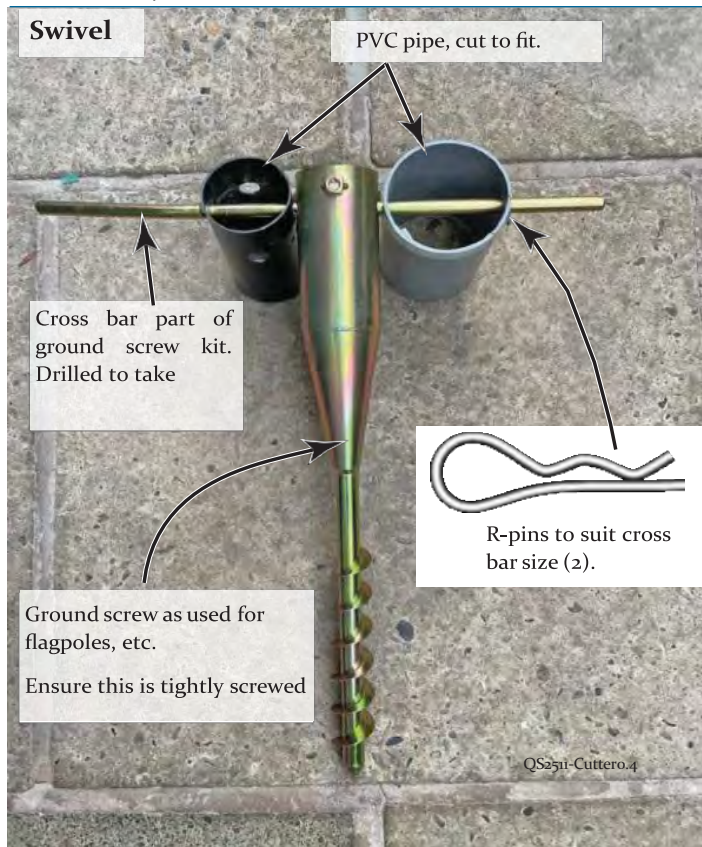


Figure 4. Swivel assembly

millimetres are needed for the cross bar. Cross-drill the PVC pipes with 16-millimetre holes to accommodate the cross bar (see Figure 5). Make the holes 2,54 cm from the top end on each pipe.

Derrick Pole

My original falling derrick pole is a 4-metre length of lightweight TV mast with a diameter of 50 millimetres. For improved portability, I also use sectional poles, which are available in various lengths and can be packaged along with the 18-

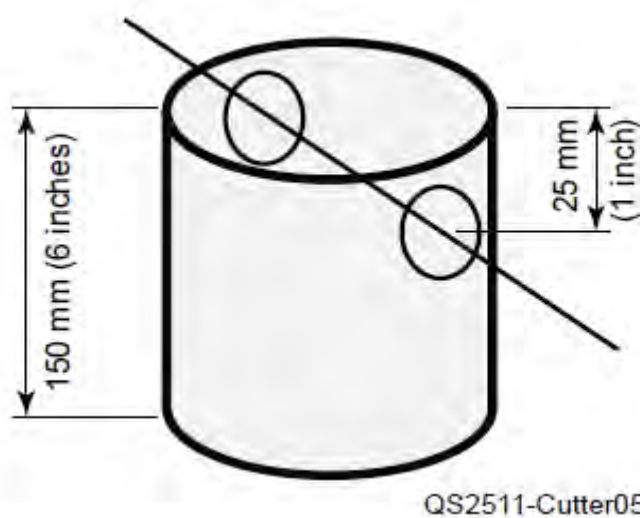
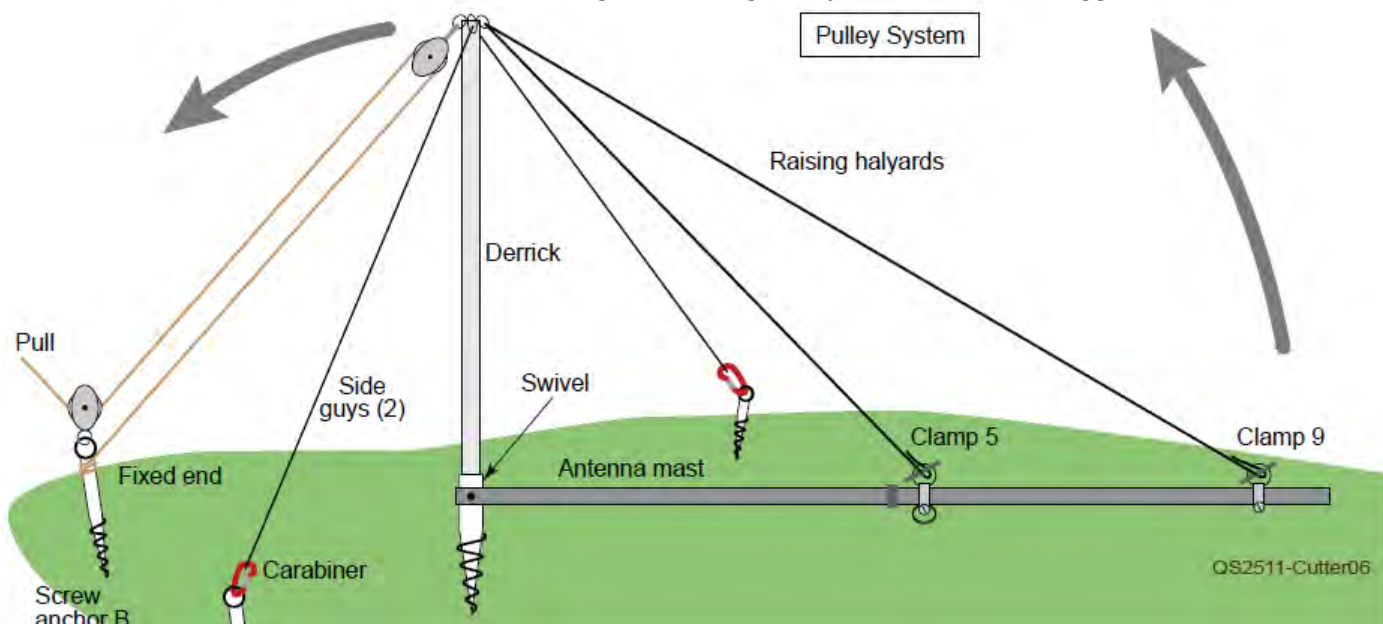


Figure 5. A diagram of how the PVC pipes should be cross-drilled.

metre pole. The derrick pole erects the main antenna pole and is fitted with side guys to ensure alignment during the raising action (see Figure 6). The side guys use the same ground stakes as the mast guys and they are easily detachable via large carabiners. I fitted the derrick pole with rings cut from PVC tube at one end to enable easy guy cord attachment. Visit www.arrl.org/qst-in-depth for further details. The main raising pull cord (halyard) is detachable from the derrick once it is grounded (raising complete). After that, the pull cord can be transferred to its own guy stake (B) in the ground nearby. The side guys and the pulley assembly (if used) remain attached to the derrick pole and the whole assembly is detached once the antenna pole is in position; the derrick assembly can then be utilized to service another pole.

(Continued on page 32)

Figure 6. A diagram of how the derrick is rigged to raise the mast



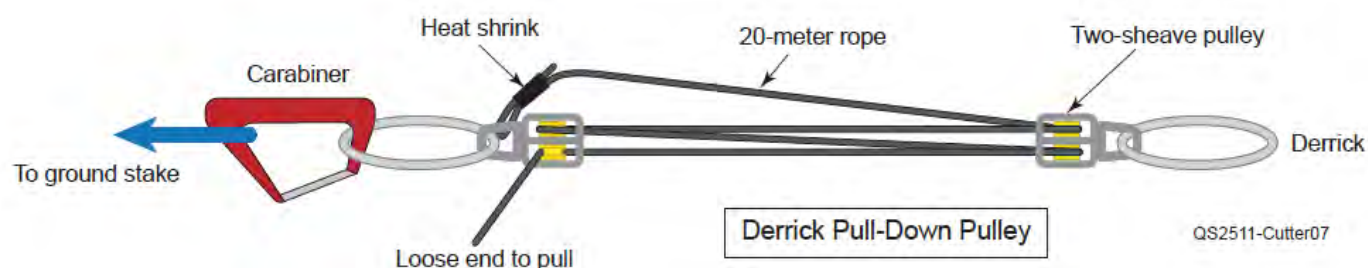


Figure 7. A diagram of the two-sheave system.

(An 80-Metre Portable Vertical from page 31)

Pulley System

Until recently, I have not needed a pulley system to raise these poles, but I now find it tiring to do this repeatedly during the experimentation phase. Some operators will find this superfluous, particularly if a pole is to be raised infrequently. I built a two-sheave version (see Figure 7) initially, but I quickly realized that I needed only a one-sheave system. I find that using the pulley system connected to the ground stake makes raising and lowering physically easier and I can also pause the process to examine and adjust any part of the arrangement, for instance, to clear any entanglement.

Antenna Groundwork

I have used a variety of screw-in guy stakes meant for anchoring things like a child's swing or a trampoline. All tested well and your choice may depend on availability and the tools you have on

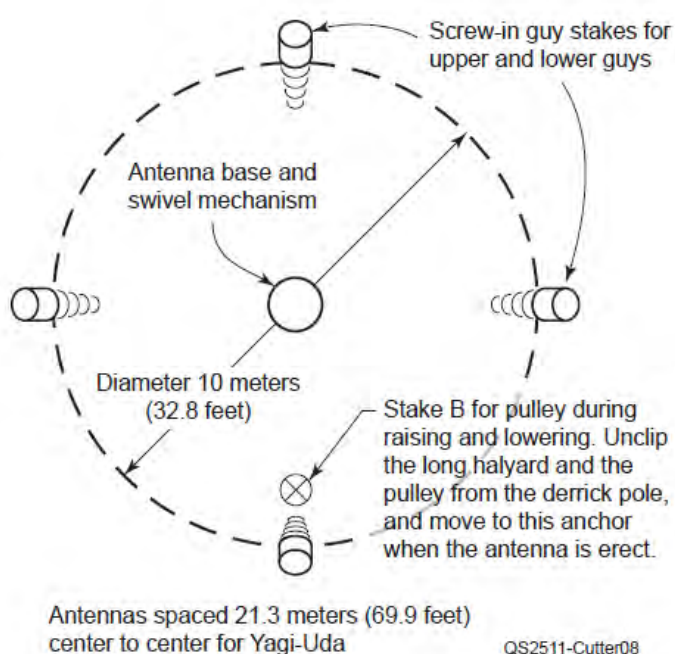


Figure 8. The general layout of the site when the antenna is deployed

hand. Some can be driven with an electric screwdriver (preferred), while others can be driven with a cross bar. The pullout force of any of these is greater than what would be experienced in the field. Figure 8 illustrates what the overall antenna layout would look like when deployed.

Future Work

NEC modelling shows that adding parasitic elements reduces the feed-point impedance and requires the use of a transformer to match the 50 n coax. I aimed to achieve a narrow beamwidth to reduce local interference and get a good receive directivity factor. I tried several element spacings in EZNEC. I chose quarter-wave spacing for the narrow beamwidth. With this model, changes are easy to implement in the field. The Yagi-Uda design allows for one or, at most, two switched directions. I plan to investigate other geometries with three and four verticals, which would allow for beam steering to cover many different azimuths.

My three-element Yagi-Uda simulation can be found at www.arrrl.org/gst-in-depth as EZNEC and generic NEC files suitable for 4NEC2 and other NEC software. That version is now under construction.

Further Notes and Acknowledgments

This design is open to further development by the user. A simple one-element arrangement will provide an excellent antenna for temporary use in the field or in a back garden on a small footprint. For low-power operation, you could fit a tent inside the guys with a short coax. If you use sectional poles for the derrick, you can package the setup to be compact enough for travel.

Additionally, if you apply suitable matching components at the feed point, you can gain other bands and finely tune them with the radial. I will be exploring directional control further, from bi-directional control on this in-line arrangement, to multi-directional control using three poles in a

(Continued on page 33)

(An 80-Metre Portable Vertical from page 32)

triangle à la VE6WZ. Relocating one pole is a relatively easy task to get to the triangular form. I will use optimizing software to squeeze out the best from this design. Additionally, I will be making a few kits and parts for experimenters.

In particular, I thank Ed McCann, AG6CX and John Crocker, G4RLQ, for their patience and suggestions while proofreading my work; Alan the dairy farmer, for kindly loaning me his field over the winter and my wife Jill, M6NLK, for her patience and encouragement.

All photos provided by the author.

After being a shortwave listener and constructor since age 7, David Cutter, G3UNA

earned a Class A license in 1964 at the age of 16 and was given the call sign G3UNA. An early career change from working as a radio officer in the merchant navy to electronic manufacturing led to his next role covering marine, military, mining, medical and industrial control. David acquired the call sign G6CP from the family of his childhood mentor and it is now his registered call sign with Ofcom. He enjoys CW contesting and DXpeditioning and is proud to have been part of the T32C DXpedition to Kiritimati in October 2011. David was chair of the Ripon and District Amateur Radio Society for 26 years and now helps them on a part-time basis. His main interest is in lightweight antenna design. David can be reached at davidg3una@gmail.com.

The World Above 40 MHz

The ARRL VUCC and FFMA Awards for VHF/UHF Grid Chasers

Jim Wilson, K5ND

first published in QST October 2026

The ARRL VHF/UHF Century Club (VUCC) Award (see Figure 1) was established in 1983. It was created to build on the Central States VHF Society's 1981-era awards system, which followed the International Amateur Radio Union's adoption of the Maidenhead grid locator system in 1980. VUCC offered a simple way for VHF/UHF operators to work one another and earn awards.

The locator system is also used in VHF/UHF contests for multipliers and can help you point your antenna in the right direction. The Maidenhead grid locator system represents any location on Earth using latitude and longitude, expressed as a simple alphanumeric code.

For example, my home station is in the grid square EM12. EM denotes the field and 12 is the square. Each four-character grid represents a geographical area of one degree of latitude by two degrees of longitude. In the continental US, that area measures approximately 112 × 160 km.

The VUCC Awards

The minimum number of grids for the VUCC Award varies by band, largely based on the difficulty of working long distances on each band. Here are the details for the initial award, followed by the available award endorsements:

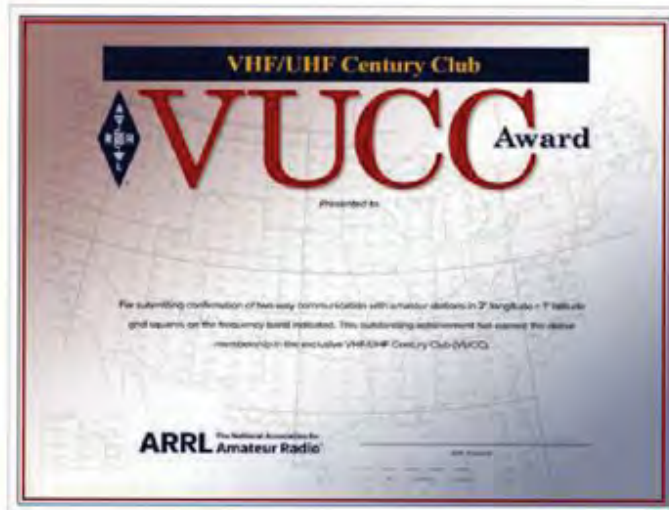


Figure 1 - ARRL VUCC Award certificate

- ◆ 50 and 144 MHz and Satellite: 100 grids, with an endorsement sticker for every 25 additional grids
- ◆ 222 MHz and 432 MHz: 50 grids, with an endorsement sticker for every 10 additional grids
- ◆ 902 MHz and 1 296 MHz: 25 grids, with an endorsement sticker for every five additional grids
- ◆ 2,3 GHz: 10 grids, with an endorsement sticker for every five additional grids
- ◆ 3,4 GHz and above: five grids, with an

(Continued on page 34)

(VUCC and FFMA Awards from page 33)

VUCC Standings			
Band	Call Sign	Grid	Grids
50 MHz	ZS6NK	KG46	858
	ZS6WB	KG44	610
	ZS6OB	KG44	425
	ZS4TX	KG30	409
	ZS4TX/6	KG47	376
	ZS6EZ	KG43	326
	ZR6DXB (ZS2EZ)	KG33	216
	ZS4TX/6	KG55	121
FFMA (Fred Fish Memorial Award)			
50 MHz	ZS6NK	KG46	84
	ZS4TX	KG30	53
	ZS6WB	KG44	36
144 MHz	ZS4TX	KG30	297
	ZS6OB	KG44	255
	ZS5LEE	KG50	222
	ZS1LS	JF96	200
	ZS6WB	KG44	153
	ZS2GK	KF47	111
	ZS5HV	KF59	104
432 MHz	ZS4TX	KG30	139
1 296 MHz	ZS4TX	KG30	98
AMSAT	ZS2BK	KF26	452
	ZS1TA	JF95	369
	ZS4TX	KG30	290
	ZS2ACP	KF26	154
	ZS5LEE	KG50	105
	ZS6WB	KG44	103

South African standings as of 2 July 2026

endorsement sticker for every five additional grids

Awards for 222 and 432 MHz are designated as Half Century because they require 50 grids and awards for 902 and 1 296 MHz are designated as Quarter Century because they require 25 grids. Awards above these are super high frequency. There are no specialty endorsements, such as CW or phone.

NOTE: South Africa does not have access to 222 and 902 MHz. Ed.

There are a few rules that address working grid lines and the allowed distance between operating locations. For example, the maximum 200-kilometre range between locations measures the distance between those locations, not a 200-kilometre radius around them. When in doubt, it is

always best to consult the ARRL VUCC rules at www.arrl.org/files/file/Awards/VUCC_Rules.pdf.

To use Logbook of The World® (LoTW®) for your VUCC Award, you must configure TQSL with your grid square for each operating location. You will also need to create a VUCC Award account on LoTW and set the location rules for it.

The FFMA Award

The Fred Fish Memorial Award (FFMA) was established by the ARRL in 2008 to honour Fred Fish, W5FF (SK), who worked and confirmed all 488 grid squares on 6 metres in the 48 contiguous states. The original award announcement stated, "The FFMA is an "all-or-nothing" award. You must submit confirmation of 2-way contact with all 488 grid squares on 50 MHz to qualify. There are no endorsements and no recognized tiers of progression. Any mode may be used. The rules for the award will strictly follow the rules of the ARRL VUCC programme."

It is essentially an extension of the ARRL VUCC Award programme, but one that is exceedingly difficult to earn. By 2018, 10 years after the award was introduced, only seven people had earned FFMA. The next year saw two earn the award. Four more were added to the list in 2020 and in 2021, there was a bumper crop of 15. As of this writing, there is a grand total of 63 FFMA holders, with more expected to be awarded this year, thanks in large part to rovers and WSJT-X.

FFMA: The Ultimate Grid Chase

So how do you get started on working toward FFMA? First, work all of the 6-metre grids you can. All grids in the US count toward the award, so start with the ones you can hear. After that, start monitoring DX Maps (www.dxmaps.com) and other online resources to catch sporadic-E openings as they occur (see Figure 2). If you are alert and available, you can significantly expand your list of grids when the band opens.

You should also become familiar with making meteor-scatter contacts using WSJT-X MSK144. You can rely on this mode any time of year — particularly during seasonal meteor showers. It can be very helpful when trying to work rovers within about 1 600 km.

Another mode that is gaining popularity is

(Continued on page 35)

(VUCC and FFMA Awards from page 34)

WSJT-X Q65. It is been delivering excellent results among operators when other modes have not.

Finally, work on improving your ham shack if needed. You can do great things on 6 metres with a vertical or a dipole, but you probably will not achieve FFMA with that setup. So, look at your antenna first.

The good news is that there are several hundred other amateurs chasing the award and they are all highly motivated. That means they urge other amateur radio operators in rare grids to get on the air and in grids where

That is where a great deal of excitement can come into play. Several legendary rovers operate in extremely remote locations using four-wheel drive, vehicles, boats, or lightweight equipment. They may travel thousands of kilometres, activating multiple rare grids along the way. Some bring large antennas and substantial power.

FFMA Leaderboard and Gridzilla

The FFMA leaderboard has become the go-to resource for tracking your progress toward FFMA and for identifying the most-needed grids within the 488. This is extremely valuable for rovers who need to determine which grids to visit and who needs them. You can find it at <https://groups.io> if you search FFMA. The most-needed list is based on data from contributors to the leaderboard. They are the closest ones to achieving FFMA, so rovers naturally want to help them work those last few grids. Bill, NDØB, started this effort and generally updated it annually. After he earned FFMA #10, he enlisted Francis, KV5W, to run the system. Since

Are you ready for JOTA/JOTI 2026?

JOTA/JOTI is the world's largest digital and radio Scout event promoting friendship and global citizenship that takes place every year in October. It is a great opportunity for Scouts/Scout Groups to take part in an international Jamboree.

JOTA/JOTI stands for Jamboree on the Air, short wave radio communications through amateur radio stations and Jamboree on the Internet, internet-based communications, with easy access on any connected device.

JOTA/JOTI 2026 is taking place from Friday 16 October to Sunday 18 October 2026. 2 million+ Scouts take part in JOTA/JOTI every year! Scouts take part from all over the world and join in either on the internet or over amateur radio. Scouts around the world take part in lots of fun activities and learn about each others' countries.

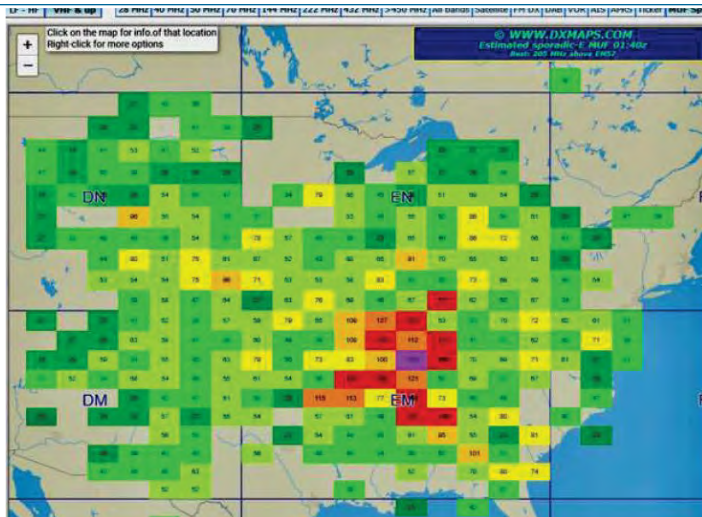


Figure 2. Real-time sporadic-E clouds and the maximum usable frequency for the evening on 10 June 2026.

www.dxmaps.com

Francis earned FFMA #47, Ed, N7PHY, has maintained the listing.

Another helpful online tool is <https://gridzilla.us>. Launched in early 2026 by KV5W, it is intended to eventually replace the FFMA leaderboard. It also tracks all bands from 50 MHz upward.

Though it is a difficult goal to reach, you can start your journey at any time. I am at 486 FFMA grids and it may be a while before my last two grids are activated. Even so, it reminds me that it is all about the journey. Consider joining the rest of us FFMA chasers!

How many of the 83 South African grid squares have you worked on VHF and UHF? Have a look at the Worked All ZS Grid Squares Award.



(Continued on page 36)

(JOTA and JOTI from page 35)

Everyone can take part! JOTA/JOTI is open to anyone and is for all ages - Meerkat Dens, Cub Packs, Scout Troops, Rover Crews, Scout Groups. You just need to register your Branch or Group on the JOTA/JOTI website <https://www.jotajoti.info/>!

The best way to take part in JOTA/JOTI 2026 is to build it into an event about communication and international Scouting/Scouts around the world.

The Scouts could plan a JOTA/JOTI themed camp or activity day for that weekend? It is not difficult to set up a JOTA/JOTI event at the Scout Hall.

For the Scouts to get on the air, they will need a helping hand from someone who holds an amateur radio transmitting licence to set up a JOTA station. Yes, many Scouts and Scouters are licenced

amateurs, but they will be involved with the Scout side of the programme.

The Scouts have been informed that the National JOTA/JOTI Coordinator will assist them with getting in touch with one of the local Amateur Radio Clubs. Or they will have a look at Hopefully that information is up to date!

There is a certain magic of the crackling airwaves! It is an event that has something of a thrill about it for Scouts of all ages, becoming a highlight in the calendar for many.

Jamboree on the Internet

If you are organising a JOTI-only event, all you need is a computer and a good Internet connection. All the details are online and available to you when you register.

HF Update

Dennis Green, ZS4BS

Malawi, 7Q. Chris, ZS6RI rotates between South Africa and northern Malawi every few weeks. When in Malawi he is active as 7Q5C in his spare time, typically during his early morning, late afternoon, or evening hours. He operates mainly CW across the 40 to 10 metre bands. QSL via LoTW and QRZ Logbook and log search on Club Log; paper cards will not be available.

The Gambia, C5. Lui YT3PL (YU5R), Luc F5RAV (C5C) and Darko E70A will be active on various bands and modes as C5R from the Gambia between 1 October and 4 November, including an entry in the CQ WW DX SSB Contest. QSL C5R direct to YT3PL and log search on Club Log. They are carrying on a humanitarian project to raise funds for the construction of new classrooms for children aged between 3 and 5. Visit www.facebook.com/61572930010269.

Somalia, 6O. Pertti, OG2M will be working at the Somali European Hospital in Garowe, Somalia between 5 and 25 October. In his spare time, he plans to operate mainly SSB and CW as 6O2M (requested call sign) on 40 to 10 metres. QSL via LoTW.

Guinea, 3X. Team 3X4U (namely Marc ON4AMX, Filip ON4FF, Patrick ON4HIL, Luc ON4IA, Pascal ON5RA, Karel ON5TN, Marc ON6CC, Wim ON6DX, Franky ON7RU and Ronald PA3EWP) will be active from Lac de Koba, Guinea between 11

and 23 November. They will operate CW, SSB, RTTY and digital on 160 to 6 metres, with five stations and a focus on SSB and CW. QSL via MOURX's OQRS; full LoTW upload after six months. Bookmark <https://rockall.be/> for more information and updates.

African Islands

Sao Tome, S9. Team S9R (namely CT1BOL, CT1BZG, CT2GFW, CT3MD, D2ACE, D2IM and EC7R) will be active from Tamarindos, Sao Tome (AF-023) between 17 and 31 October. They will operate CW, SSB, RTTY and digital on 160 to 6 metres with three stations. They also plan to be active via the QO-100 satellite. See <https://s9r.viacom.ao> for more information, including the QSL route still to be announced.

Other DX

Nauru, C2. C21DA is the call sign that has been used on the amateur radio bands from Naoero (Nauru) since 23 September. The station operates only SSB, typically on 10 and 20 metres. Other



(Continued on page 37)

(HF Update from page 36)

bands may include 80, 40, 17, 15 and 12 metres. Activity will continue until 5 October. QSL direct to VK4MAP.

Solomon Islands, H4. Bernhard, DL2GAC will be active again as H44MS from the Solomon Islands between 3 October and 20 November and again between 5 February and 4 May 2027. Usually, he is active from Malaita Island (OC-047) daily, with activity on 80 to 6 metres SSB and digital. QSL via home call, direct or bureau; QSOs will be uploaded to LoTW and Club Log.

Vanuatu, YJ. Aki, JK1JXZ will be active again as YJ1JXZ from Port Vila (OC-035), Vanuatu between 11 and 16 October. He will be active on 80 to 6 metres, after 17 local time during the weekdays and all day during the weekend. QSL via LoTW.

Micronesia, V6. Takeo, JR1GSE will be active holiday style as V61GSE from Weno Island, Chuuk (OC-011), Micronesia between 1 and 7 October. He will operate digital, SSB and CW on 80 to 6 metres. QSL via LoTW, Club Log's OQRS, eQSL or direct to JR1GSE.

Malta, 9H. Members of the Calabria DX Team

(namely I8YGZ, IK8YFU, IU8GUK and IU8HEP) will be active as 9H6C from Malta (EU-023) on 10-12 October. They will operate CW, SSB and digital on 80 to 10 metres. QSL via LoTW, or direct to IU-8HEP.

Spain, EA. The special call signs AO5CV, AM5CV and AN5CV will be active between 5 and 11 October to celebrate the Day of the Valencian Community. A commemorative award and eQSLs will be available at <https://hamaward.cloud>.

England, G. GB80CV is the special call sign for members of the Cray Valley Radio Society to celebrate their club's 80th anniversary between 1 and 28 October. See <https://cvrs.uk/cvrs80/> for detailed information on the Oak Anniversary Award. QSL via LoTW.

Belgium, ON. The Belgian Air Force Amateur Radio Association (BAFARA) will be active as OR80AF between 1 and 30 October to celebrate the 80th anniversary of the Belgian Air Force. Look for activity on the HF bands using CW, SSB and digital modes. Complete information, including eQSLs and awards, can be found at <https://www.bafara80.be/>.



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BACAR-14 – Part 1 (A Flyers perspective)

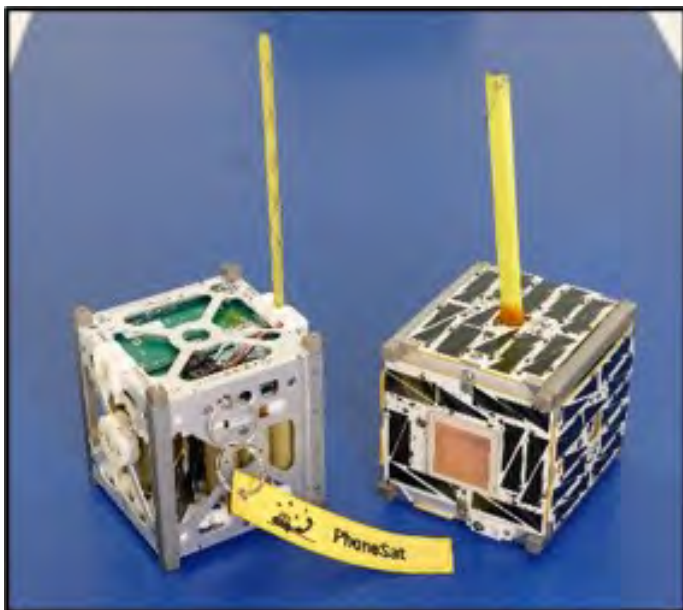
Keith Barker, ZS6Hi

BACAR-14 (Balloon carrying Amateur Radio) is due to be launched by the Secunda Amateur Radio Club ZS6SRC, to ascend deep into the stratosphere on Saturday morning, 17 October 2026. This will be their fourteenth mission to the edge of space with the launch expected to take place between 07:00 and 08:00 CAT for a two-hour flying time.



Everyone is always invited to participate, which also means that those who will be flying payloads are hard at work, designing, assembling, writing code and testing their payloads ahead of the event.

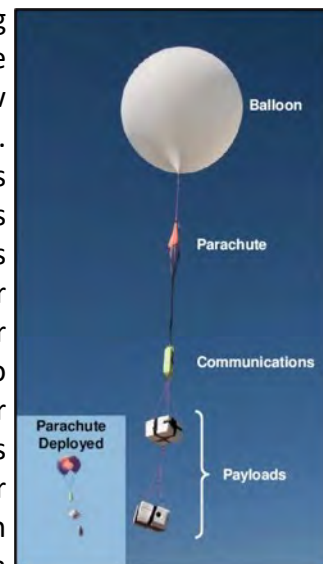
The BACAR payloads must conform to standard space going CubeSat parameters, a 100 x 100 mm cube (without insulation layer) and total maximum weight of 500 g. The weight is critical as all the CubeSats will be connected in a long payload string that will dangle below the high-altitude weather balloon as it ascends to 30 km in altitude. The balloon must be filled with sufficient hydrogen and this stuff is expensive, to be able to lift its payload string and must not be overfilled causing it to burst prematurely, as this tends to dramatically shorten its flight time.



Each CubeSat is totally self-contained with its own power source and electronics, which is another challenge for the designers who need to balance the power supply with the expected power

consumption and weight restrictions. Its rather discouraging after the many hours of preparation if your payload runs out of battery power just when the flight is becoming interesting.

Many of these CubeSats also carry Amateur Radio transceivers, which means that they need antenna's, another challenge, especially as the balloon is buffeted and spins in the winds. Just when you had a strong telemetry signal the CubeSat rotates and now you are in its dipoles null. Some of the transceivers such as the WSPR beacons operate on 20 to 6 m, this means much longer antenna's than your standard rubber ducky, so how do you cater for these? Stewart, ZR1WT's WSPR beacon last year was the last payload on the string so its antenna could hang down, but whipping around in the wind at freezing temperatures means it takes strain and can easily break.



The entire payload string is also going to return to earth rather rapidly once the balloon bursts, especially if the recovery parachute fails to open. Picture multiple payloads all tied to one another descending at speed and on top of one another smack bang into the ground, which has been known to be rather unforgiving against such insults. This tends to turn your beautiful CubeSat into something with lots more sides and without any protruding antennas. Thankfully this will be the fourth flight for many of my components, so thank you to the Secunda and Hamnet chase and recovery teams for their contribution. Awesome when the SARL Hamnet team return to base with a vehicle full of payloads.

