



The Radio Amateur Society of Australia  
March 2023

Out And About  
RASA Attends Amateur Radio Events

High Altitude Balloons:  
Amateur Radio Flying High

Investigation

- A New Tool to Fight Power Line QRM
- Solving QRM from an Air Conditioner

Construction

A Frying Pan, a circuit board, and listening in to QRM sources.

DX'pedition 3Y0J: Was it Worth It?

An Eclipse, A Space Museum and  
Amateurs With VI6CRO in April

**VK9CM DX'pedition- Cocos-Keeling Islands**

A personal account from the front-line



The Radio Amateur Society  
of Australia



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## Publication Information

Contact: [info@vkradioamateurs.org](mailto:info@vkradioamateurs.org)  
Website: <http://vkradioamateurs.org>

QTC is a publication of The Radio Amateur Society of Australia Inc.  
ABN: 64 687 227 446 (RASA)

QTC is published every quarter. If you would like to receive your copy you can either visit our web site to download or send us an email and we'll put you on our distribution list.

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## Contributing Items For QTC Magazine



QTC Magazine welcomes contributions for future editions. When planning to submit an article, please read our submission guidelines first.

Following the guidelines will save you and the editing team a lot of time and effort. The guidelines are [HERE](#)

## QTC from the Editorial Team

Welcome to the first edition of QTC for 2023. There's a good splattering of articles for your enjoyment and learning.

It's a joy to be part of an organisation whose goal is to improve the lot of Amateur Radio Operators in Australia, and to seek ways to make the hobby look attractive to newcomers.

We don't know what our retention rate is. A perfect retention rate would be 100%. That is, every person who joined the hobby doesn't leave it. But we know that can't be true because people move on, losing their interest, or competing demands win out.

We can't ignore the grim reaper. The average age of Amateurs is pretty old, so there's a whole raft of reasons why aging pulls people out of the hobby, with the ultimate being, of course, dying.

It's sad hear something like "grandpa died last week, and we found all of his amateur radio equipment in a cupboard." Further discussion reveals that Grandpa, on having to transition to aged care, was forced to surrender his hobby. Probably a hobby that he's pursued for decades, as evidenced by the box full of QSL cards that's also in the cupboard.

So keeping Grandpa in the hobby a bit longer may not have a huge impact on the number of Amateurs in the country, but we'd certainly have a lot of happy Grandpas.

At the other end of the demographic, there's a widely held misconception that getting school aged children into the hobby will stop up the gap in our numbers. Experience shows that this is simply not the case. Most kids, and it's safe to say nearly all of them, don't last long in the hobby. If their parents are not fully supportive, or simply don't know how to support them in the hobby, they fall away.

Kids mostly don't have their own money to buy equipment, nor do they have their own transport to join an Amateur Radio Club, and even if they could get there, they probably would be a poor fit. And, to be brutally honest, most amateur radio events are not attractive to youngsters.

By all means give children the Amateur Radio experience, but don't expect them to be the panacea for Amateur Radio numbers in general.

The notable exception is High Altitude Ballooning... and you can read more about that in this edition of QTC.

So where should we be recruiting our new Amateurs? Having just listed the reasons why kids don't stick around for long, we can use the same list to work out who we ought to be targeting.

Who in our wider community has money, mobility and can make their own independent decisions and can access supports in the community?

There are two broad groups - Young, single adults, and middle-aged adults whose kids are growing up, or have left the nest.

These people have everything in place to enable them to thrive in the hobby. Those are the people we should target. How to target them is a whole other story, but it's sufficient to say that we must present a hobby that supports and enhances what they are interested in.

That's where we must direct our energy.

A couple of years ago RASA worked with sector representatives to develop a strategic plan; sadly, it got very little traction from our partner national body, the WIA and no feedback from the country's two largest clubs, AR NSW and AR Vic.

You can read that document [HERE](#)

In 2023 we'll come back to this document and ask clubs to provide us with feedback.

73, QTC Editorial Team

[info@vkradioamateurs.org](mailto:info@vkradioamateurs.org)



## VK9CM – A Personal Account

*By Chris Chapman VK3QB*

Consider this a personal journal of my recent DX'pedition to Cocos-Keeling Islands. Whilst operating I grabbed screen shots from DX Clusters and the Reverse Beacon Network. I made notes about conditions, interesting contacts and propagation; and of course, the beautiful surroundings on the Islands.

This is a first-hand account of my experience as a CW operator. I hope you find it interesting.

Of course, any such venture would be impossible without the collaboration and friendship of my fellow team members: Zeljko VK6VY, Alan VK6CQ and Luke VK3HJ.



Luke VK3HJ and I departed Melbourne on 21<sup>st</sup> October 2022 with a few days stop-over in Perth... and to attend PerthTech... a technical symposium attended by about 70 local VK6 amateurs and maybe another six or so from the Eastern side of the continent.

Following PerthTech and a few days rest and relaxation with our host, Andrew VK6AS we packed our gear and prepared for departure.

As per schedule we departed Perth on 25<sup>th</sup> October for Cocos-Keeling via Christmas Island. About three hours into the six-hour flight the captain advised we'd be returning to Perth due to tropical storm activity to the North.

Christmas Island airport was experiencing rain and low fog and the fallback airport, Jakarta, in Indonesia was the subject of severe electrical storms.

Due to fuel limitations, we were unable to enter an extended holding pattern at Christmas Island.

The airline advised the flight would be rescheduled at its earliest opportunity. Somewhat tragically, this turned out to be Saturday morning, 29<sup>th</sup> October.

This meant an immediate loss of four days on the island.

Once we arrived on the main island, West Island (Saturday 29<sup>th</sup> October) we got to work unpacking the gear and setting up the stations and antennas.



This photo is taken from the veranda. You can see our main vertical antenna and how close we are to the ocean.

As is our tradition and where reliable internet connection permits, we usually make an announcement on Social Media once we're ready to commence operation. I was very pleased to hear Phil, VK3VB respond to my 20 metre CQ and be the first station in the VK9CM CW log. Phil is very familiar callsign and a regular chaser when we visit islands off the coast of Australia.

Phil operates from a regular suburban block (500 m<sup>2</sup>) and doesn't have the benefit of beam antennas or full-size dipoles. He operates with a 100W radio. Yet on our previous trip to Norfolk Island earlier in the year (VK9NT), Phil was able to work us on every HF band, as well as 160 metres; and all on CW.

### 31<sup>st</sup> October, 30 metres.

On the 31<sup>st</sup> October just before sunset I had a great run on 30m; this can be a wonderful band when conditions are right. In the space of 15 minutes, I worked from OH through to UA, JA, K5 and EA – an opening that almost spans the entire northern hemisphere... with some VK thrown in for good measure. The antenna was a vertical with 24 radials, sitting about 15 metres in from the Indian Ocean.

### A note on vertical and dipole antennas

Following about 14 DX'peditions, mostly to South Pacific (holiday style) islands and nations (Norfolk



Island, Lord Howe Island, Fiji, Vanuatu) and now Cocos-Keeling, we have arrived at the pragmatic conclusion that resonant, well positioned verticals with at least 16 radials provide *the best bang for buck*.

The same goes for dipoles. They are easy to transport, construct, tune and operate. The only exception is an 80 metre doublet fed with open wire line and a balanced ATU. This antenna performs extremely well and offers outstanding band agility.

These antennas don't require control cables, rotators, masts or other complex equipment; all of which add complexity, weight and expense to the operation. Settings up and maintaining them doesn't eat into valuable operating time either. And if something breaks it's usually easy to fix *in-situ* and won't incur a huge repair or replacement cost.

Keep It Simple Stupid (KISS) has become our motto.

## 2<sup>nd</sup> November, 17 metres JE1BJT special mention

I had a very weak opening on Wednesday morning on 17 metres (about 02:00 UTC) with some propagation into South America (SA)... but I knew JE1BJT, Akio-san had been patiently waiting and when I finished working three or four SA stations, I put out a generic CQ, and there he was.... we exchanged the usual pleasantries and finished with an extended series of friendly dits.... ☺ This is amateur radio and CW operation at its finest. Good quality Morse Code coupled with high operating standards.

There is *always* room for more than the garden variety DX'pedition "599 *tu*" exchange.

17 metres started to close about 0300 UTC... and just as I announced a QSY to 20 metres, up popped Olgierd (Oly) VK5XDX – weak but very clear. Oly and I were on Norfolk Island together some years ago and it's always a pleasure to hear another familiar callsign from home. VK5XDX in the log... now to QSY to 20 metres.

Some interesting calls followed:

5Z4PA Martin in Kenya and PJ4DX Steve in Bonaire whom I've not worked since he was in East Malaysia as 9M6DXX some years ago.

spotter	spotted	distance km	freq	mode	snr	speed	time
5BICW	VK5CM	4276 km	14026.0	CW	17 dB	25 wpm	1440z 03 Nov
5W1SA	VK5CM	9832 km	14026.0	CW	18 dB	24 wpm	1444z 03 Nov
VK0GEL	VK5CM	5988 km	14026.0	CW	14 dB	24 wpm	1444z 03 Nov
V01VJ	VK5CM	8448 km	14026.0	CW	12 dB	24 wpm	1444z 03 Nov
DFJCK	VK5CM	10561 km	14026.1	CW	47 dB	24 wpm	1444z 03 Nov
VK0GEL	VK5CM	5988 km	14026.0	CW	18 dB	24 wpm	1554z 03 Nov
5BICW	VK5CM	4276 km	14026.0	CW	20 dB	24 wpm	1554z 03 Nov
DFJCK	VK5CM	10561 km	14026.1	CW	23 dB	24 wpm	1554z 03 Nov
VU0PTT	VK5CM	3566 km	14026.0	CW	17 dB	23 wpm	1554z 03 Nov
OK1PCJ	VK5CM	10498 km	14026.0	CW	23 dB	24 wpm	1554z 03 Nov
DJ4BC	VK5CM	10672 km	14026.0	CW	21 dB	24 wpm	1554z 03 Nov
VK0GEL	VK5CM	5988 km	14027.0	CW	20 dB	24 wpm	1554z 03 Nov
5W1SA	VK5CM	9832 km	14027.0	CW	25 dB	24 wpm	1554z 03 Nov
DE1LON	VK5CM	11072 km	14027.0	CW	28 dB	25 wpm	1554z 03 Nov
5W1UN	VK5CM	10737 km	14027.0	CW	25 dB	19 wpm	1554z 03 Nov

Meals tend to slot themselves in when conditions permitted; a break in activity presented an opportunity for baked beans on toast and a strong cup of coffee.

The next three in a row.... all on 20 metres

CX6VM, VK6RZ and JE1FQV...

Spotter	Freq.	DX	Time	Info	Country
JA1DMX	28510	VK9CM	08:17 22 Feb 23	now qrt, will be agn this night	Cocos (Keeling) Islands
YC2DBW	28493	VK9CM	07:23 22 Feb 23	59	Cocos (Keeling) Islands
SP5HGY	24915	VK9CM	09:40 22 Nov 22	test	Cocos (Keeling) Islands
SP5HGY	28074	VK9CM	09:38 22 Nov 22	test	Cocos (Keeling) Islands
W4RQ	14024	VK9CM	02:38 22 Nov 22		Cocos (Keeling) Islands
LZ1LZ-@	28074	VK9CM	07:42 04 Nov 22	fake news	Cocos (Keeling) Islands
SWL-@	28074	VK9CM	07:40 04 Nov 22	DX for Europe , sorry USA :-)) :-))	Cocos (Keeling) Islands
LZ1LZ-@	28074	VK9CM	07:14 04 Nov 22	why not work ?	Cocos (Keeling) Islands
DL1RWN-@	28074	VK9CM	05:30 04 Nov 22	not work 10/12 m	Cocos (Keeling) Islands
TA1CM-@	28074	VK9CM	05:28 04 Nov 22	when 10 m ?	Cocos (Keeling) Islands
ID1OTS-@	14000	VK9CM	04:22 04 Nov 22	NEVER USA WORST DXPED EVER GOODBYE	Cocos (Keeling) Islands

About 04:00 UTC the band closed.

This seemed like an ideal time for a walk on the beach and a swim.



## Cocos-Keeling Islands – a tropical paradise

Cocos-Keeling Islands are your stereotypical tropical atoll. They lie 2,750 kms Northwest of Perth, Western Australia and 900 kms West of Christmas Island. They're closer to Jakarta in Indonesia than any state capital in Australia.

The Cocos-Keeling Islands are a group of narrow coral islands that encircle a large, shallow lagoon. Only two of the 27 islands are inhabited. There are only 14 square kilometres of land and they're just five metres above sea level at its highest point. As recorded in the 2021 census the Islands had a combined population of 593 people.

Back in front of the Elecraft KX3 and the first CQ on 18 MHz and the RBN reverts...

spotter	spot	distance km	freq	mode	sir	speed	time
10DAG	VK9CM	8721 km	18087.0	CW	38 dB	26 wpm	0902z 02 Nov
BH4DEG	VK9CM	5313 km	18087.1	CW	6 dB	26 wpm	0904z 02 Nov
JA4DNR	VK9CM	6464 km	18087.0	CW	13 dB	26 wpm	0904z 02 Nov
J1HFJ	VK9CM	6904 km	18087.0	CW	19 dB	25 wpm	0904z 02 Nov
VU2PTT	VK9CM	3506 km	18086.8	CW	13 dB	26 wpm	0904z 02 Nov
ZL2KS	VK9CM	8056 km	18086.9	CW	7 dB	26 wpm	0904z 02 Nov
BG4SOV	VK9CM	5470 km	18087.0	CW	15 dB	26 wpm	0904z 02 Nov
W1WIA	VK9CM	9532 km	18087.0	CW	21 dB	26 wpm	0904z 02 Nov
JA4JGW	VK9CM	6335 km	18087.0	CW	8 dB	26 wpm	0904z 02 Nov
JJ2VLY	VK9CM	6877 km	18087.1	CW	21 dB	26 wpm	0904z 02 Nov
DF2CK	VK9CM	10561 km	18087.0	CW	35 dB	26 wpm	0904z 02 Nov
BH4RNS	VK9CM	5444 km	18086.8	CW	6 dB	26 wpm	0904z 02 Nov
VK9ANC	VK9CM	2329 km	18087.0	CW	28 dB	25 wpm	0904z 02 Nov
JN1LK	VK9CM	6890 km	18087.0	CW	15 dB	26 wpm	0904z 02 Nov
18BCW	VK9CM	4276 km	18087.0	CW	26 dB	26 wpm	0904z 02 Nov

And there's another VK regular, Alan VK2GR in the log at 09:08 UTC on 17 metres – weaving his way in through the JA pileup! Alan's a good op with a nice steady fist and well-spaced Morse Code.

The run into JA continued until about 09:40 UTC, then a suggestion we move to 12 metres. Some initial promise but it didn't deliver. You can't be overly sensitive about feedback on the clusters and social media. In any case, the advent of Social Media demands we all develop thick skin.

SteppIR					
Spotter	Freq.	DX	Time	Info	Country
OH7KB	24897.0	VK9CM	10:00 02 Nov	UP	Cocos (Keeling) Islands
F4GWG	24897.0	VK9CM	09:59 02 Nov	stop tunes idiots	Cocos (Keeling) Islands
OK1MH	24898.0	VK9CM	09:55 02 Nov	big mess, said UP but work sim	Cocos (Keeling) Islands
DL7HC-@	24898.0	VK9CM	09:53 02 Nov	QRMer underway	Cocos (Keeling) Islands
SP3HLM-@	24897.0	VK9CM	09:53 02 Nov	EU UP-1	Cocos (Keeling) Islands
G4IRN	24897.0	VK9CM	09:51 02 Nov	up 1	Cocos (Keeling) Islands
IK2EAE	24898.0	VK9CM	09:47 02 Nov	up means SPLIT !!	Cocos (Keeling) Islands
SV7BAY	24898.0	VK9CM	09:43 02 Nov	MINI TNX GL 73	Cocos (Keeling) Islands

### Thursday local sun rise

Another familiar callsign, San K5YY at 2346 UTC. San is a good friend and was part of our team on Norfolk Island in 2013 (VK9NT). We first met on Lord Howe Island in 2009 (VK9LA). No matter where we travel, San nearly always manages to appear with a quick hello in the pileups.

It never ceases to amaze me how familiar callsigns seem to pop out of the confusing flurry of noise that unfamiliar ears will often ascribe to a DX'pedition pileup. But as any experienced operator will attest, hearing a familiar callsign

peeking above the pileup is almost like adding 3dB to the signal.

San and I exchange a quick pleasantry and then he finishes with a couple of friendly dits as I wade back into the oncoming wave of callsigns.

There followed a very good run into NA on 20 metres, with some SA for good measure. Conditions weren't great but I was able to maintain a reasonable QSO rate for a few hours. The conditions were challenging but not conducive to extended operating. We knew the path into NA was a difficult one, and we had our ears tuned to work that part of the world at every opportunity.

### Station interaction & interference:

Many readers will be only too aware of the challenges faced when two or more stations operate in close physical proximity. Inter-station interference is the Achilles heel of multi-station contesters and DX'pedition stations alike.

Generally, we manage by employing the following strategies:

- Station separation
- Antenna separation & polarisation
- Band Pass Filters
- Using only the minimum power required to maintain QSOs

And finally, a policy of consideration. As required, we reduce power, change bands, and even shut down a station if that is the best outcome for the team as a whole.

In this instance, RF from other stations was upsetting the band switching sensors in the SPE amplifiers. We noted it especially when the FT8 station was on 30 metres running 50 Watts about 15-20 metres away from the SSB and CW stations. It was shutting down the SPE amp on the 20/40 metre station. Yet there was no impact on the 12 metre station in the next room.

We tried all the usual tricks: ferrite rings, relocating coax runs and even moving antennas, but ultimately a combination of reduced power and better band selection enabled us to maintain operations with up to three stations on-air simultaneously.

**A note about FT8 and power**  
(a slight but important distraction from CW)

FT8 is a weak signal mode. It is not an arms race. If you enter a room and there are a lot of people talking and you decide you want to talk to the guest of honour, you generally have two options.

The first (and generally regarded as best practice) is to observe the mood of the room and audience and weave your way into a discussion. This approach takes a little more finesse, skill and consideration as well as patience.

The other (and sadly more common of late) is to barge in with all guns blazing. Yell your demands at the top of your voice. Of course, this approach will result in others being forced to act in a similar manner. Before you know it, the room is filled with angry, screaming people... none of whom are listening and fewer meaningful conversations ensue.

Welcome to modern day FT8 pileup operation. QSO rates drop and frustration builds. It can't be much fun at either end of the pileup.

If you work one of our DX'peditions with the second approach you won't ever make it to the log. You won't make it past our software filters. At the outset, we set our parameters to filter out anyone whose signal is greater than 0dB.