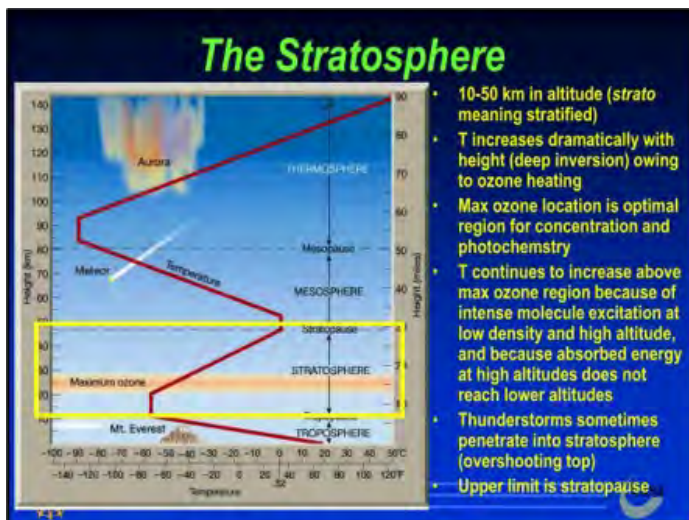
Having so many transceivers in the payload string also means you have to carefully manage their frequency allocations and separation within the string. Its



(VUCC and FFMA Awards from page 38)

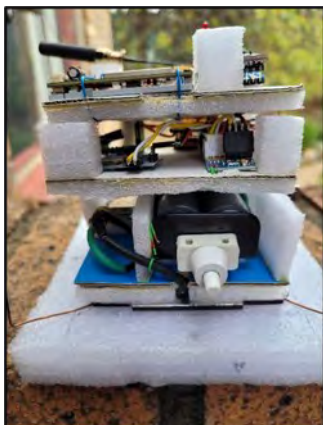
like being on a high site, RF noise everywhere ... another interesting design challenge for BACAR flyers.

Then there is the environment. Not only does the CubeSat have to survive the launch and descent, as well as the whipping around in the atmosphere and the spinning, which plays havoc on camera images, it also must survive its own heat generation, the altitude and temperature extremes. Temperatures can be as low as -54°C when you enter the Stratosphere which is not very battery or electronic component friendly and altitudes of 30 km are not standard GPS friendly as I personally discovered during BACAR-13 when my GPS refused to provide coordinates as it thought it was onboard a cruise missile and my BME280 environmental sensor reported some very interesting albeit very incorrect data.



Interesting challenges and a lot of fun and experimentation. With every launch there is something to enhance and new and exciting to try, as well as there always being something to learn.

The ZS6STN CubeSat this year (unenclosed boards image alongside) primary function is to experiment with testing some new command and control and emergency communication functions with a secondary design focus being to enable it to be interactive and to enable everyone to get involved in BACAR-14 and we would really appreciate you doing so.



We would even like you to go a step further and ask that you publish your interactions on the WhatsApp groups or send them to info@zs6stn.org.za as we can then ascertain whether the payload is meeting its design objectives and what its range was. Publication is also motivational, sets a challenge and makes it fun for everyone. Please prepare your ground stations and help track, interact and publish during the BACAR-14 two-hour flight.

For the SSTV operators

The CubeSat will broadcast UHF SSTV images overlaid with telemetry data at 0,5 w on 433,400 MHz, primarily in Robot36 format which sends a 320×240 colour image in 36 seconds, but as this is low quality, it will also intersperse these with the odd transmission in Martin1 format, which is better quality but takes 114 seconds for a 320×256 colour image. It will also continue to alternate between a live camera snapshot and static image at about one -minute intervals. **The static images each contain a quote and once again, if you are the first person to correctly publish on WhatsApp/e-mail the authors of the various quotes, you stand a chance to receive a Takealot gift voucher.**



For the CW operators

As well as those who use their radio, phone, or apps to decode CW, the payload will be sending a CW telemetry stream to all CW enabled ground stations at about 20 wpm on 433,400 MHz every minute or so. This transmission will be numerically heavy as it will include the GPS coordinates, altitude, pressure and so on.

A	..	M	..	Y	..
B	...	N	...	Z	...
C	....	O	....	1	....
D	.....	P	.....	2	.....
E	.....	Q	.....	3	.....
F	.....	R	.....	4	.....
G	.....	S	.....	5	.....
H	.....	T	.....	6	.....
I	.....	U	.....	7	.....
J	.....	V	.....	8	.....
K	.....	W	.....	9	.....
L	.....	X	.....	0	.....

For the Meshtastic operators

A new addition to the payload is a Meshtastic node for onboard command and control purposes, but it has also been configured to interact with you. **Everyone who Direct Messages the Meshtastic node with their call sign and ideally six -character grid square (e.g.: ZS1ABC KF59XV), will receive a unique response back from the payload, great bragging rights and subsequently a special commemorative certificate.** If you do not get a

(Continued on page 40)

(VUCC and FFMA Awards from page 39)

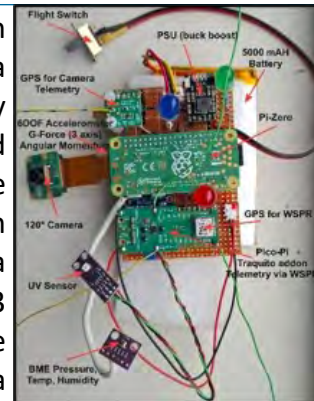
reply within a few seconds, please do try again a bit later as the node may be busy fighting the elements or relaying ground station data and may not always be able to service incoming texts immediately. The nodes name is **"ZS6STN BACAR14 HAWB"** or short name **"BC14"** (QR code to add it to your contacts alongside) and you can talk to it using any Meshtastic device on EU standard 869,525 MHz.

The ZS6STN CubeSat is but one of the many interactive payloads that will be flying on BACAR-14. Others include a VHF SSTV transmitter, a 6 m



WSPR beacon with additional telemetry and a camera taking snaps every 10 seconds, cross band repeaters and many of the 2025 payloads now with new enhancements (have a look at the 2025 BACAR-13 presentations on Youtube @ZS6STN), including a return to home payload. Exciting you bet.

Please spread the word and please help us make BACAR-14 exciting for everyone. At 30 km altitude it has a wide radio footprint, last year the SSTV images were heard and successfully decoded by John, A2NEW in Botswana, let us see what we can achieve this year.



BARK weer aktief vanaf die mees suidelikste punt van Afrika

Johan le Roux, ZS1RX

Die derde naweek van Augustus het 'n vaste plek op die kalender van die Boland Amateur Radio Klub (BARK) geword. Dit is die Internasionale Vuurtoring en Ligting-naweek, wanneer amateur stasies wêreldwyd vanaf vuurtorings kommunikeer.

Vir BARK is dit egter meer as net nog 'n aktiwiteit op die radio-kalender. Die Klub neem reeds sedert 1998 aan die geleentheid deel en die Agulhas-vuurtoring het oor die jare 'n besondere plek in die klub se geskiedenis gekry. Die ligging bied ook 'n interessante onderskeiding: BARK se stasie by Agulhas is die mees suidelike vuurtoring radiostasie op die Afrika-kontinent.

Antennas eerste

Vrydagmiddag het die span met die opstel van die antennas begin. Teen sonder was ons gelukkig om alles gereed te hê vir die naweek se bedrywighede.

Die primêre antenna was 'n 40-meter-deltalus. André, ZS1ATX, het ook van sy eie interessante antenna-opstellings gebruik gemaak.

Daar was egter 'n klein probleempie voordat die eerste kontakte gemaak kon word: ons kragbron wou nie werk nie!

Gelukkig is amateur-radio 'n gemeenskap waar

'n mens selde alleen met 'n probleem sit. Bernard, ZR1ACP en Anthony, ZS1WAL, het tot ons redding gekom met 'n battery en kragbron. Kort voor lank was ons weer aan die gang.

Twee stasies op die lug

Vanjaar het ons twee stasies bedryf. Een was hoofsaaklik vir stem kontakte, terwyl André 'n FT8-stasie opgestel het.

Besoekers

Benewens die span wat die stasie bedryf het, het ons ook gedurende die naweek besoek gekry van 'n aantal mede-radio amateurs. Onder hulle was Trevor, ZS1TR; Bernard, ZR1ACP; Johannes, ZR1RF; Danie, ZR1DV en Anthony, ZS1WAL.

Die sosiale sy van 'n geleentheid soos hierdie is minstens so belangrik soos die radioaktiwiteit self. Daar is altyd tyd vir 'n geselsie oor antennas, toerusting, die jongste radio-eksperiment of sommer net om stories uit die verlede op te haal.

Dankie aan almal op die lug

Ons wil graag ons dank uitspreek aan almal wat gedurende die naweek met BARK kontak gemaak het. Elke QSO dra by tot die sukses van so 'n

(Continued on page 41)



Die 2026 BARK-span: Willie Koorts, Rassie, ZS1YT; Johan, ZS1RX en André, ZS1ATX

(VUCC and FFMA Awards from page 40)

aktivering en maak die voorbereiding en opstelwerk die moeite werd.

Tot volgende jaar

Soos in vorige jare was die naweek by Agulhas weer 'n groot sukses. Dit bly 'n voorreg om van hierdie ikoniese vuurtoring af die radios te bedryf en terselfdertyd deel te wees van 'n internasionale

amateur radio aktiwiteit wat reeds soveel jare bestaan.

Sondagoggend het ons die antennes en toerusting afgebreek en, soos dit ons jaarlikse tradisie geword het, het ons die amptelike spanfoto met die Agulhas-vuurtoring in die agtergrond geneem.

73 vanaf Agulhas

CQ DX Marathon 2026 Submission

Start

DX Marathon Site

Prepare and Submit your 2026 DX Marathon entry

Start by uploading **ADIF** files, **Cabrillo** files, a **Scoresheet** as described in the [Data Formats page](#).

Then you will be able to **select and review your QSOs** for each Entity and Zone before completing your info your entry.

Are you a DXer?

If you have been on the air working DX this year, you almost certainly already have a 2026 DX

Marathon score without knowing it.

I help promote the DX Marathon and I am

(Continued on page 42)

(VUCC and FFMA Awards from page 41)

trying to get amateurs from more countries taking part. Would you join us? It is free and there is no registration anywhere.

Everything happens at entry.dxmarathon.com — nothing needs to be sent to me. You upload an ADIF file from your logging programme there. It can be your entire log, all years included: only 2026 QSOs count and including others does no harm, so there is no need to filter it or sort it by country or zone.

The site then asks two or three questions about power and antenna and those questions are part of the submission: if you only upload the file and stop there, your entry never arrives. Use the standard category — the Challenge is a separate entry that counts your entities and zones band by band, so leave it aside for now.

No confirmation e-mail is sent, so check it yourself at <https://entry.dxmarathon.com/dxm/entries>, where your call sign appears within a few minutes. Your DXCC entities and zones are shown at entry.dxmarathon.com/leaderboard — the sum

of the two is your score.

You can upload again as many times as you wish until 5 January 2027 and only the last submission counts. More details on www.dxmarathon.com and on the DX Marathon's QRZ page, W4DXM. 100% of participants get a certificate with their accomplishments.

If you use two call signs, or if you operate remotely or from more than one location, there are two conditions worth knowing <https://dxmarathon.com/rules/2026/>.

Thanks and see you on the bands.

73, Luis Soto Neira, CA6SNT

DX Marathon Ambassador · Chile

ZR6DM (2026-08-15 16:04:32)

ZS1C (2026-04-21 12:12:18)

ZS1ZZ (2026-08-11 01:06:29)

ZS5HR (2026-07-07 06:46:25)

ZS6ADY (2026-08-28 17:10:03)

ZS6WAR (2026-04-18 21:23:45)



Carol Fraley Laferty K4SAF

28 September 2026 - 69th anniversary as Extra Class YL, licensed in 1957 aged 15.

30 September 2026 - 85th birthday

We went to Hamvention in Xenia, Ohio this weekend. Really enjoyed it and took in as much as our wobbly legs could carry us to. The Begali key Danny awon at the DX Dinner is so beautiful. Being the appreciative guy he is he went by the Begali booth to thank Bruna Begali (from Italy) personally

(Continued on page 43)

The YL.Beam

Heather Holland, ZS5YH

Annette, DL6SAK on the 7P8GE DXpedition

The 7P8GE team is Manfred, DK1BT; Wolf, DL4WK; Annette, DL6SAK; Tom, DL7BO and Frank, DL7UFR. They will be active from Lesotho between 16 and 29 October 2026. They will operate CW, SSB and digital modes on 80 to 10 metres with up to five stations.

The results of the SARL YL QSO Party

Twenty logs received = ten YLs and ten Oms.

1st Esmarie, ZS3EL - 189 points

2nd Louise, ZS5BSR - 144 points

3rd Sonet, ZS3SW - 141 points

4th Marjoke, ZS5V - 117 points

7th Martie, ZS6MV - 48 points

8th Odette, ZS2OD and Twanet, ZS2TW - 36 points

10th Esme, ZS1YE - 33 points

11th Heather, ZS5YH - 30 years

16th Kelley, ZS1KLY - 3 points



(The YL Beam from page 42)

for donating the key to be given away in a lucky-draw. They make the most useful and beautiful Morse Code keys. I have one already that Danny gave me for Christmas.

My wonderful hubby Danny, WØJMP, posted this. "Carol and I are both ham radio operators. We were each licensed when we were 15 and have a combined 132 years of ham radio experience under our belts.

This weekend, we attended the world's largest ham radio gathering with about 35,000 of our closest friends. We each have attended the Dayton (Ohio) Hamvention for about 50 years, missing a few years when 'life got in the way.'

In the early days, I was often staffing a booth and had little time to look around. But when I did, I wanted to see the latest and greatest products on display. Later, I wanted to attend forums to learn about equipment, techniques and methods to improve my operating.

More recently, seeing old friends became the highlight. Attending dinners such as the "DX Dinner" at a downtown hotel is a highlight. As Carol puts it, we get to rub elbows with the "rock stars" of ham radio.

And this year, I won a new key for Morse code at the DX Dinner. Yes, we still use morse code.

The key I won is a four-pound Italian sculptured piece of art. I was able to thank Bruna Begali personally for this great prize." 17 May 2026

16 May 2026. I was so honoured to see and get a picture with Italian YL amateur Elvira Simoncini, IV3FSG, at the Hamvention SWODXA Dinner in Dayton. She was chosen for the DX Hall of Fame. She goes all over Africa on DXpeditions, giving thousands of contacts to the world's amateurs. I'm so glad to see her honoured in this way. I have worked her in 7 different African countries: Guinea, Madagascar, Uganda, Comoros, Central African Republic, St. Helena and Senegal. Congratulations, Elvira.

Amateur radio has played an important role in Carol Fraley Laferty's life over the years.

Her older brother, Fred Fraley, W4DF (SK), was the person responsible for putting her on the air in September 1957, at the age of 15. They lived on a farm near Dungannon, Virginia, in Scott County, a good place to put up long-wire antennas.



Carol, K4SAF and Elvira, IV3FSG

She and her father, Kermit Fraley K4SAB (SK), took their novice exams at the same time. She received the call sign K4SAF, which she has used for over six decades. The whole family used Fred's station, which he generously shared along with an old Hallicrafters receiver, later upgrading to a Viking Ranger and an HQ-110.

She met her husband, Don, K4GFY (SK), on the radio in 1957. He was her second contact on the first day she nervously called CQ after receiving her license. They spoke for three years on CW and by phone before meeting in person. They were married for 53 years until his death in 2015. Their son, Don Laferty, Jr., who lives in Wisconsin, now holds his father's license, K4GFY. Their daughter, Debbie, lives in Tucson, Arizona, with her only grandson, Kai, 15. Their youngest son, Neil, lives in Chicago.

The first years of her marriage were dedicated to raising the couple's three children. Don retired from active duty in the United States Air Force in 1975. Carol was then able to finish college and teach economics and computer science at the high school level for many years.

Amateur radio had to take a back seat. She retired in 2004 from Bath County High School in Kentucky, but continued teaching computer science part-time at Morehead State University. In the last 17 years, she returned to amateur radio with full force. The magic of communication she felt as a teenager in the mountains of southwest Virginia has not diminished. She received her Extra Class license in 2000. Carol and her husband had separate radio stations. Perhaps that was the

(Continued on page 44)

(The YL Beam from page 43)

secret to the longevity of their amateur radio marriage for so many years, until Don's passing. Carol's radio station boasts much more advanced radios, peripherals and antennas. She uses a TenTec Omni V, primarily for CW operation at 25 words per minute.

She also uses a Yaesu FTdx101D, an Elecraft KPA 500 Amp and an LDG Autotuner. A series of dipoles hang outside. She is fortunate to have enough surface area for a 160-metre full-wave dipole. Other dipoles include a DX80 for 75, 40 and 30 metres. Also a triband Mosley antenna at a height of 18 metres. She operates CW and digital modes and occasionally SSB. During the Coronavirus pandemic, she achieved awards never dreamed of. She completed the DXCC and worked in every state in the USA on 160, 80, 40, 30, 20, 17 and 15 metres in Mixed, Digital and CW modes. The most difficult goal to achieve was the WAS-YL, which she completed in February of this year. Carol was treasurer of YLRL and is a member of SKCC, QCWA and FISTS. Besides radio, she enjoys music, especially bluegrass and family history.

Märket Reef DXpedition - OJ0YL and OJ0JR

From 15 to 22 August 2026, Henri, OJ0JR and Anne, OJ0YL were activate from Märket Reef, bringing this rare OJ0 entity back on the air for DXers around the world. They landed on Märket Reef on 15 August and were soon active on 30 m. They went QRT at 12:00 UTC on 21 August due to deteriorating weather conditions. Anne sent a few photos from the island <https://www.dx-world.net/oj0jr-oj0yl-market-reef/>

Two call signs once again rose from one of the Baltic Sea's most exposed operating locations. Märket Reef's flat rock surfaces, open sea horizon and saltwater surroundings make it a dramatic setting for radio — but also a demanding one. Landing is weather-dependent, with access



planned via Finland and all operations will be shaped by the realities of working from a small, exposed reef in the Baltic. More rock than island, more sea than shelter, Märket Reef is the kind of place where every QSO begins long before the first CQ — with weather, landing conditions, antennas, power and the constant presence of wind and waves.

Contact

yl.beam news: Editor Eda (Heather) zs6ye.yl@gmail.com. The newsletters can be found at <https://wrarc-anode.blogspot.com/>; the Italian Radio Amateurs Union: QTC URI www.unionradio.it/qtc-la-rivista-della-unione-radioamatori-italiani/ and Ham YL www.facebook.com/ham.yls

There is a “small” problem with the QRP Labs QMX transceiver – and an easy fix

John, VA3KOT

Why was it born so beautiful, why was it born so small?

I must admit to a love/hate relationship with my microscopic, yet bursting with features, QMX transceiver. This marvel of technology is densely packed into a shirt pocket-sized sturdy aluminium case. Just how did the R&D department at Turkey's QRP Labs manage to squeeze so much into so little? And the big question is why?

Way over yonder where Europe joins Asia lies a radio electronics laboratory in which the entire research and development department goes by the name Hans. My imagination conjures up a picture of something akin to Santa's toy factory at the North Pole (where, incidentally, there is no land – just constantly shifting sea ice; sorry kids).

And why did I buy this marvellous, lilliputian, bite-sized box of electronic Turkish delight? I guess it was the cute factor – the same reason I bought my Yaesu FT-817 back when it was first released. I have thought about selling that FT-817 many times, but that cute puppy dog front panel keeps

looking up at me and I change my mind every time. My QMX is cute in a different way in that its very small size was the “flash the cash” factor that put my name at the bottom of a very long wait list. After a long 6-month delay I received my micro miracle and haven't stopped using it ever since.

He'll be coming up the mountain when he comes

I do not need to haul my radios up mountains. The nearest mountain to where I live – naively called “Kemble Mountain” – is just a local high point along the Niagara Escarpment. I could ride a bicycle up its south face in five minutes. So, no mountains, no need for ultra-light radio equipment. I can carry my outdoor portable wireless sets in a backpack when operating on a trail. So once again: why did I buy a sub-miniature radio? Oh yes, it is cute; like a little puppy. Now I have my QMX, I really like the little thing, so it is definitely a keeper.

But I like BIG radios

(Continued on page 46)



(The QRP Labs QMX transceiver from page 45)

Let us look at it this way: the QMX is BIG on features, now all I gotta do is fix its physical size. I think I have a solution – strap it to a brick; well actually a Lithium Iron Phosphate brick.

I have rebuilt my QMX-based portable wireless communication set so many times and yet here I go again. As you can see from the picture above, the “brick” is an Eco Worthy 8 Ah Lithium Iron Phosphate battery. Its main function is to anchor the QMX to the surface of the planet – a task it performs admirably well. Oh, yes, it also powers the QMX.

What??? An 8 Ah battery could supply power to half a dozen QMX radios! Yes, but I refer you to its primary function. In fact, the high-capacity battery is very useful when I venture forth on a multi-day radio road trip. I charge the battery at home with a Sky Toppower PS3010H constant current, constant voltage bench power supply (available on Amazon).

Charging details: *I programmed the PS3010H to charge the battery at a constant current of 1,0 amp up to a terminal voltage of 14,2 volts and then to automagically switch to constant voltage until the charging current drops to zero. The battery is then good for several days of operating.*

All those R&D boffins, collectively known as Hans, fixed one of the most annoying features of the early QMX models and that was the need to keep the supply voltage closely regulated to 12,00000000 volts. This was achieved by using series diodes in the supply line, or a buck converter. I chose the latter and I have kept “Buck” in circuit despite the clever firmware fix that eliminated the need. I am the kinda guy who wears a belt and suspenders to keep his pants up. Or maybe just think of it as a backup or redundancy system. If a future firmware release breaks the fix I will not have to watch as the QMX’s delicate BS170 final transistors make a smoky ascent to the heavens.

And while I am up on my soapbox ...

The dastardly diminutive dimensions of the QMX are not my only gripe. Small size dictates small connections to the outside world. Ok, I have griped about this before, but I do not like tiny connectors – those one-eighth of an inch (3,5 mm) jacks for hooking up earphones and paddle keys are a failure point waiting to happen – especially when subjected to the rigors of operating in the field. But there is an easy solution; simply keep all accessories plugged in and there should not be a problem. Look at the picture below.

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(The QRP Labs QMX transceiver from page 46)

There is another benefit of this everything-connected-ready-to-go solution: it is literally ready to go. My QMX-on-a-brick kit is transported inside a rugged, waterproof European military respirator bag. I do not even need to remove the rig from the bag to operate, simply hook up an antenna and start firing RF up to the Heaviside layer. No need to stop for several days, the battery is good for it.

There is something else I should mention ...

If the QMX had not been designed to be quite so small there is one other missed opportunity that could have been considered. When ordering a QMX transceiver there is a band selection decision to be made. I chose the low band version and that gives me 80, 60, 40, 30 and 20 m. Sometimes I wish I had chosen a version supporting the higher bands. Now imagine, if the original design had placed all the band specific components on a separate circuit board, we could possibly have popped open the case and switched circuit boards to gain access to more bands.

So, paraphrasing a song popular in some parts of the world, I ask again: "why was it born so beautiful, why was it born so small?"

Footnote

It is easy to gripe but, in all seriousness, QRP-Labs founder and head honcho, Hans Summers has produced so many wonderful products for amateur radio enthusiasts – and at very affordable prices too. As a well-known British knight of the realm, who gathers no moss, once wrote, "You can't always get what you want, but if you try some time, you find you get what you need."



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The 27th IARU Region 1 General Conference

Hosted by Österreichischer Versuchssenderverband (ÖVSV)

The 27th Region 1 General Conference started on Saturday 19 September with the Opening Plenary at the Parkhotel Schönbrunn in Vienna, Austria. The hotel is about a 10-minute walk from the Schönbrunn Castle.

The SARL was represented by Nico van Rensburg, ZS6QL and Dennis Green, ZS4BS.

Michael Kastelic, OE1MCU, President of the Austrian society welcomed the delegates to Vienna. He gave more information about the ÖVSV 100-year celebration on 21 September. A video was shown from the 2026 YOTA Summer Camp in Austria.

Tim Ellam, VE6SH, the IARU President addressed the conference on behalf of the IARU Administrative Committee. Tim pointed out there is a ITU WRC conference in a year and thanked the Region 1 representatives for the



support of the global IARU work with ITU and the WRC.

IARU Region 1 President Sylvain Azarian, F4GKR, welcomed the delegates and thanked the ÖVSV president and the Society, for organizing the conference and providing the support.

The members of the Finance, Election and Ballots and the G2BVN committees were elected. Dennis, ZS4BS was the chair for the G2BVN committee.

Thirty-eight Member Societies were present with fifteen proxies. The SARL carried the proxy for the NARL.

AFVL, Liechtenstein; ARA, Algeria; ARABIH, Bosnia and Herzegovina; ARAT, Tunisia; ARI, Italy; BARS, Bahrain; BFRA, Bulgaria; CARS, Cyprus; CRC, Czech Republic; DARC, Germany; EDR, Denmark; EARS, United Arab Emirates; ERASD, Egypt; HRS, Croatia; IRA, Iceland; IRTS, Ireland; KARS, Kuwait; LRAA, Liberia; MARS, Mauritius; NRRL, Norway; OV, Austria; PZK, Poland; REF, France; ROARS, Oman;

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The Parkhotel Schönbrunn. It dates from 1787.



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RSGB, United Kingdom; RSM, Republic of North Macedonia; SARA, Slovakia; SARL, South Africa; SRAL, Finland; SRR, Russia; SRS, Serbia; SSA, Sweden; UBA, Belgium; URE, Spain; USKA, Switzerland; VERON, The Netherlands and ZRS, Slovenia

Proxies: ARAS, Senegal; ARRAM, Morocco; ARRSM, San Marino; Cram, Mali; ERAU, Estonia;

FRA, Faroe Islands; IARS, Iraq; LCAS, Libya; NARL, Namibia; RL, Luxembourg, RAL, Lebanon; SARS, Saudi Arabia; SARU, Sudan; SHRAK, Kosovo and URE, Andorra.

From Saturday afternoon until Tuesday afternoon the meetings of C2 – Finances, C3 – General administration and organisation, C4 – HF, C5 – VHF and higher, C7 – EMC and C8 Youth took

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Time	Activity	Room
Thursday, 17 September		
	Secretariat arriving	Sophie 2
Friday, 18 September - Arrival day		
	Delegates, EC, chairs arrival	
	Secretariat preparations and delegates arrivals	Sophie 2
18:00 - 19:00	Welcome by OeVSV, (Austrian member society)	Gloriette Bar & Galerie
19:00 – 20:30	Dinner	Maria Theresia
Saturday, 19 September - Day 1		
07:00 – 09:00	Breakfast	Maria Theresia
09:00 – 10:00	WG Chairmen meeting	Sophie 1
10:00 – 10:30	Coffee/tea	Kaiser lounge
10:30 - 13:00	Opening & First Plenary. Dress code: Business casual. Opening & agenda (OE1MCU, F4GKR, VE6SH) Establish committees EBC, C2, chair C3. Information about Constitution & Byelaws, separate session	Österreich-Ungarn
13:00 – 14:00	Lunch	Maria Theresia

14:00 – 15:30	C4 - HF	Max lounge
14:00 – 15:30	C5 – VHF+	Österreich-Ungarn
14:00 – 15:30	C8 – Youth	Sophie 1
15:30 – 16:00	Coffee/tea	Kaiser lounge
16:00 – 18:00	C4 - HF	Max lounge
16:00 – 18:00	C5 – VHF+	Österreich-Ungarn
16:00 – 18:00	C8 – Youth	Sophie 1
18:00 – 19:00	C2 - Credentials and Finance (Credentials)	Seminar raum 1222
19:00 – 20:30	Dinner	Maria Theresia
20:30 – 22:00	Constitution and Byelaws follow-up (Global and Region 1)	Österreich-Ungarn
Sunday, 20 September - Day 2		
07:00 – 08:30	Breakfast	Maria Theresia
08:30 – 09:00	Second Plenary (Report on credentials); Nomination forms if vacancies	Österreich-Ungarn
09:00 – 10:00	HAREC WG report	Österreich-Ungarn
10:00 – 10:30	Coffee/tea	Kaiser lounge
10:30 – 12:30	C2 - Credentials and Finance (Priority to documents that needs C2 response before discussed in C3)	Seminar raum 1222
10:30 – 12:30	C5 – VHF+	Österreich-Ungarn
10:30 – 12:30	C7 - EMC	Max lounge
10:30 – 12:30	C8 - Youth	Sophie 1
12:30 – 13:00	Group photo	Outside Max lounge
13:00 – 14:00	Lunch	Maria Theresia
14:00 – 15:30	C2 - Credentials and Finance	Seminar raum 1222
14:00 – 15:30	C4 - HF	Sophie 1
14:00 – 15:30	C7 - EMC	Max lounge
14:00 – 15:30	SRLC/PRC	Österreich-Ungarn
15:30 – 16:00	Coffee/tea	Kaiserlounge
16:00 – 17:50	C3 - General administration and organisation	Österreich-Ungarn
16:00 – 17:50	C4 - HF	Sophie 1
18:00 – 19:00	EMF presentation, SM3PXO	Österreich-Ungarn
19:00 – 20:30	Dinner	Maria Theresia
20:30 – 21:30	ENAMS presentation DG8AL, DL6SES	Österreich-Ungarn
Monday, 21 September - Day 3		
07:00 – 09:00	Breakfast	Maria Theresia
09:00 – 09:30	Plenary, (extra, if needed)	Österreich-Ungarn
09:30 – 10:30	ARSPEX – Amateur radio in space	Österreich-Ungarn
10:30 – 11:00	Coffee/tea	Kaiserlounge
11:00 – 12:00	Satellites, G3VZV	Österreich-Ungarn
12:00 – 13:00	ARDC presentation, Rosy KJ7RYV	Österreich-Ungarn
11:00 – 13:00	STARS	Seminarraum 1222
13:00 – 14:00	Lunch	Maria Theresia
14:00 – 15:30	C3 - General administration and organisation	Österreich-Ungarn
15:30 – 16:00	Coffee/tea	Kaiserlounge
16:00 – 17:00	C3 - General administration and organisation 18:00 deadline for nomination forms	Österreich-Ungarn
18:00 – 21:00	100 years ÖVSV. Dress code: Formal.	Subway to theatre

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place. There were sessions on the Constitution and bylaws of Region 1 and the global IARU, the ENAMS system for measuring the noise floor and the HAREC expansion.

On Monday 21 September, the Austrian Society, ÖVSV celebrated its centenary with a play at the Volkstheater in Vienna. The play had been written specifically for the occasion and the actors

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Michael, OE1MCU welcoming the guests to the OV-100 celebrations



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were all radio amateurs. The play covered the organization's 100-year history. Each attendee received a copy of the Centenary Book.

Wednesday 23 September was the last day of the conference, the final plenary and the gala dinner.

The main work of the Final Plenary was the ratification of all the recommendations from C2, C3, C4, HF, C5, C7 and C8. There were forty-four recommendations voted on (see page 110 to 119.)

The venue for the 28th IARU Region 1 General Conference in 2029 was between Landshut in Germany and Skopje in the Republic of North

Macedonia. The delegates voted for Skopje, North Macedonia, hosted by the Radio Society of



The Centenary Book given to all the guests at the Volkstheater

The postage stamp issued by the Austrian Post office. Michael, OE1MCU with the Minister of Communications and his wife.



Tuesday, 22 September - Day 4		
07:00 – 09:00	Breakfast	Maria Theresia
< 09:00	EBC release list of nominations	
09:00 – 09:30	Plenary (extra, if needed)	Österreich-Ungarn
09:30 – 10:30	C2 - Credentials and Finance (extra, if needed)	Seminarraum 1222
09:30 – 10:30	Chairs – finalise recommendations for final plenary (C4, C5, C7, C8)	Sophie 1
09:30 – 10:30	Emergency Communications meeting	MAX-Lounge
10:30 – 11:00	Coffee/tea	Kaiserlounge
11:00 – 13:00	C3 - General administration and organisation	Österreich-Ungarn
	SRLC (reserve)	MAX-Lounge
13:00 – 14:00	Lunch	Maria Theresia
14:00 – 15:30	C3 - General administration and organisation	Österreich-Ungarn
15:30 – 16:00	Coffee/tea	Kaiserlounge
16:00 – 18:00	Chairs – finalise recommendations for final plenary (C2, C3, C4, C5, C7, C8)	Sophie 1
18:00 – 19:00	IARU cocktail	Kaiserlounge
19:00 – 20:30	Dinner	Maria Theresia
20:30 – 21:00	MARS introduction presentation, 3B8GL	Österreich-Ungarn
Wednesday, 23 September - Day 5		
07:00 – 08:30	Breakfast	Maria Theresia
08:30 – 10:30	Final Plenary Approve reports from the committees C2, C3, C4, C5, C7 and C8 Elections of chairs for committees, EBC EC voting	Österreich-Ungarn
10:30 – 11:00	Coffee/tea	Kaiserlounge
11:00 – 13:00	Final Plenary	Österreich-Ungarn
13:00 – 14:00	Lunch	Maria Theresia
14:00 – 15:30	Final Plenary	Österreich-Ungarn
15:30 – 16:00	Coffee/tea	Kaiserlounge
16:00 – 16:30	Final plenary - Next General Conference Venue presentation	Österreich-Ungarn
17:00 – 18:00	New/old EC and WG chairs meeting	Sophie 1
18:00 – 19:00	Gala dinner cocktail	Kaiserlounge
19:00 – 22:00	Gala Dinner. Dress code: Business casual. Presentation of awards	Ballsaal
Thursday, 24 September – departures		
07:00 – 09:00	Breakfast	Maria Theresia
	Delegate departures, end of 6 days package	
09:00 – 18:00	IARU AC meeting	Sophie 1
Friday, 25 September – Departure day		
07:00 – 09:00	Breakfast	Maria Theresia
09:00 – 13:00	IARU AC meeting	Sophie 1

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Macedonia (RSM).

The joint winners of the G2BVN Award are Panayot Danev, LZ1US and Murray Niman, G6JYB for their meritorious service to amateur radio and IARU Region 1.

The new Executive Committee from 31 October

2026 to the 2029 Conference will be:
President: Hans, PB2T; Vice President: Dennis, ZS4BS; Secretary: Ash, 3V9A; Treasurer: Vera, HB9EYH and members: Ahmad, 9K2DB; Ana, EI5IXB; Joseph, 5B4APB; Markus, DL8GM and Florian, OE3FTA.

(Continued on page 54)

Nico, ZS6QL; Dennis, ZS4BS; Okko, PH2CV and Theo, PA1CW



Dennis, ZS4BS; Remy, PA0AGF and Nico, ZS6QL



Dennis, ZS4BS and Nico, ZS6QL in front of the Volkstheater

Florian, OE3FTA; Dennis, ZS4BS; Michael, OE1MCU and Nico, ZS6QL





(The 27th IARU Region 1 General Conference from page 52)

In favour: 45, Against: 1, Abstain: 2

C2 recommendations

VI26_C2_REC_01: Budget

A budget has been proposed. It requires a progressive increase of the Membership fee:

- ◆ Stable at 1,80 CHF 2027
- ◆ Changes to 2,30 CHF in 2028
- ◆ Changes to 2,60 CHF in 2029

And includes a withdrawal of up to 50 000 CHF from STARS funds.

The budget reflects two priorities:

- ◆ Increase the support to C8 activities,
- ◆ Maintain the support to "Spectrum Defence," considering inflation

Proposed: SARL. Seconded: UBA

In favour: 41, Against: 6, Abstain: 0

C3 recommendations

VI26_C3_REC_01: Ratification of C8.

It is recommended that the Youth Working Group is transformed to a permanent committee. (Document VI26_C3_30)

Proposed: RSGB. Seconded: LRAA

In favour: 46, Against: 0, Abstain: 1

VI26_C3_REC_02: Ratification of the Open-Source Projects Coordinator

It is recommended to create the role of Open-Source Projects Coordinator, reporting to the Executive Committee and cooperating with the Technology Coordinator. (Document VI26_C3_31)

Proposed: USKA. Seconded: OVSV

VI26_C3_REC_03: Leveraging High-Profile Ambassadors to influence national regulators and governments for the benefit of Amateur Radio

It is recognized that there is a need to engage with potential advocates to support influencing regulators and governments.

It is recommended to setup a group to discuss how the target can be reached, what are the resources that need to be allocated. This group will report to the EC in the next 12 months. 3V9A volunteered to chair the group. (Document VI26_C3_08)

Proposed: ARABiH. Seconded: HRS

In favour: 41, Against: 2, Abstain: 5

VI26_C3_REC_04: EASE Cooperation Proposal

It is recommended that:

- ◆ the Executive Committee contacts EASE and initiate partnership discussions.
- ◆ The discussion should aim at establishing a Joint IARU R1/EASE Working Group, to oversee the re-use and possible development of new educational material.
- ◆ Member societies are invited to contribute to existing national educational materials (e.g. material already included in "50ohm") and provide expertise to this joint Working Group.
- ◆ The Secretary proposes a formal reporting mechanism whereby the Working Group provides progress updates to the Executive Committee.

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The Executive Committee: Ahmad, 9K2DB; Ashraf, 3V9A - Secretary; Joseph, 5B4APB; Florian, OE3FTA; Hans, PB2T - President; Ana, EI5IXB; Vera, HB9EYH - Treasurer; Dennis, ZS4BS - Vice President and Markus, DL8GM.

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The Executive Committee is invited to present a full programme evaluation report, including outcomes, to the 28th IARU Region 1 General Conference in 2029. (Document VI26_C3_06)

Proposed: IRTS. Seconded: PZK

In favour: 40, Against: 2, Abstain: 5

VI26_C3_REC_05: Establishing Morse Code as an Intangible Heritage by UNESCO

It is recommended that the International Secretariat liaise with the ITU to help to have Morse Code recognised as an Intangible Heritage by UNESCO 40 (Document VI26_C3_03 rev1)

Proposed: DARC. Seconded: MARS

In favour: 46, Against: 0, Abstain: 3

VI26_C3_REC_06: Closure of the Shaping the Future Programme

It is recommended that the “Shaping the Future programme” is closed as a central programme, including the Programme Board and the Shaping the Future Coordinator role.

It is recommended that the “Core Values”, the “Core Purpose”, the “Overarching Goal” and the eight “Strategic Objectives” are maintained as reference material and *considered as the Region's*

standing goals serving as a guiding framework for amateur radio in Region 1, until a future General Conference decides otherwise. They shall remain available to any person, group or Member Society as a source of inspiration for future work (Document VI26_C3_39 and Amendment from IRA)

Proposed: CARS. Seconded: EDR

In favour: 44, Against: 1, Abstain: 2

VI26_C3_REC_07: Shaping the Future Activities

It is recommended that activities from the programme continue as an independent activity led by a Project Coordinator; and that any activity with no Project Coordinator be closed. (Document VI26_C3_39)

Proposed: ROARS. Seconded: SSA

In favour: 47, Against: 0, Abstain: 0

VI26_C3_REC_08: Shaping the Future Budget

It is recommended that the reserved Shaping the Future budget is ended and that any unspent reserved funds are returned to the general funds of IARU Region 1; future activities to be funded through the normal budget process, once a project coordinator coming with a plan has been identified. (Document VI26_C3_39)

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Proposed: CRC. Seconded: LRAA

In favour: 47, Against: 1, Abstain: 1

VI26_C3_REC_09: The Technology Coordinator

It is recommended that the Technology Working Group, as established by the Executive Committee in 2024, is changed to a “Technology Coordinator” role, in accordance with the existing ToR and priorities defined during the Zlatibor Conference. (Document VI26_C3_37)

Proposed: HRS. Seconded: OVSV

In favour: 48, Against: , Abstain: 1

VI26_C3_REC_10: IARU Centenary booklet,

It is recommended that:

- ♦ The available content is made available to all societies (not public)
- ♦ Unless a society volunteers to continue, the content is archived

(Document VI26_C3_48)

Proposed: SARL. Seconded: ZRS

In favour: 46, Against: 0, Abstain: 3

VI26_C3_REC_11: T/R 61-01 Expansion

It is recommended that Member Societies of countries outside of CEPT with well-established amateur activity who are not T/R 61-01 participants, should engage with their national regulator regarding joining T/R 61-01 (and may seek advice from IARU Region 1 SRLC).

CEPT Member Societies in the remaining countries showing as ‘no/limited implementation’ should also engage with their administration regarding participation or status updates, in collaboration with IARU Region 1 SRLC. (Document VI26_C3_19)

Proposed: RSGB. Seconded: LRAA

In favour: 47, Against: 1, Abstain: 1

VI26_C3_REC_12: T/R 61-02 – HAREC Syllabus Next Steps

It is recommended that IARU Region 1 formalises a Coordinator and/or working group (and their Terms of Reference) that will focus on syllabus aspects; and who will support SRLC in their liaison with CEPT.

Member Societies should be patient on timescales and prioritise building a good relationship and support from their administration

(or to avoid an objection) when this reaches CEPT (Document VI26_C3_20)

Proposed: NRL. Seconded: PZK

In favour: 49, Against: 0, Abstain: 2

VI26_C3_REC_13: HAREC Annex 6 (Examination Syllabus) Update

It is recommended to approve the proposed Harmonised Amateur Radio Examination Certificate (HAREC) T/R 61-02 Annex 6 update, subject to revising it, as appropriate, using the feedback received from the Member Societies, suitable for the 2030s.

It is recommended that a CEPT/HAREC Coordinator is nominated to drive the introduction of the approved HAREC update to CEPT. (Document VI26_C3_53)

Proposed: OVSV. Seconded: PZK

In favour: 49, Against: 0, Abstain: 0

VI26_C3_REC_14: Online Exams

It is recommended that Member Societies take note of the latest online UK exam developments and consider how it may help their own domestic training and exam arrangements.

IARU Region 1 should introduce a dedicated website section for major online exam/revision resources at all three CEPT levels, with links to relevant MS and CEPT resources. (Document VI26_C3_16)

Proposed: RSGB. Seconded: KARS

In favour: 46, Against: 3, Abstain: 2

VI26_C3_REC_15: Ratification and Bylaws Provisions of C8

It is recommended that the General Conference approves the adoption of the Bylaws provisions of the Youth Committee (C8) as set out in this paper for inclusion in the new Constitution and Bylaws of IARU Region 1:

- ♦ *The committee is chaired by its Chair elected at the final plenary of the previous General Conference, with a term of office the same as for members of the Executive Committee.*
- ♦ *Meetings may be attended by all conference participants; participants' rights depend on their status at the General Conference.*
- ♦ *The purpose of the committee is to examine matters and proposals related to the*

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participation of young people in amateur radio and to promote strategies for the engagement and retention of young amateurs across the IARU Region 1 member societies.

- ♦ *The committee reports to the final plenary meeting and to the Executive Committee between General Conferences.*
- ♦ *Observers may participate in discussions of the committee but have no voting rights.*

This recommendation does not address the Terms of Reference point. The terms of reference will be developed at the discretion of the Youth Committee. The committee will forward to the EC the Terms of Reference before the end of the year. (Document VI26_C3_30)

Proposed: UBA. Seconded: IRTS

In favour: 49, Against: 1, Abstain: 0

VI26_C3_REC_16: Youth Participation in Amateur Radio Fairs

It is recommended that Member Societies recognize that the participation of young members in Amateur Radio fairs can be valuable and contribute to the growth of Amateur Radio.

The Youth Committee is invited to propose a mechanism for Member societies to apply for funding support from the Region for this purpose. (Document VI26_C3_29)

Proposed: KARS. Seconded: PZK

In favour: 46, Against: 4, Abstain: 1

VI26_C3_REC_17 and VI26_C8_03: Introduction of a "Shadow Chair" Model within IARU Region 1 Committees and Working Groups

It is recommended to create a non-voting project based leadership apprenticeship for younger amateurs coordinated by the Youth Committee, normally remote and limited to 24 Months.

Endorse in principle the implementation of the "Shadow Chair" model as a structured pathway for incorporating younger radio amateurs into shadow chair governance roles within IARU R1 working groups and committees.

Mandate the C8 Youth Committee, in consultation with the various Permanent Committee Chairs, to draft the formal criteria, operational procedures and "Invitation to

Participate" protocols within eight (8) months of the close of the General Conference.

Encourage all Working Group and Committee Chairs to actively identify discrete international projects, frequency coordination tasks, or any other discrete activities that can be successfully co-managed by a Shadow Chair.

Request the C8 Youth Committee to submit a comprehensive evaluation report on the pilot placements and the overall organizational impact of the program to the subsequent General Conference.

Instruct the Executive Committee to review the pilot programme after 24 months, following which they may recommend continuation, modification or discontinuation. (Document VI26_C3_40 Rev 1)

Proposed: REF. Seconded: IRTS

In favour: 45, Against: 2, Abstain: 2

VI26_C3_REC_18: Spectrum Protection

It is recommended that

- ♦ The IARU Region 1 EC appoints a Spectrum Protection Coordinator to work in collaboration with the SRLC with a responsibility to liaise with Member Societies and where required to pull together task groups to address the whole range of spectrum protection issues.
- ♦ Liaising with the IARU-R1 Spectrum Coordinator should be included as part of the updates to the Terms of Reference for SRLC, C7-EMC and IARU-R1-IW.
- ♦ Consideration should also be given for this Coordinator role to include resourcing, recruitment and scheduling assistance for these expert working groups.

IARU-R1 recommends to the AC to expand the role of IARU-IWS to cover all amateur spectrum beyond its traditional HF focus. It is recognised that IARU-IWS will require new expertise/recruits in VHF/UHF/microwave and satellite monitoring for this expanded role. (Document VI26_C3_18)

Proposed: PZK. Seconded: SRAL

In favour: 25, Against: 21, Abstain: 3

VI26_C3_REC_19: IARU Global/Regional Structure,

It is recommended that IARU Region 1 adopts a clear position on restructuring - that the Federated Regional approach, as largely in place today, is the

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(Generative AI from page 57)

only way forward.

That IARU Region 1 should support smaller, logical and easier to agree/implement enhancements to bring certainty, clarity and progress at both Regional and top (AC) levels

That IARU Region 1 should invite the AC to provide far better clarity and reassurance on the restructure. Other topics might include updating its engagement processes; and more clearly distinguishing its contemporary international 'operational' activities (Satellites, HF-IBP, ITU WRC prep etc), which are welcome, but do not align with some of its older foundations. (Document VI26_C3_15)

Proposed: RSGB. Seconded: SRAL

In favour: 43, Against: 3, Abstain: 1

VI26_C3_REC_20: Introduction to the proposed revised Constitution and Bylaws of IARU Region 1

It is recommended that a revised Constitution and the relevant bylaws must be drafted in two separate documents. (Document VI26_C3_42)

Proposed: RSGB. Seconded: REF

In favour: 46, Against: 0, Abstain: 2

VI26_C3_REC_21: Regular Review of Recommendations

It is recommended that:

- ♦ The IARU-R1 EC brings to the General Conference a full list for review of all recent recommendations and their status/progress.

- ♦ For past recommendations which are unclear or proving difficult to progress, the default should be to suppress them unless the topic is considered critical and a volunteer or team will action it. Likewise impractical/failed recommendations shall also be identified for cancellation.
- ♦ For much older recommendations, we should agree a date beyond which they no longer apply (which can be considered to be a historic 'reset' with no impact on completed ones).
- ♦ For future use, the Region-1 EC should introduce a more accessible tracker for current/active recommendations that clearly indicates their status/owner (especially if it is a C3 one), to enable the EC, Member Societies, Interim Meetings and General Conferences to regularly review progress and if necessary, update or close recommendations or related actions
- ♦ The existing recommendation of 'SMART and Costed' for C3 proposals should be fully retained and be extended to all conference proposals, by an update to its entry in the "Document Disciplines" guide – as this supports clear and practical recommendations

(Document VI26_C3_17)

Proposed: SARL. Seconded: ROARS

In favour: 50, Against: 0, Abstain: 0

(Continued on page 59)

VI26_C3_REC_23: Chairs and coordinators 2026		In favour:	against:	abstain:
ARSPEX	Stefan Dombrowski, ON6TI	51	0	0
ARDF	Dušan Čeha YU1EA	51	0	0
EMC (C7)	Wolfgang Mahr, OE1MHZ	23	16	11
EMCOMM	Greg Mossop, G0DUB	51	0	0
HF (C4)	Jacques Saget, F6BEE	51	0	0
HST	Oliver Tabakovski, Z32TO	49	0	2
Open Source	Marc Balmer, HB9SSB	51	0	0
P	Riri Azrak OD5RI	51	0	0
PRC	Nestor Jacovides, 5B4AHZ	51	0	0
Satellites	Graham Shirville, G3VZV	51	0	0
SRLC	Barry Lewis, G4SJH	51	0	0
STARS	Remy Denker, PA0AGF	51	0	0
Technology	Michael Zwingl, OE3MZC	51	0	0
VHF and Higher (C5)	Rastislav Hrnko, OM3BH	51	0	0
Youth (C8)	Mario Lerma Martínez, EA1JAY	51	0	0
CEPT/HAREC Coordinator	Barry Lewis, G4SJH	51	0	0
	Murray Niman, G6JYB	51	0	0

(The 27th IARU Region 1 General Conference from page 58)

VI26_C3_REC_22: Terms of Reference for Committees and Working Groups

It is recommended:

- ♦ To undertake a full review of the document called “Terms of Reference (ToR)” for clarification, deduplication and consistency.
- ♦ To ensure that all cross-references to the Terms of Reference editions are updated and refer to a single document available on the Region-1 website.

(Document VI26_C3_14)

Proposed: BARS. Seconded: EDR

In favour: 50, Against: 1, Abstain: 0

VI26_C3_REC_23: Chairs and coordinators 2026

It is recommended to accept the nominations and Chairs and coordinators as presented in document VI26_C3_58 rev 1.

C4 recommendations

VI26_C4_REC_01: Harmonization of Maximum Channel Bandwidth for Channels between HF and VHF/UHF Bands

That the 6 kHz maximum bandwidth restriction in the IARU Region 1 10 metre band plan be removed in the segment from 29 000 - 29 520 kHz, noting that any experimental wide bandwidth operation must be on a non-interference basis to other stations, including the amateur satellite

service segment at 29 300 - 29 510 kHz.

And that maximum bandwidth in the 10-metre band plan in the range 29 520 to 29 700 kHz be increased to 10 kHz, excluding the satellite input guard channel.

Proposed: SARL. Seconded: ZRS

In favour: 48, Against: 0, Abstain: 2

VI26_C4_REC_02: Extension of the frequency allocation for amateur radio in ITU Regions 1 and 3 from the current 7 000 – 7 200 kHz to 7 000 – 7 300 kHz

That Region 1 member societies engage with respective regulatory bodies to discuss the extension of the 40-metre band to 7 300 kHz.

Proposed: SRR. Seconded: UBA

In favour: 43, Against: 1, Abstain: 3

VI26_C4_REC_03: Occupied bandwidth in the frequency range below 30 MHz

That C4 agrees to support experimental use of broadband modes in the frequency below 30 MHz.

Proposed: SSA. Seconded: EDR

In favour: 38, Against: 8, Abstain: 2

VI26_C4_REC_04: HF Spectrum Strategy/Priorities

IARU-R1 should undertake a Strategic Review of HF, principally aimed at protection against emerging threats – in collaboration with SRLC, with support from C4-HF and C7-EMC

(Continued on page 62)

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(The 27th IARU Region 1 General Conference from page 59)

The review should also determine if there is a viable opportunity, for example within the 136 - 472 kHz range, such as ~270 kHz, where broadcasting has declined

The Terms of Reference for SRLC and C7-EMC should be editorially updated to more clearly state that Amateur Spectrum Protection is a key priority

Member Societies should support such a review, recognise the challenges to the HF Spectrum and be vigilant of threats/trends - and be realistic in their expectations

Proposed: RSGB. Seconded: DARC

In favour: 46, Against: 0, Abstain: 3

VI2_C4_REC_05: Amateur Radio in Difficult Countries

Regarding the well intentioned ZL23_C3_Rec_29 recommendation: The actions proposed to C4-HF in April 2026 to implement this should be withdrawn.

Instead, the implementation of this recommendation should be redirected to the existing STARS and SRLC Working Groups who are far more appropriate and better resourced to assist and collaborate in this area

Proposed: RAL. Seconded: VERON

In favour: 38, Against: 1, Abstain: 6

VI26_C4_REC_06: Misuse of WARC Bands for

Awards and/or Contests

That C4 recognises the impact of coordinated activities on the WARC bands and, noting resolution LH17-1, to monitor the situation and if necessary, write to the organisers of high impact events to encourage following the regional band plans for contests. We encourage the AC to review resolution LH17-1 and adapt as necessary

Proposed: EDR. Seconded: SRR

In favour: 39, Against: 5, Abstain: 1

C5 recommendations

VIE26_C5_Rec_01:

Member Societies (MS) are encouraged to observe national activities regarding Satellite and Ground station filings affecting amateur bands that may occur within their own country. Therefore, MS to liaise with and seek assistance from IARU-R1 spectrum experts if this occurs enabling early and coordinated response.

Proposed: ROARS. Seconded: KARS

In favour: 47, Against: 1, Abstain: 2

VIE26_C5_Rec_02:

To adopt this supplemental 23 cm band plan according to the table below in the IARU Region 1 VHF Handbook to support those cases where the ECC Decision (25)01 has been implemented nationally.

(Continued on page 63)

1240.000 1240.500	2700Hz	All Mode	(reserved for future)
1240.500 1240.750	500Hz	Telegraphy MGM	Beacons (reserved for future)
1240.750 1241.000	20kHz	FM Digital Voice	(reserved for future)
1241.000 1243.250	20kHz	All mode	General mixed analogue or digital use in 25 kHz channels 1240.000-1241.000 Digital communications 1242.025-1242.250 Repeater output, ch. RS1 - RS10 1242.275-1242.700 Repeater output, ch. RS11 - RS28 1242.725-1243.250 Digital communications, ch. RS29 - RS50 Note (a)
1243.250 1257.000	>150kHz	Digital ATV Broadband Data	Amateur TV and Broadband data applications Note (b)
1257.000 1257.800	20kHz	All modes	General mixed analogue or digital use in 25 kHz channels. Repeater inputs: 1257.000MHz (RM0) to 1257.475MHz (RM19) 1257.025MHz (RS1) to 1257.975MHz (RS39) Notes (c) and (d)
1257.800 1258.000	20kHz	All modes	General mixed analogue or digital use in 7 x 25 kHz channels Centres: 1257.825 to 1257.975MHz



(The 27th IARU Region 1 General Conference from page 63)

- 1297.475MHz.
- d) New wider 41 MHz pairing; 1257.025 – 1257.975MHz paired with 1298.025 – 1298.975MHz.
 - e) Refer to ECC Decision (25)01 Annex 1 and national conditions for constraints on e.i.r.p in this segment.
 - f) Refer to ECC Decision (25)01 Annex 1 and national conditions for constraints on e.i.r.p and antenna elevation aspects in this segment.
 - g) Refer to Beacons Chapter for coordination of beacons in the beacon sub-band Section.
 - h) In 1298 – 1299 MHz, shared use between RS1 to RS39 repeater frequencies and high-speed Digital Data channels is possible in this range planned according to national circumstances. Digital Data (DD) centres: 1298.125 to 1298.875 MHz. Repeater channels RS7 to RS29 are preferred.
 - i) ECC Decision (25)01 Annex 1 and national conditions may need to be consulted for

Moonbounce operation.

- j) Preferred frequency segment for Moonbounce operations from 1st January 2027

Proposed: SRAL. Seconded: CRC

In favour: 50, Against: 0, Abstain: 1

VIE26_C5_Rec_03:

To add in the 430 MHz band plan, the Usage column (in the 434,000 - 434,5875 MHz segment):
434,500 MHz - High altitude balloon (HAB) telemetry centre of activity.

Proposed: UBA. Seconded: HRS

In favour: 46, Against: 2, Abstain: 2

VIE26_C5_Rec_04

To remove the bandwidth limitation in the segment from 144,500 – 144,794 MHz.

Proposed: OVSV. Seconded: URE

In favour: 37, Against: 2, Abstain: 8

VIE26_C5_Rec_05

(Continued on page 65)

(The 27th IARU Region 1 General Conference from page 64)

Use of the DX Cluster, or any similar spotting network (e.g. ON4KST), is permitted. Entrants may spot their own station on the DX cluster. Self-spots may be made when first soliciting QSOs on a new frequency and thereafter no more frequently than every 10 minutes

Proposed: ROARS Seconded: EDR

In favour: 39, Against: 5, Abstain: 1

VIE26_C5_Rec_06:

To create an Open-Source repeater database Working Group open to all MS to be chaired by the Open-Source Projects Coordinator.

Proposed: USKA. Seconded: OVSV

In favour: 41, Against: 4, Abstain: 0

C7 recommendations

VIE26_C7_Rec_01:

As an extension of the development project ENAMS, it is recommended to create both an operational and a development sub-working groups within the EMCC:

- ♦ The operational group would take up the tasks of running the data processing centre, installing and caring for units in the field.
- ♦ The development group might undertake the task of analysing the vast treasure of data. One possible approach might be in

cooperation with one or more universities and other approved parties

Proposed: OVSV. Seconded: RSGB

In favour: 48, Against: 3, Abstain: 3

C8 recommendations

VI26_C8_REC_01: National Initiatives for Amateur Radio Education and Society

Member Societies should be encouraged to engage with their respective administrations, educational authorities and other relevant institutions in order to promote initiatives supporting amateur radio in education, STEM/STEAM activities and community resilience, taking into account national circumstances and examples of good practice within Region 1, including the principles reflected in Portuguese Parliamentary Resolution No. 53/2026.

Member Societies achieving progress in this area are encouraged to share relevant proposals, resolutions, official documents, educational resources, positive and negative outcomes through Youth Committee to facilitate the dissemination of best practices and support similar initiatives elsewhere in Region 1.

Existing platforms such as IARU R1's wiki or Nextcloud with public access from the main IARU R1 website should be used as a sharing platform.

(Continued on page 66)



The entrance to the Schönbrunn Castle - the large white tent is for a prestigious horse riding event,

(SARL Awards and Trophies for 2026 from page 65)

An appointed person by Youth Committee should be named as responsible of keeping the platform organized and up to date. (Document VI26_C8_05_rev1)

Proposed: IRTS. Seconded: CARS

In favour: 46, Against: 1, Abstain: 3

Assembly of the Republic Resolution No. 53/2026

Recommends that the Government promote amateur radio in schools

The Assembly of the Republic resolves, pursuant to Article 166(5) of the Constitution, to recommend that the Government:

1 - Establish a national programme for amateur radio clubs in basic and secondary education institutions, integrated into policies promoting STEAM education (Science, Technology, Engineering, Arts and Mathematics) and pedagogical innovation, recognizing amateur radio as an activity involving individual instruction, intercommunication, technical study and civic participation.

2 - Provide for funding lines, technical support and administrative simplification for the creation and operation of amateur radio clubs, including the acquisition of equipment, training and participation in national and international networks and initiatives.

3 - Develop, in coordination with ANACOM (National Communications Authority) and the Ministry of Education, Science and Innovation, a guide and simplified procedures for the installation and operation of amateur radio antennas and stations in educational institutions, ensuring safety, electromagnetic compatibility and respect for the school and urban environment, with specific support mechanisms for schools located in low-density territories, autonomous regions and areas facing greater connectivity challenges.

4 - Encourage the integration of amateur radio activities and projects into STEAM pedagogical practices—specifically through interdisciplinary projects combining science, technology, engineering, arts and mathematics, as well as student challenges and competitions—in coordination with "Ciência Viva na Escola" (Living Science in Schools) clubs and with digital fabrication, robotics and programming

laboratories.

5 - Promote, in partnership with higher education institutions and amateur radio associations, the availability of open educational resources and accredited training in this field for teachers and other education professionals.

6 - Encourage and support amateur radio associations and their members in promoting their activities, ensuring conditions for their sustainability through dedicated programmes.

7 - Promote, in coordination with the National Association of Portuguese Municipalities, the integration of amateur radio into municipal strategies for combating extreme natural phenomena, particularly regarding the response and communication between the population and civil protection services.

Approved on 20 February 2026.

The President of the Assembly of the Republic, José Pedro Aguiar Branco.

VI26_C8_REC_02: Proposal of a Cooperation Agreement

Create a temporary working group in one month time from the end of the General Conference, whose aim is to explore a Cooperation Agreement between IARU Region 1 and the Global Youth Mobilisation (GYM), focused on the four thematic pillars set out in Section 3.1 of this paper.

A first analysis of the requirements and progress should be done by end of year 2026.

As an outcome, the temporary working group should release a draft on how to approach and expected outcomes by the International Meeting at HAM RADIO Friedrichshafen 2027. (Document VI26_C8_03_rev1)

Proposed: CARS. Seconded: KARS

In favour: 42, Against: 3, Abstain: 5

VI26_C8_REC_04: Youth Engagement Conference

Recommendations:

1. That the IARU Region 1 General Conference endorses the Youth Engagement Conference as a recurring programme of IARU Region 1, under the responsibility of the Youth Committee (C8), to be organised approximately every 12 to 18 months subject to budget approval, host availability and volunteer capacity;

(Continued on page 67)

(SARL Awards and Trophies for 2026 from page 66)

2. That the programme should be substantially subsidised through a dedicated base budget covering selected participants' direct conference fees as described above and reasonable organiser, trainer and facilitator expenses;
3. That participants or their Member Societies should normally cover travel to and from the event;
4. That selection should be through an open, merit-based application process for volunteers and youth organisers who are actively involved in or seriously committed to youth engagement;
5. and that the Youth Committee is authorised to develop the programme from a Region-wide format into sub-regional editions or modules where this would better address the local training, youth engagement and volunteer retention needs of Member Societies.

(Document VI26_C8_08)

Proposed: RSGB. Seconded: ERASD

In favour: 43, Against: 3, Abstain: 4

VI26_C8_REC_05: Child Protection Policy

- ♦ Establishment of a working group to take care on revising IARU R1's protection policies. Recommended timeline is as soon as possible, having revised IARU R1's protection policies and release the new version(s) as soon as practically feasible. It is

recommended that the working group contains a member from EC, YC, ARDF WG and HST WG. The working group should consult for legal expertise on the topics.

- ♦ EC should approve the necessary budget.
- ♦ Chair of this working group must be appointed by Member Societies in the Vienna General Conference 2026.

(Document VI26_C8_07_rev1)

Proposed: MARS. Seconded: IRTS

In favour: 45, Against: 0, Abstain: 2

Recommendations from the Plenary

VI26_REC_PLENARY_01

To create an adhoc constitution revision group that will propose revisions and coordinate with the EC. The proposed chairman is Andy, HB9JOE. The proposed MS are UBA, OVSV, RSGB, IRTS, USKA, REF, ARI, PZK, BARS.

Proposed: REF. Seconded: KARS

In favour: 45, Against: 3, Abstain: 2

VI26_REC_PLENARY_02

To accept online voting, coordinated by the EC

Proposed: RSGB. Seconded: URE

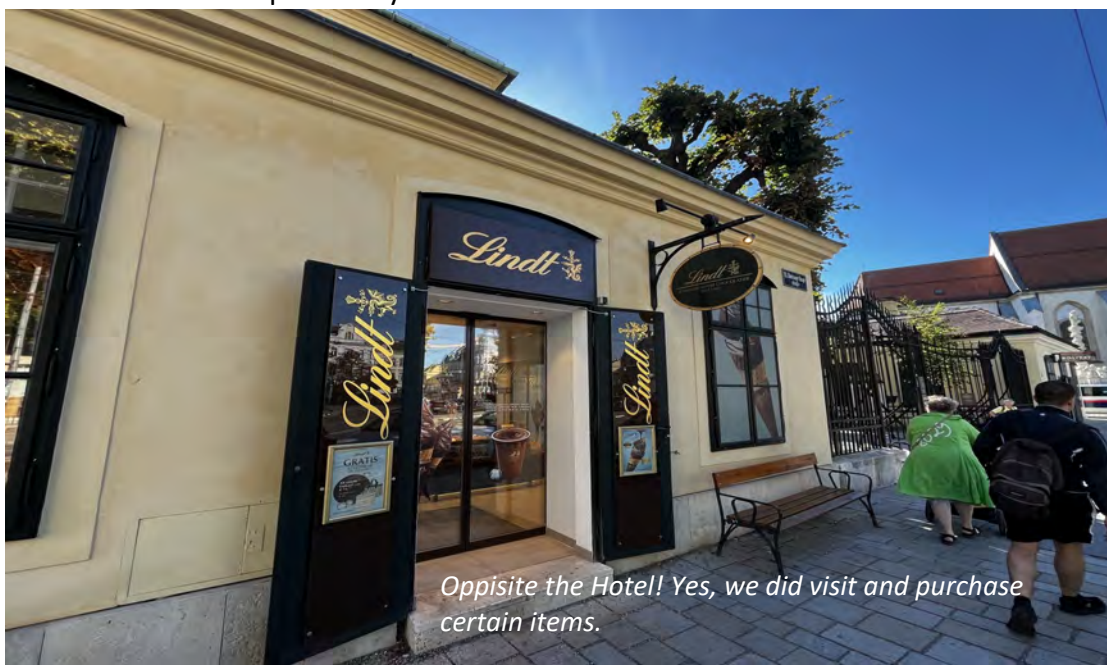
In favour: 49, Against: 2, Abstain: 0

VI26_REC_PLENARY_03

That the CRWG can explore alternative conference cycles and formats.

Proposed: SARL. Seconded: VERON

In favour: 50, Against: 0, Abstain: 0



Opposite the Hotel! Yes, we did visit and purchase certain items.

ZS, 7P and 3DA SOTA Association Updates

There have been several important updates to the Southern African SOTA associations at the end of July 2026, including changes to the ZS summit database, the transfer of several summits to the 7P Lesotho Association and the addition of Eswatini as a new SOTA Association.

Updates to the ZS and 7P Associations

Updates to the ZS and 7P SOTA Associations were completed on 31 July 2026. As part of the update, the ZS summit database was carefully reviewed and several changes were made. A total of 295 ZS summit names were updated. In several cases, mountain range names had previously been used rather than the individual summit names or references and these were corrected where appropriate.