We operate with no more than 50W and whilst we might commence operation in Standard mode, we nearly always end up operating in Fox & Hound Mode.

## QRP

A little personal highlight – every trip I try to get a few QRP QSOs with my Elecraft K1 or KX3 and 5 Watts or less.

2022-11-03 11:19	JR4GPA	14019.00 CW	599	599	JA
------------------	--------	-------------	-----	-----	----

On this trip I had a contact with JR4GPA Sam-san in Okayama, a distance of 6,505 km, but not quite enough to qualify for the NAQCC 1,000 Miles per Watt award. I am always amazed at what can be achieved with QRP. It's a constant reminder that high power operation is not a prerequisite to getting high-satisfaction contacts in the log.

Before flicking the big switch on the amplifier, just stop and consider if 100W, 50W or even 10W might bag that new one. How much more satisfying would it be to spend an hour

navigating the pileup, reading the ebb and flow of the DX'pedition operator and finally bagging the QSO with just 5 or 10W?

Compare that to barging into battle with 1kW and blasting your way into the log.

After all, it's only 20dB... or about 3-4 S-points. More often than not, the DX'pedition station is likely enjoying very low noise levels and finely tuned ears; so give QRP a go. You can always wind the wick up if required.

## 3<sup>rd</sup> November, 20 metres.

Very early on the 3<sup>rd</sup> November I had a strong path (more like a funnel) into Italy for about 40 minutes on 20 metres. Maybe 70% of QSOs were with Italian stations. It's quite intriguing when propagation opens with such specificity.

Then the band closed... but a look at the RBN revealed – it opened behind me back into OC.

operator	operator	distance km	freq	mode	type	sig	speed	time	seen
HUFRUP	VKOCM	2911 km	14028.7	CW	QO	3.05	23 wpm	11484 03 Nov	now
BOICB	VKOCM	4866 km	14028.7	CW	QO	2.05	23 wpm	11484 03 Nov	84 seconds ago
WADOC	VKOCM	1778 km	14027.5	CW	QO	5.05	23 wpm	11479 03 Nov	2 minutes ago
WADOC	VKOCM	1778 km	14027.8	CW	QO	7.05	23 wpm	11479 03 Nov	9 minutes ago
VWAGC	VKOCM	2508 km	14027.8	CW	QO	5.05	23 wpm	11479 03 Nov	11 minutes ago
WADOC	VKOCM	1778 km	14027.5	CW	QO	10.05	23 wpm	11479 03 Nov	21 minutes ago
WADOC	VKOCM	1778 km	14027.5	CW	QO	2.05	23 wpm	11479 03 Nov	24 minutes ago
HUFRUP	VKOCM	2911 km	14027.5	CW	QO	1.05	24 wpm	11464 03 Nov	31 minutes ago
WADOC	VKOCM	1778 km	14027.8	CW	QO	5.05	24 wpm	11464 03 Nov	33 minutes ago
WADOC	VKOCM	1778 km	14027.8	CW	QO	3.05	22 wpm	11459 03 Nov	45 minutes ago

The Reverse Beacon Network once again demonstrates its value in charting signals and helping radio amateurs better understand and react to the vagaries of radio frequency propagation.



## The Ionosonde

HF propagation has always fascinated me. I was keen to visit the Ionosonde station located a short 5 kilometre bike ride from our QTH on Cocos (Keeling).

An ionosonde is a special radar for examining the ionosphere, that magical band of ionised particles encircling our home and enabling our HF signals to bounce around the planet with mystical qualities.



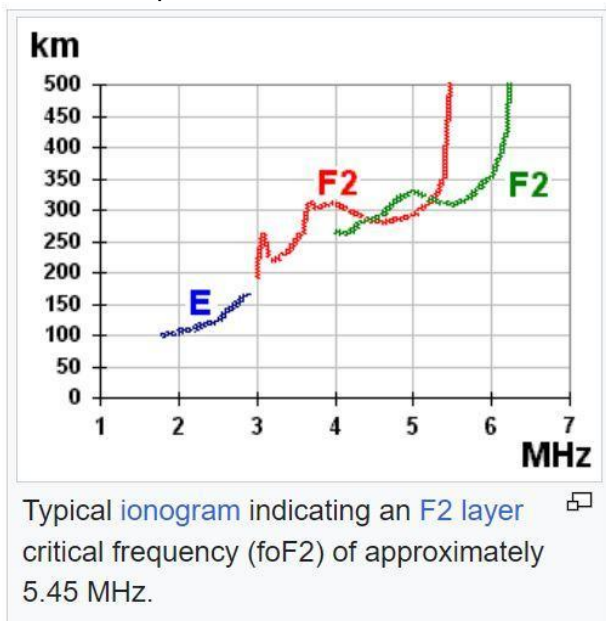
"An ionosonde consists of:

- A high-frequency (HF) radio transmitter, automatically tunable over a wide range. Typically the frequency coverage is 0.5–23 MHz or 1–40 MHz, though normally sweeps are confined to approximately 1.6–12 MHz.
- A tracking HF receiver which can automatically track the frequency of the transmitter.
- An antenna with a suitable radiation pattern, which transmits well vertically upwards and is efficient over the whole frequency range used.
- Digital control and data analysis circuits.

The transmitter sweeps all or part of the HF frequency range, transmitting short pulses. These pulses are reflected at various layers of the ionosphere, at heights of 100–400 km (60 to 250 miles), and their echoes are received by the receiver and analyzed by the control system. The result is displayed in the form of an ionogram, a graph of reflection height (actually time between transmission and reception of pulse) versus carrier frequency.

An ionosonde is used for finding the optimum operation frequencies for broadcasts or two-way communications in the high frequency range."

Source: Wikipedia



If you aren't familiar with ionosondes check out YouTube for some informative videos.



**And now the end is here....**

**(with apologies to the late Frank Sinatra) -**

And so I face that final curtain

My friend I'll make it clear...

It is always inevitable... that these DX'peditons will come to closure. Sadly, on this occasion, our time on-air was cut severely short by force majeure circumstances. Nonetheless, it was a wonderful experience and the pileups were rewarding. During every operating session, I learnt something new or built on an existing skill.

And more often than not, it's not about how to use the radio, tune a filter or copy a little faster... it's usually about developing patience, building listening skills, making notes and working to get the weaker signals into the log.

And to close VK9CM for 2022, I was chuffed that Phil VK3VB was also the last QSO in the CW Log; a bit like a book-end! (Don't tell him I said that please).

I haven't written much about my fellow DX'peditors or their contributions to the overall success of VK9CM, but it goes without saying that we operated as a team, rekindled old friendships and built new ones. We learnt lessons (as is always the case) which we'll apply to future expeditions.

I extend my thanks to Luke VK3HJ, Alan VK6CQ, Zeljko VK6VY and XYLs Dragana and Mui-Kim



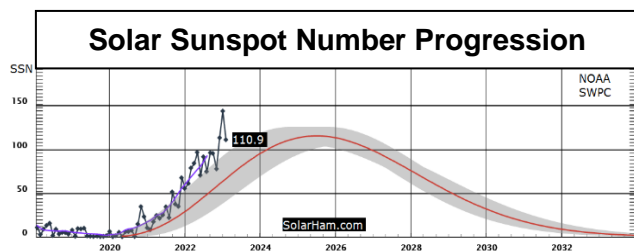
for their friendship, support and camaraderie on Cocos-Keeling Island in November, 2022.

And finally, I thank the thousands of radio amateurs from around our wonderful planet, without whom this DX'pedition would have been an epic failure.

73, Chris VK3QB (operating VK9CM)



[SolarHam by VE3EN](#)



### Australian Space Weather Forecasting Centre

The Australian Space Weather Forecasting Centre is your one-stop shop for space weather data and forecasts. SWS provides support for a wide range of systems and technologies affected by space weather. These include:

- HF radio systems, such as communications and surveillance systems
- Geophysical exploration, power systems protection and the cathodic protection of long distance pipelines
- Satellite and spacecraft operations

<https://www.sws.bom.gov.au/>

## HF Conditions and Cycle 25

Well, if you're an HF operator you will have noticed a marked improvement in conditions over recent times. Over the last month or so we've seen the Solar Flux Index (SFI) regularly exceed 200 and some very lively opening from 20-10 metres.

Anecdotal stories indicate 10m openings to Europe through the night with regular (almost daily) opening on 20m via long path to Europe. There have been reports of QRP SSB Long Path contacts between VK and G-land on 20m.

As Cycle 25 builds we'll see better openings more often. The likelihood of flicking the radio on and working some juicy DX will only improve. You won't need high-gain beam antennas on 15m towers, nor will you need amplifiers to get some great DX in the log.

Of course, the beam antenna will help in more ways than one...

If you're not sure where to start check out RASA's "Welcome to Amateur Radio – a Guidebook for newcomers" which has a section dedicated to HF DX operation.

<https://vkradioamateurs.org/welcome-to-ar-guidebook-for-newcomers/>

Or you can read this in true e-magazine format by visiting the QTC Bookshelf: <https://qtcmag.com/>

If you have any questions or need some pointers, ask at your local club or send us an email and we'll try to point you in the right direction.

[info@vkradioamateurs.org](mailto:info@vkradioamateurs.org)



Image Courtesy of Aaron Shaw, South Dakota.

## RASA Attends Another Four Events

*By the RASA Editorial Team*

October and November in 2022 were busy months for RASA. Apart from the preparation that has been put into the ACMA Class License submission, we also attended several events around the country. Here is a little bit about what has been going on.

### PerthTech 2022

On the weekend of 22<sup>nd</sup> and 23<sup>rd</sup> October 2022, this was an event of national significance, put together by the WA Amateur Radio News (NewsWest) team in Perth. Amateurs from Western Australia and further afield gathered at the Gidgannup sports complex, about 45 Kms North East of Perth, for a symposium of speakers talking about all things Amateur Radio.

For WA it is an occasion for locals to congregate and catch up on important amateur radio topics. RASA set up an information table, where visitors picked up free laminated band plan cards and stickers, and were able to have a chat. RASA donated two QRM Kill Kits to the impressive collection of door prizes drawn on the weekend.



Paul Anslow VK2APA, the RASA president flew in from NSW to speak at the conference. Ian Jackson VK3BUF, RASA Admin Secretary and Dianne Jackson VK3JDI drove directly from Victoria. Chris Chapman VK3QB, also from Victoria called in on his way to a DX'pedition on Cocos (Keeling) Island. Ian and Chris spoke jointly about the QRM Guru initiative and the challenges presented by Amateurs having to deal with increased noise levels. Chris also made a separate presentation on Morse Code, it's legacy and its contemporary attraction for the modern radio amateur.

Other speakers were Paul VK5PAS describing his involvement in the WWFF (World Wide Flora and Fauna) program where Amateurs around the world operate from national parks.



Another visitor was Scott Williams VK3KJ, the President of the WIA. Scott was keen to host a discussion on all things affecting amateur radio today. After comparing notes with Paul, the RASA president, it was evident that they shared many of the same concerns and decided to jointly host a forum on the subject. This was a productive, if not historic, discussion that was well received by the crowd. (see the last edition of QTC for more details)

Other presentations included contesting by Justin Ogle N9TTK, remote station operation by Rob Seaman VK6LD, Remote Digital operation by Nigel Hanwell VK6CPU, Home Brew tips by Donald Howarth VK6DJM, the BINAR satellite program by Daniel Busan VK6BUS, Arduino VFO for bush radio by Dan Dwyer-Sutton VK6NAD and antenna construction by Peter Miles VK6YSF.





Local attendees drove to the conference, and about twenty pitched swags, or parked caravans and campers on the football oval.



Sunday morning kicked off with a cooked breakfast next to the oval.

Many thanks to Bob VK6POP and his team for putting together this premier event for Australian Amateur Radio.

### **Radio & Electronics Association of Southern Tasmania 2022**

On the 5<sup>th</sup> and 6<sup>th</sup> of November 2022, only a fortnight after PerthTech, the Radio and Electronics Association of Southern Tasmania (REAST) hosted an amateur radio convention in Hobart. It was preceded by an evening barbecue at the REAST clubrooms at the Queens Domain in Hobart North.



The presentations at the University of Tasmania, Sandy Bay, were hosted by the REAST President Justin VK7TW and Hayden VK7HH.

There were ten 30-minute presentations spread over the day. Ian VK3BUF of the RASA committee, attended and spoke about the processes of dealing with RF interference and the website QRM Guru. This presentation was

recorded and can be viewed on the Ham Radio DX YouTube channel. (As this article goes to print, the presentation has been viewed nearly 20,000 times.)

<https://www.youtube.com/watch?v=s6ldphgRJas>



On the Sunday, an expo event was staged at the same venue with new and second hand goods for sale. Two QRM Guru ferrite filter kits were donated by RASA as door prizes. A QRM Club kit with tools and resources for fighting interference was also donated to REAST.



### **Southern Peninsula Amateur Radio Club RadioFest**

Two weeks later on Sunday the 20<sup>th</sup> of November 2022, the Southern Peninsula Amateur Radio Club (SPARC) held their RadioFest at Rosebud on Victoria's Mornington Peninsula. This was the first SPARC RadioFest since COVID-19.

There were about sixty tables and approximately two hundred visitors on the day. RASA had an information table attended by Ian VK3BUF and Chris VK3QB and they were kept busy with enquiries.



It was a well-organized event; A copybook production on how a successful hamfest should be orchestrated. Congratulations to SPARC are in order for such a professional and well-polished event.

An extensive array of door prizes were drawn in the afternoon. One of the door prizes was a WIA donation of a 2019 WIA callbook. This was won by Ian VK3BUF at the RASA table. The irony of this was not lost on the MC.



We were pleased and encouraged by the large number of attendees that came to the RASA table with words of support for the work that we have been doing for Amateur Radio. The message was clear: RASA are maintaining the right balance of news distribution, resources and quality representation to the ACMA.

### Ballarat Amateur Radio Group Hamvention

Kicking off 2023, RASA attended the Ballarat Amateur Radio Group's Hamvention on the 5<sup>th</sup> February.

The weather was kind and about 200 visitors attended the day. The club put on tea & coffee facilities as well as a barbeque.

Once again, we had a steady flow of visitors to the RASA table seeking information about the hobby as well as dealing with QRM. Ian had his Ultrasonic Receiver kit on display, which generated a lot of interest.

As with all such events, they'd not be possible without the commitment of local clubs and volunteers. RASA has visited close to 30 clubs and hamfests in the last four years and can attest to the value these "on the ground" efforts provided by local clubs.

All these events are important for RASA as they provide an opportunity to meet with a broad cross section of Amateurs and discuss topics of concern and listen to ideas. RASA is driven by our members. If your club is conducting a radio function and would like RASA representatives to attend, please reach out via email to [info@vkradioamateurs.org](mailto:info@vkradioamateurs.org)

We operate with volunteers and may not be able to reach every event, but we'll do our best.



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### RAOTC

For amateurs licenced 25 years or more





## PerthTech 2023

Following the very successful 2022 event, PerthTech is on again in 2023.

We've tentatively set aside the weekend 27-28-29th of October, at the same venue, in Giddegannup, 40 Kms Northeast of the Perth CBD, with a repeat of the caravan/camper option, which proved very popular in 2022.

That's about as much detail as we have, so stay tuned. We will post regular updates at the PerthTech pages of the [VK6.NET](https://vk6.net) website.

At this early stage, we're seeking ideas about which topics you'd like to see presented at PerthTech. You may like to volunteer to make a presentation. Visit the website to look out for the call for papers.

If you'd like to join the PerthTech team, we'll be calling for help later in the year.

## RASA HF DX Contest

RASA's first HF DX Contest was a success. We congratulate Alan VK6CQ who won with 439 points.

Alan put in a sustained effort over the course of the year and the committee thanks Alan and the other contestants who took the time to enter our contest.



We've already kicked off with the 2023 contest. You can read more about it by following [this link](#).

Mike, VK6MB, setting up his equipment at HamCampion, in 2022.

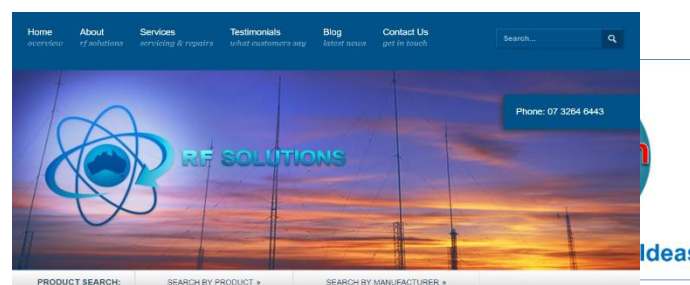


And in another new concept, we've decided to offer a prize to one lucky contestant. That's right... all you need to do is have a go (subject to a minimum score) and you'll go into the draw to win a RigExpert AA-35 Antenna Analyser. (Pictured Right)

We extend our thanks to Carsten at RF Solutions for his support of the DX contest. [Click Here To View](#)

So, dust off your station and fire up your 2x1 contest call and have a go.

Good luck in the contest.



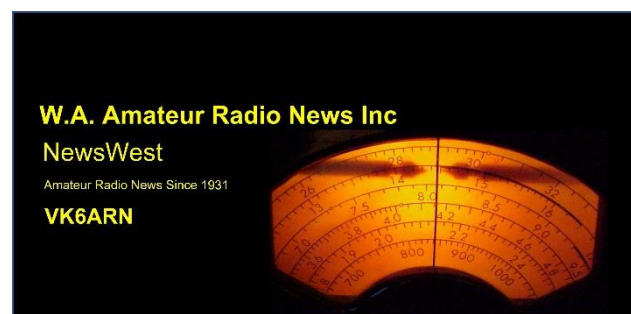
Your supplier of choice in excellent amateur radio products

RF SOLUTIONS is your authorised distributor of superior amateur radio products in Australia, New Zealand, and the Asia Pacific region – catering for both the casual operator and the serious DX-ing and contesting operator. We offer exceptional and personalised customer service combined with comprehensive technical knowledge.

## W.A. Amateur Radio News, Inc

WAARN is an Amateur Radio Club based in Western Australia. Their principal activities are the production of a weekly Amateur Radio programme, and staging of PerthTech, a premium Australian Amateur Radio symposium.

The Amateur Radio news programme is called NewsWest, and is heard on air, online and on demand. WAARN's website is [VK6.NET](https://vk6.net)



## 60 Metres? It Makes No Sense

*By The RASA Committee*

The 60 metre or 5 MHz amateur band was approved by the 2015 World Radio Conference. The band runs from **5.3515 MHz to 5.3665 MHz**.

60 metres has some unique propagation characteristics which make it attractive to the international amateur radio community. The allocation is not large, but it fulfills an important niche in the HF portion of our spectrum.