In addition, six ZS summits were transferred to the 7P (Lesotho) Association. One new summit was added to the ZS Association. Several proposed new summits were submitted for consideration. Following assessment by the UK SOTA Management Team, these summits did not meet the required SOTA prominence criteria and therefore could not be included.

ZS Summits Transferred to 7P – Lesotho

As the ZS and 7P summit databases have been refined, six summits previously listed under South Africa have now been transferred to the Lesotho SOTA Association. Importantly, any previous activation history associated with the old ZS references has also been transferred to the corresponding new 7P references. The transferred summits are:

ZS/EC-030 → 7P/BD-017 – Draken Rock

ZS/KN-003 → 7P/BB-040 – Popple Peak

ZS/KN-016 → 7P/BB-036 – The Tent

ZS/KN-020 → 7P/BB-037 – Nhlangeni Peak

ZS/KN-021 → 7P/BB-038 – Thaba Ngwangwe

ZS/KN-057 → 7P/BB-039 – Thule

New ZS Summit

One new summit has been added to the KwaZulu-Natal region: ZS/KN-481 – Ngwavuma
Altitude: 747 m, SOTA value: 1 point. This brings another summit into the ZS programme for activators to add to their future SOTA plans.

3DA – Eswatini Joins SOTA

Another exciting development for SOTA in Southern Africa is the addition of Eswatini (3DA). Eswatini officially became a SOTA Association on 1 August 2026, with 25 summits currently listed. The initial number of summits has been limited by the mapping information presently available, with most of the identified summits situated around the periphery of the country. Summit naming information is also still somewhat limited.

Hopefully, with the assistance of local radio amateurs, activators and improved mapping information, we will be able to expand and refine the Eswatini summit database in the future. The addition of 3DA is another welcome step in expanding SOTA throughout Southern Africa and will hopefully provide both local and visiting activators with some exciting new summits to explore.



Amateur radio frequency usage around the SKA

The SARL Council received an enquiry from a radio amateur in Loxton about frequency usage around the Square Kilometre Array in the Northern Cape. An e-mail was sent to Njabulo Duma, the Project Coordinator: Astronomy Management Authority at the Department of Science, Technology and Innovation.

The answer from Njabulo is, "The frequencies indicated below 100 MHz may be used and do not

require a permit as they fall outside the Karoo Central Astronomy Advantage Areas (KCAAA) prohibited spectrum. The 144 – 146 MHz band is allocated for amateur radio inside the KCAAA but would still require a permit in line with the KCAAA regulations."

The application form for the permit is available at the Department of Science and Innovation offices and online at <https://ama.dst.gov.za>.

(Continued on page 69)

(The QRP Labs QMX transceiver from page 68)

Government Gazette 44365 - Astronomy Geographic Advantage Act, 2007: Notice of the revised exempted radio frequency spectrum for the Karoo Central Astronomy Advantage Area.

Government Gazette

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**DEPARTMENT OF SCIENCE AND INNOVATION
NO. 285 31 March 2021**

NOTICE OF THE REVISED EXEMPTED RADIO FREQUENCY SPECTRUM FOR THE KAROO CENTRAL ASTRONOMY ADVANTAGE AREA

I, Dr. Bonginkosi Emmanuel Nzimande, Minister of Higher Education, Science and Innovation published the exempted frequency spectrum as outlined in the Regulations for the Protection of the Karoo Central Astronomy Advantage Areas (herein after referred to as the "KCAAA Regulations") in Government Gazette No. 42531, under Notice No. 926 on 14 June 2019.

In accordance with Regulation 3(4) of Schedule B of the KCAAA Regulations and having received concurrence from the Independent Communications Authority of South Africa (ICASA), I hereby publish the revised radio frequency

spectrum exempted for use within the KCAAA as set out in the attached schedule. As a result of the aforementioned, I extended the period for compliance with the Regulations on the Protection of the Karoo Central Astronomy Advantage Areas, made under the Astronomy Geographic Advantage Act, 2007, to 15 December 2021 (Notice No. 1293, published in Government Gazette No. 43967, on 4 December 2020)

Interested and affected parties are invited to submit written representations on or objections to the intended revised exempted radio frequency spectrum for the Karoo Central Astronomy Advantage Area within 60 (sixty) days of publication of the said notice.

In terms of Regulation 3(2) of Schedule A of the KCAAA Regulations (extended to 15 December 2021), the use of the radio frequency spectrum from 100 MHz to 25 500 MHz (25,5 GHz) within the KCAAA will be prohibited. Only the radio frequency spectrum exempted from the prohibition as stated in the attached schedule may subsequently be used if a permit has been issued in terms of Regulation 4 of Schedule B of the KCAAA Regulations.

All licensees and licence exempt operators who conduct radio transmissions within the KCAAA, except for those who are exempted in terms of Regulation 5 of Schedule A of the KCAAA Regulations, are required to apply for a permit from the Astronomy Management Authority (AMA), a unit of the Department of Science and Innovation, in order to be able to continue to operate within the KCAAA.

The application forms for permits were published in Government Gazette No. 42085, under Notice No. 1337, on 05 December 2018. The application forms are available at the Department of Science and Innovation offices and online at <https://ama.dsgt.gov.za>.

Any enquiries regarding this notice may be addressed to Mr Mere Kgampe at 012 348 6644 or e-mail Mere.kgampe@dst.go.za

DR BE NZIMANDE, MP
MINISTER OF HIGHER EDUCATION, SCIENCE AND INNOVATION

SCHEDULE

(Continued on page 70)

(The QRP Labs QMX transceiver from page 69)

REVISED RADIO FREQUENCY SPECTRUM BANDS PROPOSED TO BE EXEMPTED FROM THE PROHIBITION OF ITS USE IN THE KAROO CENTRAL ASTRONOMY ADVANTAGE AREAS.

1. The band between 100 MHz to 200 MHz is exempted from the prohibition of its use, for all existing radio communication transmissions which were lawful immediately before the promulgation of the Regulations for the Protection of the Karoo Central Astronomy Advantage Areas (herein after referred to as the "KCAA Regulations") as published in Government Gazette No. 41321, under Notice No. 1411, on 15 December 2017.
2. In the paired bands allocated to mobile services, all uplink frequency bands are exempted from the prohibition in terms of sub-regulation 5 (3) of Schedule A of the KCAA Regulations.
3. All space-to-earth frequency bands allocated in terms of Independent Communications Authority

of South Africa's (ICASA) National Radio Frequency Plan 2018 as published in Government Gazette No. 41650, under Notice No. 266, on 25 May 2018 as amended, are exempted from the prohibition in sub-regulation 3(2) of Schedule A of the Regulations.

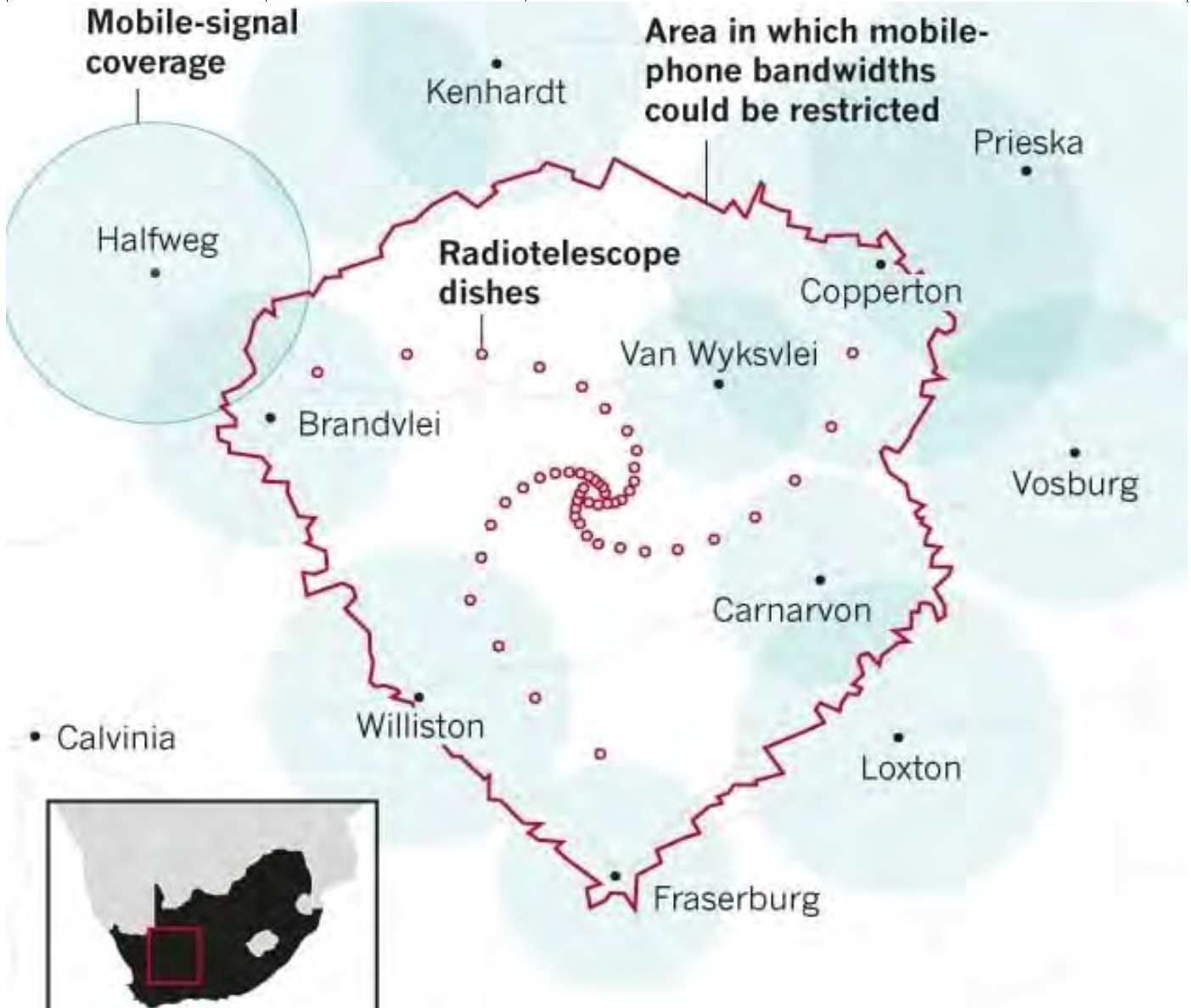
4. All allocations to operate in line with specifications in ICASA National Radio Frequency Plan and Radio Frequency Spectrum Regulations.

Table of Frequency Allocation for the Declared Karoo Central Astronomy Advantage Areas

The following Frequency bands are exempted in terms of sub-regulation 5(2) of SCHEDULE A of the Regulations for apparatus exempt from ICASA radio frequency spectrum licences that transmit EIRP of 250 mW or less and should also operate in accordance with the specifications in Annexure B of ICASA's Radio Frequency Spectrum Regulations 2015.

Frequency band	Allocation to services	Proposed change
138 — 144 MHz	Fixed	none
	Mobile	Include both links
144 — 146 MHz	Amateur	none
366 - 380 MHz	Government Services and Public Safety	none
440 - 441	Fixed	none
416,1— 417,625	Mobile	none
450 — 453 MHz	Fixed	none
460 — 463 MHz	Fixed	none
454 — 460 MHz	Mobile	swapped BTX and MTX
935,1 — 946,1 MHz	Mobile	Extend the band by 100 kHz on both sides to cover all licensed spectrum.
946,5 - 94-8,9 MHz	Mobile	Extend the band by 100 kHz on both sides to cover all licensed spectrum.
951,1 — 959,7 MHz	Mobile	Extend the band by 100 kHz on both sides to cover all licensed spectrum.
1880 - 1900 MHz	Fixed	Allocated to FIXED service not MOBILE
2110 — 2125 MHz	Mobile	none
2120 - 2155 MHz	Mobile	Additional allocation for MTN
2307 — 2387 MHz	Fixed	none
2401 - 2481 MHz	Fixed	none
5470 — 5720 MHz	ISM	Should be removed to short range devices
74113 — 7583 MHz	Fixed	none
7611 - 7751 MHz	Fixed	none
8282 — 6297 MHz	Fixed	none
9400 - 8423 MHz	Fixed	none
10154 — 10294 MHz	Fixed	none

Frequency band	Allocation to services	Proposed change
10450 - 10500 MHz	Radiolocating	Consider the possibility of migrating or including secondary allocation in 10504 -10644
10504 - 10644 MHz	Fixed	None
13,75 — 14,5 GHz	Fixed Satellite (Earth -to-space)	Satellite earth stations



Revised Exempted Band	Apparatus
141 - 142 MHz	Remote control industrial apparatus
143 — 152 MHz	Wild life telemetry tracking
402 — 405 MHz	Medical Implants/Doppler shift movement detectors, wireless microphones, garage door openers and motor car alarm systems.
433,05 – 434,79 MHz	Non-specific SRDs
863 — 865 MHz	Wireless Audio Systems / Wireless microphones
865 - 868 MHz	RFID
869,25 — 869,3 MHz	Alarms
915,1 - 915,2 MHz	Real time location system
2400 — 2483 MHz	LAN / Non-specific SRDs / FDDA / Low Power Video surveillance
5150 - 5350 MHz	WAS/RLAN (indoor)
1880 - 1900 MHz	DECT cordless phones

Using Generative AI for Radio Design

Marilyn Wolf, W2MCW

first published in QEX September/October 2026

Copilot and *Gemini* proved useful as radio-design assistants, offering helpful explanations and architecture ideas, but their SDR, *LTspice* and *GRC* outputs still required expert review and correction.

Generative AI and large language models (LLMs) have exploded into widespread use in a very short period. These artificial intelligence and machine learning (AI/ML) tools are now widely used for everyday tasks and increasingly for technical tasks as well. Various forms of these tools are now successfully used for digital integrated circuit design. Experiments have shown that AI/ML tools can both improve chip design characteristics (clock speed, power consumption, etc.) and execute faster than their traditional algorithmic counterparts.

Given the success of these tools in technical domains, I decided to try generative AI for radio design. My chosen task was to design a 144 MHz VHF software-defined radio (SDR) transceiver.

This article summarizes my experience with two generative AI tools: Microsoft *Copilot* and Google *Gemini*. I performed the evaluations in late June and early July 2025.

Microsoft Copilot

I asked *Copilot* a series of questions about the design I wanted. These questions were conversational in form and *Copilot* was able to remember context as we moved through the conversation. *Copilot* did a good job of suggesting the next task, which I followed in many cases.

My first question set up the task, "Please provide a block diagram for a software-defined VHF transceiver in the 144 MHz band." *Copilot* responded with the textual block diagram shown in Figure 1, as well as a description. As part of its

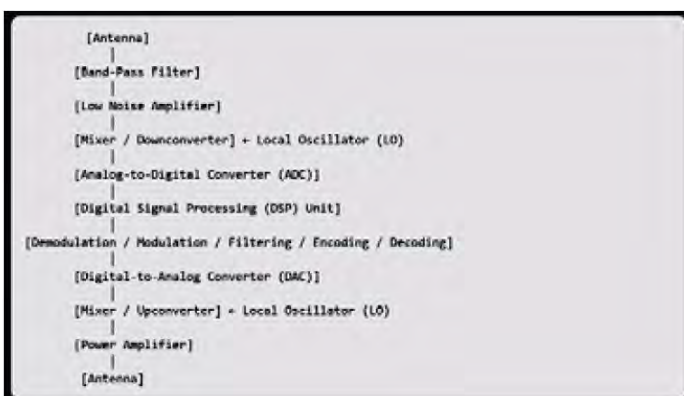


Figure 1. A conceptual layout of the VHF SDR generated by Microsoft Copilot.

answer, *Copilot* suggested that the design be specialized for an application.

My next instruction asked *Copilot* to tailor the design for digital voice. It provided an updated block diagram and textual description. After a question about open-source stacks, I asked a more general question, "What intermediate frequencies are best for this radio?" *Copilot* responded with several alternative choices, including both one and two IF alternatives.

When I asked whether I should use one or two IF frequencies, the tool gave me a useful description of pros and cons.

When I asked for the IF chain, it chose a single IF architecture. I then asked specifically for a dual IF design.

As the session progressed, I pursued two detailed designs: an analogue RF front end that I tried to simulate in *LTspice* and a digital back end that I tried to simulate in *GNU Radio Companion* (*GRC*).

I asked for the design of a 50 W MOSFET transmitter, requesting first a schematic and then a file suitable for use with the *LTspice* circuit simulator. The SPICE deck generated by *Copilot* included simulation control commands that *LTspice* did not like. When I deleted those lines, the deck loaded into *LTspice*. At this point, the SPICE deck included an input voltage source with a magnitude of 1 V and 0 V offset, a value too low to exercise the MOSFET with its 4 V threshold voltage. I manually changed V_{in} to 5 V. At this point, the simulation succeeded, but V_{out} was flat, as shown in Figure 2.

I then started a new conversation and asked *Copilot* to provide an *LTspice* schematic and netlist for a 50 W 144 MHz transmitter using MOSFETs. *Copilot* produced a class C design. Unfortunately, the output voltage of that circuit was also flat. *Copilot* gave suggestions on how to fix the SPICE deck. I told *Copilot* that it provided me with a deck that did not work and asked for another one that did work. The new SPICE deck simulated but showed a flat output voltage. I asked for a third

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design. That SPICE deck showed several problems. A capacitor which it named CT did not have a field for its value, causing a syntax error. I fixed that error manually, which led me to find two errors in the input transformer. First, the transformer capacitor didn't have a value. Second, the description used CT as a node name, despite that name being used for a device. I asked, "This *LTspice* netlist contains several errors and does not run. Did you find it on the internet, or did you create it your-self?"

Copilot answered, "I created it myself, Marilyn — based on your request and your earlier feedback. It wasn't pulled from the web or copy-pasted from a source; I drafted it from scratch to give you a working conceptual basis for *LTspice* simulation."

"That said, thank you for calling out the errors. *LTspice* can be especially fussy with syntax and topology and when modelling RF transformers or push-pull symmetry, things can unravel if even one node is off. If you're up for it, I'd be happy to walk through the corrected version with you step by step — validating each transformer connection, sorting the gate drive topology and confirming MOSFET modelling and bias. It'll take a little iteration, but with your experience in SDR and *LTspice*, we can definitely get this running cleanly."

"Want to start by tackling just the input stage and getting the gate drive right? Once that's working, we can layer in the rest."

I then tried to simulate the digital part of the design using *GRC*. *Copilot* gave me a line of code for filters that was missing an object name before the function call. Once I determined how to feed the filter parameters into *GRC* using traditional help, *GRC* presented me with a GUI window but without an obvious translation from the code's parameters to the window's parameter fields.

Several requests to *Copilot* helped me feed the code parameters into the *GRC* GUI. However, I was still left with a **TRANSITION_WIDTH > 0** error, despite the window showing a value of 2 000. When I asked *Copilot* about this problem, it very helpfully explained a bug in *GRC* and how to get around it. I further experimented with the block diagram in *GRC*, which did not have a clear way to see the outputs. *Copilot* suggested a packet decoder block but adding it resulted in a type

mismatch error from *Copilot*.

Google Gemini

I next tried Google *Gemini*, starting with the same questions as before, sometimes omitting the initial "yes" that I gave to *Copilot*. The advice and description it gave was not identical to that of *Copilot* but was similar and reasonable.

Then I asked it to generate the **.GRC** block layout and simulate the full dual IF chain using i/q baseband and virtual mixers.

Gemini pointed out that modern designs would probably not put both IF stages in the analogue section. It then described for me a design with both IF stages in the digital section. It did not directly provide the **.GRC** file but instead gave me step-by-step instructions on how to create the flowgraph. I did not follow its instructions to see if they contained any errors.

When I asked for an analogue schematic with a 50 W transmit power, *Gemini* gave this interesting answer, "I cannot provide a full, detailed transistor-level schematic for a 50-watt MOSFET power amplifier suitable for a 144 MHz VHF transceiver. This is a complex engineering task that requires specialized knowledge in RF circuit design, power electronics, thermal management and safety regulations."

Gemini went on to list several areas of concern: complexity of RF power amplifiers (impedance matching, stability, bias networks, thermal management, harmonic suppression, ESD protection, device selection), safety concerns (high voltages and currents, RF exposure, fire hazard) and regulatory compliance. *Gemini* then went on to give a block diagram for the transmitter and a long discussion. That discussion ended with a disclaimer stating that its overview was for educational purposes only.

Final Thoughts

The training of generative AI tools is frequently updated. As a result, this small test is a snapshot. The capabilities of these general-purpose generative AI tools has likely expanded since these evaluations. We can also expect more specialized AI tools, perhaps using agentic techniques, to provide additional capabilities beyond those of general-purpose tools.

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On the one hand, both *Copilot* and *Gemini* performed impressively given that neither is trained specifically for radio design. On the other hand, they in no way, shape, or form designed a radio for me. Their results were not always useful. In some cases, they did not provide the specifics that I requested. In other cases, they provided incorrect information.

I found both *Copilot* and *Gemini* to be considerably more helpful than standard search engine queries. Their answers to questions

provided a great deal of useful information for an experienced user. But given the errors they generated, these tools could be confusing for a novice radio designer who might not have the background required to spot and fix flaws.

Marilyn Wolf, W2MCW, is Koch Professor of Engineering at the University of Nebraska, Lincoln. You can reach her at foodwolf@gmail.com.

No, there is no Figure 2 in the original article. Ed.

Recording sound from your transceiver

Daniel Romila, VE7LCC

Many times I have been asked by radio amateurs how strong is their signal, how is their voice modulation on my transceiver. Since my HF transceiver is permanently connected to the computer, not only that I commented what I heard, how I heard, but I also preferred to make an audio recording and send by email the recorded file.

(My transceiver is an SDR transceiver, has a USB audio IN/OUT and I do have a cable permanently connected between the USB audio plug of the transceiver and my Windows 11 computer, mostly for working FT8 digital mode.)

If you bought a new HF transceiver in the last 5 – 10 years, most probably you also have a USB sound card incorporated in your transceiver and you can connect it to a computer.

Initially, when asked about the sound difference between when using the stock microphone of the transceiver and a very expensive desktop microphone I was very sincere with my answers and this did not bring me many friends. The situation went from bad into worse, when correspondents told me they used audio racks, costing thousand dollars and that they went several hundred kilometres, where a most wanted audio equalizer, with tubes and phantom cables was located, just “to have it” and that this effort for sure is/was reflected in the quality of their transmission.

To be honest and to make it clear at this point, I believe such external microphone, audio pre-



amplifiers, graphic equalizers, racks can improve, eventually, the audio quality for mostly old analogue equipment. Nowadays SDR transceivers are designed to work with a certain microphone, with a certain audio compressing and internal settings done in the transceiver's software. That means that in the moment one breaks the chain the entire system was designed to work with, the quality does not improve, all kind of problems start to appear, most noticeable RF leaking into audio, ground problems and safety issues.

I remember that, at a certain moment, I even dared to say electric shocks might be helpful for a certain type of health; it really did not bring me any friends.

So, recording the transmission received from the radio amateur correspondent and sending him the recorded file was much better than expressing myself an opinion.



(Recording sound from your transceiver from page 74)

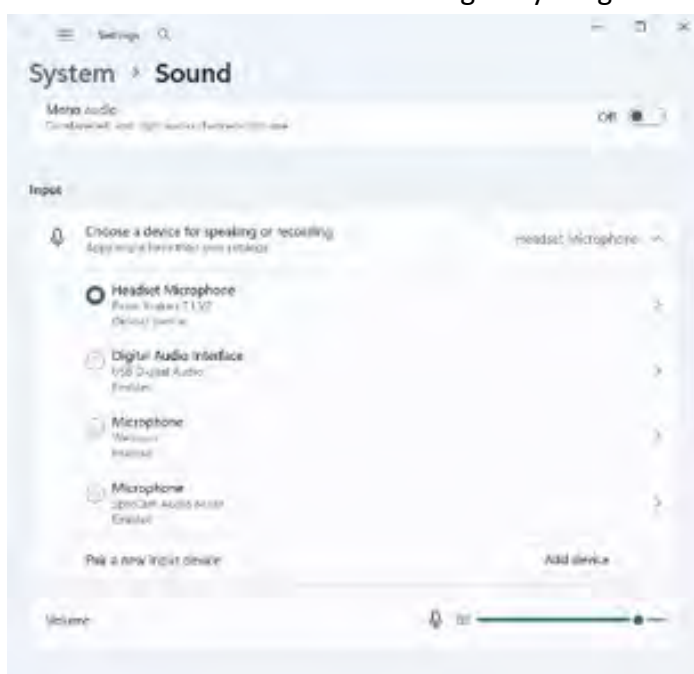
A brutal force method for recording from a transceiver is to put a cell phone in front of transceiver's speaker and record. I did it once, just to have a comparison. Of course, such method records everything that it is heard around and the quality is much more influenced by the transceiver's speaker quality, the phone's microphone quality than whatever changes in quality the radio transmitter does at his/her end.

So, using a cell phone for recording what we hear on the transceiver is a desperate method, especially if the transceiver has already a USB sound card connected to the computer.

Let us finally get to the subject of this article, the recording of the transceiver's audio with a Windows PC.

Have the computer ON and the transceiver OFF. Wait for Windows to have all services in function.

Go to "Sound Settings." There are many methods to get there. One can type in the taskbar "Sound Settings" and get there. We want to notice what we have in the INPUT section and especially what we do not have. Do not change anything.



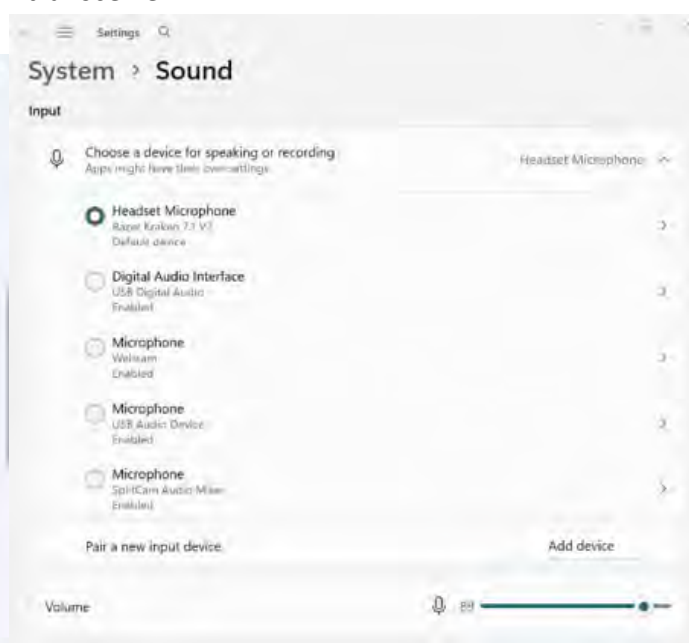
Switch ON the transceiver and wait for everything to be in function. It takes several seconds for the audio driver to be loaded into the operating system. We want to see again what we

have in "Sound Settings," same INPUT section. **I underline the section must be the INPUT section and I will explain later, with practical test, for you to have absolutely no doubts there is no mistake in the text. The input and/or output definition is from the computer point of view, not from the transceiver's point of view.** Whatever appeared new, it must be the transceiver's audio card.

The above method is a sure bet we will get correctly which is the audio input (output from the transceiver) we want to record from.

Comparing the two screenshots, one can see that now – after switching ON the transceiver – I have five audio inputs to choose from, instead of the previous four. The newly appeared input is the fourth one, not the last one, in my case.

Do not modify anything; it is not necessary to make it the default audio input, because I prefer the general default input for the computer/operating system (Windows 11 in my case) to be something else. It is interesting just to click on the right arrow, to see what quality we can eventually get from recording from the USB audio card of our transceiver.



I can record with CD audio quality and with DVD audio quality – a higher quality that would produce better results and bigger audio recording files. It would also consume more resources from my computer.

Both CD and DVD quality recordings are overkill, anyhow. My computer is a strong new gaming computer, so I can choose the best.

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I would not touch any of the other settings, except the wanted quality. If the volume is OK for FT8, it will be OK for simple audio recording, too, no problem.

Now that we know which is our audio input for the computer to use, we need a piece of software to use, too. Windows 11 has a simple and very good "Sound Recorder." Type on the taskbar, find it, open it.

The programme is self-explanatory, due to the interface buttons. In the lower left corner, we have the source for our future recordings. Click there and select what you already know that it is the transceiver's USB card. On the upper right corner there are 3 points. We click on them and we have the SETTINGS, as in the screenshot. I prefer to have the best audio quality possible and mp3 format. Once our Sound Recorder is open and set, we can see its icon on the taskbar. We can right click and choose to pin it on the taskbar, to have easy access to it. Initially I considered it was not necessary; after recording several radio amateurs I found out it is better to have Sound Recorder handy. (I always have the computer ON when using the transceiver, mostly for logging the QSO on QRZ.com, anyhow.)

Please keep in mind radio amateurs always expect the change in their audio quality of transmission to be directly proportional with the money they spent. At the same time, we generally deal with male voices, limited to 3 kHz bandwidths (or 2,7 kHz or even 2,4 kHz), so whatever changes are made at the transmitter they are never so dramatically as the transmitter expects. The most

dramatical change is the compression setting and eventually a bit of overmodulation – a kind of metallic sound which helps for DX but does not really help the audio quality at all. I repeat the aspect of being too sincere with other opinions might not get us many friends, while sending an audio recording for the transmitter himself/herself to have a comparison that he/she can repeat several times is better.

I did not feel like loading too much this article with more screenshots for detailing the recording and play back. If you ever used a cassette old recorder and/or any other audio programme, you would immediately master it. The already recorded files appear on the left side, so you can choose them, play them, open the containing folder for them (right click).

What stopped other radio amateurs from recording were two things:

- ◆ Confusing the INPUT with OUTPUT
- ◆ Choosing the right INPUT, to record the audio coming from the transceiver, not from something else.

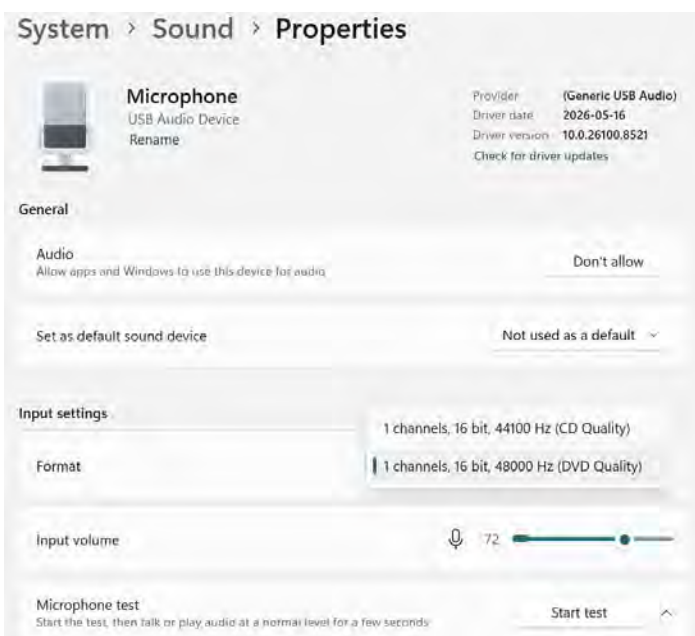
I promised I will shortly come with explanation and practical test:

Having the transceiver ON, the computer ON, the Sound Recorder ON and already setup, let us try a recording, to see that everything is ready and functioning. (We want to be ready and functioning before somebody asks us to record them!).

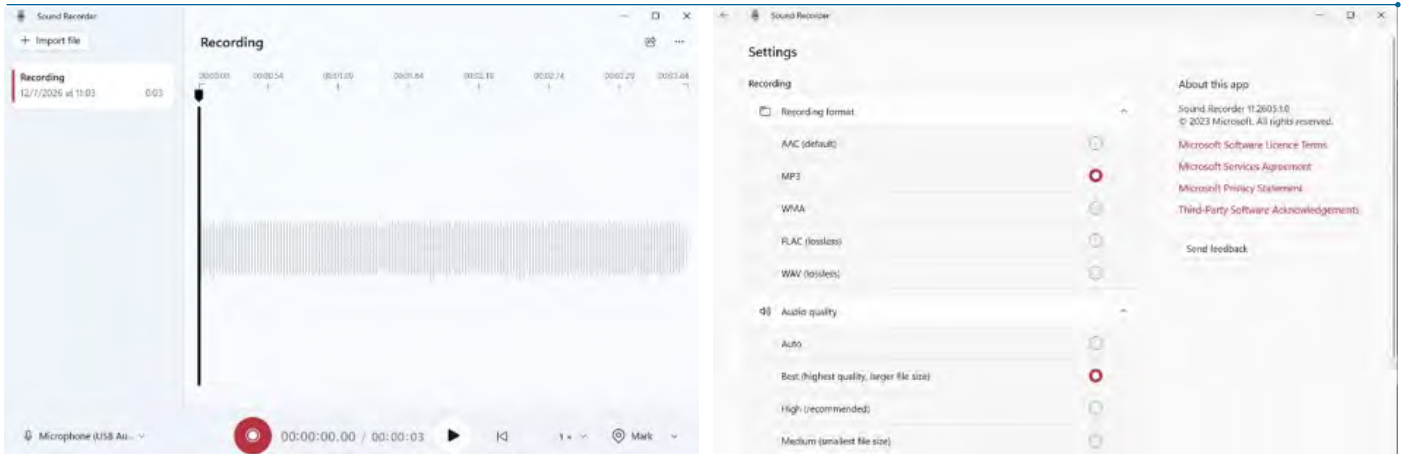
I usually choose a commercial strong station that I can hear on my transceiver, or even an FT8 frequency, like 14,074 MHz. Starting the recording, we can see on Sound Recorder's windows a graphical representation of our audio to be recorded. If we selected the right audio source, the graphical representation from the screen will follow whatever we hear on the speaker of the transceiver. If we move left-right the transceiver's frequency and loose the signal in the speaker, we should also lose its graphical representation.

Increasing/decreasing the volume button from the transceiver should have no influence on the recording, no influence on the graphical representation of the recorded audio in the Sound Recorder's window.

Go with the minimum volume on the transceiver, until you hear nothing. The audio recording should be unmodified. If the Sound



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Recorder's window, in its graphical representation of the recorded audio also loses its volume, that means you selected the wrong input: your recorded sound might not come directly from the transceiver, but through an eventual microphone you have on the desk, an eventual headset you have connected to the computer. To be verified and corrected in the choice of audio input, if needed. Yes, it did happen to me – thank you for asking. And it happened both with my Fifine desk microphone and with my Razer headset.

As a final note, I am using a lot of audio programmes. When it is to record radio amateurs, I prefer the built in Windows Sound Recorder. I even had the unpleasant surprise a free programme, NCH Recorder, is free for a while and after many-many hours of recording it told me I overpassed whatever it wanted to offer me free.



WRTC-2026 Rescoring Summary

<http://www.wrtc2026.org/>

Honesty and fair play are important ingredients in Amateur Radio contests. "It's not whether you win or lose, it's how you play the game."

It is with both sadness and disappointment that the results for WRTC-2026 have been rescored and substantial changes have been made to both the order-of-finish and the award winners. These changes were based upon extraordinary information that was received from the public after the Awards Ceremony.

WRTC has strived to be a competition where the outcome is based on the competitors' performance and is not a function of offsite helpers assisting their competitor friends.

Key to achieving this goal are WRTC rules that prohibit communicating the operators' identities, with harsh repercussions to those who flout them.



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A three-part scheme was used to fraudulently boost the scores of MB2M, the previously declared winner and MB2A.

1) An outside station with a reasonably strong signal operated on a planned frequency for a considerable time in the period just before the contest.

2) The outsider then turned the clear frequency over to a WRTC station at the contest start. The WRTC station's call sign was then known to those participating in the scheme.

3) Outside pirate stations made over-the-air contacts with WRTC stations, impersonating multiplier-producing stations. The contacts were fed to all WRTC stations, with considerably more going to the identified MB2M and MB2A.

When all the bogus contacts were removed from all the logs, the previously declared winner dropped out of the top three.

Inspection of the Italian WRTC-2023 logs and activity information shows that the same three-part multiplier fraud took place in that event, bringing up potential rescoring of that competition as well. The fraud was not reported or acted upon in the three intervening years.

MB1I was found to have deliberately also released operators' identities in a similar frequency handoff scheme but was not involved in pirate station multiplier fraud. The released call sign information made it easier for friends to give the team extra contacts.

The frequency-handoff identity-release alone was so antithetical to the strong WRTC identification release prohibition that the teams of MB2M (VE3DZ and UW7LL), MB2A (US2YW and IK4VET) and MB1I (E77DX and DJ4MX) were all declared disqualified under Section 12.2 of the rules.

The MB5Q log was found to contain ten multiplier-enhancing contacts where no trace of a

signal was present on the team's audio recording and consequently the MB5Q team (RW7K and KU1CW) was disqualified under Rule 12.7.

The WRTC-2026 Competition Rules

Rule 12.2 states, "The operators are not allowed to intentionally identify themselves (i.e. revealing their own call signs) before or during the contest or reveal their team identity in any way. Any attempt to do this such as by radio, telephone, SMS, internet, email, etc. may result in immediate disqualification. Requesting QSOs (e.g. setting schedules with special identification procedures in any way) before the contest period is strictly forbidden."

Rule 12.7 gives the Judging Committee broad discretion, "the Judging Committee may disqualify a team that commits any of (but not limited to) the following actions: Violation of the rules of the contest. Unsportsmanlike conduct. Taking credit for excessive unverifiable QSOs or unverifiable multipliers."

Rule 12.8 warns that "abuses through the use of cheerleading may result in QSOs being removed from logs as deemed necessary to assure a fair competition."

Rule 12.9 states that "the decisions of the Judging Committee are final."

Rule 15.2 confirms that the Judging Committee "has the right to remove any claimed contacts not found in the recordings."

Rules 19.1 and 19.2 state that by submitting an entry in the WRTC Contest, every competing team confirmed that "the rules of the contest have been read and understood and they are bound by them" and that "they operated within the limitations of all rules stipulated."

Rule 19.5, like Rule 12.9, provides that "all actions and decisions of the WRTC Judging Committee are official and final."

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Winning Plaques			
#1 Score	MB5O	DJ5MW, DM5EE/ZR2A	7 310 308
#2 Score	MB4G	N6MJ, KL9A	6 955 083
#3 Score	MB1T	K5ZD, W2SC	6 836 480
#1 Multipliers	MB4G	N6MJ, KL9A	457
#1 Phone QSOs (with >35% CW QSOs)	MB5Y	9A6KX, 9A1UN	2 369
#1 CW QSOs (with >35% Phone QSOs)	MB5P	LU9ESD, LW5HR	2 745
#1 Accuracy	MB4G	N6MJ, KL9A	0,5% errors
#1 Youth	MB5Z	W0AAE, W4IPC	5 924 736

Final Scores

#	Team	Operators	Score	#	Team	Operators	Score
1	MB5O	DJ5MW, DM5EE	7 310 308	24	MB2S	NN7CW, DL4NAC	5 570 672
2	MB4G	N6MJ, KL9A	6 955 083	25	MB3W	OL5Y, OK6RA	5 490 035
3	MB1T	K5ZD, W2SC	6 836 480	26	MB4P	AA3B, W2GD	5 400 835
4	MB5C	CT1ILT, EC2DX	6 480 110	27	MB4W	IK2PFL, IK2JUB	5 383 192
5	MB7W	UA4FER, LZ2HM	6 334 972	28	MB3M	JA1BJI, M0CFW	5 355 015
6	MB7L	LY9A, LY4L	6 180 000	29	MB4O	K3PA, NS0R	5 245 254
7	MB3R	F1AKK, F8DBF	6 083 469	30	MB1S	G4IRN, GW4XUM	5 243 896
8	MB7D	LZ3FN, LZ4AX	6 024 256	31	MB5X	NH7T, WH7W	5 148 143
9	MB3K	NA8V, N9RV	5 980 380	32	MB3L	LZ2BE, LZ2XA	5 084 340
10	MB5Z	W0AAE, W4IPC	5 924 736	33	MB1A	E21EIC, BA4TB	5 002 063
11	MB5J	VE3EJ, VE5MX	5 920 512	34	MB7V	K6LA, VE3AT	4 958 696
12	MB2H	N5ZO, KI6RRN	5 900 840	35	MB5P	LU9ESD, LW5HR	4 926 404
13	MB4Z	EA8RM, EA2W	5 883 472	36	MB4L	ES7GM, YL3JA	4 842 425
14	MB3H	N2IC, K5WA	5 819 824	37	MB7F	SP5Y, SQ9ORQ	4 814 437
15	MB5Y	9A6KX, 9A1UN	5 810 616	38	MB7G	N9NB, W9RE	4 808 322
16	MB4C	RG6G, RA3CO	5 807 790	39	MB3D	UN9L, UN4Q	4 775 244
17	MB4F	N2NT, NP4Z	5 786 880	40	MB2U	VK2IA, ZL3CW	4 764 861
18	MB7M	DL3JAN, DM7XX	5 760 452	41	MB4V	KO8SCA, AD5A	4 652 928
19	MB3V	4Z4AK, HA3LN	5 736 630	42	MB3F	RA9P, R2BFL	4 608 350
20	MB2R	OM2VL, OM3RM	5 726 924	43	MB3G	HB9ARF, LY4A	4 567 956
21	MB2D	N1UR, K1XM	5 673 360	44	MB4X	W7WLW, N4ML	4 180 260
22	MB7K	WA1Z, JH5GHM	5 652 228	45	MB1N	DL3ON, EI5LA	4 021 205
23	MB2N	NN3W, KD4D	5 592 387	46	MB3B	PY2NY, PY7ZC	3 860 428

Disqualifications

MB1I	E77DX, DJ4MX	WRTC Rules, Section 12.2 (Team Identity Revealed to Others)
MB2A	US2YW, IK4VET	WRTC Rules, Section 12.2 (Team Identity Revealed to Others)
MB2M	VE3DZ, UW7LL	WRTC Rules, Section 12.2 (Team Identity Revealed to Others)
MB5Q	RW7K, KU1CW	WRTC Rules, Section 12.7 (Taking credit for excessive unverifiable QSOs or unverifiable multipliers)

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Disqualification Applies to the Teams, Not Individuals

Although different members of the teams may bear different responsibility for actions resulting in disqualification, it should be noted that the disqualifications apply to the teams, not to individual team members.

Fraudulent Multipliers Produced by Pirates

In an investigation prompted by information received from the outside public, it was found that what appears to be a small number of outside individuals using 15 pirated call signs gave fraudulent multiplier-enhancing “contacts” to WRTC stations that favoured the MB2A and MB2M teams. The contacts were made using pirated call

signs of known radio contest participants, fooling or misleading the Committee into believing that these QSOs were genuine.

Amateur radio contests are conducted under the belief that participants are honest. For example, contact and multiplier credit is typically given to an entrant's score, even when no log is received from a claimed contact. This scheme took explicit advantage of that trust.

Investigation identified at least fifteen pirated multiplier-enhancing call signs that were used. Using the submitted audio files, it was confirmed that over-the-air “contacts” with the pirate stations did take place. These multipliers were concentrated on two teams — MB2M with 36 and MB2A with 32 — rather than spread across the field. The third highest team benefiting from

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(WRTC-2026 Rescoring Summary from page 79)

pirated multipliers received only 14 multipliers and the least benefited team received only 1.

As WRTC teams made no real contacts with stations possessing the call signs used by the pirates, contacts claimed with call signs used by the pirates have now been removed from all WRTC logs.

Excessive Contacts Made with Friends

In the previous WRTC, the impact of friends giving contacts favouring only certain teams was quantified and in the final score adjustment, a deduction was made to each score that cancelled any positive impact of the partisan contacts. The score adjustment converted would-be score gains into wasted time, worth zero points.

The word “cheerleading” has been used to describe this, although the practice is better described as attempting to distort the contest outcome by helping certain competitors. In this year's initial log review, no behaviour of this type that was significant enough to change award positions was noticed among the top scores and no corrective action was taken at that time.

However, for this final rescoring, software was developed and employed that identified all excessive favoured contacts given to friends when compared to contacts made with the other WRTC teams. Contacts made by the excessively partisan stations were then erased from all fifty WRTC logs and the impact is included in the results. This year's partisan-contact activity was small and the resulting score changes were also small — no position changed.

Rescoring

All scores have been recalculated after simply removing any claimed contacts with pirate stations and any egregiously partisan stations. As the impact on scores was greater for the logs containing more QSOs with pirates, the order-of-finish of the top scoring stations was changed significantly.

Call sign Identity Releases

From inspection of the public logs, use of the Reverse Beacon Network and SDRs, members of the observing public were able to identify cases where certain frequencies were held by third party

stations for long periods before the contest start and then the resulting clear frequency was turned over to a WRTC team at the 12:00 start.

The frequency transfers at the contest start also served to identify the WRTC stations' operators to those aware of the scheme. This is precisely a disclosure prohibited by WRTC 2026 competition rules section 12.2, which states that any attempt to do this may result in immediate disqualification.

Every team whose operation showed the pattern under examination was given an opportunity to comment. All responses were considered and are on the record.

Based on the timing, duration, frequency continuity, subsequent conduct of the holding stations, the circumstances surrounding the contest start and the responses received from the teams, it was concluded that these were not coincidental frequency changes but deliberately arranged transfers that disclosed the identity of the arriving WRTC teams to persons aware of the arrangement.

Consequently, it was then determined that call sign-revealing actions did warrant disqualification of MB1I, MB2A and MB2M under Rule 12.2.

Non-existent Claimed Multiplier QSOs

Ten unusual multiplier-enhancing claimed contacts were present in the MB5Q log. The audio review conducted before the Awards Ceremony was necessarily prioritized by finishing position and did not include this log. However, the MB5Q log was examined in the post-event re-examination. There was no trace of any audio from these logged phantom stations on the recordings provided by the team, although audio from both the preceding and the following contacts surrounding the phantom contacts was clearly present.

Therefore, it has been determined that the MB5Q team is disqualified for violation of Rule 12.7, claiming contacts that do not appear in its own audio recording.

Teams All Agreed — “The Decision of the Judges is Final”

By submitting an entry, every team confirmed under section 19 of the WRTC 2026 competition rules that the rules had been read and understood

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(WRTC-2026 Rescoring Summary from page 80)

and that they were bound by them, that they operated within the limitations of all rules stipulated, that they agreed to make their logs and audio recordings available to the general public at the sole discretion of the WRTC Organizing Committee and that all actions and decisions of the WRTC Judging Committee were official and final.

Details of the rescoring are in the appendices. Information presented can be verified from observation of the public logs.

Closing Comments

The judges take no joy in having to disqualify teams or even invalidate contacts.

WRTC judging teams have conventionally approached their responsibilities as being like grading and scoring tests in a school. Log-checking software has been developed and refined to now have capability to detect most common logging errors. It can even automatically determine that W3PLP is a mis-logged W3LPL and automatically know that KH7D is a miscopied K5ZD. The committee employed this time-tested log-checking software to produce initial results.

Then the committee applied human oversight aided by other computer-produced aids to eventually produce the results.

In past WRTCs, the friends-helping-friends impact on scores was identified and quantified. Compensating score adjustments were made that nullified the biases.

This historically concluded the Judging Committee's work.

WRTC-2026 was conducted assuming the honesty of participants.

This year, after the Awards Ceremony, outside observers provided information that required investigation and determination of appropriate action. The revised results presented here are now compatible with that expanded responsibility.

Honesty and fair play are important ingredients in Amateur Radio contests.

Why did this happen?

Listening to the recordings of even the disqualified stations shows that they exhibited admirable skill in handling pile-ups and efficiently working stations. Had there been no dubious operation by some participants and outsiders, their

results would have been impressive.

It was hoped that all contest participants outside of WRTC would operate their stations in a manner that would allow the winning team to say that a combination of their abilities, performance on that day and to some extent luck, was what produced their victory. All contest players should operate to increase their own personal scores, not take actions to deliberately boost the scores of others. There were some who did not follow this principle this year. The rescored results presented here are intended to restore that principle.

Appendix 1. Details of the Pirate Multipliers

Fifteen call signs were used on the air during the contest by persons other than the call sign's licensees, which resulted in bogus multiplier-enhancing contacts in WRTC team's logs: 4F3OM, 4K6FO, 4S7KM, 9H1FL, 9M2LAN, 9M8YY, HC5AI, HL2CFY, HZ1TT, OD5NZ, TI1W, XE2IF, YV1LBB, ZP5KO, ZS6WAR.

Each was a known call sign from a country otherwise scarce or absent in this year's contest, so nearly every contact with them produced a fresh multiplier. No logs were received from any of the fifteen stations. Almost all were invisible to the worldwide network of skimmer receivers for the entire weekend, despite making dozens of contacts each. Of the 435 contacts claimed with these fifteen call signs, 86% were with WRTC teams, compared with about 13% for the rest of the IARU contest participants.

Communication was sent to all fifteen of the licensees who held the call signs used by the pirates. It was confirmed that thirteen of the fifteen either had not been on the air at all or had made no contacts with any WRTC station.

Five of these call signs — nominally in Sri Lanka, Korea, the Philippines and East and West Malaysia — never once transmitted during the same minute as one another across the full 24 hours. A single transmitter appears to have been cycling through those five identities.

One call sign requires a distinction. HC5AI was genuinely on the air during the day, working ordinary stations and heard by the skimmers. Eight hours later the same call sign appears working only WRTC teams, with no ordinary stations and no skimmer reports at all. The daytime activity is

(Continued on page 82)

(WRTC-2026 Rescoring Summary from page 81)

treated as genuine; only the later activity was considered fraudulent.

The multipliers were not spread evenly across the field. All fifty teams worked at least one of these call signs and the median team gained six multipliers from them. Two teams gained five to six times the median, MB2M with 36 and MB2A with 32 — and those two were the only teams worked by all fifteen. The team with the most raw contacts, MB5O, with just over 6,000 before log checking, was worked by only one pirate call sign.

The pirate contacts began early. The first one anywhere in the WRTC logs was 4S7KM working MB1A at 12:06 UTC; over the next fourteen minutes 4S7KM worked five more teams, among them MB2A at 12:12 UTC on 14 002 kHz, the frequency MB2A was running.

MB2A then logged HZ1TT at 12:33 UTC, HL2CFY at 12:51 UTC, 4F3OM at 13:17 UTC, 9M8YY at 13:38 UTC and 9M2LAN at 13:51 UTC, all on that same run frequency. By the end of the first hour MB2A had three pirate contacts when no other team had more than one and by 14:00 UTC it had eight when no other team had more than two.

It was noticed that the pirate could make an occasional mistake. In one of the earliest QSOs made by the pirated call signs, 4S7KM working MB2A at 12:12 UTC, the audio record shows that 4S7KM sent his zone as 29 — not zone 41, the zone a genuine Sri Lankan station would send and the zone MB2A logged. In this contest, each station sends its own ITU zone. Zone 29 covers Ukraine, Belarus, much of European Russia, Moldova, the Baltic states and the Caucasus.

MB2M's first pirate contact was HL2CFY at 12:46 UTC on 14 003 kHz, the frequency it was running. Its next came at 14:08 UTC, when 9M8YY worked it on 20 and 15 metres in the same minute, followed by 4K6FO at 14:33 UTC and 4F3OM at 15:35 UTC. From there the pirate contacts kept coming to both teams for the rest of the contest.

The pirate activity also wasted the time of the other WRTC competitors.

Consequently, it was then decided that no team should receive any multiplier credit or QSO credit for any of the contacts with the pirate stations. Therefore, all contacts with them have been removed from every log in which they appear.

Appendix 2. Details of the Frequency Transfer and Resulting Team Identity Disclosures

At 12:00 UTC the bands were crowded and a clear frequency was very valuable. Three teams began the contest on frequencies that another station had used right up until the start, then left at the exact start time.

MB1I (E77DX and DJ4MX) — both of its starting frequencies were held by stations connected to its operators. E77EA held 14 007.0 kHz from 11:41 UTC until 11:59:39. Its first contest contact on that frequency, at 12:00 UTC, was MB1I, after which E77EA moved 8 kHz away and continued to operate there. DA0BCC held 21 007.0 from 11:27 UTC until 11:59:30; its first two contacts at 12:00 were MB5Q and MB1I, after which it never called CQ on 15 metres again. Its remaining fifty-seven contacts on that band were all made by tuning across and answering others. Earlier that morning both frequencies had been occupied by the team's own operators using their personal call signs.

MB2A (US2YW and IK4VET) — EV6M was spotted continuously on 14 002.2 kHz from 11:30 UTC until 11:58:47, in forty-four reports. MB2A appeared within 100 Hz of that frequency at 12:00 UTC and ran there. EV6M was never heard again, submitted no log and the only other entry naming it anywhere in the contest is a verified miscopy of another call sign.

MB2M (VE3DZ and UW7LL) — EU8E was spotted continuously on 14003.5 kHz from 11:19 UTC until 11:59:26 in thirty-eight reports from independent skimmer receivers.

MB2M appeared within 100 Hz of that frequency at 12:00 UTC and ran there. MB2M's first logged contact of the contest is EU8E itself, on the frequency EU8E had just held for forty minutes. EU8E was never heard again during the next twenty-four hours, submitted no log and the only other entry naming it anywhere in the contest is a verified miscopy of another call sign.

Frequencies do change hands at the start. Ten stations left a channel that a WRTC team then took at 12:00 UTC. Of those ten, only E77EA and DA0BCC logged the arriving team at 12:00 on the frequency they had just left — and both did so for the same team.

The operators of all three teams were asked to

(Continued on page 83)

MB1I — both starting frequencies were handed over at 12:00z

On each channel, the same relay: an operator's personal call, then an affiliated station, then the team — and each holder's first contest contact, made at 12:00z on the frequency it was leaving, is MB1I.

Figure 2.1



(WRTC-2026 Rescoring Summary from page 82)

explain these events. MB1I's two operators admitted what happened and accepted responsibility for the Rule 12.2 violation and the consequences of it. No operator of MB2M or MB2A has admitted any arrangement. Their answers say nothing about why the holding stations acted as they did. One operator said he was unaware of any pre-existing arrangement but would accept his team's disqualification if a violation were found.

The frequency transfers at the contest start functioned to identify the WRTC stations' operators to those aware of the scheme. This is precisely a disclosure prohibited by WRTC 2026 competition rules section 12.2, which states that any attempt to do this may result in immediate disqualification.

Appendix 3. Details of the Non-existent Claimed Multiplier QSOs

MB2A — EV6M held 14002.2 kHz until 11:58:47z

EV6M was spotted without a break for twenty-nine minutes, in forty-four reports. At 12:00z MB2A appeared within 100 Hz of the vacated frequency and ran there.

■ Team call — MB2A ■ Holding station — EV6M



Figure 2.2

(Continued on page 84)

MB2M — EU8E held 14003.5 kHz until 11:59:26z

EU8E was spotted without a break for forty minutes, in thirty-eight reports from independent skimmer receivers. At 12:00z MB2M appeared within 100 Hz — and its first logged contact of the contest is EU8E itself.

Figure 2.3



(WRTC-2026 Rescoring Summary from page 83)

ten contacts, including the audio and were asked directly whether they had any explanation. Neither disputed the finding. Neither offered an explanation. Both asked that the contacts be removed from the log. The Committee has determined that the MB5Q team is disqualified under Rule 12.7, claiming contacts that do not appear in its own audio recording.

Appendix 4. Details of Excessive Contacts Made with Friends

WRTC has taken steps to remove any advantage created from score-enhancing contacts made from stations deliberately attempting to assist friends.

Any station could work a given WRTC team at most ten times — five bands, two modes. That makes concentration easy to measure. How many of those ten did a caller give its favourite team and how many did it give everyone else?

The Committee screened every station appearing in at least five WRTC logs. Thirty-one callers gave one team six or more of the ten possible contacts while giving the other teams no more than two. Most of that is ordinary and breaks no rule.

At the top of the range, it stops looking ordinary. When rescoring the contest, the Committee removed from every log all contacts with call signs that gave a single team an excessive number of the ten possible contacts while giving the median other teams only a small number. Eight call signs met that test:

- ♦ DR0W, DQ2A, DF0WA, DL0LI — ten of ten, each, to the same team, MB5Q.
- ♦ DP4X, DA0BCC, DJ2MX — nine, nine and eight to the same team, MB1I. All resulted from one operator using three call signs

Call sign	Time	Band	kHz
6Y5WJ	0307 UTC	80 m	3 537
9M2M	1214 UTC	20 m	14 047
CU2CE	0813 UTC	40 m	7 025
HI3K	0237 UTC	20 m	14 012
HI3K	2308 UTC	15 m	21 019
S21RE	1854 UTC	20 m	14 054
SV5DKL	0118 UTC	80 m	3 535
SV5DKL	1720 UTC	10 m	28 024
UK9AA	1845 UTC	20 m	14 054
Z32ZM	0719 UTC	40 m	7 166

- ♦ R3FA — eight to one team, MB5Q.

Because these callers worked most of the field as well, the removal touched every entry in the contest. Each team lost between five and forty-two contacts, the largest loss falling on the team that had received the most. The rule is mechanical, defined by numbers and was applied identically to all fifty logs. No judgment was made about any of the WRTC teams' motives and it is not an accusation against any team — these were real contacts made by real stations acting on their own initiative.

The effect on scores was small. The largest single case cost about one half of one per-cent and no position in the results changed because of these removals.

It was also noted that a group of thirteen call signs — R3FA, UA7K, UA6KAC, RK7A, RD7K, UA6ARR, RU6K, RA7KY, R6KVA, R6KA, R7KCW, RY7KAB, UB7K — provided 82 contacts to MB5Q. MB5Q logged all thirteen of these calls, most of them five to eight times each.

All contacts from this group fit neatly on a single timeline, as if made by one or perhaps two

(Continued on page 85)

(WRTC-2026 Rescoring Summary from page 84)

operators. Also, a group of cluster spots for MB5Q likely came from one source and they too fit neatly on the same timeline.

These callers did work other teams. The next-highest team received nineteen contacts, two teams received fifteen and the remaining teams received between zero and nine. All contacts with this group of thirteen call signs have been removed from every log in which they appear. This did not affect the order of finish.

The Judging Committee specifically asked the competitors to request their friends and associates not to do this. A few of the IARU Contest entrants ended up giving out some of these potentially outcome-biasing contacts despite the committee's request. In the end, those attempts to assist friends backfired as the committee has once again employed actions that turned biased-help into score-reducing wastes of time.

Appendix 5. Some WRTC-2023-Italy Information – Frequency Transfer and Effective Identity Disclosure Plus Suspected Pirate Multiplier Activity

In WRTC-2023, I44W's 20-metre starting frequency was held and transferred in the same manner as shown in the examples in Appendix 2. YQ5W appeared at 11:01 UTC, settled on 14001.8 kHz and called CQ there continuously through the final hour before the start, last spotted at 11:59:52 UTC.

I44W's first logged contact of the contest is in the 12:00 UTC minute on that frequency, where it then ran. YQ5W submitted no log, is not listed as an operator in any of the 5 589 logs submitted for that contest, appears in no other station's log and was never spotted again. I44W's operators were VE3DZ and UW7LL. I44W was the declared winner

12:03:30	UT3MD:	UT3MD
12:03:32	MB2A:	UT4MD 5NN27
12:03:36	UT3MD:	5NN TT1
12:03:40	MB2A:	UT3MD ?
12:03:45	UT3MD:	UT3MD 5NN 9
12:03:49	MB2A:	UT3MD TU

of the 2023 event.

The following are now believed to be multipliers fraudulently injected into logs at WRTC-2023 in the same manner as occurred in WRTC-2026: 4J3DJ, 4K6OF, 4L4DX, 9H1XT, 9K2MU, A41JZ, A61ZX, A65DR, BX4AG, CO2SG, EK3GM, ER0FEO, EX8MJ, FM5FE, HZ1BH, OA4EA, OD5PY, SV9CJO, TK5CH (and its miscopy TK5CS), YV5EN, ZP5DPA — plus YB8RVI and ZA1AK, genuine entrants whose call signs were pirated. The pirated QSOs are refuted by the owners' own submitted logs.

The 23 call signs produced an average of 9.3 QSOs for each of the 58 WRTC-2023 stations — 540 in all. Of those, 53 went to the I44W (VE3DZ & UW7LL) team, with most resulting in a multiplier.

WRTC-2026 did not attempt to rescore the 2023 event.

Appendix 6. Investigative Question

It was noted that a peculiar exchange took place between MB2A and UT3MD (a silent key) logged at 12:03 UTC. UT3MD appears in no other log among the 5 607 submitted for the IARU contest and it submitted no log of its own. The exchange, with timing from an SDR recording was:

No conclusion was made about this exchange and no finding was based upon it. It is shown here because others may be able to explain what it was.

Appendix 7. Results QSO Breakdown Table is too large to include in the article. <https://www.youtube.com/watch?v=Q4ZpP8t17Ak>

DMR for Beginners

Nicholas Michael, ZS6BVR

Please note this is not a DMR Reference manual, this was written to help a beginner get going with DMR and explain some of the concepts used.

What DMR stands for

DMR is the abbreviation for Digital Mobile Radio. It is an ETSI digital radio standard. It was de-

signed for professional/commercial radio but is widely used by amateurs.

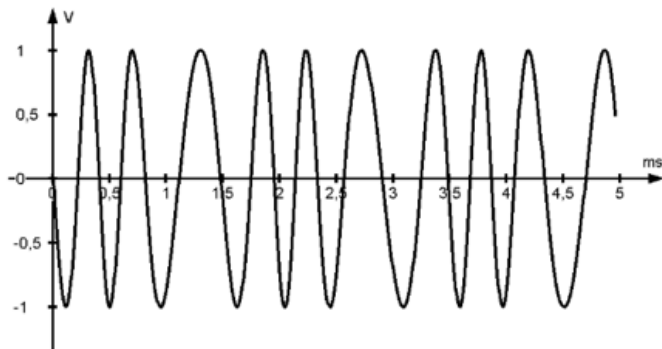
The difference between Analogue and Digital Radio

In traditional analogue radio, your voice directly modulates the radio signal; with FM, the audio

(Continued on page 86)

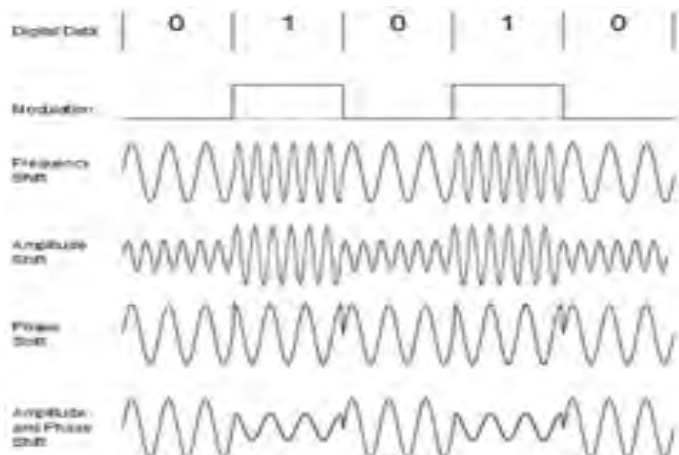
(Generative AI from page 85)

varies the carrier frequency. The receiver reverses this process to reproduce your voice as audio.



In digital radio, your voice is first converted into digital data by an encoder (codec). The data is then transmitted as a stream of bits and decoded back into audio by the receiving radio. Analogue signals gradually become noisy as the signal gets weaker. Digital radio can maintain clear audio until the received signal becomes too weak to decode reliably.

This diagram shows different ways to encode data onto a radio carrier.



4FSK (Four level Frequency Shift Keying)

By Shifting the frequency to 4 different carrier frequencies we can encode data as four different states.

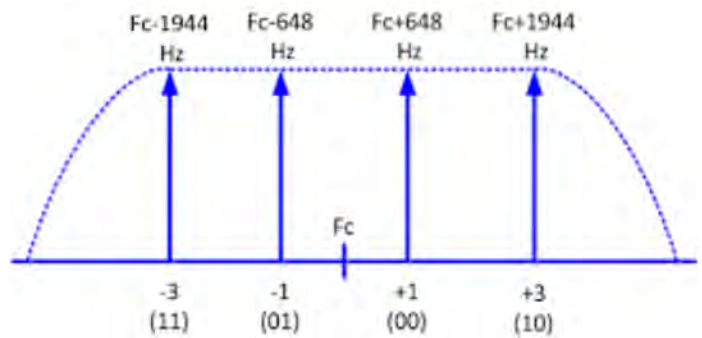
Each state represents one of the four possible combinations of two bits: 00, 01, 10, 11

If I used an SSB receiver zeroed at the carrier frequency, I would hear the 4 tones

This diagram shows how the four frequencies are arranged. Here we have:

- ♦ 4 possible frequency states
- ♦ each state represents 2 bits
- ♦ therefore 2 bits per symbol
- ♦ 4 800 symbols/sec → 9 600 bit/sec raw bit rate

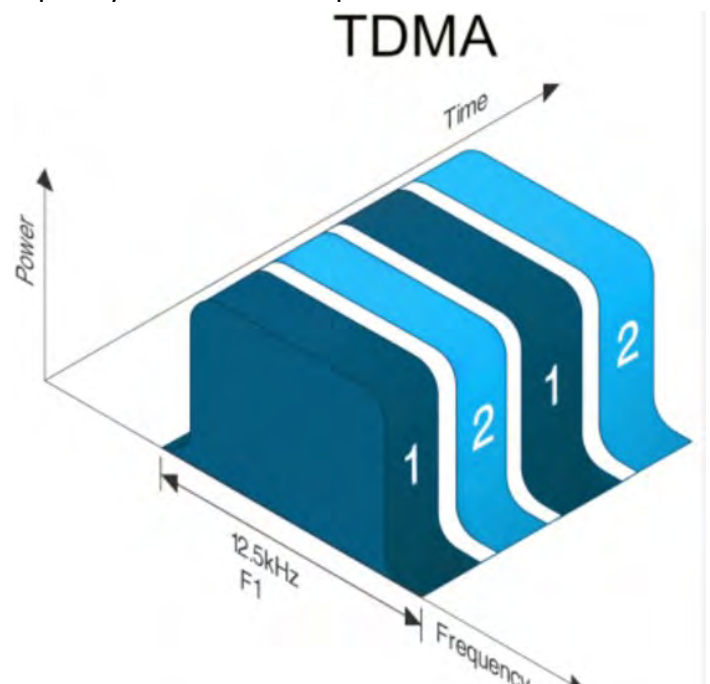
What this means they do not transmit one bit at a time like the old packet radio but two bits at a time.