Over 215 countries have granted 60 metres to their Amateur Radio communities, including New Zealand.

Australia is the exception. Our regulator remains steadfast in their decision to deny access to this band.



RASA has been lobbying ACMA for access to 60 metres over the past three years. Thus far our requests have been denied.

The ACMA advises that this part of the spectrum must be reserved for 'Defence purposes', which may include the Jindalee Over the Horizon Radar System.

There are no defence allocations either in or near the 60 metre amateur band. This part of the radio spectrum is allocated to the fixed and mobile services in the Australian and International Spectrum Plans.

Let's look at the key reasons behind why amateur radio should be granted access to 60 metres:

There are already more than two thousand, two hundred Australian frequency assignments between 5 and 6 MHz. The band is used extensively by land mobile networks.

The busiest of these networks, by far, are the eight major networks catering to remote outback travellers in four-wheel drive vehicles.

Between them, these networks operate on ten 5 MHz frequencies through twenty-five base stations, spread all over Australia – there are base stations and mobiles operating in every State and Territory.

Collectively, these networks have thousands of users. They all operate regular daily scheduled broadcasts. The frequencies used are spread all over the 5 MHz land mobile band. All stations use 100W transmit power.

Contrast this with the proposed amateur allocation – operating in a 15 kHz sub band, on four fixed channels, using 8 dB less transmit power (15W). It is also proposed that the band only be available to Advanced licensees, thereby further restricting access.

The potential for interference to radar systems from such an allocation is negligible. Moreover, the restriction of the proposed amateur allocation to four channels in a narrow sub-band means that these can easily be notched out by the radar system if required – they would thus have no effect on its utility. To argue that amateurs would have an impact is simply not technically viable. This view has been endorsed by former Defence HF radio engineering specialists.

If 5 MHz operations did affect Australian defence systems, then they would already be completely compromised by the large amount of fixed and mobile services currently in use and (presumably) by Amateurs in New Zealand and other Pacific nations. If this were the case, then ACMA would have immediately prohibited any new commercial allocations in this part of the spectrum, because they threaten "National Security". This has not happened. Is amateur radio the subject of discrimination by the regulator, one wonders?

The ACMA and Defence position is not viable technically or operationally. Any reasonable person would draw the conclusion that the Department of Defence harbours an unreasonable dislike of Amateur Radio.

More recent correspondence with the ACMA implies that they are not making a regulatory assessment of the 5MHz spectrum themselves but are simply deferring the decision to the Department of Defence and accepting their position unchallenged.



It can be argued that ACMA's decision to deny Amateur access is not based on logic. It defies their own charter as an independent regulator of the Australian radio spectrum.



RASA will continue to pursue an Australian amateur allocation on 60 metres.

For the record...

We have recently seen what can only be described as grossly inaccurate and damaging misinformation being published by the WIA journal, *Amateur Radio Magazine*. In this instance the misinformation comes from the editor himself, Roger Harrison, who stated:

"Perhaps you are unaware that a competing National Association advocated against allocation of the 5 MHz band to amateurs in Australia..." (ref: Page 61 of AR Nov-Dec-2022)

Such remarks are poor form on many levels. They are not only clearly untrue, but are also divisive, uninformed, and intended to create unnecessary conflict in our community.

There remains a small but powerful group of people who control the WIA, and some of these people are unelected volunteers. We know the WIA President, Scott Williams was unaware of this article in AR Magazine and would have blocked its release had he been given the opportunity.

For some reason, the magazine's editor still can't bring himself to say RASA, nor understand that RASA is *not* a competing association, but a legitimate body that performs the work that the WIA eschews or does poorly.

**Let's be clear. RASA has NEVER advocated AGAINST a 5MHz allocation for amateurs.**

It is sad to see a long-standing journal like *Amateur Radio* drift so far from its charter of honesty and inclusion. Journalistic integrity requires that a retraction and apology be printed in the next edition of the magazine. A formal complaint has been lodged with the magazine's Editor and President of the WIA.



We respectfully await the outcome, although based on past form, we won't be holding our breath.

## Welcome to RASA Publications:

- Amateur Radio Guide Book
- VK Regulations Handbook
- Getting started with Repeaters
- Australian Band Plan Quick Reference Guide
- Interference Resolution (QRM) Process Guide
- Useful Web sites information sheet

If your club is running a course and would like to provide these resources to your students just send us an email. This is a free resource. We only ask that you cover postage costs.



Ask your Club President to email us at [info@vkradioamateurs.org](mailto:info@vkradioamateurs.org)

## Free DMR Australia

By Glenn Dunstan VK4DU

Free DMR is the newest of the DMR servers in Australia. It offers some very interesting features that the more traditional DMR servers do not.



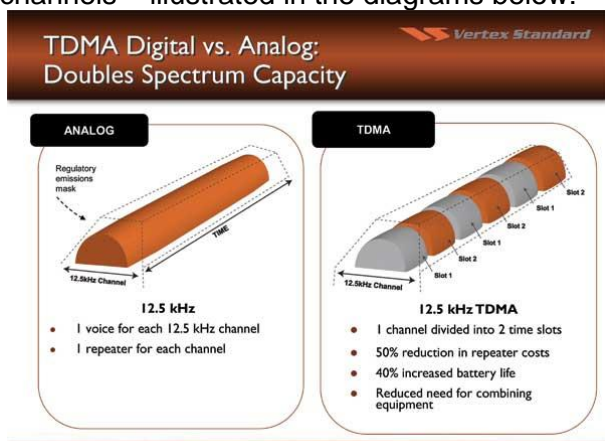
But first, a refresher in DMR.

Digital Mobile Radio (DMR) is a land-mobile radio network standard developed by the European Telecommunications Standards Institute (ETSI). DMR is used by thousands of professional land-mobile radio networks worldwide.

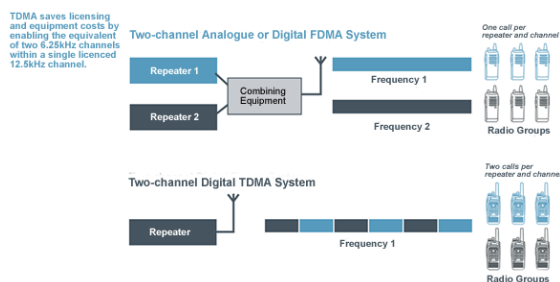
A wide variety of DMR mobile, base and portable equipment is available from numerous manufacturers.

DMR uses Time Division Multiple Access (TDMA) to provide two 30 ms “slots” per 12.5 kHz radio channel.

Each slot can carry independent voice conversations – this means that each DMR repeater provides two simultaneous voice channels – illustrated in the diagrams below:



Analogue vs. TDMA (courtesy Vertex Standard)



## DMR networks

One of the great advantages of DMR is that repeaters are designed to be linked together directly via IP. This allows interconnection of repeaters in the next suburb, or on the other side of the world...

A number of DMR system designers who were also amateurs realised the potential offered by DMR for wide area connection of amateur repeaters. They have formed world-wide networks of thousands of interconnected DMR repeaters across the world, including Australia and New Zealand.

There are more than 200,000 registered amateur DMR users and more than 9000 registered repeaters world-wide.

Broadly speaking, there are two types of networks used in DMR:

Master-Peer; and Peer to Peer

Motorola DMR repeaters can be connected directly together in a master-peer arrangement called *IP site connect*. This creates a small network – limited to 15 repeaters. The IPSC network bridge system used in amateur DMR master-peer networks was developed to overcome this limitation.

The IPSC master-peer system is used in many large DMR networks.

There are some downsides with this arrangement:

the talk groups (TGs) carried by the network repeaters and hotspots are set at the network master and are fixed – only an admin can change them.

the centralised nature of the network gives admins complete control over who uses “their” network – this has lead, in some networks with poor governance, to disputes and users being blocked indiscriminately, and:

the network often ends up with too many TGs – which can make it unwieldy and confusing for new users – radios can be very complex to program.



Peer-Peer networks have no master, per se. They have a number of advantages for the user.

Some, like [FreeDMR](#) [FreeDMR – Open Networking. Reaching out to the World.](#) offer self-selection of TGs for repeaters/hotspots. Select or change the TGs carried by your repeater/hotspot as you wish;

FreeDMR also offers dial a TG – you connect to any TG by dialling it from your radio's keypad. This can make radio programming really simple, as you don't need to program all the network TGs into your radio – only the main calling channel, and one other channel for dial a TG; and if one server has a fault, you can switch to another.

The other great advantage of Peer-to-Peer networks like FreeDMR is that you can access your home country "calling" TG from any FreeDMR network. For example, if you were in the UK, you could use TG505 (Australia) from any Free DMR repeater.

Master-peer networks normally do not offer this feature. You have to call on the "world-wide" channel, and hope your friends are listening....

Free DMR is a sensible middle ground between the "wild west" of some networks and the prescriptive control of others.  
FreeDMR in Australia

There are several FreeDMR servers in Australia - as the network is peer-peer, all the servers are interconnected.

The network is growing strongly - there are now 5 repeaters in VK4 and 3 and numerous hotspots connected.

The Australian FreeDMR Talk Groups are as follows:

- 505 National calling
- 5050 News, nets and ragchews
- 5052 Eastern States
- 5055 Central States
- 5056 Western States
- 50599 Dial a node
- 50510 FM repeater Link

A full list of world wide talk groups may be found at: [World Wide Talk Groups – FreeDMR](#)

Free DMR also has many bridges to other digital modes such as System Fusion and also to analogue repeaters via the Allstar network.

The "dashboard" is a web page that shows network activity – the main VK FreeDMR dashboard may be found at:

[FDMR Monitor - STATUS \(vkfreedmr.com\)](#)

Links and more information

[DMR information](#)

[FreeDMR Australia | Facebook](#)

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## Does your club run training courses or exams for newcomers?

If so, read on...

RASA has put together a free **Amateur Radio Welcome Pack**. These packs comprise a portfolio folder which includes a number of useful documents and reference sheets.

Give your students some practical and relevant material to take away at the end of the course.

Included in this **Welcome Pack** are some documents and information sheets to help your students get started. Click [HERE](#) for more information on the Welcome Pack.



Image sarcnet.org

## Build An Ultrasonic QRM Tracker

*By Ian Jackson VK3BUF*

At the FAMPARC club in September, PerthTech in October and at the SPARC Hamfest in November, I took along my home brew ultrasonic parabolic microphone and waved it about, demonstrating its potential for tracking down QRM sources on power lines. On each occasion it generated considerable interest. Many approached me and asked where they could obtain a copy of the design.

As a result, I decided to write a construction article. The first question this raises for readers is knowing where to obtain the parts, particularly a circuit board blank.

In conjunction with this article, RASA is making a short form kit available. This will include the circuit board and components. This simplifies construction, but kit builders still have to obtain their own reflector and mounting brackets. Proceeds from any kit sales will contribute to maintenance of the QRM Guru website, so it's for a good cause.

### Why Ultrasonics?

The audio spectrum is something we all take for granted. Most young people (prior to rock concert attendance) will hear up to 15-16 KHz with little difficulty. However, age takes its toll. A quick check with some headphones and a function generator tells me that at 61, my own hearing maxes out at about 11 KHz. (Thank you, Dire Straits!)

The limitations of my personal audio spectrum was brought home on a camping trip to Ada River in Eastern Victoria. There were plenty of bellbirds and other bird sounds coming from the trees. I set up my laptop with an audio program that used an acoustic waterfall display via the internal microphone. I could see the bellbirds pinging away on the display as chains of coloured dots. What surprised me was there were clusters of other bird calls on the screen in the 12 to 20KHz range, well beyond my hearing capability. The scale of this activity surprised me. Of course, bats use audio reflections at ultrasonic frequencies for navigation. Just like radio waves, it is easy to forget that there is a whole world of sound beyond our natural hearing capability.

### What this project does

This device uses an ultrasonic microphone to receive sounds high in the audio spectrum and then convert them to sounds in our human hearing range. The addition of a parabolic reflector makes the receiver highly directional. The circuit is simple. It uses the same principle that allows humans to listen to AM radio stations. First there is a pre-amplifier to boost what the microphone is hearing. This is mixed with an oscillator that is adjustable from 30 to 48 KHz. The difference between the oscillator and the received signal is then in the human hearing range. These sounds pass through a filter, then an audio amplifier, which is in turn driving a pair of headphones, or connected to an



external amplifier to drive a loudspeaker. Any ultrasonic sounds within microphone range can be heard as regular audio in the easy-to-monitor 1 to 5 KHz range.

### A brief summary of the design

It was unnecessary to design a circuit from scratch. The core design used here is based on a clever circuit published by James Hanson (QST, April 2006). Some changes have been made. The cheap low-impedance headphones available from supermarkets were a poor match to the LM386 audio amplifier, so a small impedance matching transformer was added to the output.

The original circuit used breadboard construction, which complicates the assembly process. For simplicity, a circuit board layout was created. This makes the receiver more compact and significantly reduces assembly time.

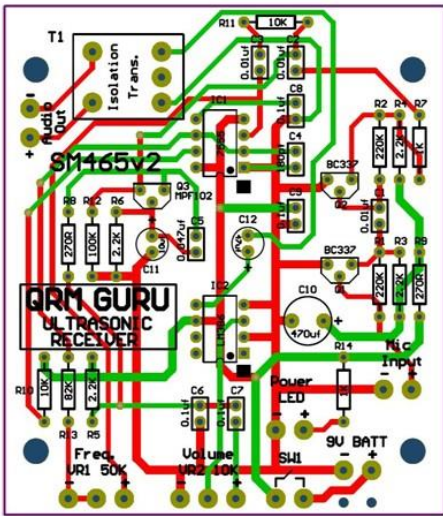
The board was sized to fit a standard rectangular Hammond enclosure. This provides sufficient space for a power switch, power indicator, volume, and frequency controls and a 9V battery.



The mechanical layout here differs from the original article, which used a genuine parabolic reflector dish. Here we simply used a glass frypan lid, which proved to be surprisingly tough and effective. We don't need to remove the original handle, instead we simply clamp to it. If the lid has a steam hole, it can be used for the shielded microphone cable.

Assembling the circuit board

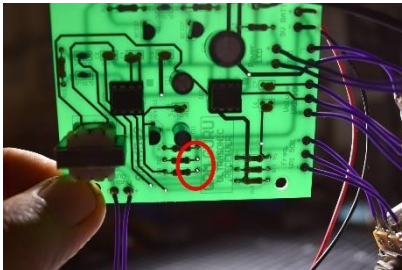
Construction is straightforward. Component values and designations are shown on the overlay. All holes are thru-hole plated, meaning that each hole has an electrical connection which joins the top layer to the bottom layer.



This also makes for a tougher board, as the components fully anchor to the holes. On single sided boards tracks can shear whenever heavier components are subjected to physical shock. It is advisable to use IC sockets for the two chips. The few cents that the sockets cost are insignificant compared to the inconvenience and stress to the board if having to replace a suspect IC at some point in the future.

The + and - battery clip pads have adjacent holes so that the battery clip wires can be fed through for strain relief. The three electrolytic caps have a '+' designation for the positive leg. This will correspond with the longest pigtail on each capacitor.

For mysterious reasons, the positive leg of electrolytic capacitors are always identified on PCBs but generally, on the capacitors themselves, only the negative leg is labelled.



Once all the components are attached and soldered, try holding the completed board up to the light. If you see any light shining through the component holes (example circled) then a solder connection has been missed.

Take care to not confuse the MPF102 transistor with the two BC337 transistors. They look quite similar, but do different things. Prepare ten short sections of wire, about 60mm long and strip a little off each end. These will be used to extend the pads at the bottom of the board to the potentiometers, the power LED and the On/Off switch.

The MPF102 FET is a very old device and may be difficult to obtain. A reasonable substitute for the MPF102 is the 2N5458.

At the two mic input pads, the braid of the shielded audio wire should connect to the '-' pad. The rest of the board assembly is routine. If there is any doubt about resistor colour code values, check them with a multimeter before soldering them into place.

Component parts list

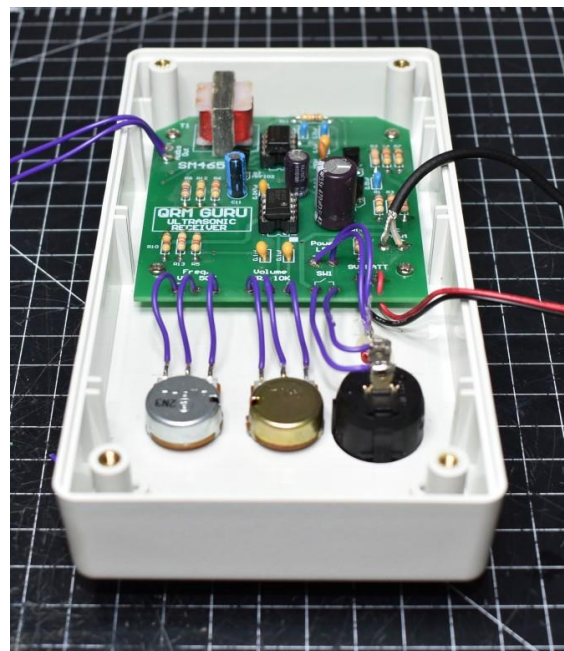
Desig	Component	Description
PCB	SM465v2	Ultrasonic Receiver PCB, double sided, through hole plated
R1	220K	Resistor, carbon 1/4W 5%
R2	220K	Resistor, carbon 1/4W 5%
R3	2.2K	Resistor, carbon 1/4W 5%
R4	2.2K	Resistor, carbon 1/4W 5%
R5	2.2K	Resistor, carbon 1/4W 5%
R6	2.2K	Resistor, carbon 1/4W 5%

R7	1K	Resistor, carbon 1/4W 5%
R8	270R	Resistor, carbon 1/4W 5%
R9	270R	Resistor, carbon 1/4W 5%
R10	10K	Resistor, carbon 1/4W 5%
R11	10K	Resistor, carbon 1/4W 5%
R12	100K	Resistor, carbon 1/4W 5%
R13	82K	Resistor, carbon 1/4W 5%
R14	1K	Resistor, carbon 1/4W 5%
C1	0.01uf	Capacitor, 10nf 50V mono
C2	0.01uf	Capacitor, 10nf 50V mono
C3	0.01uf	Capacitor, 10nf 50V mono
C4	180pf	Capacitor, ceramic
C5	0.047uf	Capacitor, 47nf 50V mono
C6	0.1uf	Capacitor, 100nf 50V mono
C7	0.1uf	Capacitor, 100nf 50V mono
C8	0.1uf	Capacitor, 100nf 50V mono
C9	0.1uf	Capacitor, 100nf 50V mono
C10	470uf	Capacitor, 470uf 25V RB Electrolytic
C11	10uf	Capacitor, 10uf 25V RB Electrolytic
C12	470f	Capacitor, 47uf 25V RB Electrolytic
Q1	BC337	Transistor, NPN, general purpose
Q2	BC337	Transistor, NPN, general purpose
Q3	MPF102 (2N5458)	Transistor, N channel J-FET
IC1	7555	IC, CMOS oscillator/timer chip, DIP 8
IC1skt	DIP8	IC socket, general purpose
IC2	LM386	IC, Audio Amplifier, DIP 8
IC1skt	DIP8	IC socket, general purpose
L1	Power LED	Led, 3mm

T1		1K to 8 ohm audio transformer. (Altronics M0216)
VR1	50K POT	Potentiometer, 50K linear, 16mm
VR1knob		Freq adjust knob
VR2	10K POT	Potentiometer, 10K linear, 16mm
VR1knob		Freq adjust knob
SW1		Switch, rocker, round chassis mount (Altronics S3188)
Case		Enclosure, Hammond (1599EGY) from Switches Plus.
MIC		Ultrasonic Transducer (RS components 237- 0799 )
Clip		9V battery clip
Screw		4 x pcb mount screws
Solder		Section of 0.71mm resin cored solder
Cable		Shielded audio cable, 400mm
Label		Enclosure label, self adhesive

### Preparing the enclosure

Once the board is complete it can be mounted inside the enclosure. If the 1599EGY Hammond box is used, the board should fit directly to the four corresponding plastic posts with four small self-tapper screws.