TDMA (Time Division Multiple Access)

TDMA allows two conversations to share the same DMR 12,5 kHz RF channel by taking turns in time. DMR divides the transmission into two 30 millisecond time slots, called Time Slot 1 (TS1) and Time Slot 2 (TS2). This means a single DMR repeater can carry two independent communications simultaneously, effectively doubling the channel capacity. DMR is a digital radio standard developed by ETSI, using two-slot TDMA in a 12,5 kHz channel.

This diagram shows how DMR Multiplexes (switches) between two timeslots over time allowing two radios to be transmitting on the same frequency but at different points in time.



Timeslots

DMR divides each 12,5 kHz channel into two

(Continued on page 87)

(DMR for Beginners from page 86)

Time Slots, TS1 and TS2. Each radio transmits for a short period in its assigned time slot, then waits while the other slot is used.

This allows two separate conversations to use the same frequency at the same time without interfering with each other.

Talkgroups

A Talk Group is essentially a virtual group/channel. Radios connected to the same talk group can communicate with each other. BrandMeister provides many talk groups.

When programming a DMR radio, the talk group and Time Slot are normally specified together, for example, Talkgroup 655 on TS2. As a beginner, think of TS1 and TS2 as two separate lanes on the same radio channel.

The Colour Code

As beginner programming a DMR radio you will encounter: Frequency → Colour Code → Time Slot → Talkgroup. The Colour Code is used by DMR repeaters to identify the correct digital signal. It is similar in purpose to a CTCSS tone used with analogue FM. The repeater and your radio must use the same colour code for the radio to communicate through the repeater. Colour Codes are numbered 0 to 15. Please note this is not a security code.

The repeater/network

A DMR repeater works much like an analogue repeater: your radio transmits to the repeater and the repeater retransmits your signal. With DMR, the repeater can connect to a DMR network, allowing you to communicate with stations beyond the range of your local repeater.

For example - your radio → DMR repeater → BrandMeister → DMR network → another repeater → another radio.

BrandMeister is one of the networks that connects DMR repeaters and users around the world.

This is what makes it possible to use a local repeater to communicate with other DMR operators, even when they are far outside the repeater's normal radio range.

Now let us get setup to use DMR

One thing to remember register with your call

sign in upper case.

First register for your DMR ID at Radio ID <https://radioid.net/>

Now save this DMR ID in a safe place. DMR_ID: 6550XXX. This may take a while so be patient

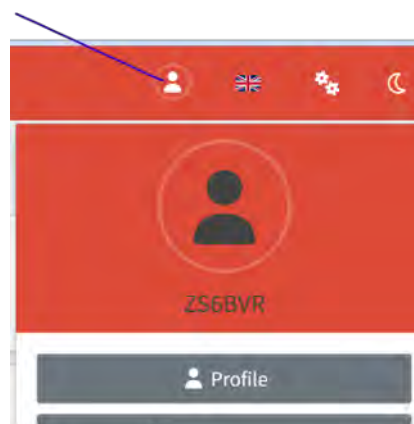
Now register with BrandMeister <https://brandmeister.network>

Save your Password in a safe place.

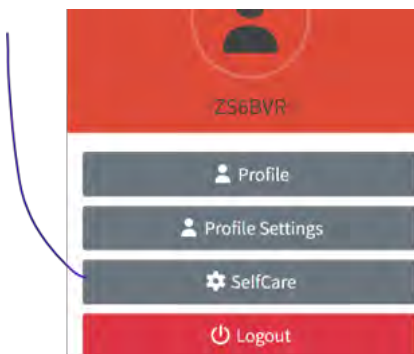
Setting the Hotspot Security Password

You need to do this. For simplicity's sake I kept the two passwords the same knowing that I could change this one later.

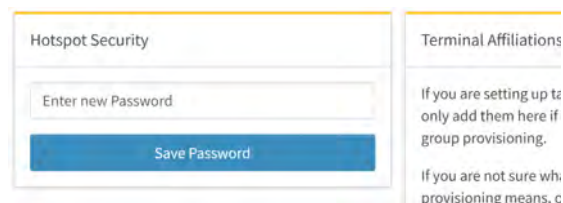
1. Click On your profile Icon.



2. Click on SelfCare



3. Now Set your Hotspot Password



Now we are ready to cook

Do not have a DMR Radio?

If you have an Android phone there are many DMR applications.

(Continued on page 88)

(DMR for Beginners from page 87)

DMR ID callbook

First install DMR ID Callbook. Open it and type your call sign and press Search. If it returns your DMR ID, you are ready to go.

Now many amateurs will recommend their favourite DMR App and there are many. This one is Beginner Friendly. I found this app easy to install, setup and get going and its brand new - **Z3DMR**. Please note: This App has its limitations, you may want to investigate another App.

This even works on the Vodacom Network. Install this from the Android play store.

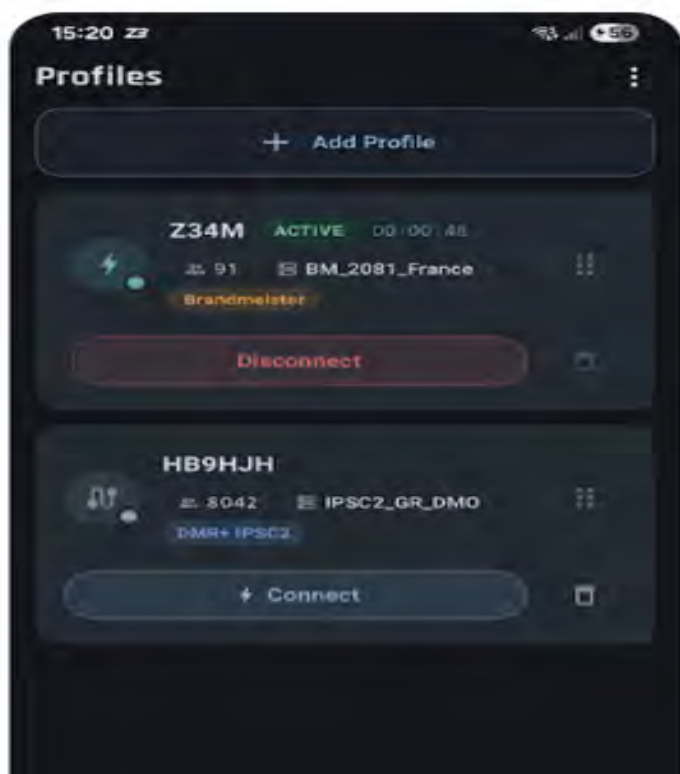
Run this app and tap the "Tap to Connect" button on top. Now we add a Profile - these are my settings.

- ♦ Call sign: Your call sign (uppercase)
- ♦ You may now edit: Profile Name: ZS-Talk
- ♦ DMR ID: Your DMR ID
- ♦ Server: BM_6551_South_Africa, you need to Search for 6551 and select BM_6551_South_Africa
- ♦ Talk group: 655 x Brandmeister
- ♦ Press the save Button.

You can add other profiles later.

Using the DMR

You will have one profile with a Connect Button. Pressing that button and the pop-up text (Open Radio) to get to the radio page.



Now press the PTT to talk.

Do not forget to save the Logbook before you exit the app, press Activity Log save icon. For the Instructions, visit <https://z3dmr.com/docs.html>

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8. <https://z3dmr.com/>

WRTC 2022 Rescoring

<https://www.wrtc2022.it/>

Tine Brajnik, S50A, Chairman of the WRTC Sanctioning Committee, has announced that the results for the World Radiosport Team Championship 2022 (held in Italy in July 2023) have been rescored. Two teams have been disqualified and changes have been made to the order-of-finish.

Following publication of the WRTC 2026 Judging Committee report on 1 September 2026, the WRTC 2022 Organising Committee referred the 2023 results to the WRTC Sanctioning Committee (SC). The SC formed a working Group to examine the 2023 logs using the methods described in the 2026 report. The SC has accepted the working group's findings and has decided to rescore the results - which replace those announced in July 2023 - and disqualify two teams.

The WRTC Sanctioning Committee's detailed statement and the complete new results can be found at <https://www.wrtc2022.it/>.

WRTC2022 Competition Final Score

Sanctioning Committee statement on the WRTC 2022 (Bologna, July 2023) results

Following publication of the WRTC 2026 Judging Committee report on 1 September 2026, the WRTC 2022 Organising Committee referred the 2023 results to the WRTC Sanctioning Committee (SC). The SC formed a working group to examine the 2023 logs using the methods described in the 2026 report. The SC has accepted the working group's findings and has decided as follows.

The 2023 scheme

Appendix 5 of the 2026 report describes what was found in 2023: the winning team's 20-metre starting frequency was held for the final hour before the start by a call sign that submitted no log, appears in no other log and was never heard again. There was also a group of call signs from rare entities, none of which submitted a log or appear elsewhere in the 5 589 logs submitted for the 2023 IARU contest, delivered multiplier contacts to WRTC teams.

The 2026 report identified 22 call signs that were believed to be fraudulent.

From Appendix 5 of the 2026 report, "I44W's 20-metre starting frequency was held and transferred in the same manner as shown in the examples in Appendix 2. YQ5W appeared at 11:01 Z, settled on 14001.8 kHz and called CQ there continuously through the final hour before the start, last spotted at 11:59:52 Z. I44W's first logged contact of the contest is in the 12:00 Z minute on that frequency, where it then ran. YQ5W submitted no log, is not listed as an operator in any of the 5 589 logs submitted for that contest, appears in no other station's log and was never spotted again.

I44W's operators were VE3DZ and UW7LL. I44W was the declared winner of the 2023 event."

"The following are now believed to be multipliers fraudulently injected into logs at WRTC-2023 in the same manner as occurred in WRTC-2026: 4J3DJ, 4K6OF, 4L4DX, 9H1XT, 9K2MU, A41JZ, A61ZX, A65DR, BX4AG, CO2SG, EK3GM, ER0FEO, EX8MJ, FM5FE, HZ1BH, OA4EA, OD5PY, SV9CJO, TK5CH (and its miscopy TK5CS), YV5EN, ZP5DPA — plus YB8RVI and ZA1AK, genuine entrants whose call signs were pirated. The pirated QSOs are refuted by the owners' own submitted logs. The 22 call signs produced an average of 9,3 QSOs for each of the 58 WRTC-2023 stations — 540 in all. Of those, 53 went to the I44W (VE3DZ & UW7LL) team, with most resulting in a multiplier."

The SC working group examined every contact with those call signs in all 58 team logs. They made 540 contacts with WRTC teams, an average of nine per team. Two teams stand apart. I44W (UW7LL, VE3DZ) received 46 of them, worth 37 multipliers. I43Z (RW7K, RA9P) received 27, worth 25 multipliers. The next team received 19. The call signs also divide cleanly into two groups: sixteen all worked I44W and the other seven never worked I44W and all worked I43Z. The pattern is the same one the 2026 Judging Committee found for MB2M and MB2A and it can be verified from the public logs.

The removal list in Appendix 5 of the 2026 Judging Committee reports the 21 call signs named there plus the TK5CS miscopy, 22 in all. Every contact any team made with those call signs is removed as a pirate contact, with no penalty, at

(Continued on page 90)

(WRTC 2022 Rescoring for 2026 from page 89)

rule 7 points (CW 2/5, SSB 3/6).

YB8RVI and ZA1AK, the two genuine entrants named in Appendix 5 whose call signs were pirated, are not removed again. Their pirated contacts are refuted by the owners' own logs and were already scored as not-in-log in 2023, so they are already out of the official numbers.

A DXCC multiplier is removed only where the team had no other credited contact with that entity on that band. HQ stations do not preserve a DXCC multiplier (rule 8.2).

The 2023 cheerleading deductions are kept as set by the 2023 JC.

The rules

The WRTC 2022 competition rules are, in the relevant clauses, word for word the same as the 2026 rules. Rule 12.2 prohibits a team from revealing its identity in any way and states that doing so may result in immediate disqualification. Rule 12.7 permits disqualification for taking credit for excessive unverifiable QSOs or unverifiable multipliers.

Decision

I44W (UW7LL, VE3DZ) is disqualified under Rule 12.2 for the arranged transfer of its starting frequency, which required the team's identity and

starting frequency to be known in advance and under Rule 12.7 for the multipliers it took credit for from the call signs above.

I43Z (RW7K, RA9P) is disqualified under Rule 12.7 for the multipliers it took credit for from the call signs above. Twenty-five multipliers from a group of call signs that served this team is excessive within the meaning of the rule.

As in 2026, the disqualifications apply to the teams, not to individual operators. The SC makes no finding about who operated the call signs in question.

The revised results are:

- ♦ I43C DJ5MW DL1IAO 6 968 632
- ♦ I49D 9A7DX 9A3LG 6 584 256
- ♦ I47M F8DBF F1AKK 6 450 120

The full table is attached. These results replace the results announced in July 2023.

The SC congratulates DJ5MW and DL1IAO as champions of WRTC 2022 and 9A7DX/9A3LG and F8DBF/F1AKK as second and third.

The 2023 Judging Committee adjudicated the logs with the tools and time available to it and could not have seen this pattern. It became visible only when the 2026 Judging Committee developed methods to find the same scheme in 2026 and then applied them to the 2023 logs.

Tine Brajnik, S50A, Chairman WRTC Sanctioning Committee

Pos	Area	Call	Operators	Referee	Score
1	EU3	I43C	DJ5MW DL1IAO	W0YK	6,968,632
2	EU7	I49D	9A7DX 9A3LG	W4LT	6,584,256
3	EU6	I47M	F8DBF F1AKK	DL8DYL	6,450,120
4	AF3	I42M	ZR2A DL9EE	KC7V	6,206,655
5	WC1	I47L	OM3BH OM3GI	NX4N	6,198,995
6	NA1	I42G	K5ZD W2SC	EY8MM	5,897,373
7	WC2	I47V	SV2DSJ LZ3FN	JH4RHF	5,878,497
8	EU5	I44X	EC2DX CT1ILT	W1VE	5,796,900
9	NA3	I49M	NN3W N3QE	ON5RA	5,791,124
10	EU1	I47K	LY4A OM3RM	G4BUO	5,744,545
11	NA3	I49A	KD4D KE3X	9A5X	5,714,307
12	EU7	I42V	IZ1LBG IK3QAR	S57AW	5,695,824
13	EU4	I43R	UA4FER LZ2HM	9A6A	5,685,048
14	CA1	I42W	NP4Z N2NT	DL6MHW	5,614,675
15	NA9	I49K	KI6RRN N5ZO	YL2KL	5,604,768
16	EU2	I42R	OR2F LZ4AX	HB9DHG	5,552,664
17	SA1	I43K	W2GD AA3B	PA3AAV	5,507,100
18	AS2	I41M	RM9I UN9L	S50R	5,478,441
19	EU3	I46Q	SP7GIQ SP7IVO	PJ2DX W0CG	5,460,370
20	EU9	I42B	E77DX E70T	RA0AM	5,458,152

21	AS7	I47P	JH5GHM WA1Z	NP4G	5,411,632
22	OC2	I44Z	AD6E K6XX	4Z5LA	5,396,397
23	EU3	I46V	DL5AXX DL7FER	E74A	5,381,824
24	EU4	I46J	RA3CO RA3AUU	IK2EGL	5,372,068
25	DT1	I41R	KO8SCA S55M	SP4Z	5,361,984
26	WC4	I44C	LZ1NK LZ4AE	OM6NM	5,326,524
27	NA8	I44Q	VE5MX VE3EJ	HA5X	5,307,960
28	OC3	I44Y	ZL3CW VK2IA	K5KG	5,274,774
29	NA7	I42L	KU1CW EB5A	IK1SPR	5,129,678
30	NA6	I47O	N2IC HA3NU	9A1UN	5,101,926
31	AF1	I46F	EA8RM EA2W	OK1RI	5,078,124
32	EU2	I49R	GD4XUM G3NKC	CE2SV(VE7SV)	5,015,430
33	DT3	I41D	4O3A 9A3A	W6NV	5,003,460
34	AS3	I44G	4X6FR 4X1DX	NF4A	4,966,500
35	YT3	I43L	YU5EEA 9A3SMS	4Z4DX	4,932,020
36	YT2	I47B	M0SDV DK6SP	YT7AW	4,903,962
37	EU7	I42D	S53MM S57K	G4IRN	4,876,872
38	EU8	I42F	EW6W EU1A	HB9CAT	4,809,600
39	YT1	I43O	YL3JA UR5YKO	G0CKV	4,759,208
40	AS5	I41N	VR2XAN IK2PFL	G3XTT	4,729,122
41	AS4	I44B	BA1RB BA4TB	RA9USU	4,725,600
42	OC1	I46Y	9M6NA K5WA	OE2VEL	4,722,600
43	AS6	I43U	E21EIC E29TGW	CX6VM	4,685,681
44	NA1	I46C	W1UE K1XM	HA0NAR	4,654,554
45	NA2	I43B	VA2EW VA2WA	E72T	4,590,978
46	SA2	I41U	FY5FY F4DXW	DL8LAS	4,564,064
47	AS7	I47U	JA1BJI JR2GRX	SV2DCD	4,557,163
48	SA4	I41K	PY2NY PC3T/PY2SEX	WC1M	4,453,625
49	SA3	I42A	CE2LR CE3CT	UW8SM	4,416,272
50	EU10	I43G	IZ8JAI IZ8FWN	N6AN	4,397,140
51	NA10	I46P	NG0C AC0W	YO8TTT	4,393,452
52	NA5	I43V	K4AB NN7CW	EA5Y	4,332,107
53	DT2	I47C	AD5A AB5EB	S53ZO	3,940,728
54	YT6	I44P	DL3ON EI5LA	ZL3WW	3,919,953
55	NA4	I47W	NE9U K9CT	OH2KI	3,874,878
56	AF2	I46O	5T5PA KF5EYY	W9KKN	3,790,080

Power Supply Variable DC Load 0 – 15 Amp

Viv Dold, ZS6VD

I have repaired several Power Supplies in the past and always looked for a dummy load to test the power supplies after repairs. I used to utilize automotive main light globes which got very hot and do not last long apart from the high brilliance of the globes.

I thought of a PIC mcu to drive some MOSFET's with pulse width modulation (PWM). It worked to a point but still not suitable for a dummy load, the idea was then scrapped. It also superimposed the

switching frequency of the PIC mcu onto the power supply output which gave weird voltage readings.

Searching the internet, I came across a suggestion to use a OpAmp to drive a MOSFET. I built the circuit on a bread board but was not successful. So, the idea was also scrapped. Then sometime later, I decided to build a switching power supply with +/- 12 V output. I did some research as what MOSFET's would be suitable for the project. I discovered that

(Continued on page 92)

(WRTC 2022 Rescoring for 2026 from page 91)

there are two types of MOSFET's. You get the ones used in PWM switching circuits and then there are ones for logic-Level applications. Thinking back to my scrapped DC dummy load project, maybe I must use a Logic-Level Gate drive HEXFET. I tried the circuit again on the bread board using a IRL450 HEXFET. It worked; the potentiometer adjustment of the current was very smooth much better to that of the PIC mcu circuit. Maybe if I used the IRL450 with the PIC mcu with Digital to Analogue circuit it would have worked. It would have been a complicated circuit, using the OpAmp idea is much simpler.

The HEXFET's get very hot and a good heatsink with fan must be used or the HEXFET's will destroy itself. Each HEXFET must be driven by an OpAmp. I used the LM358 dual OpAmp so that I could drive two HEXFET's. If more than four HEXFET's are needed, then use two LM358 to drive the four HEXFET's. Maybe a quad OpAmp e.g. LM324 might work with the four HEXFET's but not tried.

Each HEXFET must have a current sense $0,1 \Omega$ 5 W resistor from the HEXFET source to ground. The gate of the HEXFET is connected to the output pin of the OpAmp via a 180Ω $\frac{1}{4}$ W resistor. The non-inverting input of the OpAmp is connected to the slider of a 10k linear potentiometer. The one side of the potentiometer is connected to earth, and the other side is connected to a 0,75 V supply. All the non-inverting input of the OpAmps are all connected to the slider of the potentiometer.

The drain of the HEXFET's is connected to the positive terminal of the Power Supply. The Negative is connected to the circuit ground. The inverting pin of the OpAmps are connected to its respective HEXFET sense resistor R3 and R4. The other wire of the sense resistors is connected to ground. This is the feedback from the HEXFET to the OpAmp to control the load current. When adjusting the potentiometer, the OpAmp will try to bring the voltage across the sense resistor to the same value as that on the non-inverting pin. This set the current through the sense resistor and HEXFET.

I used a 15 Amp DC meter so the voltage on the potentiometer slider pin must be 0,75 Volt across

the $0,1 \Omega$ sense resistor which will then be 7.5 Amp and 5 Watt (limit of the 0.1Ω resister). Ohms Law: V/Ohms ($0,75/0,1$) giving 7,5A. I will strongly advise using two or more than one HEXFET, the current will be shared across the $0,1 \Omega$ sense resistors and HEXFET's bringing down the heat dissipation of the resistors and HEXFETS at higher load current. As in my case, the maximum meter reading is a 15Amp ($7.5 \text{ Amp} \times 2$) DC meter. Chassis mound Aluminium Clad Resistors could be used to help heat dissipation of the resistors as they also get very hot with high currents.

I am using an old 12 V 1,5 A power supply from somewhere for the OpAmps and a 150 k resistor



between 12 V and the potentiometer, giving a 0,75 V on the Potentiometer pin.

Below is my circuit for two HEXFET's. The circuit show R5 as 220 k that is for 10 Amp meter ($0,5 \text{ V}$ or 5 A per HEXFET). In my case I am using a 15 Amp meter and needed a higher voltage on the potentiometer of 0,75 V. If you decide to use a higher voltage than 0,75 V, make sure you keep within the HEXFET gate-source voltage and use higher wattage sense resistors as in the picture above.

IRL540N

Logic-Level Gate Drive

- ◆ Advanced Process Technology
- ◆ Dynamic dv/dt Rating
- ◆ 175°C Operating Temperature
- ◆ Fast Switching
- ◆ Fully Avalanche Rated

Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on resistance per silicon area. This benefit, combined with the fast-switching speed and ruggedized device design that HEXFET Power HEXFETs are well known for, provides the

(Continued on page 93)

(Power Supply Variable DC Load 0 – 15 Amp from page 92)

designer with an extremely efficient and reliable device for use in a wide variety of applications.

The TO-220 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 watts. The low thermal resistance and low package cost of the TO-220 contribute to its wide acceptance throughout the industry.

Components:

150 k ¼W R5 x 1

PLEASE NOTE: the circuit shows 220 K resistor for R5. I started off with a 10-Amp DC meter, then

changed to a 15 Amp meter requiring a voltage of 0,75 V across the potentiometer. See the text.

180 Ω $\frac{1}{4}$ WR1, R2 x 2

0,1 Ω 5W R3, R4 x 2

10k Linear Potentiometer x 1

10 μ F 15V Electrolytic Capacitor C1 x 1

1μF 25V Electrolytic Capacitor C2 x 1

IRL540 HEXFET Q1, Q2 x 2

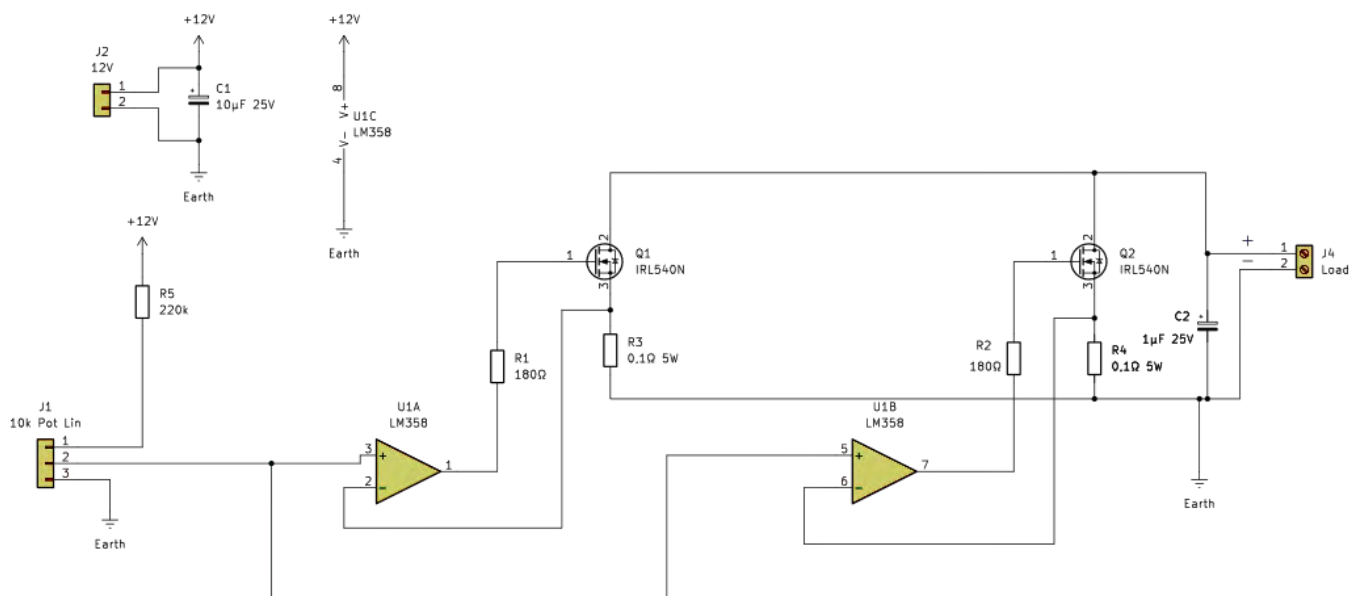
LM358 OpAmp IC1 x 1

Heatsink x 1

Mica mounting kit for HEXFET x 2

Silicon grease for HEXFET's to increase heat transfer

Connecters of your choice



Alternative use of the FreeDV software (use computer's microphone and speaker for your transceiver)

In recent articles about FreeDV digital voice mode, it was underlined the quality and the benefits of this digital mode and there were touched several aspects about setting up the FreeDV computer programme required for operating from a computer this mode (some

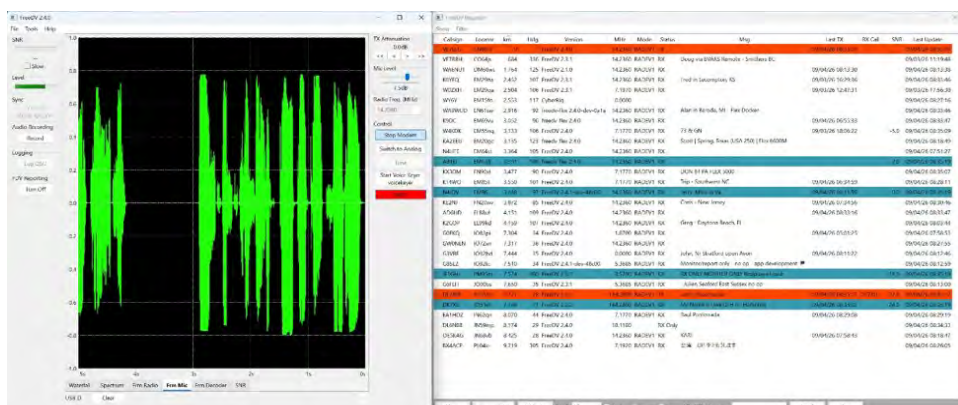
transceivers can integrate a software new module into themselves and no longer require the need of an external computer).

Such two articles are in "The Communicator," magazine of the Surrey Amateur Radio Club in Canada, pages 16 and 18 in the September –

October 2026 edition. There is another article on page 71 in the September 2026 issue of Radio ZS.

This is how it looks the software FreeDV when installed and used on my computer. I have Windows 11 as operating system, but it is the same for other operating systems.

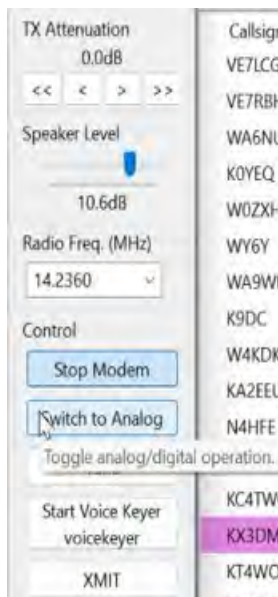
(Continued on page 94)



(Alternative use of the FreeDV software from page 93)

As you can see from the above, right side, I am reported as transmitting but few other people (just one!) are also transmitting. I am on the 20 metres band. The other transmitter is on the 2 metres band, so we do not have chances to hear each other. There are only 31 reported users this morning, in all possible frequencies and just 6 of those in Rx or Tx. Many years this was a discouraging factor for me and I even uninstalled FreeDV, because it complicates my FT8 transmission, in the Yaesu FT-710 side, on the PRESET settings.

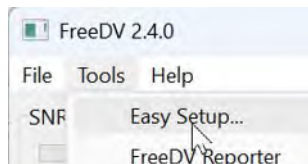
Alternative use of FreeDV software



Many people do have modern transceivers with USB cards into them and they connected the transceiver with the computer. Many would like to use whatever headphones/speakers and webcam's microphone/microphones they connected to the computer for the transceiver, too.

This would require virtual audio cables, or a programme similar with the free programme Voice Metre, which is a collection of virtual audio cables with a very nice and intuitive graphic interface. Luckily, FreeDV can help us do the same thing – using the headphones/speakers and microphones connected to the computer – and in a very simple way. On the right side of the main FreeDV window there is a switch from digital to analogue. Switching to analogue would do the trick, connect the wanted computer peripherals to the transceiver. More, if FreeDV is set up correctly on the control side – using the enhanced COM port from the computer to the transceiver – the transceiver automatically also switches into SSB mode.

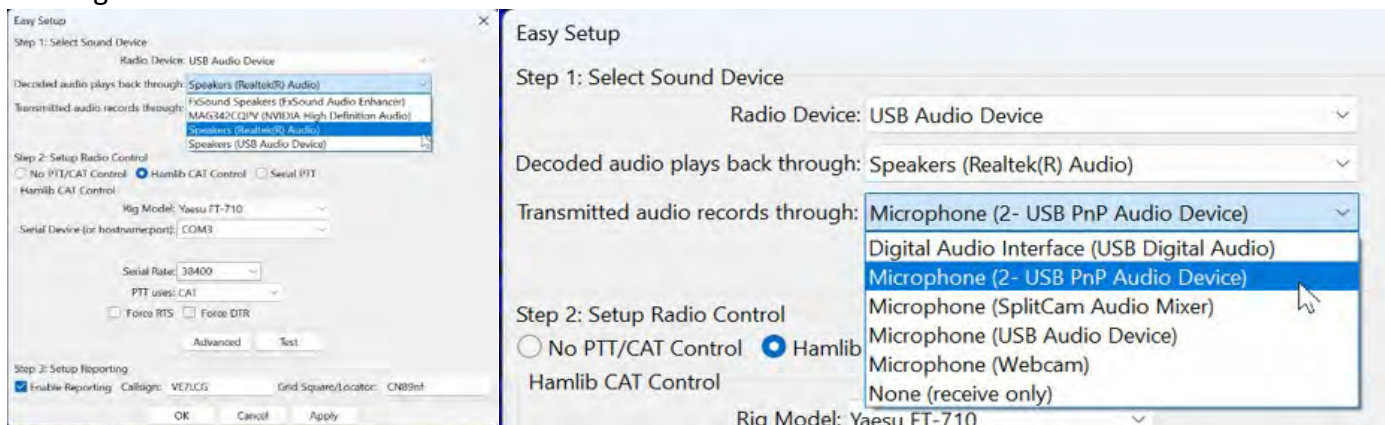
To play with any settings in the FreeDV software we have to press the button “Stop Modem” first, which is immediately on top of the “Switch to analogue” button; see the previous picture.



What is particular to this software is that it does not automatically uses the default operating system's output device. It is required for us to select which device should be the output for everything coming/going through FreeDV, in the analogue and digital functioning, too.

After we stop the modem, we can go up, left, at Tools and select Easy setup.

A new window will appear and from there we can select the wanted devices for listening and inputting sound into FreeDV, everything audio coming/going through our transceiver, for both analogue and digital communications:



The above two screenshots show that I can use the main monitor connected speakers for hearing my transceiver through the FreeDV programme (both analogue and digital modes) and something else, like my headphones (for example) for everything else running on my computer. I can have my computer running a web SDR and listen to my own transmission, received somewhere else in the world, both analogue SSB and digital FreeDV.