Holes must be drilled in the enclosure for the two potentiometers, the power switch and a 3mm hole for the red power LED. If you have one, the modern stepped drill bits are great for this. They are gentler on the plastic than conventional drill bits and de-swarf as they go.

A hole should be placed in the side of the enclosure to accommodate the 3.5mm stereo socket for the earphones. This socket can then be wired back to the two speaker pads via two wires approximately 120 mm long. As it is a stereo socket, the '+' speaker connection should go to both the Left and Right channel terminals of the stereo socket. Then you'll hear received audio in both earmuffs. A little bit of self-adhesive foam inside the case is good to help contain the 9V battery and stop it from rattling around.

### Receiver handle



The finished unit must be held in one hand. Accordingly, a handle of some kind should be attached to the base of the receiver enclosure. In the prototype, a basic handle was made from a long doorstop stem but being round it tended to spin in the hand. A better option is a camera pistol grip like the example shown here. Camera grips come with a standard 1/4" thread at the top. Cheap grips on eBay start at around \$15. This is a more comfortable alternative and also makes the unit look more professional. If you're into 3D printing, here's a design for a Camera Pistol Grip: <https://www.thingiverse.com/thing:1966894>

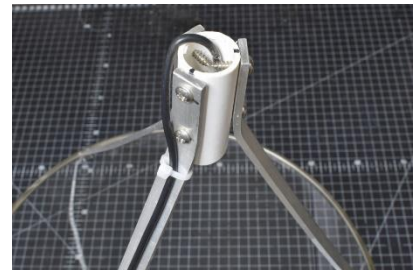
### Preparing the reflector dish

True parabolic reflectors are a little hard to come by. Fortunately, the lids on frying pans and casserole dishes are readily available and work surprisingly well. Either visit the supermarket and buy a whole new frying pan and make a 'gift' of the unwanted metal base to the kitchen, or set your alarm for 3 am, visit your own kitchen and steal one from there. (Such an appropriation is ok because it's needed for scientific purposes.)

The lid can be metal or glass, provided it has a regular curve, about 300mm across. I tend to favour the glass lid. The harder, thicker surface will pick up fewer sounds from behind the

reflector. In addition the operator can look through the glass when sighting targets. Some lids will have just a single central knob. With some fiddling, this will be ok. A lid with a full handle riveted at two points will be stronger. It can be attached to the receiver box via some angled metal clamps, with long screws to hold the handle tight.

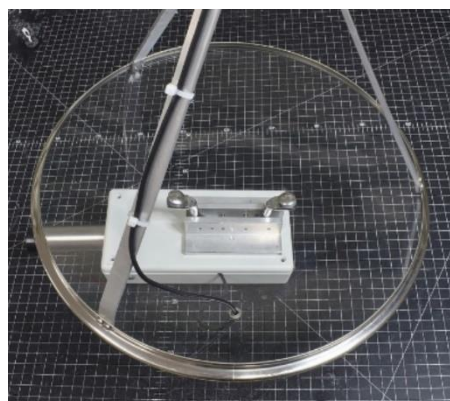
Such glass lids usually have a stainless steel metal edge, which makes an excellent base for attaching the three microphone support legs. 3mm holes can be drilled through the lip to take M3 screws.



It is important to find where the acoustic focal point is for your reflector. This can be achieved with a strong light source and a sheet of paper. Shine a light into the dish and look at the reflections on the sheet of paper. Raise and lower the paper until the reflection creates the smallest spot, and then measure the distance from the paper to the centre of the dish lid. Then you have your focal point. On my unit this distance was 245mm from the sensor face to the reflector. The sensor was supported by three aluminium flat sections obtained from a hardware store.

The original 2006 article showed a parabolic reflector and a microphone supported at only two points. This was a fragile arrangement, prone to knocking the microphone out of alignment or breaking it off entirely.

A much tougher arrangement is to support the microphone transducer in a small section of PVC pipe. The lid will probably have a steam hole with a metal grommet.



Position one of the three supporting arms near this hole. The shielded audio cable can then run

down the arm and through the steam hole as a short-cut to the receiver enclosure.



With my prototype, the arms were flat aluminium, 3mm x 12mm, 305mm in length, meeting at a section of PVC 55mm long, with an internal diameter of 17mm, held in place with self-tapper screws.

I must emphasise that all screws be tight, as any mechanical movement or flexing in the components will appear as unwanted noise and crackles. If the transducer is a loose fit in the tube, build up its diameter with some electrical tape.

To complete the assembly a large rubber stop was placed over the receiver end.

### The circuit diagram

The schematic diagram here matches the circuit board artwork in this article. There is no alignment process required.

The ultrasonic transducer is amplified by two transistors (Q1 and Q2). The 555 Timer Chip is set up as a local oscillator mixing the amplified

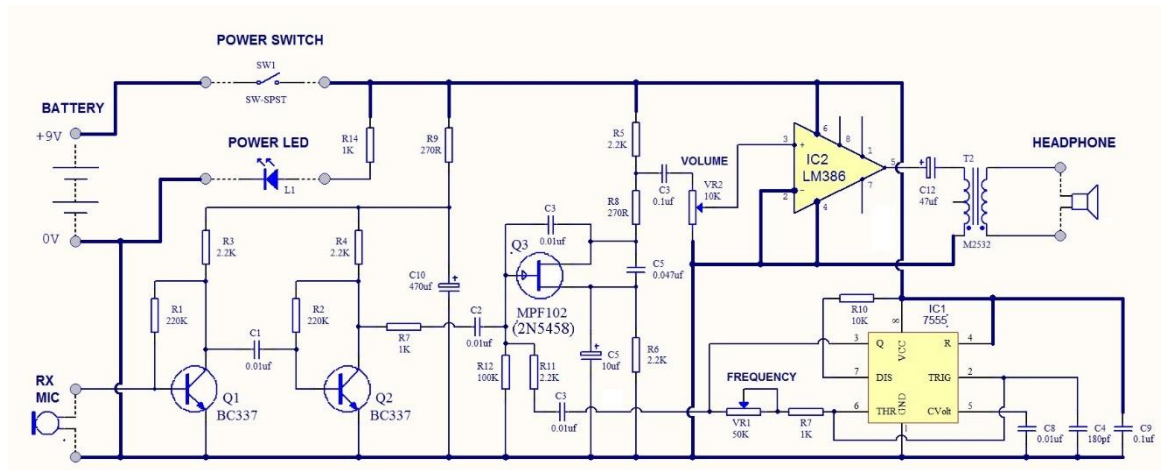
receive signal in Q3. The frequency of this local oscillator is adjustable, giving the listener the ability to convert signals between 30 KHz and 48 KHz. The difference between the incoming signal and the local oscillator signal is within human hearing. This is filtered and amplified by the LM386 Amplifier Chip. The output transformer provides improved impedance matching compatibility with basic supermarket stereo headphones. This audio can also be fed into an external audio amplifier.

### Using the unit

Operation is simple and intuitive. The output is quiet until ultrasonic sounds are received. It is highly directional. Directionality is essential when looking for corona discharge sounds radiating from a noisy power pole cross arm. This should sound a little like frying bacon. Go for a walk and listen for sounds above human hearing to get a feel for the unit. Running water, leaking compressed air from a tyre or balloon, even rubbing fingers together will generate test sounds in the ultrasonic range.

I was asked to try the receiver at a home where a Possum Scarer had been installed. The owner wanted to know if his unit worked. I found that it generated extremely loud ultrasonic tones that shifted in frequency every few seconds. It was still loud fifty metres away. I'm sure the possums (and other creatures) would not enjoy the raucous sounds that we could now hear.

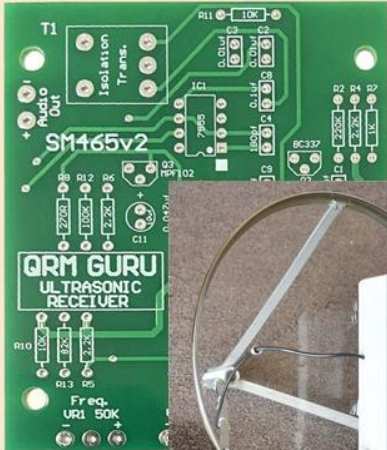

As a construction project, it is a fun and educational build. While it may not be for everyone, it remains as an excellent tool for tracking, reporting and (hopefully) elimination of power line noise bursts that can make life hell for any Amateur operating on HF.





# QRM.guru

## Resolving interference for Amateur Radio

### Ultrasonic Receiver Short Form Kit

For those interested in constructing an ultrasonic receiver project, (like the design featured in the March 2023 QTC magazine) we have blank pcb's and short form kits available.

Blank pcb only	\$10
Short form kit *	\$125
Postage (Australia only)	\$10

\* The short form kit includes the pcb, the ultrasonic transducer all pcb components, pots, knobs, switch & Hammond plastic case.

All proceeds from these kit sales go towards maintaining the QRM Guru website

To order: follow this link:  
<https://qrm.guru/category/qrm-kill-kits/>

## “Transmitter or Receiver is Covered With Some Feculences”

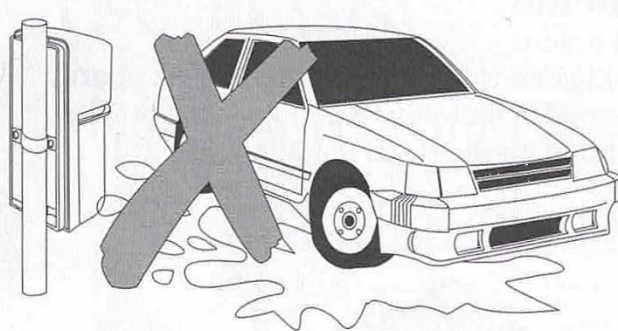
At some point we all have to open a box and extract an item that comes with instructions. As ‘real men’ don’t need instruction booklets, it sometimes doesn’t matter if they are not very good.

Where the goods have been manufactured in Asia, there are moments when the instructions are less than clear. On the recent purchase of some infrared beams designed to cross a driveway, the installer advice was a bit ...well the kindest word is ‘vague.’ (see picture below)

Putting aside the sage words of advice in the guide, the next step was to power it up and see what happens. Unfortunately, nothing

happened. It was dead. So onwards to the ‘Troubleshooting’ section.

The best advice here was: ‘The Transmitter or receiver may be covered with some feculences.’ Yet no feculences were in sight.



Installation should avoid place where there is liquor with causticity or where permeation is possible.

After stripping down the module and tracing the wiring it became apparent that the factory had placed the sticker identifying the screw terminals upside down. With the sticker and wiring reversed, the unit worked quite well.

If you, the reader have encountered any good examples of linguistically challenged user guides, please send them into QTC, so that we may share your frustrations.

## ACMA Update – Amateur Radio

By RASA Committee

On January 31st this year the ACMA released a **6 month progress report**, which can be found [Here](#). A small part of that report relates to Amateur Radio.

This portion is reproduced below:

### **Amateur radio**

*An amateur radio representative body expressed its concerns that the transition to class-licensing arrangements for the amateur service would lead to a reduction in protection from interference, and a reduction of future privileges, updates and support to the service. The submitter recommended that a service level agreement be established under the class licence that would define the responsibilities and expectations of all parties. The submitter was also of the view that the amateur service would benefit from an independent committee made up of amateur community representatives, and that operated on a consensus-based model akin to a self- or co-regulatory arrangement. Additionally, it requested that standard amateur operators be allowed to access the 50–52 MHz band. Submitters supported further investigations into higher power limits for foundation and standard operators, in addition to advanced amateur operators.*

### **Our response**

*We consulted on non-assigned amateur licensing arrangements, including a draft class licence, in Q1 2021. In our response to submissions to that consultation, we addressed concerns raised about interference protection and the perceived dilution of amateur operator privileges under a class licence. Specifically, we explained that the level of interference protection for non-assigned amateur stations will remain the same under a class licence, and regulatory conditions that apply to amateur operations, including operating privileges afforded to operators at each level of qualification, will not be changed.*

*We expect to consult in Q3 2022 on the specific implementation issues for amateur*

*class licensing. We continue to consider the best ways to engage with the amateur community through various channels. It is our view that amateur class-licencing arrangements, which will encompass the class licence and any operational procedures are adequate for the regulation of the amateur service. We do not consider it is necessary or possible to establish a service-level agreement for the service.*

*It is open to members of the amateur community, including amateur representative bodies, to form one or more amateur radio committees, and to do so without the involvement or endorsement of the ACMA.*

This is just a glimpse of what is to come later this year. It is somewhat difficult to interpret, but it is still important and we will try to unpack some of that information here.

First there is the paragraph:

*An amateur radio representative body expressed its concerns that the transition to class-licensing arrangements for the amateur service would lead to a reduction in protection from interference, and a reduction of future privileges, updates and support to the service. The submitter recommended that a service level agreement be established under the class licence that would define the responsibilities and expectations of all parties. The submitter was also of the view that the amateur service would benefit from an independent committee made up of amateur community representatives, and that operated on a consensus-based model akin to a self- or co-regulatory arrangement.*

They do not name names here, but reference ‘An amateur radio representative body’. This would be from a short list of either the WIA or RASA. As RASA did not advocate for a ‘**service level agreement**’ it would be fair to assume that this describes part of the WIA submission, which was over 130 pages in length.

Part of that submission voiced concerns over how the ACMA would respond to interference issues.

The ACMA had previously made it clear, almost two years ago now, that a transition to a class license would not further diminish their responses



to dealing with interference less than they presently do. Although, given that their internal resourcing for this work is now at its lowest point in time, that level of service is not going to be high. At least *in principle*, amateurs would be no worse off under a class licence in regard to interference management.

RASA has previously reported that this was already understood to be the case.

The ACMA responded by saying:

*We consulted on non-assigned amateur licensing arrangements, including a draft class licence, in Q1 2021. In our response to submissions to that consultation, we addressed concerns raised about interference protection and the perceived dilution of amateur operator privileges under a class licence. Specifically, we explained that the level of interference protection for non-assigned amateur stations will remain the same under a class licence, and regulatory conditions that apply to amateur operations, including operating privileges afforded to operators at each level of qualification, will not be changed.*

This was a wordy way of saying, 'We have already answered that question, we shouldn't have to answer it again'

On the subject of entering into a service level agreement with the WIA or amateurs at large, they responded with:

*It is our view that amateur class-licencing arrangements, which will encompass the class licence and any operational procedures, are adequate for the regulation of the amateur service. We do not consider it is necessary or possible to establish a service-level agreement for the service.*

And further to that:

*It is open to members of the amateur community, including amateur representative bodies, to form one or more amateur radio committees, and to do so without the involvement or endorsement of the ACMA.*

From this we can read that the ACMA intends to establish broad boundaries of spectrum allocation, transmission modes, and power levels

for amateurs, but beyond that has little interest in further involvement with the sector. It is likely that any attempts to self-regulate – or not - will have no bearing on ACMA policy.

Information disseminated from the ACMA in small portions over the past two years had already alluded that this would be their position, so the response here is not surprising.

It also highlights that most of the large submission sent from the WIA late last year was heavily predicated upon the willingness of the ACMA to increase their regulatory participation in amateur radio. Patently, none of this is likely to happen, rendering much of that submission redundant. Many who saw that submission as a blueprint for the future will be disappointed.

The RASA submission was succinct, recognising that a direct approach of only answering questions posed by the ACMA was most appropriate.

RASA is interested in how the ACMA will respond to situations that are likely to arise around Amateur Radio in the future and will be asking the ACMA a series of questions on these topics. We will report back to members with any further information that results from these inquiries.



Looking to get your licence or upgrade? If

you are in Perth, contact Ham College for excellence in face-to-face training.

Click the above image for more info.

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**National Online and Remote Training**  
from the Radio & Electronics School.



Educating Amateurs  
Since 1997. Click the  
image to go to their  
website

## News from RASA

### A New Year - A New Perspective

*By RASA Committee*

RASA is often accused of being anti Wireless Institute of Australia (WIA), and some even say that it's our goal to destroy the Institute.

That's not only untrue, it's an attempt by a few people to discredit RASA. If you took the trouble to research recent history, you'd be quite surprised at the lengths some people go to discredit, sabotage or even threaten RASA and its officials.

Sometimes these efforts have extended even further, and attack positive activities that may be seen as having a loose affiliation with RASA, such as Antennapalooza, PerthTech and the VK9NT DX'pedition Bootcamp.

Now make a list of examples where RASA people have attacked or discredited the WIA in the same nasty, vindictive manner.... crickets.

Now, why do we raise these issues from time to time. We do it simply because our hobby is too small for this bickering and sniping to be of any positive value. RASA gets to hear a fair bit from clubs and individuals. We've attended close to 40 Hamfests and clubs since 2019, and these are the common themes we hear:

Nearly everyone wants the WIA to succeed. Most people are concerned with the direction the WIA has taken in recent years:

- ✓ It has become inward looking
- ✓ Doesn't attend hamfests or clubs
- ✓ Pretends there is nothing wrong
- ✓ Refuses to engage and cooperate with RASA
- ✓ Continues to operate in the 20th century - whilst society and the hobby has moved on
- ✓ WIA membership is dropping, and this worries people
- ✓ WIA finances continue to suffer and this worries people

There are barely enough volunteers to help run clubs, let alone the WIA and RASA. Since 2018, RASA has proven itself to be dynamic, agile and successful; set against the backdrop of a 110-year-old Institute with a strong legacy and

countless members wanting to help make it a success.