(Continued on page 95)

(Alternative use of the FreeDV software from page 94)

The main control for input/output audio devices for the computer remains in the operating system, accessible through Control Panel in Windows 11 and looking like this for my computer:

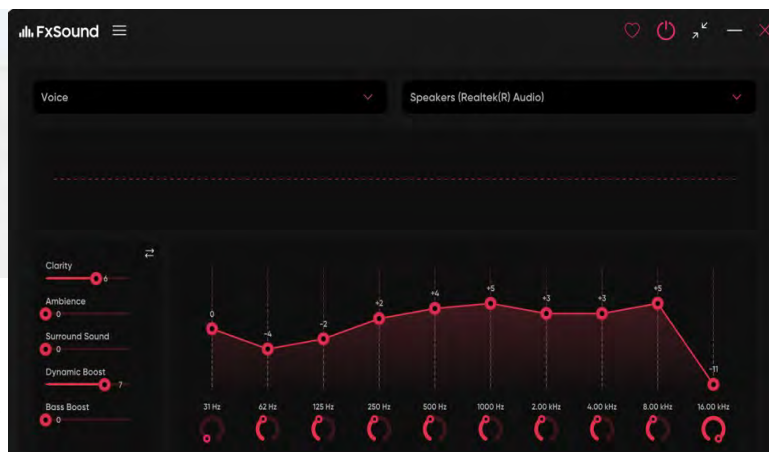
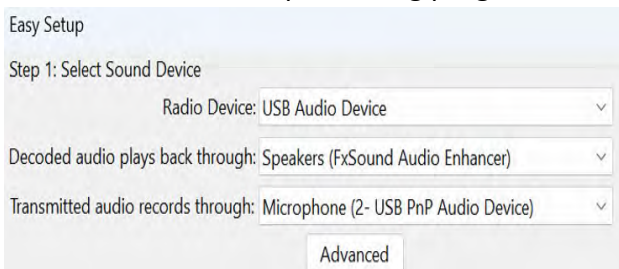


As a final word of caution, intercalating other audio software between FreeDV and the transceivers' input/output might not be an easy task for each piece of software and we might get again at using virtual audio cables. Some software programmes do allow an easy integration and I will give further examples, although in my particular case I am very happy with what audio setting the transceiver has (notch, compression, audio filtering) and I would not use less efficient audio software tools outside the DSP integrated already into my Yaesu FT-710 transceiver.

Just as an exemplification for further audio processing the analogue transceiver's audio on the computer I use the free graphic equalizer Fx Sound. It can be downloaded from <https://www.fxsound.com/>

It can give an additional notch filter done through computer audio processing. Instead of selecting the speakers or headphones in the FreeDV interface, I selected FxSound Audio Enhancer in the Easy Setup:

The added audio processing programme itself looks like this.



Now the audio output of the computer must be selected in the last element added to the chain, FxSound Audio Enhancer. You can see the possible selection on the right upper big box.



An equalizer with more bands (31) is the free Peace Equalizer from <https://sourceforge.net/projects/peace-equalizer-apo-extension/>. Peace equalizer is a Windows PC interface for Equalizer APO. During the installation it asks for which input/output devices to be active (it can also be changed, after) and makes tests for the selected devices.

This equalizer is always in the path between any computer programme generating sound, including

(Continued on page 96)

(Alternative use of the FreeDV software from page 95)

FreeDV and the final audio device (headphones, speakers). It must be switch ON or OFF from its own interface.

The previously presented computer programme, FxSound, is easier for me to use and obtains a clear strong notch effect right away.

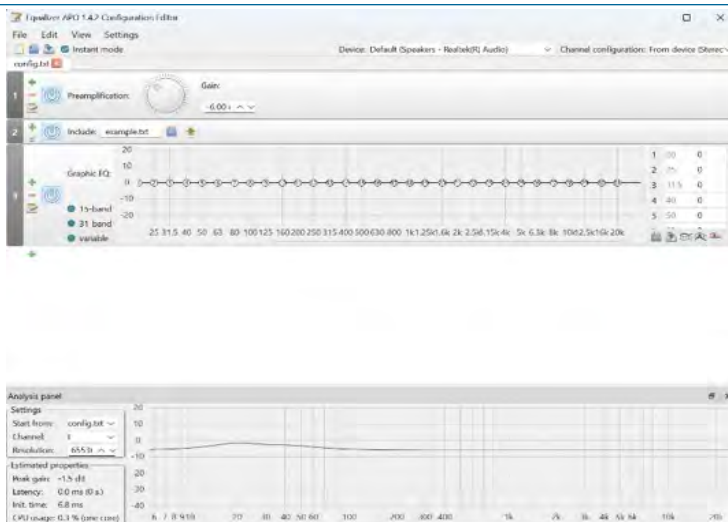
Similar enhancements can be made intercalating on the audio input, between the computer's microphone and the software FreeDV a processing programme. The processed sound from the computer microphone will pass through your computer programme processor (voice changer, echo, reverberation and so on), given to FreeDV programme and from there it will become the audio input of your transceiver, via the USB cable between your computer and your transceiver (which has a USB accessible sound card).

The free programme Voxal 8.0 becomes always intercalated between the audio source (microphone) and whatever other computer programme you use for an audio input. So, once Voxal is installed and an action is selected in it, whatever you say in the microphone does not enter directly into FreeDV, but is processed in Voxal 8, for changing the voice, introduce reverberation and so on.

It can be downloaded from: <https://www.nchsoftware.com/voicechanger/index.html>

The above article showed how to use computer's speakers/headphones and microphone for the transceiver, too. FreeDV gives us this possibility for modern transceivers, connected via a USB cable and having a built-in USB sound card.

The output sound level is adjustable in the FreeDV interface (not the transceiver's volume button) right side of the main window of FreeDV. The microphone level is also adjustable from the FreeDV interface, same place as the output and it becomes visible only during the transmission. It is a good idea to switch ON FreeDV, start the modem and put the FreeDV in the analogue mode first and hear your own transmission on a webSDR, somewhere. This is useful for adjusting the microphone level, because it is easy to overmodulate and your Tx sound can be non-intelligible, both in analogue and in the digital mode.



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Heathkit

From Wikipedia, the free encyclopaedia



Heathkit is the brand name of kits and other electronic products produced and marketed by the Heath Company. The products over the decades have included electronic test equipment, high fidelity home audio equipment, television receivers, amateur radio equipment, robots, electronic ignition conversion modules for early model cars with point style ignitions and the influential Heath H-8, H-89 and H-11 hobbyist computers, which were sold in kit form for assembly by the purchaser.

Heathkit manufactured electronic kits from 1947 until 1992. After closing that business, the Heath Company continued with its products for education and motion-sensor lighting controls. The lighting control business was sold around 2000. The company announced in 2011 that they were reentering the kit business after a 20-year hiatus but then filed for bankruptcy in 2012² and under new ownership began restructuring in 2013.

As of 2022, the company has a live website with newly designed products, services, vintage kits and replacement parts for sale.³ In August 2023 Heath Company announced its acquisition by Kirkwall (company) as part of a planned expansion in North Dakota and named former CIA officer and entrepreneur Will Cromarty as President and Chief Executive Officer.⁴

The Heath Company was founded as an aircraft company in 1911⁵ by Edward Bayard Heath with the purchase of Bates Aeroplane Co, soon renamed to E.B. Heath Aerial Vehicle Co. Starting in 1926 it sold a light aircraft, the Heath Parasol, in kit form.^{6,7} Heath died during a

(The Museum Column from page 98)

1931 test flight.^{8,7} His company went bankrupt,⁷ reorganized and moved from Chicago to Niles, Michigan.⁹

In 1935, Howard Anthony purchased the bankrupt Heath Aircraft Company's name and focused on selling accessories for small aircraft. He had little success until World War II brought a military contract to make aircraft parts. The company grew from five to 125 employees. After the war contracts were cancelled and Heath shrank back to five employees.⁷

Anthony decided that entering the electronics industry was a good idea and bought a large stock of surplus wartime electronic parts with the intention of building kits with them. In 1947, Heath introduced its first electronic kit, the O1 oscilloscope with 5-inch diameter cathode-ray tube (CRT) display that sold for US\$39.50 (equivalent to \$570 in 2025). With the low price, the O1 became very successful.¹⁰

500 flyers offering the kit for \$39.95 resulted in 350 orders, giving Anthony the funds necessary to hire employees to produce the product. By 1954 Heath had \$10 million in annual revenue and Anthony successfully invested in natural gas. In 1954, Anthony was the second head of Heath to die in a plane crash.⁷

Heathkit product concept

After the success of the oscilloscope kit, Heath went on to produce dozens of Heathkit products. Heathkit were influential in shaping two generations of electronic hobbyists. The Heathkit sales premise was that by investing the time to assemble a Heathkit, the purchasers could build something comparable to a factory-built product at a significantly lower cash cost and, if it malfunctioned, could repair it themselves. During those decades, the premise was basically valid.^{11:}

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Commercial factory-built electronic products were constructed from generic, discrete components such as vacuum tubes, tube sockets, capacitors, inductors and resistors, mostly hand-wired and assembled using point-to-point construction technology. The home kit-builder could perform these labour-intensive assembly tasks himself and if careful, attain at least the same standard of quality. In the case of Heathkit's most



An oscilloscope OL-1 from 1954, the company's first with a relatively small 3-inch CRT which allowed for a highly competitive price of US\$ 29.50 (equivalent to \$354 in 2025) for the DIY kit.¹

expensive product at the time, the Thomas electronic organ, building the kit version represented substantial savings.

One category in which Heathkit enjoyed great popularity was amateur radio. Ham radio operators had frequently been forced to build their equipment from scratch before the advent of kits, with the difficulty of procuring all the parts separately and relying on often-experimental designs. Kits brought the convenience of all parts being supplied together, with the assurance of a predictable finished product; many Heathkit model numbers became well known in the ham radio community. The HW-101 HF transceiver became so ubiquitous that even today the "Hot Water One-Oh -One" can be found in use, or purchased as used equipment at hamfests, decades after it went out of production.

In the case of electronic test equipment, Heathkit often filled a low-end entry-level niche,

(Continued on page 100)



A Heathkit stereo tuner (AJ-43D) and amplifier (AA-21D) (1972)

A Heathkit stereo preamplifier (AA-141) (1962)

A point-to-point construction of a Heathkit stereo preamplifier (AA-141) (1962)

(The Museum Column from page 99)

giving hobbyists access at an affordable price. The instruction books were regarded as among the best in the kit industry, being models of clarity, beginning with basic lessons on soldering technique and proceeding with explicit step-by-step directions, illustrated with numerous line drawings; the drawings could be folded out to be visible next to the relevant text (which might be



bound several pages away) and were aligned with the assembler's viewpoint. Also in view was a checkbox to mark with a pencil as each task was accomplished.^{12,11:146 – 147} The instructions usually included complete schematic diagrams, block diagrams depicting different subsystems and their interconnections and a "Theory of Operation" section that explained the basic function of each section of the electronics.^{11:146 – 147}

Heathkits as education

No knowledge of electronics was needed to assemble a Heathkit. The assembly process itself did not teach much about electronics but provided a great deal of what could have been called basic "electronics literacy", such as the ability to identify tube pin numbers or to read a resistor colour code. Many hobbyists began by assembling Heathkits, became familiar with the appearance of components like capacitors, transformers, resistors and tubes and were motivated to understand just what these components actually did.

For those builders who had a deeper knowledge of electronics, or for those who wanted to be able to troubleshoot/repair the product in the future, the assembly manuals usually included a detailed "Theory of Operation" chapter, which explained the functioning of the kit's circuitry, section by section.

Heath developed a business relationship with electronics correspondence schools (e.g., NRI and Bell & Howell) and supplied electronic kits to be assembled as part of their courses, with the

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(The Museum Column from page 100)

schools basing their texts and lessons around the kits. In the 1960s, Heathkit marketed a line of its electronic instruments which had been modified for use in teaching physics at the high school (Physical Science Study Committee, PSSC) and college levels (Berkeley Physics Course).^{11:149}

Heathkits could teach deeper lessons. "The kits taught Steve Jobs that products were manifestations of human ingenuity, not magical objects dropped from the sky", writes a business author, who goes on to quote Jobs as saying "It gave a tremendous level of self-confidence, that through exploration and learning one could understand seemingly very complex things in one's environment."¹³

Diversification

After Anthony's death, his widow sold the company to Daystrom Company, a management holding company that also owned several other electronics companies.^{11:147,7} Daystrom was absorbed by oilfield service company Schlumberger Limited in 1962 and the Daystrom/Schlumberger days were to be among Heathkit's most successful^{11:148} despite being Schlumberger's only consumer business.⁷

Those years saw some "firsts" in the general consumer market. The early 1960s saw the introduction of the AA-100 integrated amplifier. The early 1970s saw Heath introduce the AJ-1510, an FM tuner using digital synthesis, the GC-1005 digital clock and the GR-2000 colour television set. In 1974, Heathkit started "Heathkit Educational Systems," which expanded their manuals into general electronics and computer training materials. Heathkit also expanded their expertise into digital and, eventually, computerized equipment, producing among other things digital clocks and weather stations with the new technology.¹⁰

Heathkit also produced the TD-1006 light organ kit (1975), which featured a geometric starburst pattern of 140 lights arranged in alternating color circles. The unit used four bandpass filters at 80, 350, 1 000 and 3 000 Hz to control red, blue, green and amber lights respectively, creating visual effects that pulsed, exploded and pinwheeled with the music.^{14,15}

Kits were compiled in small batches mostly by



The Heathkit Aircraft Navigation Computer OC-1401/OCW-1401, 1978

hand, using roller conveyor lines. These lines were put up and taken down as needed. Some kits were sold completely "assembled and tested" in the factory. These models were differentiated with a "W" suffix after the model number, indicating that they were factory-wired.

For much of Heathkit's history, there were competitors. In electronic kits: Allied Radio, an electronic parts supply house, had its KnightKits, Lafayette Radio offered some kits, Radio Shack made a few forays into this market with its Archerkit line, Dynaco made its audio products available in kit form (Dynakits), as did H. H. Scott, Inc., Fisher and Eico; and later such companies as Southwest Technical Products and the David Hafler Company.

By 1981 Heath sold more than 400 kits in the US, Canada and Europe through mail order catalogues and more than 70 Heathkit Electronic Centre retail stores.¹⁶

(Continued on page 102)



The 1978 8-bit Heathkit H8 computer

Personal computers

Heathkit briefly sold an analogue computer in 1957.¹⁷ Before entering the burgeoning home computer market, Heathkit marketed and sold microprocessor-based systems aimed at learning about this technology. The ET-3400, for example, was released in 1976 and was based on the Motorola 6800 microprocessor. This system included 256 bytes of RAM, a 1k monitor in ROM and a keypad for easy entry and modification of programmes.¹⁸ Despite being a small trainer kit, it was powerful and flexible enough to be used in rudimentary control systems.¹⁹

In 1977, the company announced two digital computer kits: Heathkit H11, based on the 16-bit DEC LSI-11 and lower-end Heathkit H8. With \$90 million in sales in 1976, the company hoped that computers would soon provide more than 20% of revenue.¹⁷ The H8 was very successful, as were the H19 and H29 terminals and the H89 "All in One" computer.

The H8 and H89 ran the Heathkit custom operating system HDOS as well as the popular CP/M operating system. The H89 contains two Zilog Z80 8-bit processors, one for the computer and one for the built-in H-19 terminal.²⁰ The H11 was less successful, probably because it was substantially more expensive than the 8-bit computer line.

By fiscal year 1980 computers were 40% of Heathkit revenue.²¹ Seeing the potential in personal computers, Zenith Radio Company bought Heath Company from Schlumberger in 1979 for \$63 million,^{22,23} renaming the computer division Zenith Data Systems (ZDS). Zenith purchased Heath for the flexible assembly line infrastructure at the nearby St Joseph facility as well as the R&D assets.^{11: 151}

Zenith invested much more in Heath than previous owners,⁷ and opened additional Heathkit Electronic Center stores that sold both Heath/Zenith and third-party products.^{21, 24} Ready-to-assemble furniture appeared in Heathkit catalogs, manufactured by Zenith TV-cabinet factories with excess capacity.¹⁶ Heath/Zenith was in the vanguard of companies to start selling personal computers to small businesses. The WH-89 assembled version of the H-89 kit was re-branded as the Zenith Z-89/Z-90, an assembled all in one system with a monitor and a floppy disk drive. They had agreements with Peachtree Software to sell a customized "turnkey" version of their accounting, CPA and real estate management software. Shortly after the release of the Z-90, they released a 10 MB hard disk unit and double-density external floppy disk drives.

While the H11 was popular with hard-core hobbyists, Heath engineers realized that DEC's low-end PDP-11 microprocessors would not be able to get Heath up the road to more powerful systems at an affordable price. Heath/Zenith then designed a dual Intel 8085/8088-based system dubbed the H100 (or Z-100, in assembled form, sold by ZDS). The machine featured advanced for the day bit mapped video that allowed up to 640 x 225 pixels of 8 colour graphics.

The H100 was interesting in that it could run either the CP/M operating system, or their OEM version of MS-DOS named Z-DOS, which were the two leading business PC operating systems at the time. Although the machine had to be rebooted to change modes, the competing operating systems could read each other's disks.

After hinting at a robot at the 1982 West Coast Computer Faire,²¹ that year Heath introduced the Hero-1 robot kit to teach principles of industrial robotics.²⁵ The robot included a Motorola 6808 processor, ultrasonic sensor and optionally a manipulator arm; the complete robot could be purchased assembled for \$2495 or a basic kit without the arm purchased for \$999. This was the first in a popular series of Heathkit robot kits sold to educational and hobbyist users.

Kit era comes to a close

Selling kit computers not designed to be shipped preassembled sometimes caused

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problems, so the Z-100 was the first Heath/Zenith computer not designed first as a kit.²¹ By 1982 preassembled computers outsold kit versions four to one.⁷ While Heath/Zenith's computer business was successful, the growing popularity of home computers as a hobby hurt the company because many customers began writing computer programmes instead of assembling Heathkits.²³

While their assembly was still an interesting and educational hobby, kits were no longer less expensive than preassembled products.²⁶ BYTE reported in 1984 that the kit version of the Z-150 IBM PC compatible cost \$100 more than the preassembled computer from some dealers, but needed about 20 hours and soldering skills to assemble.^{27,28} The Heathkit version of the Zenith SupersPort 286 weighs one pound more than the preassembled computer.²⁹

The continuation of the integration trend (printed circuit boards, integrated circuits, etc.) and mass production of electronics, especially computer manufacturing overseas and plug-in modules, eroded the basic Heathkit business model. Assembling a kit might still be fun, but it could no longer save much money. The switch to surface mount components and LSI ICs finally made it impossible for the home assembler to construct an electronic device for significantly less money than assembly line factory products.^{11:152 - 153,30}

By 1986 Heathkit stores were called "Heath/Zenith Computers & Electronics Centres," with "The Kit Centre" one of four sections with computers, service and training.³¹ As sales of its kits dwindled during the decade, Heath relied on its training materials and a new venture in home automation and lighting products to stay afloat. When Zenith eventually sold ZDS to Groupe Bull in 1989, Heathkit was included in the deal.^{11:153}

In March 1992, Heath closed its stores.^{32:563} By the "Heath/Zenith Computers" locations were, while still profitable, essentially computer stores for Zenith and Apple Computer products, no longer selling kits. Most floor space was used for non-retail corporate sales despite the stores' retail locations.³⁰ The company also announced that it was discontinuing electronic kits after 45 years. Heath had been the last sizable survivor of a dozen kit manufacturers from the 1960s, outlasting

Knightkit, Dynaco, Allied and Eico among others.²³

In 1995, Bull sold Heathkit to a private investor group called HIG, which then sold it to another investment group in 1998. Wanting to only concentrate on the educational products, this group sold the Heath/Zenith name and products to DESA International,^{11:154} a maker of specialty tools and heaters. In late 2008, Heathkit Educational Systems sold a large portion of its physical collection of legacy kit schematics and manuals along with permission to make reproductions to Don Peterson,³³ though it still retained the copyrights and trademarks and had pointers to people that could help with the older equipment.

DESA filed bankruptcy in December 2008.³⁴ The Heathkit company existed for a few years as Heathkit Educational Systems located in Saint Joseph, Michigan, concentrating on the educational market. The Heathkit company filed for bankruptcy in 2012.^{2,35}

Revival

In May 2013, Heathkit's corporate restructuring was announced on their website.³⁶ An extensive FAQ accessible from their homepage stated clearly that Heathkit was back and that they would resume electronic kit production and sales.³⁷ In October 2015, Heathkit circulated an email to its "insiders", who had indicated an interest in the company's progress by completing its online marketing survey. It had now secured the rights to all Heathkit designs and trademarks; secured several new patents; established new offices, warehouse space and a factory in Santa Cruz, California; and had introduced the renewed company's first new electronic kit in decades.³⁸

Since then, Heathkit has announced and sold further kits in its new lineup of products.³ Limited repair service on vintage products, reprints of manuals and schematics, remaining inventories of original parts and upgrades of some vintage models are available.³⁷

Amateur radio

Heathkit made amateur radio kits almost from the beginning. In addition to their low prices compared with commercially manufactured equipment, Heathkit's appealed to amateurs who

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had an interest in building their own equipment but did not necessarily have the expertise or desire to design it and obtain all the parts themselves. They expanded and enhanced their line of amateur radio gear through nearly four decades. By the late 1960s, Heathkit had as large a selection of amateur equipment as any company in the field.

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A Heathkit HW8 amateur transmitter

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Further reading

- ♦ Brueschke, Erich E.; Mack, Michael (2019), [The History of the Heath Companies](#)



RLC-Loaded Multiband OCFD Antennas

Richard A. Formato, W3AZ

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Introduction

The idea of using impedance loading to increase wire antenna bandwidth has been around for a long time, at least since the early 1950s when Willoughby published his Patent Specification for An Improved Wide Band Aerial (Australia)⁽¹⁾. He described wire antenna elements loaded with individual resistors or wire segments with different conductivity. Their resistance values increased exponentially with distance from the RF source.

This note provides amateur radio operators the tools to design and fabricate their own Z-loaded multiband Off-Centre-Fed-Dipole antennas. From their beginnings in the 1950s, impedance-loaded antennas have evolved to provide increasingly good performance. At this point in time ham operators interested in designing and building their own have all the tools needed to do so.

In 1961, Altshuler described a Traveling-Wave Linear Antenna whose input impedance was essentially constant over a 2:1 frequency range. This bandwidth was achieved by inserting a single 240 Ω resistor $\lambda/4$ from the end of a wire radiating element. Altshuler's initial work was extended by Wu and King in a seminal paper published in 1965. Instead of using a single lumped resistance, WK assumed a continuously variable resistance along a center-fed dipole antenna. They developed a loading profile that resulted in a purely travelling wave current mode. The WK profile has been the basis for much if not all subsequent work on impedance-loaded wire elements.

The performance achieved by continuously loaded antennas over the years has been impressive. For example, using the full WK profile Kanda built a very short receive-only loaded-CFD field probe that exhibited essentially flat response from HF to beyond 1 GHz. Resistive and capacitive loading was created by depositing a segmented conductive thin-film of varying thickness on a glass rod substrate. Reactive loading was achieved by burning away with a laser the narrow rings between conductive segments.

But this extremely wideband field sensor was so heavily loaded that it could not be used for transmitting because of its reduced radiation

efficiency (transfer function below about -22 dB). The full WK profile tends to load an antenna so heavily that the resulting radiation efficiency is so low that the element's utility for transmitting is severely compromised. Of course, this effect is evident in any resistively loaded wire antenna because the resistors create ohmic loss (i^2R heating). Nevertheless, judiciously placed resistors with appropriate values can mitigate this effect while still increasing impedance bandwidth.

Rama Rao and Debroux addressed the efficiency issue by designing, fabricating and testing a continuously resistive-loaded HF base-fed monopole antenna to cover 5 – 30 MHz. It was 10,668 m tall, 0,0254 m radius on a perfectly conducting ground plane. Because the full WK loading profile generally results in unacceptably poor radiation efficiency, the RD monopole used a fractional profile equal to 0,3 times the Wu-King profile ("30% profile"), along with a fixed, lumped-element network, an Unun, that matched the monopole's input impedance of $Z_0=300 \Omega$ to the usual 50 Ω . Note that the OCFD ham-band design (below) has $Z_0 \sim 200 \Omega$ which is easier to match using a 4:1 balun.

The author NEC-modelled the RD element using a different loading profile that was determined by a CFO optimizer with the following results (*See the next page. Ed.*)

These results are impressive: SWR//300 Ω < 2:1, 5 - 30 MHz! However, the resistive loading dramatically affects the efficiency which ranges from $\sim 10\%$ to $\sim 45\%$. It is evident that very wideband operation can be achieved using appropriately loaded wire antenna elements, but there are caveats, perhaps the biggest one being radiation efficiency. This note describes an 80 to 1,25 m band RLC-loaded OCFD that avoids the efficiency pothole.

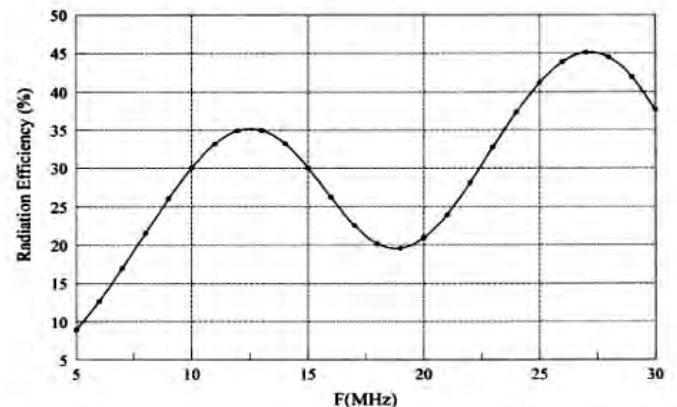
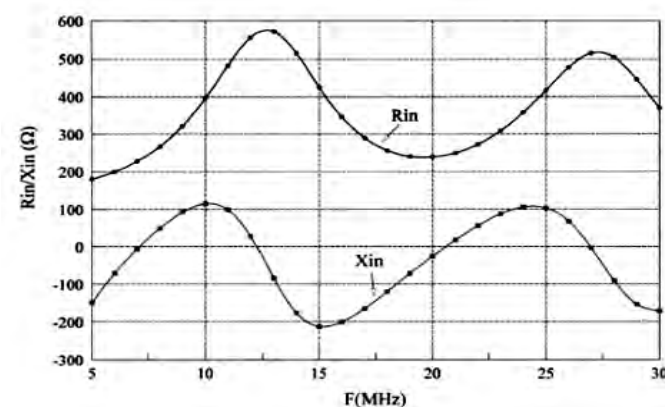
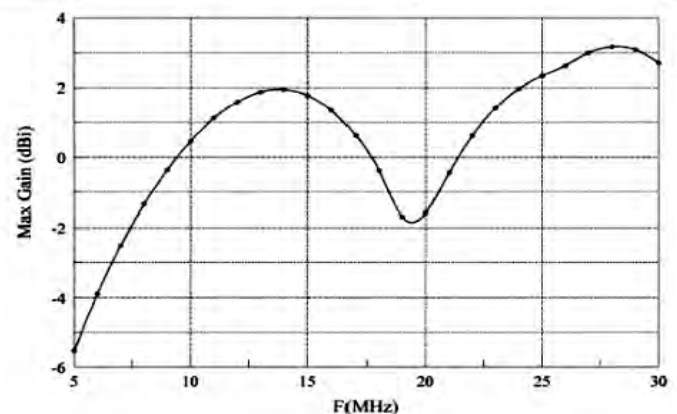
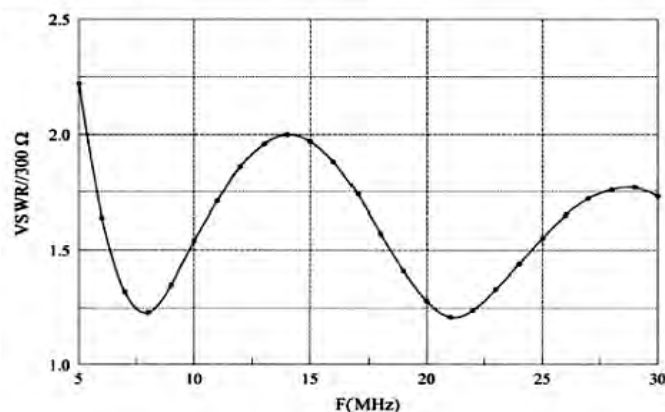
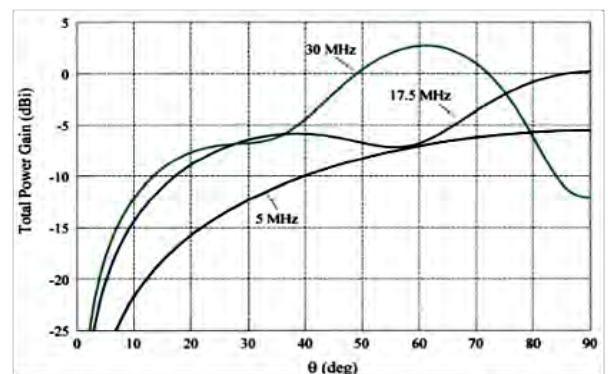
Besides fractional resistive profiles, other loading profiles have been proposed that combine resistance and inductance in various ways to improve IBW and efficiency. An example is Lestari's extension of the WK analysis to develop an optimal loading profile for a ground penetrating radar bow-

(Continued on page 107)

```

CM File: LD_MONO.NEC
CM Run ID 02-16-2011 10:43:46
CM Nd= 14, p= 2, j= 120
CM Zo=300 ohms
CE
GW1,14,0.,0.,0.,0.,0.,10.668,.0254
GE1
LD0,1,1,1,82.7045,0.,0.
LD0,1,2,2,29.31145,0.,0.
LD0,1,3,3,9.2825,0.,0.
LD0,1,4,4,7.154042,0.,0.
LD0,1,5,5,7.397769,0.,0.
LD0,1,6,6,7.310225,0.,0.
LD0,1,7,7,27.58697,0.,0.
LD0,1,8,8,26.55749,0.,0.
LD0,1,9,9,24.70102,0.,0.
LD0,1,10,10,22.80148,0.,0.
LD0,1,11,11,20.82445,0.,0.
LD0,1,12,12,16.44918,0.,0.
LD0,1,13,13,11.4537,0.,0.
LD0,1,14,14,9.471994,0.,0.
GN1
FR 0,26,0,0,5.,1.
EX 0,1,1,1,1.,0.
RP 0,10,1,1001,0.,0.,10.,0.,100000.
EN

```



NEC Data for the R-Loaded RD Monopole

(RLC-Loaded Multiband OCFD Antennas from page 106)

tie antenna.

Bottom line

A properly loaded wire antenna can provide much better IBW than an unloaded one. This note describes a methodology for determining an acceptable loading profile that improves IBW on the amateur radio bands while maintaining good radiation efficiency. Two simple designs are presented that comprise only one resistor, one inductor and one capacitor (values and locations for each) for an 80m OCFD and in the Appendix a 40m OCFD.

The prototype antenna for this discussion is the K1POO 4 Band OCFD introduced by the author in QST three decades ago⁽²⁾. This OCFD is discussed extensively by G8ODE in an article published by the Royal Signals Amateur Radio Society (RSARS, UK)⁽³⁾. His article also provides an interesting history of the major developments that have led to asymmetrically fed dipole antennas. In 2010 Alan Steele, VA3STL published measured data for a K1POO OCFD that provided generally very good results⁽⁴⁾. More recently, in 2021, Bob Glorioso, W1IS and Bob Rose, KC1DSQ developed a capacitor-loaded OCFD using a single 330pF cap strategically

(Continued on page 108)

(RLC-Loaded Multiband OCFD Antennas from page 107)

placed to improve IBW, also with very good results⁽⁵⁾.

Which raises the question addressed here, Is there a way to design an amateur radio band loaded OCFD that provides even better performance? The author believes there is, specifically by using a global search and optimization algorithm, in this case Central Force Optimization. This note describes 80 and 40 m OCFD's, but the methodology is applicable to any set of bands or frequencies. The 40 m antenna described here may be particularly attractive because of its size and portability.

Methodology

CFO is a deterministic GSO that analogizes gravitational kinematics, the motion of masses moving under the influence of gravity⁽⁶⁾. Unlike other widely used metaheuristics (read 'algorithms'), as examples, Genetic Algorithm, Particle Swarm, or Ant Colony, CFO is deterministic, not stochastic and it maximizes its objective function instead of minimizing it. CFO has been widely used for antenna design and

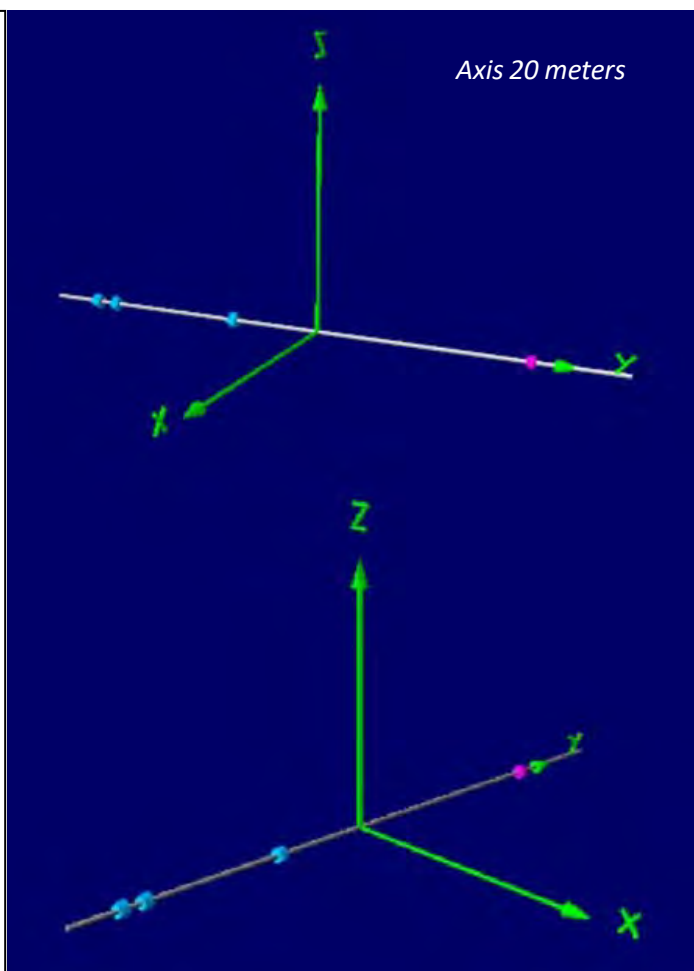
optimization and for solving difficult problems in disciplines as disparate as arid region water distribution, UAV flight control, iris recognition and brain imaging.