Together the synergies would benefit all of us.

Now, we're not going to list more examples of spiteful nasty behaviour by WIA supporters. We know people don't like reading that stuff anymore than we like writing it. It reflects poorly on the WIA and its leaders and key volunteers, and only further promotes a culture of toxicity and division at the grass-roots level of our hobby.

History has demonstrated that the WIA's failure to put history behind itself has only had a negative impact on the Institute.

Surely it's time for the WIA leadership team to get behind their President and look to the future, engage positively with members, RASA, the clubs and the new and innovative elements of the hobby.

And if key volunteers and Directors won't do this, then it's up to you, the members, to demand change. This isn't about politics. It's about promoting and supporting positive and healthy behaviour in our hobby.

If you see or hear bad behaviour, call it out. That's not politics. That's being a part of the solution to make our hobby stronger and more inclusive both now and into the future.

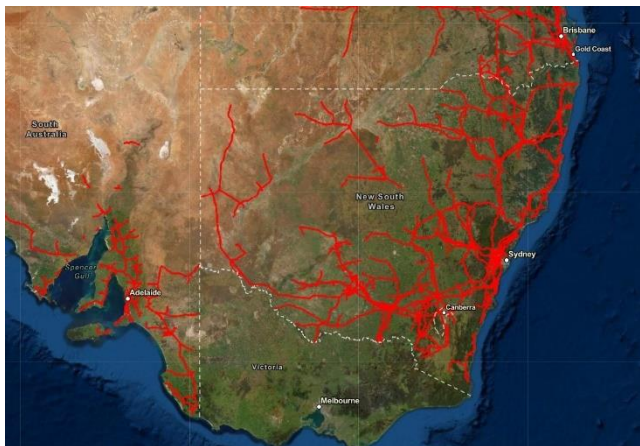
Why not write to the WIA and ask that they attend your local club. They have Directors in VK3, VK2, VK4 and VK8. They have money for travel. Help the WIA get out in front of your club and maybe you can help drive the change that is needed.





## New Tool To Fight Power Line QRM

A program being rolled out across the Eastern states of Australia has been launched as a website and safety App to let people know where power lines are and how far we should stay away from them (excluding Victoria at this stage).



Working near power lines for equipment transport, tree trimming and elevated work platforms is dangerous.

Working with antennas near power lines also has high elements of risk.

Each year there are preventable deaths result from contact with high voltage infrastructure.

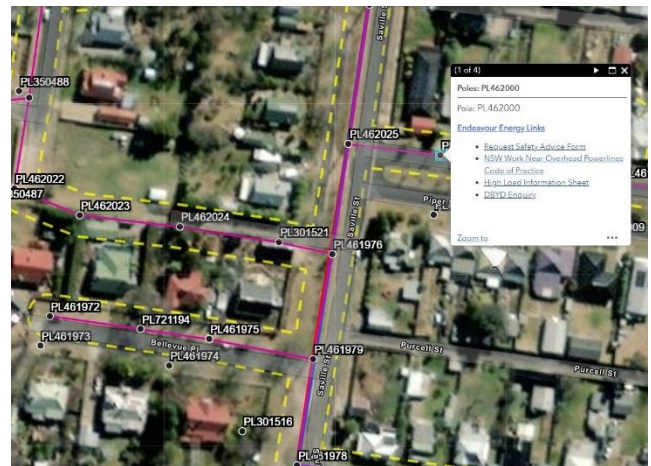
The Look Up and Live program aims to make people more aware of this danger.

The best way to access this site is to first view the brief You Tube clip [HERE](#).

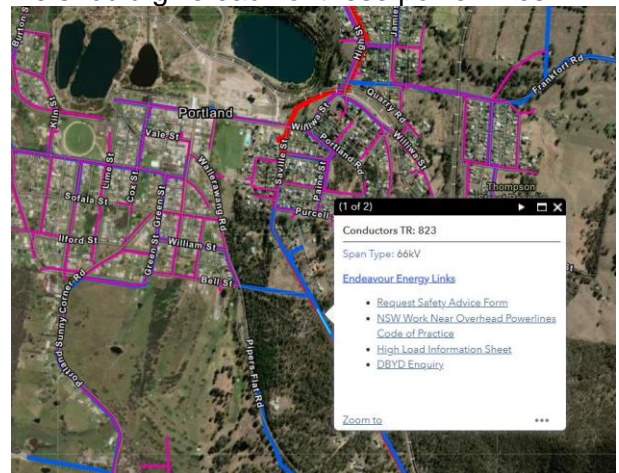
As the viewer zooms in, high voltage feeder lines are visible, showing where they wind their way through city and rural areas. Click on any power line and a box will tell you the voltage of the line and who owns it.



Amateur Radio Exams and Callsign Admin.  
For more information, visit the [AMC Website](#) and follow the links.



When the viewer zooms into the local street level, it gets interesting. We can see the lower voltage lines feeding homes and the physical clearance we should give each of these power lines.



Again, we can click on power line infrastructure to see who owns it. Additionally, all of the power poles are marked with their location and unique identifier.

Amateurs suffering from what they believe is power line interference can use these maps as an aid to follow a noise source. With appropriate receiver equipment identify the exact node where the noise is coming from and record its identification code. It is extremely useful to identify the actual owner of a given set of wires so that operators don't accidentally complain to the wrong power company.

The process for tracking down interference is described in detail at the [QRM.guru](#) website

When the source has been identified, screen captures from these maps can be passed on to the appropriate power company allowing a complaint to add substance and correctly demonstrate the full scope of the interference. It

will be great when all states and territories are a part of this program,

Note that it is common for some power companies to brush off interference complaints, or just refer the complaint to the ACMA. However the ACMA does not normally engage power line interference issues and will refer the complainant back to the power companies. It is important to note that there is an actual legislative mandate that requires power companies to respond to significant interference complaints. Some of the staff you encounter won't be aware of this requirement and fob off complaints, but some action is actually enforceable.

This information is another useful tool in the ongoing fight against QRM for radio operators.

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## Space Age Amateur Radio

In April this year, thousands of people will flock to Western Australia's Gascoyne Region for the Solar Eclipse on April 20.

As expected, Exmouth is booked out completely, and Carnarvon has planned a week of festivities around the event. Carnarvon is about 900 Kms North of Perth, and about 365 KMs South of Exmouth, as the crow flies.



Among the many events planned in Carnarvon, the Carnarvon Space and Technology Museum is open to visitors and will be running a daily "Night At The Museum" event. Click [HERE](#) to view.

## VI6CRO

Amateur Radio will be on show at the museum during that week, with a display and live demonstration of Amateur Radio equipment of the period, and more modern Satellite tracking. The special callsign VI6CRO reflects the original NASA Carnarvon callsign, CRO.

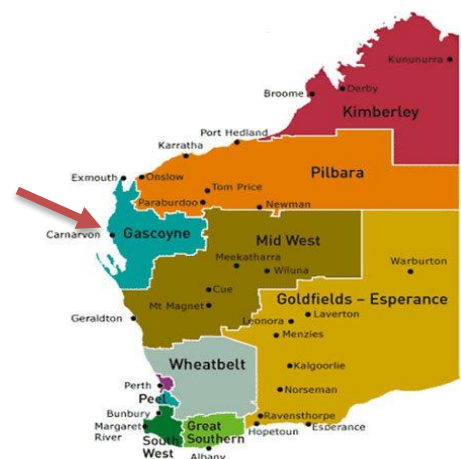
Dan VK6NAD is organizing the Amateur Radio booth, which will be inside the museum, and is being kitted out with new promotional material. He will be assisted by Cass VK6FMUM, and others are expected to volunteer.

Phil VK6YOB is the museum manager and has assisted Dan in the planning process. Dan has received help and support from Steve VK6SJ and Mick VK6TU.

With a live Amateur Radio station on display, Dan is expecting to have plenty of contact with Amateurs on air, so the visitors can see and experience Amateur Radio in action. Dan's space age radio station, pictured below, is a feature of the display.



Those manning the booth will be fielding lots of questions and will have on hand leaflets that will help interested people link into Amateur Radio on their return home.



The VI6CRO Webpage is [HERE](#)

**VI6CRO and the Amateur Radio Display in Carnarvon are led by Dan VK6NAD and proudly sponsored by WA Amateur Radio News.**



## QRM Case Study – Air Conditioner QRM

By Klaus Illhardt VK3IU

Klaus Illhart VK3IU had a significant noise problem that made HF operations difficult. Klaus has prepared a detailed description of the process of tracing and resolving the source of the interference. The full report supplied was much longer. Here we have an abbreviated version to give readers a sample of Klaus' experience.

### RF Interference From Brivis Evaporative Cooler

I would like to express my sincere thanks to the Brivis support team, who in the early steps of this process, went above anything what I would have expected in supporting me. I am looking forward to resolving the RFI to a level where a proper use of the radio spectrum will be possible while keeping the family cool.

#### Problem description

When the evaporative Cooler is operational, noise levels increase from S2 on a HF Receiver to S9 over a frequency range from 18MHz to 30MHz. Further "control traffic" can be observed in the 140 MHz to 150MHz range. This was heard on individual frequencies at S3, even when the cooling unit is not operational and in standby mode. Switching OFF of the Cooler at the main AC power switch board kills all interference.

When the evaporate cooler is operating, it makes the use of the frequencies between 18 to 30MHz impossible, as receive signals cannot not be decoded/received.

#### Antenna installation:

The left antenna is a vertical Butternut HF6V HF antenna 3.5 to 30MHz, 8m high on the 1.5m mast. Antenna to the right 50 to 450MHz vertical antenna, 2m high on 1.5m mast. The cooling unit is approximately 2m from the antennas.

#### Measurement of RFI

Measurement of the RFI was carried out both as an observation on the Transceivers, expressed in S Units and through more detailed measurement using a HP8590A spectrum analyser, which shows noise levels expressed as dBm. The tests

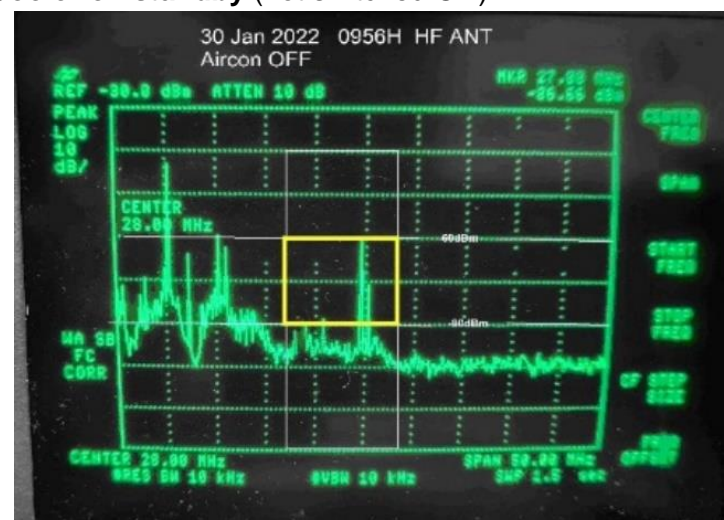


antenna installation

were carried out over the frequency range from 2 to 52 MHz.

It should be noted that the antenna used was the Butternut HF6V trapped vertical, which is resonant in sections of the HF band but performs poorly for frequencies above 30 MHz .

#### Cooler on standby (not switched ON)



The image shows a reference shot of the spectrum analyser, with the evaporative cooler deactivated. The area in the yellow rectangle shows low noise activity between 20 and 30 MHz.

## Controller Replaced

The air conditioner controller was replaced by Brivis technicians in February 2022. Measurement conducted after the change showed a decrease in noise floor between 20MHz to 30MHz of approximately 5dB. This provided a slight improvement.

Testing resumed with the evaporative cooler after



it had started up and completed its Wetting cycle. Note that the new controller changed the behaviour observed. With the old controller the noise level was present on start-up. The new controller increased the noise floor moments after the fan activated at the completion of the wetting cycle.

A battery-operated portable HF transceiver was used to conduct



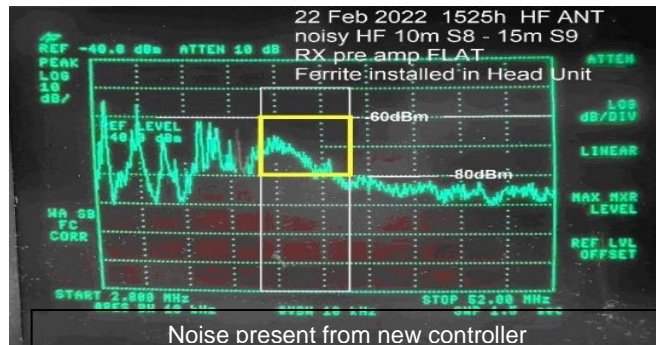
independent and portable measurements on the AC power.

This was achieved with an Elecraft K2 portable HF Receiver and a simple HF Loop antenna.

Near field investigation within the house and on the roof indicated that the short distance between the antenna and the Evaporative Cooler is of no consequence. The noise levels only drop slightly when the receive antenna is moved several metres away.

## Exclusion of RF through the AC mains supply

Interference is received through the HF Antenna. There was no influence of RF through AC power. This has been verified after power to the radio room had been shut off at the switchboard.



My station is sufficiently RF proofed. It uses RF grounding of 20mm<sup>2</sup> cable into an earth rod buried 1.5M into ground. The 240V AC supply is passed through a mains filter to prevent any RF from reaching the test equipment.



Power Line Filter rated at 250VAC 10A on a single phase supply.

## Ferrite installation



applied ferrite cores

I added three clip-on ferrite clamps (Type 43) to the power supply cable (yellow circled). This further reduced the RFI. It was noticeable that at frequencies above 28 MHz a decline in RFI is observed. Noise was suppressed by approximately 5dB from 22MHz to 30MHz.

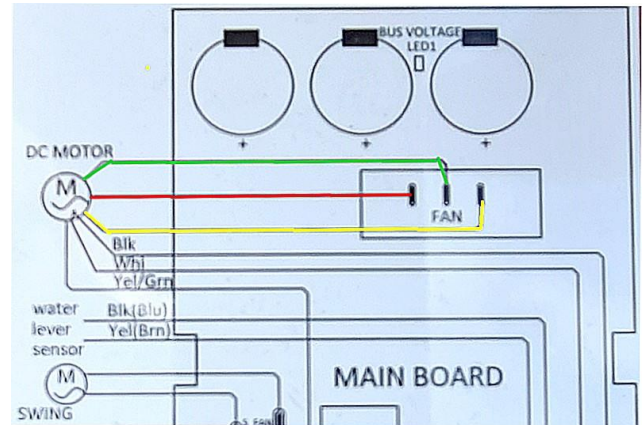


Unfortunately, I run out of clip-on ferrites. I am unsure if the smaller diameter clip had any impact. It would have been useful if Bravis could advise the function of these cables.

These results are already very promising; it seems that the fan contributed heavily to the RFI. Further tests will be done when I am able to acquire additional ferrites.

### Dependency of fan speed to RFI

A test was carried out by varying the fan speed from minimum to maximum. The observations indicate that there is minimal effect on noise levels.



Band / freq in MHz	S-Unit at FT-1000MP		
	Aircon OFF	Aircon ON FAN unit minimum	Aircon ON FAN unit maximum
29.5	2	7	7
29.0	3	5	6
28.5	3	7	7
28.0	2	7	7
21.0	2	9	9
18.07	3	7	8
14.0	6	6	7
10.1	6	6	7
7.0	7	7	7
3.8	5	4	4
3.5	9	9	8

### Insertion of RF suppression filter

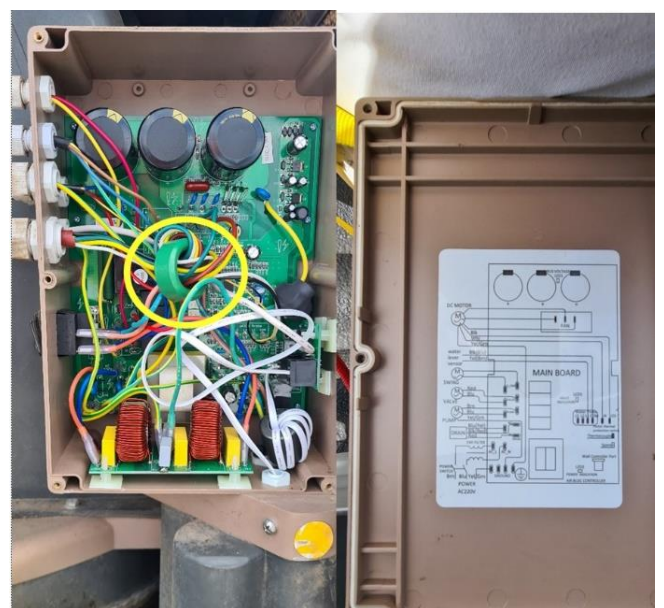
After opening the control box of the evaporative cooler some months later, it was noted that Bravis had installed a ferrite ring (specification unknown), with all wires to the fan passing through the ring.

Due to the size and number of wires only one turn was applied. This approach didn't produce much noise reduction.

### Bravis block diagram

Marked in RED, GREEN and YELLOW are the main power supply feeds to the three-phase motor. The Bravis approach of winding all wires

through the ferrite ring is almost certainly unnecessary, as only the power supply wires are suspected to carry the motor's high current requirements. The remaining are simply control and sensor wires.



I initially tried to use this ferrite core and apply more turns to the motor power wires only, but I was unable to add more than two turns. There was no notable improvement in the noise levels. In addition, the ferrite material characteristics were unknown, so I decided to develop my own solution.

### T38 Toroid filter for 3 phase motor

I experimented with two types of ring toroids F43 and T38 material, but decided after measuring both variations for my purpose the more costly T38 material was the best approach. One toroid for each of the three phase supply wires would be installed.

Thanks to **QRM Guru** and especially Ian VK3BUF with his industrial experience and professional advice, I settled on a counter turn ring ferrite, 10 turns left and 10 turns right. This as per Ian's advice will eliminate current inside the toroid itself, whilst maintaining good filter characteristics.

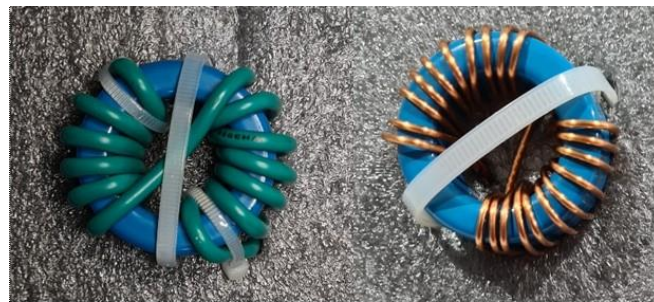
Tests indicated the toroid remains cold after 10min of running the fan on maximum. Initially I experimented with insulated wire, but this restricted the number of turns I could apply. I decided to go for coated solid copper wire instead.