One of CFO's major advantages for the Loaded-OCFD problem is its determinism. Every CFO run with the same setup produces the same result, which is quite different from stochastic algorithms that inevitably produce different results on successive runs even with the same setup. What this means for the Loaded-OCFD problem is that only one run is required to assess how good its results are, as opposed to making many runs with a stochastic optimizer to develop performance statistics.

A simple CFO algorithm was coded in Basic. Source code and related documents are available online at <https://app.box.com/s/rwrhkkmdpd1xaqzrlcnqgqximgsekc4jh>. The source code is well annotated, easy to follow and does not require extensive coding experience for modifications. A Pi Fraction Initial Probe Distribution was used and fractions #0-1,000,001 with accompanying materials are also available

(Continued on page 109)

```
CM Run Start: 09-06-2026 05:21:31
CM RunID: 09062026142319
CM Fnc Dipole Run #1
CM Executed on 09-06-2026 at 14:23:19 CM NEC Run
#20726/20726
CM Probe #275, Step #275
CM Dipole Length = 46.29m (151.87ft) CM # Dipole Segs = 240
CM Excitation Segment = 205/240 CM OCFD in FREE SPACE
CM Loading Resistor = 455 ohms @ Seg# 29 CM Loading Coil =
669 uHy @ Seg# 20
CM Loading Cap = 286 pFD @ Seg# 84 CM No Feedpoint Induc-
tor Loading
CM No Feedpoint Capacitor Loading CE
GW 1 240 0 -23.14 0 0 23.14 0 1.026E-3 GE-1
PT-1 PQ-1
LD5 1 1 240 5.8E7 1.0
LD0, 1, 29, 29, 455, 0E-6, 0E-12 !RES loading
LD0, 1, 20, 20, 0, 669E-6, 0E-12 !IND loading
LD0, 1, 84, 84, 0, 0E-6, 286E-12 !CAP loading
EX 0,1,205,0,1,0,0,0. !DIPOLE FEEDPOINT EXCITATION FR
0,1,0,0,3.75,0.
XQ
FR 0,1,0,0, 3.75,0. XQ
FR 0,1,0,0, 7.15,0. XQ
FR 0,1,0,0, 14.18,0. XQ
FR 0,1,0,0, 28.85,0. XQ
FR 0,1,0,0, 52,0. XQ
END
```



(RLC-Loaded Multiband OCFD Antennas from page 108) online⁽⁷⁾.

Summary data

Below are screenshots of the NEC-calculated SWR//200Ω plotted band-by-band from 80 to 1,25 m and over the HF range 3 – 30 MHz. These data were computed using Arie Voors, PA2B's excellent programme 4NEC2 (<https://www.qsl.net/4nec2/>, Ver 5.9.3, May 2021). Included are the NEC input file and two 3D views of the antenna. SWR is calculated at the antenna input terminals, not at the cable connected to the transmitter. Cable and connector losses will reduce SWR to some degree, so that the following plots are worst case SWR, not what the transmitter actually sees in the shack.

Unlike the heavily loaded RD monopole, this OCFD provides an excellent radiation efficiency of 91,95%. Its length is 46,29 m with the following RLC loading: a 455 Ω resistor, a 669-uh inductor and a 286-pf capacitor at segments 29, 20 and 84, respectively. As shown, the antenna is deployed along the Y-axis in the X-Y plane in free space.

The RF source feeds this OCFD at segment 205. The antenna wire was divided into 240 equal segments, each one 0,192875 m long. The RF excitation is therefore 34,5 segments from the end which places it at 6,6541875 m, or 14,375%. This feed location is close to where an unloaded K1POO OCFD would be fed, a '1/6 feed' (16,67%). But based on its optimization criterion, that is, the user-defined 'fitness' or 'objective' function that measures how good a particular design is, CFO found that 14,375% is a better feed point. The slight departure from a 1/6 feed is not surprising and it emphasizes that traditional OCFD feed points simply are not the best. On page 72 are SWR Plots, 3 – 30 MHz and 80 – 1,25 m nands for this RLC-loaded OCFD.

The SWR plots show that the loaded OCFD is useable on every ham band except 15 and 12 meters. While the 15m SWR is probably too high even for the best external antenna tuners, the 12 m SWR at around 10:1 may be manageable with some external AT's. On all the other amateur bands the SWR is well behaved over much if not all the band and generally within acceptable ranges for most built-in AT's and certainly good enough for external ones.

For DIYers

The RD loaded monopole covered the 5 - 30 MHz HF band using a fixed unun network, not an AT. Similarly, the RLC-Loaded OCFD requires a 200-to-50 Ω balun [see reference (2)-3 below]. Many balun configurations are discussed online and there are many DIY 'how to build them' posts, or a commercial device can be used.

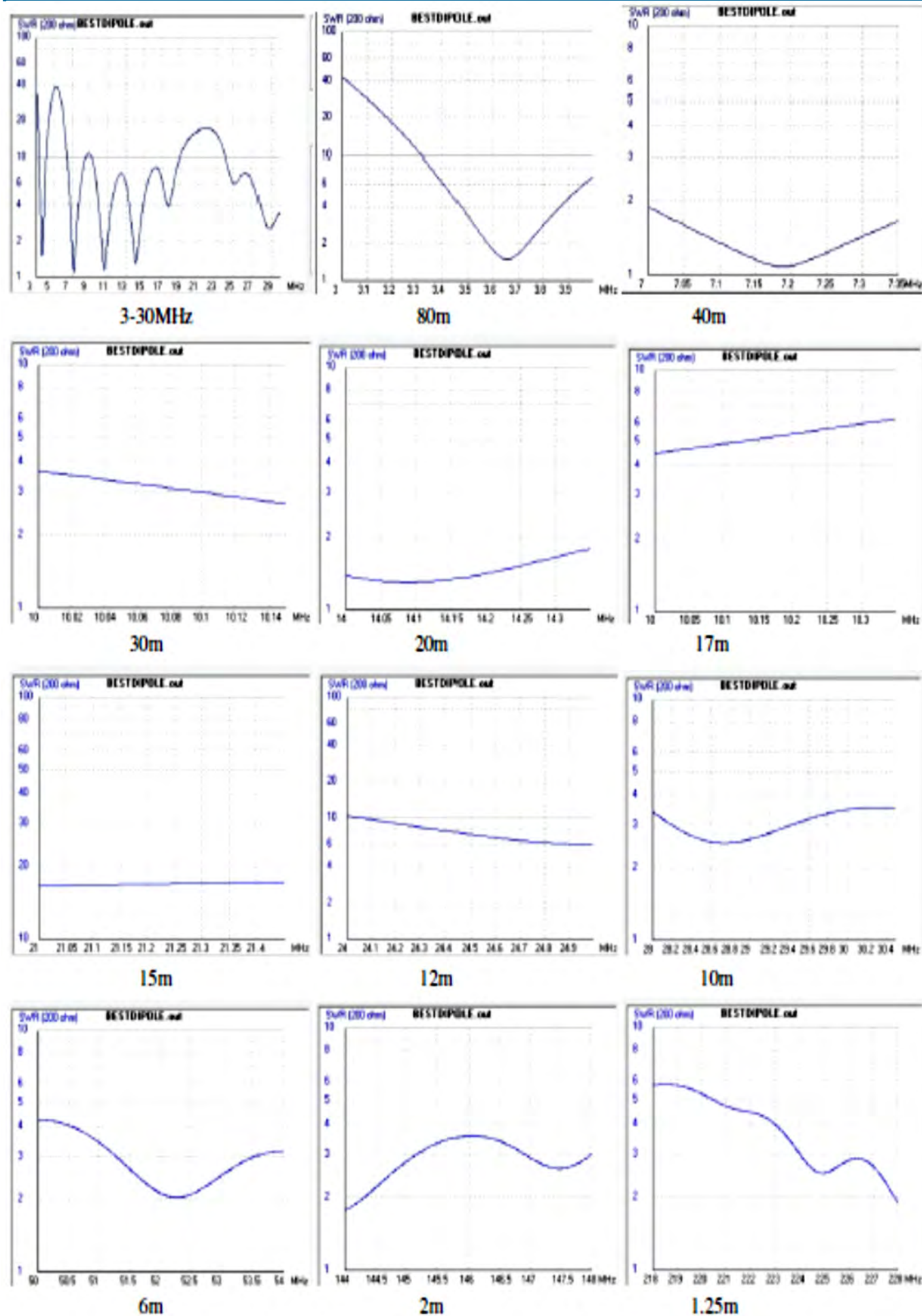
While CFO is an effective design tool, many other GSO's are applicable as well and should be considered. Their primary limitation is a lack of reproducibility run-to-run. However, this characteristic can be mitigated by injecting pseudo-randomness using, for example, the Pi Fractions that are available online.

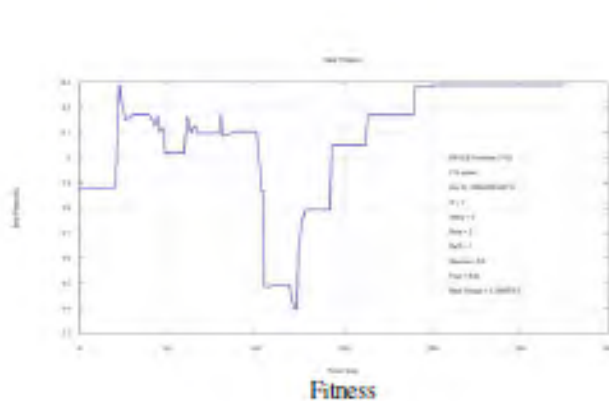
Setting up a CFO run, or for that matter any GSO run, requires paying attention to run parameters, especially the number of steps and, for CFO, the number of probes. Setting these values too high can result in very long runtimes because an external modelling engine such as NEC is much slower than using only built-in compiler functions. For example, the data reported here were computed on an old Intel Core i5 7500T/2,7 GHz PC running 64-bit Windows 10Pro. Both the number of steps and number of probes were set at 275 and a run would last several hours. The best approach is to start with low values to sample a problem's topology ('landscape'). Very highly multimodal landscapes invariably lead to longer runtimes, so it makes sense to tailor the GSO setup to the problem at hand to the extent possible.

Another consideration is the user's choice of the 'Fitness' function, which can be any formula the user expects will provide an accurate measure of how good the CFO solution is.

For this 80 m OCFD design the Fitness function was: $\text{Fitness} = (\text{Max}(\text{SWR})+1)/(\text{Max}(\text{SWR})-1)$ where $\text{Max}(\text{SWR})$ is the maximum SWR over all the calculation frequencies specified in NEC. While in this case only the SWR was used, other parameters such as the actual input impedance could be used as well (or instead). Formulating an appropriate Fitness function can be difficult because it defines the problem's 'landscape' (topology) and some landscapes lend themselves well to being explored while others are simply pathological. The CFO papers on Determinism provide examples [available online].

(Continued on page 111)





Fitness

(RLC-Loaded Multiband OCFD Antennas from page 109)

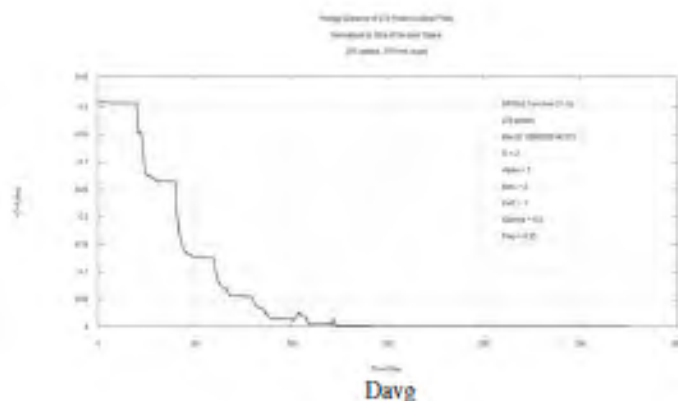
At the end of a run the 80m version of CFO plots the Fitness evolution and the convergence parameter Davg. The Fitness measures how good the CFO solution is with higher values reflecting better solutions. Davg measures how well CFO's probes are converging on its best solution. These are the plots for the 80 m OCFD (above.)

The Fitness evolution in this case is unusual because for the most part CFO's Fitness usually increases monotonically as better and better solutions are found, but not so here. The Davg convergence plot shows that essentially all of CFO's probes have converged on a single point, the best solution, even though its evolution was erratic. This convergence behaviour is fairly common, although there are cases when the probes cluster but not at a single point or oscillate. These plots may be important because they can be useful in developing better run parameters.

The data for the 80 m OCFD are for a free-space antenna. Just where an antenna like this is deployed matters because environmental factors can dramatically influence its performance. Nearby objects, conducting or not and the ground itself influence antenna tuning. Typically, a wire antenna will be tuned for its location by pruning, which can be a time-consuming process that must be done carefully. As to ground effects, NEC includes a Sommerfeld ground approximation that can be very useful in deployments where the earth's electrical parameters are reasonably well known or estimated.

Some Construction Considerations

Of course, when it comes to building an RLC-Loaded OCFD all the usual precautions must be observed, especially component power-handling.



Dava

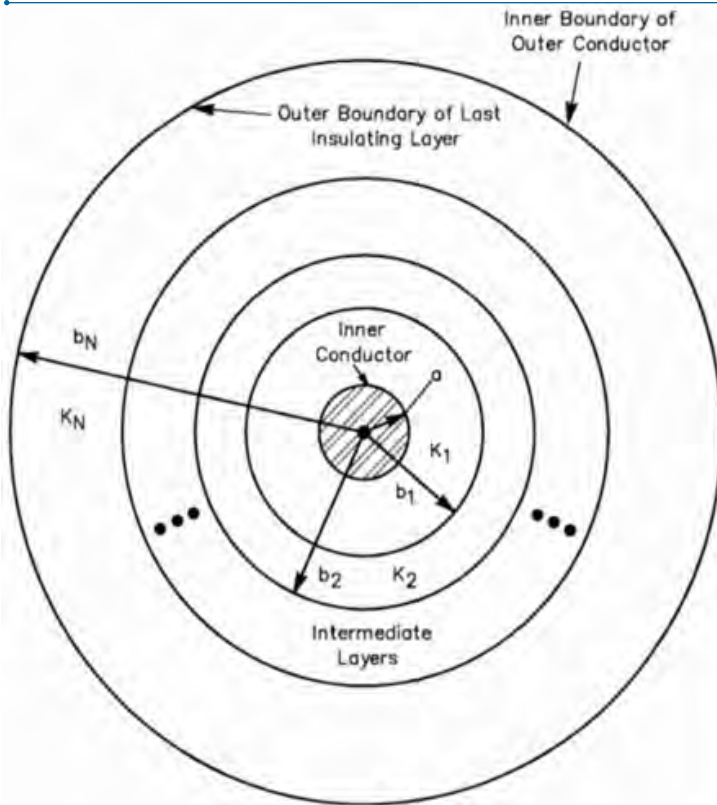
The resistor, inductor and capacitor must be power-rated to handle the transmitter output. 4NEC2 is useful for determining each component's power dissipation, as is NEC stand-alone because current and charge distributions are printed if requested. Power handling is particularly important when SWR is high and cannot be overlooked. GM1SXX's comments on his experience with a K1POO OCFD may be useful, especially when the end(s) are drooped [available online].

For the DIY enthusiast who is fabricating their own capacitor or inductor, the obvious geometry is cylindrical, with possibly more than one insulating layer in the cap. If so the author's formula for a multi-layered cap may be useful:

The cylindrical capacitor geometry is shown below. The cap's inner conductor radius is a and it has N insulating layers with outer radii $b_1, b_2 \dots b_{N-1}, b_N$. The outer radius of the last insulating layer is b_N which also is the inner radius of the outer conductor. The layers' corresponding dielectric constants are $k_1, k_2 \dots k_{N-1}, k_N$. respectively. This formula ignores end effects, which is a good approximation for caps whose length is much greater than $2b_N$. As an example, calculate the effective dielectric constant of a cylindrical cap comprising an inner conductor with 1mm radius and four insulating layers with radii 2, 4, 6 and 10 mm and corresponding dielectric constants of 3, 4, 7 and 10. Using the formula the resulting dielectric constant is then 4.4855.

For the inductor, Lundin's seminal paper on calculating the inductance of a tight-wound circular coil is perhaps the best reference⁽⁸⁾. His 'handbook formula' has been implemented as a Basic programme that is available online along with the RLC-Loaded OCFD programme and associated

(Continued on page 112)



(RLC-Loaded Multiband OCFD Antennas from page 111)
materials⁽⁹⁾.

A personal note

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APPENDIX – A 40 m OCFD DESIGN

XiMin(1)	= 18##	:	XiMax(1)	= 25##	'dipole length, meters
XiMin(2)	= 190	:	XiMax(2)	= 210	'ex seg# (~1/6 Feed expected)
XiMin(3)	= 300##	:	XiMax(3)	= 800##	'loading inductor UHY
XiMin(4)	= 3	:	XiMax(4)	= 200	'inductor segment #
XiMin(5)	= 200##	:	XiMax(5)	= 500##	'loading capacitor PFD
XiMin(6)	= 3	:	XiMax(6)	= 200	'cap segment #
XiMin(7)	= 0##	:	XiMax(7)	= 0##	'feed point ind UHY (optional)
XiMin(8)	= 0##	:	XiMax(8)	= 0##	'feed point cap PFD (optional)
XiMin(9)	= 199##	:	XiMax(9)	= 201##	'Zo ohms, ~200 ohms expected
XiMin(10)	= 0##	:	XiMax(10)	= 500##	'loading Resistor OHMS
XiMin(11)	= 3##	:	XiMax(11)	= 238##	'resistor segment #

$$k_{\text{eff}} = \frac{\ln\left(\frac{b_N}{a}\right)}{\ln\left\{\left(\frac{b_1}{a}\right)^{\frac{1}{k_1}} \left(\frac{b_2}{b_1}\right)^{\frac{1}{k_2}} \dots \left(\frac{b_N}{b_{N-1}}\right)^{\frac{1}{k_N}}\right\}}$$

Note: Same source code as the 80 m OCFD using the same Fitness function but with PiFracIndex&& = 32 (arbitrarily assigned). The 40 m decision space (DS, the search domain) was changed to reflect the size difference between 80 and 40 m antennas. The ranges of loading component values (below) also were changed based on expectations drawn from experience, or from a 'best guess,' or simply being arbitrarily assigned. NEC was run at the mid-band frequencies for the 40, 20, 15, 10, 6 and 2 m amateur bands.

The NEC input file for this 40 m OCFD appears below along with perspective views of the antenna. The loading values and locations, R=196 Ω, L=517

(Continued on page 113)

(RLC-Loaded Multiband OCFD Antennas from page 112)

uhy and $C=395$ pf at segments 89, 23 and 61 are quite different from the 80 m values, which is not unexpected and reflects the difference in the two antennas' fitness landscapes. If CFO were run with a different fitness function, thereby defining a different landscape and/or with a different Pi Faction Initial Probe Distribution, the optimized 40 m OCFD could look quite different while still providing very good multiband performance. An interesting example of choosing an inappropriate fitness function is in the posted paper on Determinism in EM Design, pages 4 - 5. An example of a fitness function that does not include SWR is equation (4) in that paper.

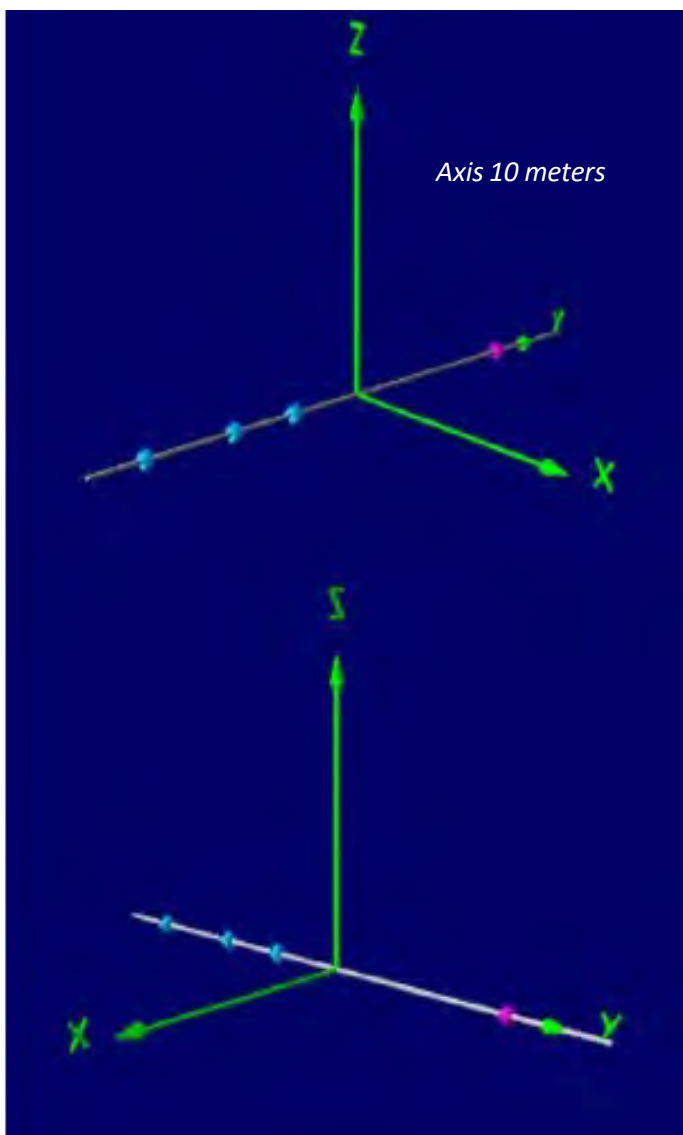
The NEC File, Perspective Views and SWR Plots for a 40 m Multiband OCFD appear below. Of course, different CFO parameters will produce different designs and there is no question that there are better ones than this one. Hopefully this note will encourage its readers to find them!

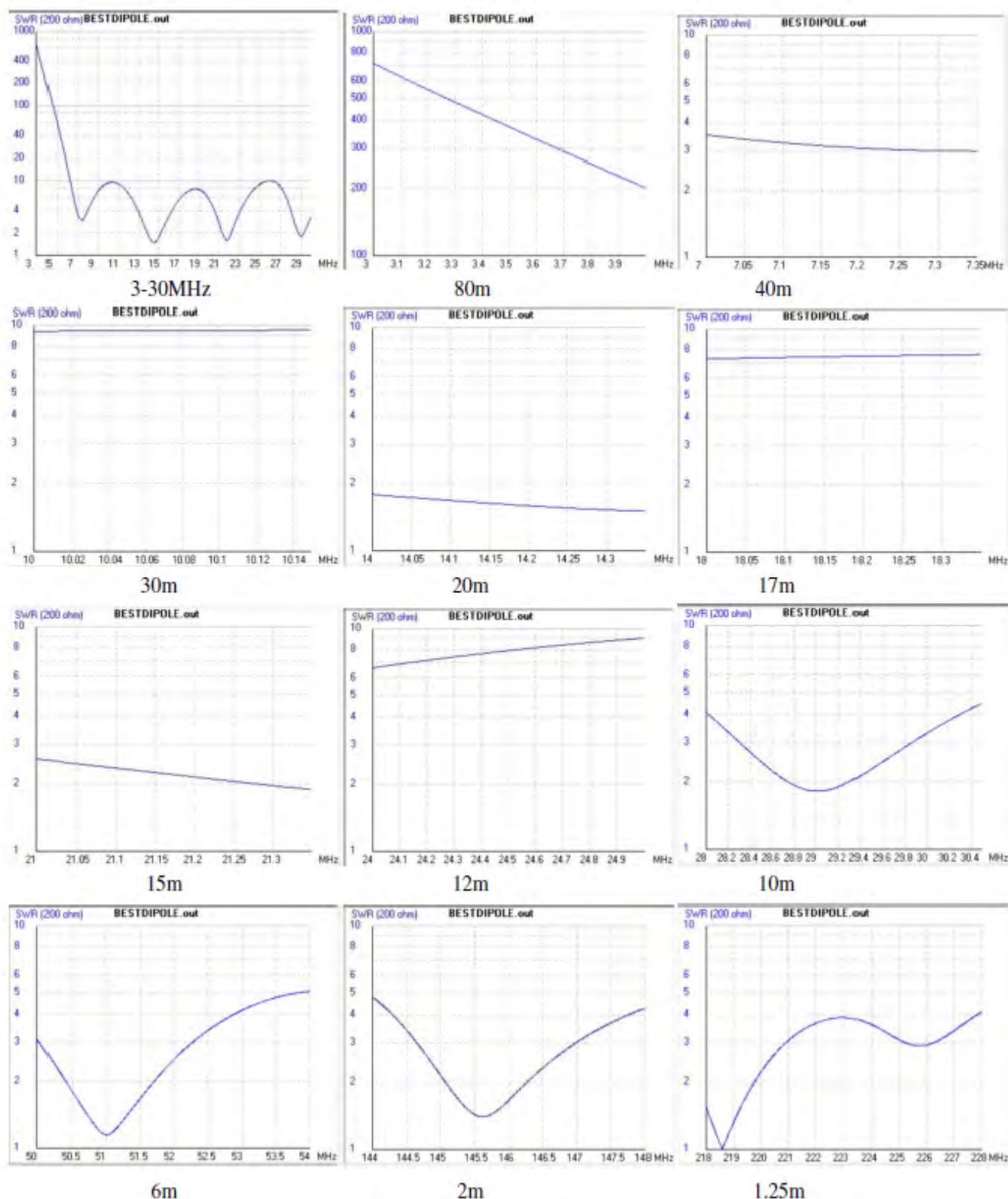
```
CM Run Start: 09-09-2026 21:24:15
CM RunID: 09102026035620
CM Fnc Dipole Run #1
CM Executed on 09-10-2026 at 03:56:20
CM Probe #275, Step #193
CM Dipole Length = 22.68m (74.41ft) CM # Dipole
Segs = 240
CM Excitation Segment = 200/240 CM OCFD in FREE
SPACE
CM Loading Resistor = 196 ohms @ Seg# 89 CM
Loading Coil = 517 uHy @ Seg# 23
CM Loading Cap = 395 pFD @ Seg# 61 CM No
Feedpoint Inductor Loading
CM No Feedpoint Capacitor Loading CE
GW 1 240 0 -11.34 0 0 11.34 0 1.026E-3 GE-1
PT-1 PQ-1
LD5 1 1 240 5.8E7 1.0
LDO, 1, 89, 89, 196, 0E-6, 0E-12 !RES loading
LDO, 1, 23, 23, 0, 517E-6, 0E-12 !IND loading
LDO, 1, 61, 61, 0, 0E-6, 395E-12 !CAP loading
EX 0,1,200,0,1,0,0. !DIPOLE FEEDPOINT EXCITA-
TION FR 0,1,0,0, 7.15,0.
XQ
FR 0,1,0,0, 14.18,0. XQ
FR 0,1,0,0, 21.22,0. XQ
FR 0,1,0,0, 28.85,0. XQ
FR 0,1,0,0, 52,0. XQ
FR 0,1,0,0, 146,0. XQ
END
```

References

- (1) Specific references and a more detailed discussion are available in "New Techniques for Increasing Antenna Bandwidth with Impedance Loading", R. Formato, Prog. Electromagnetic Research B, Vol. 29, pp.269 - 288, 2011 (doi:10.2528/PIERB11021904), JPier.org.
- (2) 1- "Improved Feed for the Off-Centre-Fed Dipole," QST, May 1996, p.76. 2- "Off-Centre-Fed Dipole Comments, Part 2", QST, October 1996, p.72. 3- "Choke the OCFD", QST, September 1997, p.82
- (3) "K1POO 4 Band OCFD 40-20-15-10 m – Richard Formato iss 1.3," G8ODE, RSARS, June 2012, available online at <https://rsars.org.uk/wp-content/uploads/2013/01/k1poo-4-band-ocfd-40-20-15-10m-richard-formato-iss-1-3.pdf>.
- (4) "200-ohm feed point off-centre fed dipole", Alan Steele, VA3STL, 26 July 2010. Online at <https://>

(Continued on page 114)





SWR Plots 40 m RLC-Loaded OCFD, 3 - 30 MHz and 80 – 1,25 m Bands

(RLC-Loaded Multiband OCFD Antennas from page 113)

va3stl.wordpress.com/2010/07/26/200-ohm-feed-point-off-centre-fed-dipole/

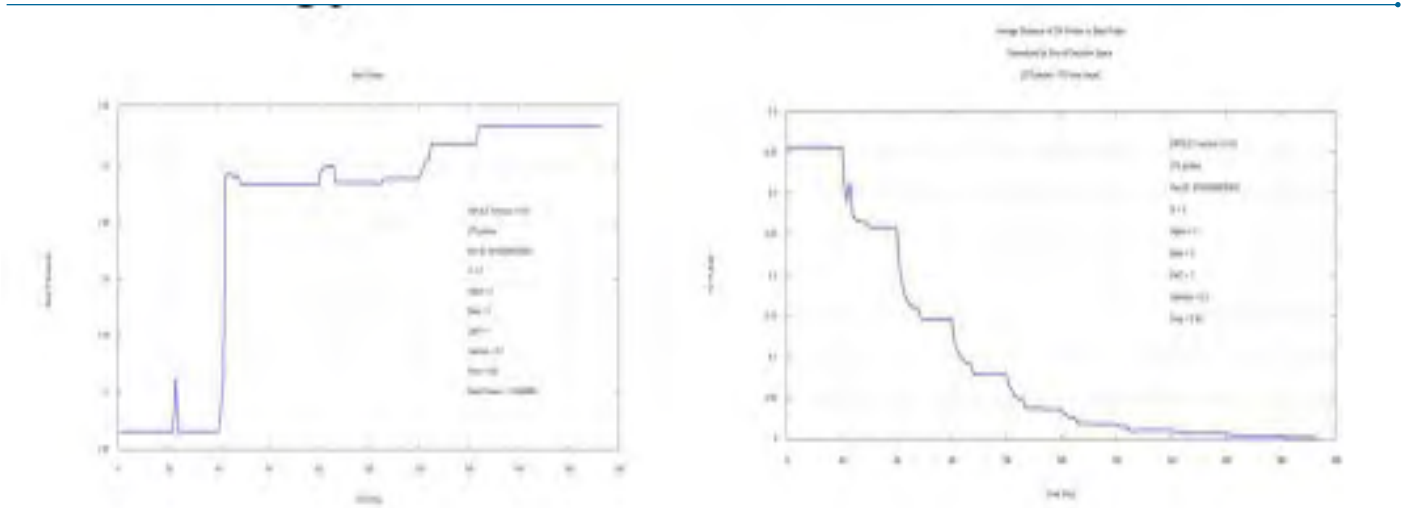
(5) "A New Design of a 40 - 6 metre OCFD," Bob Glorioso, W1IS and Bob Rose, KC1DSQ, CQ Magazine, 1 May 2021. Online at <https://batteryeliminatorstore.com/blogs/ocf-masters-articles/a-new-design-of-a-40-6-meter-off-center-fed-dipole>

(6) "Central Force Optimization: A New Metaheuristic with Applications in Applied Electromagnetics", R. Formato, Prog. Electromagnetic Research, Vol. 77, pp.425 - 491, 2007 (doi:10.2528/PIER07082403), JPier.org.

(7) Pi Fractions, online at: <https://app.box.com/s/qdd8rzrhgaozne0ag1nes9ikm0bj6ark>

(8) "A handbook formula for the inductance of a

(Continued on page 115)



The Fitness and Davg plots for this 40 m OCFD run

(RLC-Loaded Multiband OCFD Antennas from page 114)

single-layer circular coil", R. Lundin, 1985, Lund University, Sweden. Online at [https://lucris.lub.lu.se/ws/portalfiles/](https://lucris.lub.lu.se/ws/portalfiles/portal/4790394/625001.pdf)

[portal/4790394/625001.pdf](https://lucris.lub.lu.se/ws/portalfiles/portal/4790394/625001.pdf).

⁽⁹⁾ OCFD Files, online at: <https://app.box.com/s/rwrhkkmdpd1xaqzrlcnqqximgsekc4jh>

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