### Installation of toroid in Evaporate Cooler

In November I went back on the roof and installed the three toroids and measured their impact. The diagram below shows the wiring layout.

I had a spare F43 toroid and spare wire length, so I decided that whilst on the roof, I would use it as well and wound around another 5 turns.

(Manufacturer: TDK R 36.0 x 23.0 x 15.0 mm Order code: B64290L0674X037)



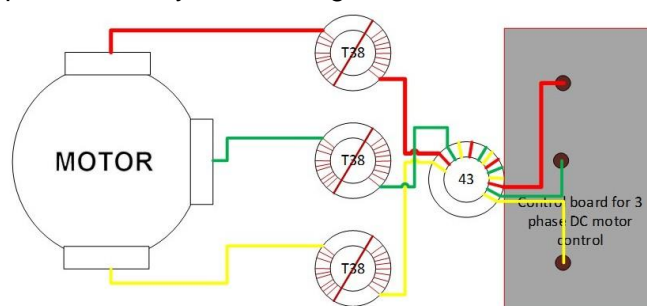
T38 with 12 turns

T38 with 22 turns

### Noise with inserted Choke Filters

A series of repeated measurements were taken over the following days.

Measured was always with two methods, the YAESU FT-1000MP in S scale and with the HP Spectrum analyser showing dBm levels.



- 1 AC off,
- 2 AC on slow fan and
- 3 AC on fan on maximum speed.

At the start I also measured the AC start up phase, where the pre-cooling occurs. The pump is pumping water through the filter matts to pre-wet them before the fan starts. The water pump in pre-cooling phase does not contribute significantly to the noise.



AC ON low FAN speed

AC ON high fan speed



As expected, the modifications had a big effect. The noise stayed well below the -80dBm. The noise floor fell by approx. 15dB.

Improved noise figures - 10 January 2023 app  
TIME 1820H to 1831H

2.4kHz SSB Filter / 500Hz CW Filter pre  
amplifier TUNED amplification curve.

### Conclusions

These changes have taken 18 to 30 MHz from being completely unusable, to being able to conduct good QSOs on these bands. The effort involved was totally worthwhile, as apart from my own comfort, turning off the air conditioning on hot days would not be popular with the family.

As a future task, I will be sourcing clip on ferrites of different material to further suppress RFI from 20 MHz and up.

This report has been forwarded to Bravis for their information. Co-operative on-the-ground experiments like this provide an ideal opportunity for manufacturers to design better filtering into their appliances.

My advice to readers with similar problems is 'Don't give up'. Identify the source of the noise and work out a solution. Of course, this is easier if you are the owner of the offending appliance. It will be more challenging if the noise is coming from neighbours.

*Klaus Illhardt, VK3IU, is a Telecommunications Engineer from Clyde North, Victoria.*

## History – Harry Simmons

Henry Trethowan ("Harry") Simmons was born in Western Australia in 1905. In February 1920, at the tender age of 14 he passed his Public Service examination as a Telegraph Messenger and was soon appointed to that position in the ubiquitous Postmaster-General's Department.

The following year he passed the examination for appointment as Junior Mechanic in Training. His work in the Telegraph Branch put him in contact with many involved in the new craze of radio and wireless. It did not take long for the bug to bite.

He was a founding member of the pre-eminent Subiaco Radio Society, rubbing shoulders with the likes of Wally Coxon VK6AG (Radio 6WF chief engineer until the PMGD takeover) and W. R. Phipps VK6WP (Chief Engineer, Whitfords Network).

In February 1925, Harry was one of a handful of wireless experimenters who received the KDKA shortwave broadcasts to Australia. The following month he commenced a regular series of lectures aired over 6WF, and under the auspices of the Subiaco Radio Society, focussed on shortwave work but covering a wide range of radio topics.

In May 1925, at a Radio Exhibition sponsored by the Subiaco Radio Society and The Wireless Institute, Harry Simmons was awarded first prize in a class for flexibly constructed wireless sets.

Credit: History of Wireless Telegraphy and Broadcasting in Australia. [Web](#)



QRM Guru is now linked to the Amateur Radio Tech Support (ARTS) ticketing system. This enables users to raise support tickets if they need a little more assistance in working through their issues.

Arts is a great example of how a member-based organisation can use a Help Desk Ticketing System to provide real value to its members. You can visit ARTS [Here](#)





## Ham Radio Responsibilities and Opportunities

*How ham radio needs to make changes to protect the community*

*By Mark Beacham VK3XB*

*(Editor's Note: The views expressed in this article are those of the author. They do not necessarily represent those of QTC, the Editorial Team or RASA.)*

Ham radio, or amateur radio, is a popular hobby enjoyed by people of all ages and backgrounds. It involves the use of radio equipment to communicate with other amateur radio operators around the world. Ham radio operators must be licensed by their respective governments in order to use the radio spectrum. However, as the popularity of the hobby continues to grow, there is a growing concern about the behaviour of some individuals within the community.

In recent years, there have been several high-profile cases of individuals using their ham radio licenses to engage in stalking and harassment of fellow operators. In one case, a ham operator in Australia was sentenced to 12 months in jail for stalking and harassing a fellow ham operator. This case highlights the potential for the misuse of the hobby and the need for stricter regulations to protect the safety and reputation of the community.

Another similar case is a ham radio operator in Erie, who was charged with broadcasting false weather emergencies. This kind of behaviour not only puts lives at risk, it also undermines the reputation of the hobby.

It is worth noting that many other countries, such as UAE and Kenya, already have in place a "fit and proper person" check as part of their licensing process. This check is designed to ensure that only individuals who are committed to the safety, ethical, and responsible use of radio spectrum are granted a license. It is a common sense approach to ensure that the valuable resource of radio spectrum is not used by unsuitable people for nefarious uses.

One of the challenges in addressing this issue is the fact that many of these incidents involve online harassment, which can be difficult to track and prosecute. However, the lessons from the online world can be applied to the ham radio community. For example, social media platforms have implemented measures such as user

reporting and account suspension to combat online harassment. Similarly, the ham radio community could consider implementing a reporting system for incidents of harassment and misconduct and holding individuals accountable for their actions through disciplinary action or revoking of their license.

Another solution could be to conduct background checks on individuals applying for a ham radio license. This would provide an extra layer of protection for the community and help to identify individuals who may pose a risk. The idea of a "fit and proper person" check is not a new one and already in place in many countries. This approach would not only help to protect the safety and reputation of the community, but it would also ensure that the valuable resource of radio spectrum is not misused.

It is important to remember that governments provide almost free access to the valuable resource of radio spectrum to the hobby of ham radio and also have a responsibility to ensure that this privilege is not used by unsuitable people for nefarious uses. The protection of the hobby now and into the future is vital and bad behaviour may have a negative effect on this reputation and the desire of the public to take up the hobby.

Another approach to address the issue of stalking and harassment within the ham radio community would be through education and training. By providing education on responsible communication and appropriate behaviour, ham radio operators can be made aware of the potential consequences of their actions. Moreover, providing training on how to handle difficult situations, such as instances of stalking and harassment, can equip operators with the tools they need to effectively deal with these issues.

In conclusion, the ham radio community has a responsibility to ensure that the privilege of access to the radio spectrum is not abused. Incidents of stalking and harassment, such as those highlighted in the recent Australian case and the Erie case, are not only harmful to the individual targeted but also to the reputation of the hobby as a whole. It is important that the community takes steps to address these issues and protect the hobby for now and into the future.

Implementing a "fit and proper person" check for licensing, providing education and training on responsible communication, and creating a

reporting system for incidents of misconduct are all steps that can be taken to address the issue of stalking and harassment within the ham radio community. Ultimately, it is in the best interest of the community to take proactive measures to ensure that the hobby of ham radio is not tarnished by the actions of a few individuals.

In the end, governments provide almost free access to the valuable resource of radio spectrum to the hobby of ham radio and also have a responsibility to ensure that this privilege is not used by unsuitable people for nefarious uses. Ham radio is a hobby that can bring people together and allow them to communicate in times of emergency. The protection of this hobby should be taken seriously and steps should be taken to ensure that the reputation of the hobby is not tarnished by the actions of a few individuals.

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## Why Join an Amateur Radio Club?

*By Bob Bristow VK6POP*

Clubs are the backbone of organised Amateur Radio in any given location. Although it's entirely possible to live a full and busy Amateur Radio life outside of a club, there are many reasons why joining and participating in a club is a good thing.

There is evidence that a person who has social capital will fare better in terms of their enjoyment of life and in their mental health.

What is social capital? It's pretty easy - you've probably worked it out already. It's the things you do together with other people, the clubs and groups that you participate in, and the friends and family that you engage with regularly.

So even before we look at the benefits to Amateur Radio, especially your Amateur Radio career, having social capital puts you in a good position to enjoy a socially healthy life.

Now let's look at clubs. By participating in a club, you get to share your own experiences and knowledge, and at the same time benefit from others sharing the same things.

You've probably heard the saying "the whole is greater than the sum of its parts". This little piece of wisdom from Aristotle is as true today as it was back then.

A group of people working together in a club setting can bring about some great results that individuals would find it hard to achieve.

In these days of increasing restrictions on what we as Amateurs can do in our own backyards, we can look to Clubs to provide a shack and have a decent crop of antennas.

Where your Amateur Radio activities may be restricted at home, in the club setting you're back in the good old days.

There are lots of perfectly acceptable self-centred reasons for being a member of an Amateur Radio Club and a load of other reasons to be part of a sharing community.

So if you've previously not considered joining a club, or you've fallen away from club membership and wondering why your Amateur Radio life has dulled down, stop awhile and consider or reconsider your local clubs.

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## Australian Ladies Amateur Radio Association

(ALARA) was formed in 1975.

The membership has now grown to over 200, with many Australian members sponsoring overseas YLs into ALARA.

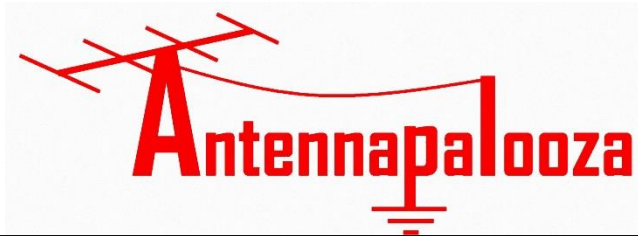
The term "YL" stands for "young lady", regardless of age.



The Association's mission is to encourage women's interest and active participation in amateur radio. Click on the logo to visit the website.



## Antennapalooza 2023



**Antennapalooza**, now in its 8th year, will return to Drouin West in 2023 on April 14, 15 and 16. (The weekend after Easter)

The theme for 2023 will be 'Station Efficiency'.

It will include talks and demos on different ways that Amateurs can improve the way they operate.

Set in a 6 acre field, 50 km due East of Dandenong, visitors can bring their tent or caravan for the weekend, or just stay for the day. Set up an antenna and have a play on-air, or take in the demonstrations.

Entry is Free. Bookings are not essential, but please email a registration with your name and callsign so we can plan logistics. Let us know if you plan to camp or just stay for the day.

Email us at: [sparky@dcsi.net.au](mailto:sparky@dcsi.net.au)

Visit the AntennaPalooza website, <http://antennapalooza.net.au/> which provides information on how to find the venue, what to expect when you get here and list the short lectures that will feature on the Saturday and Sunday. These will include discussion on portable ops, and High Altitude Ballooning. See the HAB article in this issue of QTC.

Free tea, coffee & barbecue facilities will be on hand. Toilet facilities are provided. In the evening a warming fire will be lit in the Forest Area.

Amateurs can try their field equipment, meet old friends and throw some snags on the barbie. Visitors, who are just learning about Amateur Radio will benefit from this event. The brief lectures in the central pavilion will focus on topics like antenna efficiency, power consumption, having everything at your fingertips when you operate.

Several clubs in the region have been invited to participate.



## International Marconi Day

**22<sup>nd</sup> April 2023**

*By FISTS Down Under Committee  
contact Chris VK3QB*

International Marconi Day is observed annually on the Saturday closest to the 25<sup>th</sup> of April, which is the birth date of Guglielmo Giovanni Maria Marconi, who is recognised as inventor of radio. This year International Marconi Day is on 22<sup>nd</sup> of April.



The International Morse Code Preservation Society (FDU) will be celebrating Marconi's contribution to our hobby during the month of April.

We have applied for the Special Event Callsign VI1MARCONI. We invite members to operate the callsign throughout the month of April as a part of a casual contest and to recognise Marconi's birth date and achievements.

The primary purpose of this event is to encourage more activity, and by running a structured contest we hope this will motivate all CW operators to get on air more than they might otherwise.

If you would like to use VI1MARCONI during April (excluding 22<sup>nd</sup> April) please send an email to Chris vk3qb(at)hotmail.com

Members can apply to use the club's callsign VK2FDU during April.



The Marconi Key

### RULES - The Marconi Contest

The primary objective of this initiative is to encourage CW activity on our bands. So dust off your key, cootie or paddle and get on-air.

The specific goal is to work as many CW stations as you can throughout the month of April. If you are comfortable with conversational morse code, we ask that you mention the special event callsign and/or reference Marconi and his contribution to

radio. You can direct listeners to the website [www.fdu.org.au](http://www.fdu.org.au) for more information.

### Bands:

160, 80, 40, 20, 15, 10 metres. No WARC bands.

### Scoring:

VK station – 1 point

DX station and VK9, VK0 – 2 points

VK2FDU – 5 points

VI1MARCONI – 10 points

DX Special event callsigns (GM4IMD – only active on 22 April – UK time) – 15 points

Duplicates are permitted but cannot be on the same day on the same band. (i.e. you can work VK2FDU on three different bands on the same day, and you can work VK2FDU on 3 April and then again of 4 April on the same band etc)

All CW QSOs for the month of April are valid (either in UTC or local times, just be consistent)

### Categories:

Open > 100W

Low Power <= 100W

QRP 5W or less

- You can request endorsement for straight key.
- Certificates for placegetters and participants.
- 2x1 contest-callsigns may be used.
- Only FDU members can apply to use VK2FDU or VI1MARCONI.

### Logging:

For VK2FDU and VI1MARCONI, operators must provide the log in ADI Format – other formats will only be permitted by agreement with committee prior to use. When you apply to use VI1MARCONI or VK2FDU you are agreeing to provide a log in ADI Format. Other methods may be agreed with committee on a case-by-case basis (e.g. Excel or photo of paper log).

For entrants, any format with a summary sheet – we have many members who use paper logs

We'll advise if other FISTS Chapters or Morse Code clubs intend to operate similar special event callsigns.

### Credits:

Photo of Marconi:

<https://www.britannica.com/biography/Guglielmo-Marconi>

Photo of morse code key:

<https://www.titanicmuseum.org/artefacts/white-star-line-wireless-room-marconi-key/>



## Morse Code - Practical RST Reporting

By Chris Chapman VK3QB

This article is intended as an introduction for newcomers.

The RS(T) system of reporting is used by amateur radio operators as a standard for exchanging information about signal quality, strength, and reception.

As illustrated by the table below, the international RS(T) reporting comprises three discrete numbers:

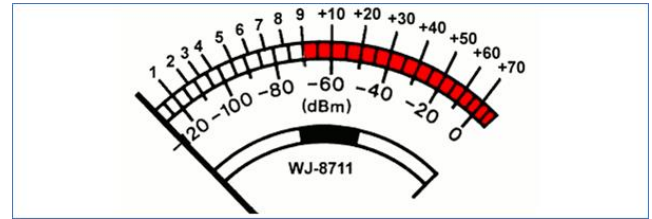
Readability (R), Strength (S), and Tone(T) – for CW signals

No.	Readability	Strength	CW Tone
1	Unreadable	Faint	Extremely rough
2	Barely readable	Very weak	Very rough AC note
3	Difficult	Weak	Low pitched AC
4	Minor difficulty	Fair	Slightly musical AC
5	Easily readable	Fairly good	Some AC hum
6	-	Good	Modulated tone
7	-	Fairly strong	Slight whistle
8	-	Strong	Near DX, ripple
9	-	Very strong	Pure DC note

Typically, **S** will refer to your radio's S-meter reading.

Strength 9 on a properly calibrated S-Meter indicates 50µV at the receiver antenna connector.

S-points range from one to nine, with each S-point being defined as a 6dB increase in signal strength. Whilst this 6dB definition is widely regarded as a standard, some S-meters may not be calibrated correctly, or tolerance levels may vary.



In any event, the S-meter in most modern radios will provide a good relative measure when observing and reporting on signal strength. Now, in theory, going from S-3 to S-4 is a 6dB power increase. If you were running 10W and receiving an S-3 report, you'd need to increase to 40W to receive an S-4 report. Going from 10W to 100W is a 10dB increase in power, or just under two S-points.

Quite often a one S-point increase in signal strength can take a marginal signal to an armchair copy.

The table below provides the received power levels in dBm - you may hear these terms used as well.

Signal Strength	Relative Intensity	Voltage at antenna connector	Received Power
S1	-48dB	0.2 µV	-121dBm
S2	-42dB	0.4 µV	-115dBm
S3	-36dB	0.79 µV	-109dBm
S4	-30dB	1.6 µV	-103dBm
S5	-24dB	3.2 µV	-97dBm
S6	-18dB	6.3 µV	-91dBm
S7	-12dB	13 µV	-85dBm
S8	-6dB	25 µV	-79dBm
S9	0dB	50 µV	-73dBm
S9+10	10dB	160 µV	-63dBm
S9+20	20dB	500 µV	-53dBm
S9+30	30dB	1.6 mV	-43dBm

### In practice:

Received signals will almost never be constant and may fluctuate a little, or a lot. As such, readability and signal strength both have a bit of subjectivity in how they are reported.

If you have a constant noise floor of S-3 and you are copying a signal with a little difficulty at the same strength, you might send an RST of 439.

This indicates to the other station that their signal is weak (but not faint) and readable with only minor difficulty.

At my QTH I have very little local noise on most HF bands. So, whilst the needle may not move, the signal is not “faint”. It may well be an armchair copy and at least 3- background noise. In these scenarios I’ll likely give an RST of 529 or 539.

You may have a received signal which is S8 or S9, but local QRN or QRM may be making copy a little difficult. In such cases an RST of 489 would be appropriate; you may even add “ur RST 489 with QRN”.

Auroral flutter may render a signal unreadable, or very close to unreadable... again, a little subjectivity may be required when providing a signal report.

### Experiment:

The next time you’re in a QSO with stable signal strengths, try cutting your power back by 50% (just 3dB) and ask the other station for a comparison.

When conditions are good, a few dB won’t make a noticeable difference... but in marginal situations even 2-3dB can make or break a QSO.

Some operators have taken to using the RSN system of reporting.

*“RSN is an attempt by some Australian radio amateurs to try and address the shortcomings of RST. The “N” stands for Noise. Because virtually all transmitters now have perfect Tone, the T is seldom useful – but we do have very high levels of Noise these days.*

*As an example, if we send a report of RST 369, the other guy has no way of knowing why his readability is mediocre. Is it QRM? QRN? QSB? Perhaps even QSD?*

*By sending a report such as “RSN 368,” he will understand that, although his strength is a respectable S6, the Noise is stronger at S8, so he’s losing the battle.”*

Source:

<https://maritimeradio.org/resources/morse-code-resources/signal-reporting/>

A Facebook correspondent made the following comments recently:

*“Try to work out how strong the signal is by narrowing the bandwidth progressively and keeping the desired signal in the centre of the reduced passband. If this removes enough noise to allow the S-meter to move as the incoming signal varies in strength, it is giving a more usable indication of the signal strength.*

Narrowing the passband from 3 kHz to 500 Hz will reduce the noise power by a factor of six, which is 7.7 dB. Going even lower to 300 Hz cuts the noise down by 10 dB, so that gives you a chance of seeing the S-meter move as the incoming signal keys on and off, or as an SSB operator speaks. Generally, few people can even hear SSB at a Signal to Noise Ratio (SNR) lower than 0 dB. CW can be copied a bit lower than that.”

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## Supporting RASA

The Radio Amateur Society of Australia, RASA, serves the Amateur Radio Community with representation to the Regulator, the ACMA, and with practical resources, provided free of charge, to Amateurs and Amateur Radio Clubs.

RASA operates on a small budget, and is able to do so because its work is done by volunteers. RASA owns no property, as there is no need for it.

There are, of course, costs incurred in web hosting and software fees, and the occasional purchases of materials for resources for Amateur Radio operators. These include:



VKREGS.INFO

QRM.guru

Resolving interference  
for Amateur Radio

- Welcome to Amateur Radio Guidebook
- QTC E-Magazine (You’re reading it)

You can support RASA by becoming a member, and by making a donation.

You might also have some skills you’d like to add to the mix. Contact us: [info@vkradioamateurs.org](mailto:info@vkradioamateurs.org)



## HamCamption 2023

By Darren King, VK6EK

Good morning campers, the Mayanup chapter of the Southern Electronics Group invites hams and their wives, husbands, partners, offspring or just people interested in radio and camping to attend our second annual field event on the 13th and 14th of May 2023.

Mayanup Ham-Camption is an informal camp-out and radio get-away weekend where we can use and discuss practical projects for your radio and antennae in an open area with a welcoming fire pit, plenty of tall trees and great facilities.

Food, beverages and drinking water are all BYO. We will provide further details of take away options closer to the event.

The grounds are large with plenty of space for your caravan, tent or swag with some indoor shed room in case we get the odd shower or two.



Glynn VK6PAW with his go box setup

If you choose to visit but would prefer a more civilised motel or bed and breakfast, there are many available from 10 to 30 minutes from Mayanup.

There is limited power available on the grounds, so self contained power is preferred. There are toilets and showers, and camping will be \$10 pp/pn.

The event is focused on the weekend, but campers are welcome to arrive on the Friday afternoon or evening, but if you are planning to do this, please let me know beforehand so we can unlock the gates.

Our event last year was a hoot, and we expect this year to be even better. The location is a leisurely 3 hours drive from Perth and two hours from Albany and Busselton.

For further details and to register your interest please email to <[vksixek@gmail.com](mailto:vksixek@gmail.com)>

**Darren, VK6EK, is organising HamCamption for the Southern Electronics group.**



Mike VK6MB with his portable setup



As with any Amateur Radio function, Food is abundant and popular.

## High Altitude Ballooning and STEM

*Article created with input from Mark VK3QI, Trevor VK3TWC, EMDRC News & photos by Andrew VK3BQ and Christine VK3EEK*

### What is High Altitude Ballooning or HAB

High Altitude Balloons are generally uncrewed balloons, usually filled with helium or hydrogen, that are released into the stratosphere, generally attaining between 18 and 37 km above sea level.

High Altitude Balloons are used extensively by meteorological organizations around the world as weather balloons for purposes of obtaining measurements of key environmental variables i.e., wind speed, temperature, humidity, pressure, etc.

This data is used to model weather conditions and provide weather predictions which are used by businesses around the country to guide various aspects of their operations.



Meteorological organizations tend to launch such weather balloons at-least once a day from various locations across their countries for purposes of data collection.

High Altitude Ballooning or HAB as some of us like to call it has links with Amateur Radio and is a sport that is attracting a very diverse audience. Amateurs have been launching High Altitude Balloons of varying sizes for many years but it's only of late that High Altitude Ballooning has earned recognition and respect among the wider community.

### STEM Opportunities

High Altitude Ballooning offers STEM (Science, Technology, Engineering, Maths) learning opportunities to kids of all ages. We'll talk about the learning opportunities a bit later in the article.

### High Altitude Ballooning in Australia

Project Horus, a sub-group of the Amateur Radio Experimenters Group (AREG, an Amateur Radio club based in Adelaide, South Australia), has been launching high-altitude balloons since 2010. Founded by Terry Baume, the group has performed more than 60 launches as of March 2023. Launching mainly from Mt Barker and Auburn, South Australia, they have performed launches for schools, universities, TV programs, special effects companies, STEM outreach programs, and of course many launches for the Amateur Radio community (including launches at the 2012 and 2017 WIA AGMs). Mark VK5QI currently heads up the Project Horus initiative for AREG.

Project Horus's core focus is on the radio-communications aspects of high-altitude balloon launches. Reliable telemetry is critical for tracking balloon launches, and amateur radio allows for experimentation with systems that would be difficult (or at least very expensive!) to do under a commercial license.

Examples of this include flying cross-band repeaters allowing communications over an 800 km diameter footprint and transmitting live digital ATV (using DVB-S) from 30 km altitude.

All of their launches have a large community focus, with many around South Australia (and even into Victoria!) receiving and uploading telemetry. Their last flight, Horus 59, had 25 receiver stations taking part, with previous launches having over 40 stations participate.

Project Horus has been instrumental in developing open-source tracking and telemetry systems now in use by many HAB groups around the world (including EMDRC!). Some examples of this include:

The SondeHub-Amateur website, allowing tracking of worldwide HAB launches.

The Horus Binary telemetry system, using very robust modulation & coding designed specifically

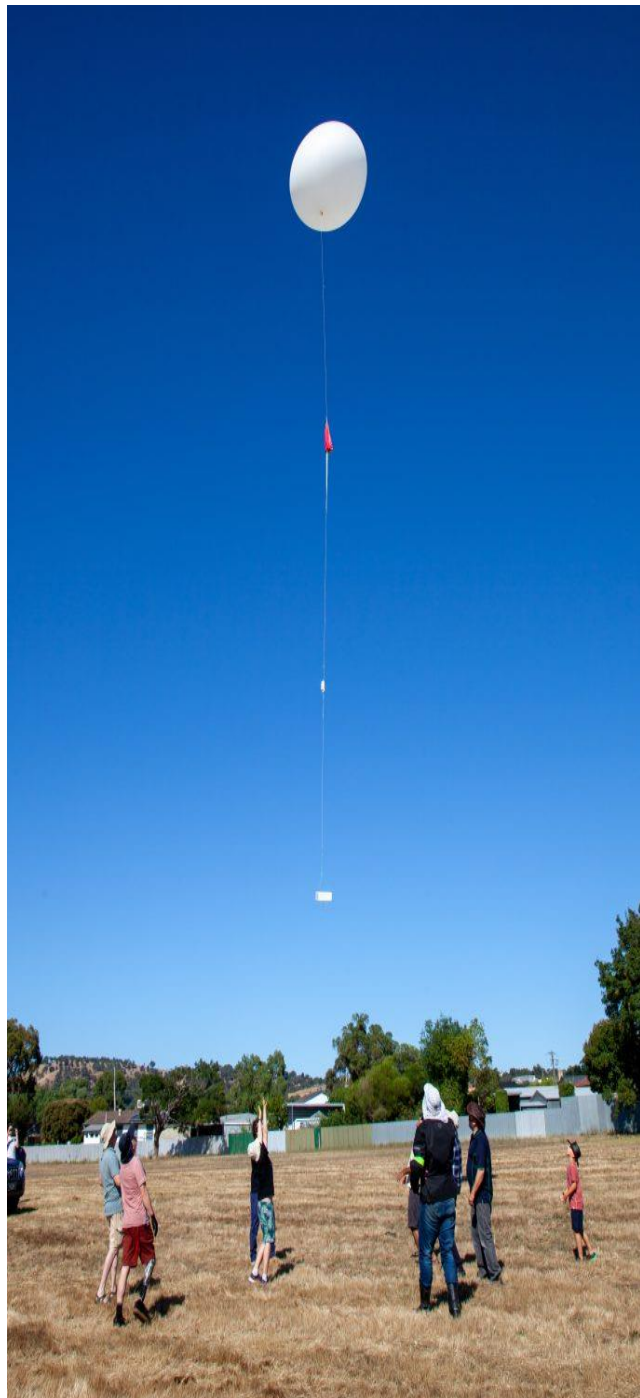


for tracking of HAB launches, using re-purposed meteorological radiosondes as transmitters.

The Wenet imagery downlink system, which allows transmission of high resolution snapshots throughout the flight. These images are displayed online, allowing anyone to follow along with a flight.

Learn more about the work Mark VK5QI and Horus at the following link

<https://www.areg.org.au/archives/category/activities/project-horus>.



Mark VK5QI has been instrumental in helping launch other High Altitude Balloon initiatives

around Australia. Trevor VK3TWC (EMDRC Member) with support from Mark VK5QI, the EMDRC committee and several EMDRC members helped launch the EMDRC High Altitude Balloon group in Melbourne, Australia.

The EMDRC High Altitude Balloon group has had 3 launches so far with a number of additional launches scheduled for 2023. Learn more about the EMDRC High Altitude Ballooning group at <https://www.emdrc.com.au/high-altitude-ballooning-resource-centre/>.

### **What Learning Opportunities Does High Altitude Ballooning Present**

High Altitude Ballooning as we mentioned earlier offers a plethora of learning opportunities to kids of all ages. Here's a list of some of the great STEM learning opportunities on offer:

- Learn how to build a Raspberry Pi based High Altitude Balloon tracking system;
- Design, build, test your own antennas for tracking the High Altitude Balloon;
- Design, build, test the payload (to be attached to the High Altitude Balloon);
- Design, build, test different sensor packs that you might want to combine with your primary payload;
- Learn how to use the custom build tracking software (Horus Chasemapper) to track, chase and retrieve the payload;
- Design, build, test custom payload boards with integrated sensors;
- Learn how to model performance of the balloon, performance of the parachute for different weather conditions;
- Learn how to model flight path predictions for combinations of different balloon sizes, parachute sizes, payload weights, etc; and
- Learn how to plan, execute a High Altitude Balloon launch

High Altitude Ballooning also introduces participants to technologies that build on some fundamental amateur radio skills; fox hunting, antenna construction, coding, and QRPP transmitters. And then there's the newer aspects to get involved in; like air safety requirements and GPS tracking technology.

High Altitude Ballooning is a great way for kids of all ages to get making, creating, innovating with STEM. Kids learn so much about STEM in the classroom, High Altitude Ballooning gives kids of

all ages an opportunity to participate in a real-world STEM activity putting those grey cells of theirs to work and helping them pickup critical life skills along the way.

High Altitude Ballooning has been referred to as “The poor man’s space program”.

*Amateur Radio High Altitude Balloons is the study and use of high-altitude balloons to explore near space. Near space is the region of atmosphere between 60,000 feet and the accepted boundary of space at 328,000 feet altitude.*

*These altitudes make near space far more like Earth orbit than the surface of the Earth. Air pressure in near space reaches 99% of a vacuum of better and temperatures drop to a low of -60F or colder.*

*Cosmic radiation is over 100 times greater than at sea level. Hobbyists and citizen scientists alike use balloons to send payloads to near space, recording images and scientific data as they go.*

*ARHAB.org is the primary location for posting and tracking upcoming high altitude balloon missions. For more information on ARHAB, this Wikipedia entry is a great introduction.”*

Source: <https://arhab.org/>

## EMDRC and High Altitude Ballooning

The Eastern and Mountain District Radio Club (EMDRC), located in the Eastern suburbs of Melbourne offer members the opportunity to participate in High Altitude Ballooning. The EMDRC High Altitude Balloon group started about two and a half years ago, with the idea having its roots at the Melbourne Raspberry Pi Group.

Their initial years were spent applying for a flight instrument (license to launch), planning their first launch and then constantly having to replan due to the COVID pandemic before finally being able to launch in September 2022.

The EMDRC launch team includes –  
Payload & Electronics – Trystan, Luke VK3UKW  
Balloon Management Team – Greg, Chris VK3PLS, Nathan VK3DNS, Toby VK3TOS, Rory VK3ASY  
Launch Control – Brad VK3BKQ with the support of Ryan (VK3InTheMaking) and Andrew VK3BQ



Logistics & Modelling – Trevor VK3TWC  
Barbecue & Facilities Management – Tom VK3FTOM  
Photography – VK3EEK, VK3BQ

Trevor VK3TWC considers himself lucky to be able to work with such a passionate bunch of individuals as part of the EMDRC High Altitude Balloon team. The group includes a bunch of reliable and enthusiastic team members who are committed to the High Altitude Balloon initiative.

***A core objective of the EMDRC High Altitude Balloon initiative is to offer amateur radio enthusiasts, kids, and families across the community an opportunity to experience STEM in the real world. The EMDRC High Altitude Balloon initiative seeks to engage with universities, schools, and TAFEs; engaging with the younger generation helping to promote the STEM learning opportunities HAB has to offer.***



In September 2022, EMDRC launched their first HAB from Ararat. The objectives of this first launch were to familiarise members in the technologies and safety procedures involved in HAB-ing.

They launched a second balloon in December, and their third balloon on the 19<sup>th</sup> February 2023. Read the launch report for the last launch [here](#). You can read more about their launch by visiting their website [here](#).

They also have a very useful resource page [here](#).

To further promote HAB-ing and Amateur Radio EMDRC attended the Monash Maker Faire in December. The more positive exposure we can bring to our hobby the better, and EMDRC does a great job in this regard.

### Recent Media Coverage

Media coverage never goes astray, and it's great that EMDRC with Andrew Scott VK3BQ, Trevor VK3TWC and Mark VK5QI from AREG were able to promote their hobby through a report in The Guardian. You can read more in [this article](#) in The Guardian.

Andrew VK3BQ, also helped EMDRC obtain some publicity by linking Trevor VK3TWC along with the producers at ABC Radio Melbourne. Listen to the interview [here](#) and read the article [here](#).

**Chasers wanted!** - EMDRC would love to have more members and amateurs from around Victoria provide telemetry tracking (and chasing) for our payloads. And if you don't have the radio gear you can still track using the web interface! You can track the balloon via <https://amateur.sondehub.org/> from your phone. Tracking is easy, using a 70cm SSB radio and laptop, or a simple SDR USB dongle and

raspberry pi! More info on how to decode and track can be found here:

<https://www.emdrc.com.au>. Drop the EMDRC team an email at [hab@emdrc.com.au](mailto:hab@emdrc.com.au).

If you're located in Adelaide, the Amateur Radio Experimenters Group (AREG) is also involved in HAB. Visit their website here:

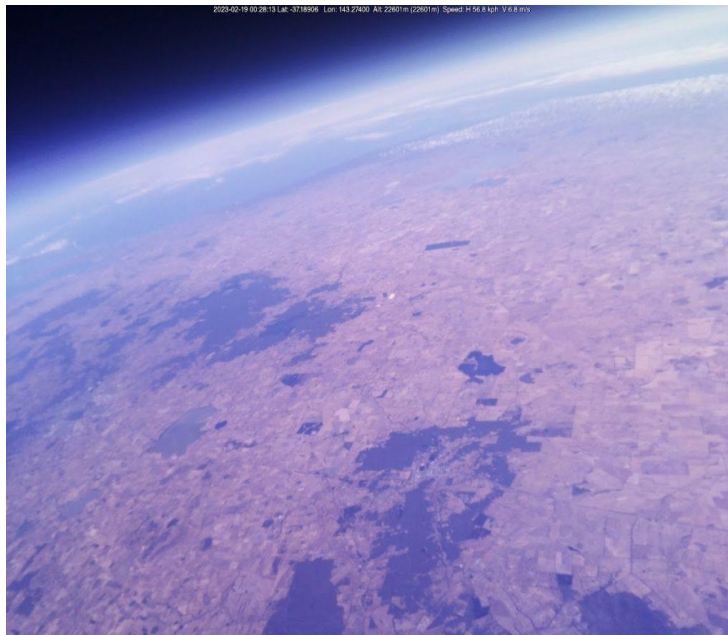
<https://www.areg.org.au/>.

Here's some interesting links to get you started. Project Horus – Plot a reprogrammed radiosonde used as a payload for Amateur High Altitude Balloons [HERE](#)

Project Horus GUI – Windows software to track a reprogrammed radiosonde used as a payload for Amateur High Altitude Balloons [HERE](#)

All of the images are broadcast in real-time from the balloon – <https://ssdv.habhub.org/>

Link to track the Horus payload in real time – [Sondehub](#)



We'll keep track of this new and interesting facet of the hobby and bring you more reports in future editions of QTC.

**Join the High Altitude Balloon Group wherever you are**

We keep in touch through discord (Chat Server).

Join us at our "Make, Innovate, Create" Discord Server. Joining us on discord doesn't cost you anything, it's absolutely FREE to join.

Please read the #rules channel to understand the guardrails we have put in place to make sure discord remains a safe place for everyone. And here is the URL for getting onto discord – <https://discord.gg/4FkrKJeNt5>

**Photos credit : Christine VK3EEK and Andrew VK3BQ**



## Bouvet Island - 3Y0J

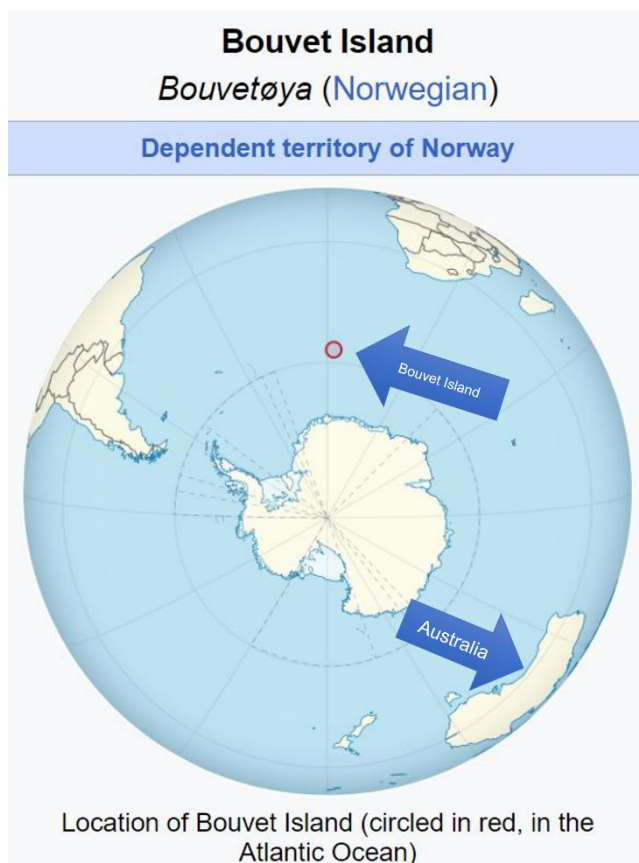
*By the RASA Committee*

Anyone who takes more than a passing interest in HF DX will have been across the recent DX'pedition to Bouvet Island, operating under the callsign 3Y0J.

Bouvet Island is a territory of Norway and is declared an uninhabited protected nature reserve. It is in the South Atlantic Ocean and is regarded as the world's most remote island. Bouvet is a volcanic island and about 93% of its surface is covered by ice and snow.

There is absolutely nothing welcoming or safe about a visit to Bouvet, unless you're a seal or penguin.

These are good reasons why Bouvet Island is Clublog's number 2 most wanted DXCC Entity.



And so, it has been with great anticipation that a group of DX'peditioners with a Norwegian lead team announced almost two years ago they'd be undertaking to activate this highly sought after entity. As with any venture of this magnitude and profile, it has seen changes in team composition, fundraising to the tune of about USD\$700,000,

and a change in the boat chartered to get the team safely to and from the island.

As one would expect, any expedition to such a remote and unwelcoming part of the planet would demand only the best of resources, skills, preparation, and risk mitigation plans.

You can read more about this DX'pedition by visiting their website <https://www.3y0j.no/> and more news here: <https://www.dx-world.net/3y0j-bouvet-island/>

Those who use Facebook may already have been following their trials and tribulations as the team travelled to Bouvet, about two weeks on-location, and the subsequent travel back to terra firma. You can visit their Facebook page [here](#)

By now you're probably thinking to yourself "this is a bloody remote and unforgiving location. I sure hope these guys know what they're doing and don't take any unnecessary risks".

Well, they've certainly been subjected to some inclement weather and their plans were dialled back considerably following their first attempt to make landfall.

In summary, the team set expectations that they'd make ca 200,000 QSOs, running 12 stations with amplifiers pretty much 24\*7 for their anticipated two-week activation.

The harsh reality of Bouvet saw them activate only two stations with no amplifiers, simple antennas and making around 18,000 contacts. In the face of the adversity this was still a significant and worthy outcome.

However, there has been much adulation and "hero worshipping" on social media and it appears much of the risk has either been downplayed or ignored altogether.

Alan VK6CQ/VK0LD is a retired Antarctic professional and veteran of some previously highly regarded Antarctic DX'peditions. He has watched the 3Y0J team with a critical eye and genuine concern for their welfare.

In what some may regard as a contrary but important open letter to the DX community, Alan has communicated his qualified concerns and asked the questions "did the 3Y0J Team expose themselves to unnecessary risks? Were they

reckless with their decision making and should the broader amateur radio community rethink how we plan and support DX'peditions to such remote and hazardous locations?"

Alan's letter is reproduced here. It raises very important issues that need the attention of both the team leaders and the DXCC Desk. More broadly, it needs the attention of every DXer if we don't want future DX'peditions in the headlines for all the wrong reasons.

*RASA publishes this letter in good faith, and has not formed any opinion about the Bouvet expedition or Alan's letter.*

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## **3YØJ, BOUTVETØYA. An Open Letter**

### **TO THE ARRL & WORLDWIDE DX COMMUNITY**

*By Alan Cheshire, VK6CQ/VK0LD*

#### **INTRODUCTION**

This is not the place to comment on the success or otherwise of 3YØJ's scaled back DX Operation at Bouvetøya nor dwell upon the ethics and morality of various Team members entering their own home callsigns into the 3YØJ log – Others can make those assessments.

However, 3YØJ's overall operational safety, critical decision-making, approval process, landing permit status and risk management all require immediate attention and further scrutiny.

There is no questioning the 3YØJ Team's dedication, determination and commitment to activating the second rarest DX entity in the world nor their desire to satisfy the expectations of the worldwide DX Community. However, based on the evidence on 3YØJ's own Facebook page, it is clear to the professional eye that the Team were understating the true nature of the hazards and dangers they were faced with and were overstating their own capabilities in dealing with them.

The facts of the matter are that 3YØJ came uncomfortably close to sustaining serious injuries or even fatalities and could have easily become the focus of an international Search & Rescue mission or medical evacuation. This is the stark reality, irrespective of whether the 3YØJ Team and the DX Community wish to acknowledge or deny the fact.

## **OPERATIONAL SAFETY & CRITICAL DECISION-MAKING**

Famous last words (almost) from 3YØJ's own Facebook page after four Team members were marooned on the Island for four days and three nights:

"No big deal at the time because the next zodiac run would bring us our essential supplies."

"I was first to go. I wore the waders in an attempt to keep dry."

Now that Marama has fulfilled its contractual obligations and has safely delivered the 3YØJ Team back to civilization, the 3YØJ Team is under an obligation to explain to the ARRL DXCC desk, corporate sponsors, DX foundations and the DX Community at large why the first Zodiac landing on Cape Fie's high energy and very hazardous black sand beach ignored Rule #1 in the Basic Polar Safety & Survival Manual, viz:

ALL required emergency survival gear plus minimum ten days rations & fuel **MUST** be landed on the **FIRST** landing in case weather and/or sea conditions suddenly deteriorate, and you can't get back to the ship! If you are unable to complete this primary task safely, then abort, return to the ship and wait for conditions to improve before making another attempt.

There is no justification whatsoever for breaking this most basic of all polar survival rules even if the weather at the time is blue skies, no wind and the sea is as flat as a pancake – your life and the lives of your colleagues may very well depend on it!

Anyone working with the Australian or other national Antarctic programs would have been fired on the spot and sent home in disgrace for such reckless disregard of basic safety protocol, so please do not resort to the "You weren't there so you don't know the situation" routine - it won't wash.

The Team must provide an honest and open assessment of how such a foolhardy and reckless decision was made, exposing some of the Team to a completely avoidable and unnecessary life-threatening scenario in the process. Why did that first Zodiac landing apparently consist of four men and only a few odds & ends of emergency survival gear, spare pair of socks etc. and little or no food or fuel?

One objective and dispassionate appraisal might be that a combination of blind DX passion and over-zealous enthusiasm coupled with sheer impatience to get off the boat and get on the air got the better of them. After over two years of PR and fundraising, 3YØJ had finally arrived at Bouvetøya and the Team were now champing at the bit to get onto the Island, on the air and calling 'CQ DE 3YØJ' as soon as possible no matter what the cost, including their own safety and possibly their own lives as well, so it would seem.

Bouvetøya is no place for innocent novices or polar rookies and being marooned on a very cold, windswept and wet sub-Antarctic island without proper shelter and/or adequate supplies is not a topic for plaudits, congratulations, mutual back-slapping or amusing after-dinner anecdotes. It is a very serious and imminent 'Life or Death' scenario, especially when sea conditions are such that a return to the vessel is impossible for an extended period and any possible helicopter evacuation is at least a week's sailing away. Even a relatively minor deterioration in the weather in these circumstances can quickly escalate into a major life-threatening crisis.

Who made this very basic and potentially fatal error of judgment? Is it reasonable to assume that the Zodiac Driver/Polar Field Guide who was there to ensure the Team's safety was actually the one making these crucial on-the-spot decisions? Did his safety advice fall on deaf ears and was he overruled by one or more of the other Team members in their blind eagerness to get ashore and start operating?

It behoves the Team Leadership to disclose exactly how such critical decisions were made and by whom. Was the Zodiac Driver/Polar Field Guide a paying participant or a chartered professional paid to provide safety advice? Is he the same person referred to in the Q&A session enroute to Bouvetøya as '....a professional film producer on board (who) is contracted (i.e., being paid) to make the video of the DX-pedition'. If so, does he carry professional indemnity insurance?

NCDXF, IDXA, GDXF, DX Engineering etc. and all other individual donors and sponsors deserve an explanation as to why 3YØJ came very, very close indeed to becoming a major disaster which could have easily involved serious injury, hypothermia, drownings or other fatalities and which without doubt would have rapidly escalated

into a major international rescue effort involving SANAP's\* Agulhas II icebreaker and/or the TAAF\*\* supply vessel, Marion Dufresne. Did the 3YØJ Leadership take out indemnity insurance to cover the enormous cost of such an eventuality?

To those who may retort or argue that the 3YØJ Team members were fully entitled to risk their own lives at Bouvetøya if they chose to do so; then what about the lives of those who may be obliged to come down to evacuate the victims of an accident or provide other assistance in perilous conditions? Are DX-peditions entitled to risk the lives of their possible rescuers as well?

Responding with an indignant 'We knew what we were doing, there were no injuries or any disasters and we made it back OK' is little more than vague obfuscation and is really not enough. The photos, videos and descriptive commentary on the 3YØJ Facebook page clearly demonstrate that most Team members were well out of their competency and comfort zones and at one stage at least, four of them were literally struggling for their very survival in the heavy surf at Cape Fie beach. In other words, there very nearly was a disaster.

#### **APPROVAL PROCESS & LANDING PERMIT STATUS**

Did Norsk Polarinstitut\*\*\* (NPI) simply notify 3YØJ that their scientific monitoring site at Nyrøysa was off-limits and then merely advise them to go find somewhere else to land, or did 3YØJ receive an official permit from the Norwegian Government to land by boat and set up camp at Cape Fie? If so, then why has it never been available for public scrutiny? (there's no copy of it on the 3YØJ official website).

The British, Australian New Zealand and French approval/permit processes for private expeditions wishing to visit their various Antarctic territories are extremely lengthy, onerous and strict for two very good reasons:

Firstly, these governments have no wish for members of the public to jeopardize their own well-being in any of their southern territories.

Secondly, they are somewhat reluctant to have to bear the enormous costs of a rescue mission. As a consequence, it is almost certain that Marama and its 3YØJ passengers would never have been permitted to enter any of their sub-



Antarctic territorial waters, let alone land on any of their islands.

It is reasonable to assume that Norway has a similar approval/permit policy in place that is at least as strict as those of the British etc. If so, one must wonder how official permission to land on Bouvetøya was obtained in the first instance.

The NPI Bouvetøya web page states that a permit is only required to enter Nyrøysa and that a permit is required to operate a helicopter anywhere on or around the Island. No mention is made of boat landings elsewhere on the Island; presumably because NPI considers a boat landing somewhere other than Nyrøysa to be so hazardous and difficult that nobody would ever be crazy or naïve enough to even try.

This therefore begs the question: Does the helicopter permit referred to on the 3YØJ website serve as 3YØJ's official landing permit for Cape Fie, even though there was never any plan to use helicopters? In other words, has a loophole in the Norwegian approval/permit process been exploited in this instance in order to give credence to the 3YØJ Operation and misrepresent landing permits to key stakeholders and to the ARRL DXCC desk for DXCC accreditation purposes?

Were 3YØJ's plans ever submitted for a full review and approval process by NPI and did the Norwegian authorities grant 3YØJ specific permission to land by boat and establish a camp at Cape Fie? If they did, then who was legally liable in the event of a mishap requiring a rescue mission? If they did not, then how can 3YØJ possibly be considered valid for DXCC purposes?

This is a critical point that requires urgent clarification for reasons obvious to any DXer.

## RISK MANAGEMENT

Attempting to scale back and get 3YØJ on the air with reduced capability after the near-miss incident of four men being stranded on the Island in on-going poor weather and rough sea conditions was a foolhardy and rash, if not downright reckless course of action. It is by sheer luck alone that this did not escalate into nine people being marooned on the Island for an extended period in very primitive and hazardous conditions indeed.

Again, who actually gave the go-ahead? The Polar Field Guide, the Team Leader(s) or the Marama skipper?

Credit where credit is due: 3YØJ succeeded where two previous and very well-organized DX-peditions had failed; they managed to actually land on the Island and get on the air, albeit with a considerably reduced RF capability. However, this scaling back can in no way be lauded as bravery or as some kind of admirable determination in the face of adversity for the 'DX cause'. It was little more than a naïve face-saving exercise, coupled with misguided bravado and sheer recklessness and the Team ought now to be reflecting on the wisdom of their decision-making process at the time and modifying their behaviour and imminent interaction with the DX Community accordingly.

There should be an honest and open debrief involving the broader DX Community on the genuine life-threatening risks the Team actually faced at Bouvetøya and what actions must be implemented in order to eliminate, or at the least mitigate, such risks for future (if any) activations.

In scaling back 3YØJ activity, safety considerations clearly continued to take a back seat as illustrated by continued ignorance of, or flippant disregard for, safety protocols as posted on 3YØJ's very own Facebook page.

For example:

Sat-phone/radio calls conducted standing atop a crevassed ice cliff, on one's own and without being roped up to a partner.

- Posing for group selfies directly underneath the base of rotting serac\*\*\*\* and slowly moving ice cliffs that are particularly prone to slumping or sudden collapse without warning.

- Striking a pose whilst standing on top of icecap randkluft+ or bergschrund + which can suddenly collapse under body weight, breaking a leg, or worse.

- Taking photos from near cliff edges where a sudden high wind gust can easily blow someone over the cliff edge and onto the rocks below.

- Passenger(s) ferried to Marama wearing only a life-jacket and no immersion suit.

- Passenger almost falling into near freezing water++ between Zodiac and Marama hull and narrowly avoiding being crushed between the two by the heavy swell.

- No second (safety) Zodiac in the water in case of man overboard or Zodiac capsize.

- Wearing cumbersome and restrictive immersion suits whilst working cargo in heavy beach surf instead of full boating dry suits and lifejackets.
- Wearing waders in heavy beach surf - a well-known method of committing suicide by drowning.

And so forth, most of which could have very easily resulted in serious injury or death.

## CONCLUSION

3YØJ was funded to the tune of several hundred thousand dollars, in large part by the international DX Community and corporate sponsors, so it is not unreasonable to highlight these alarming issues and to ask these questions and expect answers.

In light of these circumstances, it is respectfully suggested that the ARRL has little choice other than to revoke 3YØJ DXCC accreditation on the grounds of reckless endangerment of life and limb if they wish the integrity and prestige of their DXCC Program to be maintained. Failure to do so is likely to be interpreted by many within the DX Community as ARRL complicity in encouraging and perpetuating unacceptable risk-taking in future DX-peditions to Bouvetøya and other similar hazardous locations.

In addition, future Bouvetøya DXCC accreditations must be limited to operations associated with bona fide government scientific visits only, such as 3YØC and 3YØE. DX-peditions to Bouvetøya without the safety net provided by a government supply vessel or icebreaker are demonstrably far too hazardous and should therefore no longer be allowed for DXCC credit.

Otherwise simply delete Bouvetøya from the DXCC list altogether before some aspiring DX Hero gets seriously injured or killed and the ARRL Board and DX Community end up with blood on their collective consciences. It is about time that the ARRL accepts this reality and adjusts its policies accordingly.

The same rationale applies to 3Y/Peter 1st Island, and to a lesser extent, VP8/h South Shetlands & VP8/o South Orkneys.

In any case, these three rare DXCC entities are below 60° South latitude and have therefore been subject to the Antarctic Treaty since 1960. All three should therefore have been added to

Antarctica CE9 VP8 KC4 etc. and deleted as separate DXCC entities decades ago.

3YØZ and 3YØI both demonstrated at great expense just how difficult and dangerous it can be just getting to Bouvetøya, let alone landing there. 3YØJ has now spent a lot of their own and an even greater amount of Other Peoples' money to demonstrate to the world that a private DX-pedition in general is not capable of safely establishing a secure and comfortable DX-pedition camp at Cape Fie by beach landing.

Sure, 3YØJ proved by misguided determination that it could be done if you turned a blind eye to safety protocols and could hack being very cold and very uncomfortable for several days at a time. However, if you can't be safe and reasonably comfortable whilst sat in front of a radio, squeezing the paddle and tapping the keyboard, then why bother in the first place? Indeed, who in their right mind would ever want to pay thousands of dollars of their own money to try doing this kind of thing again?

By all means, go play radio and be a DX Hero in the Caribbean, Jan Mayen, Svalbard or wherever else where there are well-established support facilities and Search & Rescue capabilities, but private DX-peditions should stay away from those little specks of land in the vast Southern Ocean unless they have several polar veterans onboard who know exactly what they're doing and are able to keep an eye on the sub-Antarctic novices and rookies.

Yes, I know from personal experience that these little specks of Antarctic and sub-Antarctic rock & ice can be very beguiling and tempting DX jewels indeed, but what we don't ever want to see are the bodies of DX Martyrs floating face-down in the cold swell of the South Atlantic or the legs and feet of some unfortunate DXer sticking out from beneath several tons of collapsed ice cliff or serac on Cape Fie beach.

Whilst in the short term, 3YØJ may be considered by some as a modest success in that a few thousand ATNOs were given out to the lucky and deserving few etc., it has unfortunately done the DX Community a far greater disservice in the long term.

Once the various sub-Antarctic government authorities learn of the four 3YØJ Team members being stranded on Bouvetøya without adequate

food & shelter, they won't be issuing any more landing permits to anyone, least of all DX-peditions. As a consequence, the DX Community may as well forget any future activations from Peter I Island, South Georgia, Kerguelen, Heard Island, Auckland Island etc. because chances are, they're now never going to happen.

I have no desire to be a kill-joy in this wonderful hobby of ours and I take no pleasure whatsoever in being the author of this open letter, however somebody has to point out the 'Elephant in the Room' sooner or later. Somebody has to initiate some rational, dispassionate and objective thinking as to how the DX Community manages and supports similar hazardous activations in the future.

I have witnessed many injuries, several medical evacuations, and sad to say, a few fatalities during my varied professional career in the Antarctic and sub-Antarctic. It would therefore be remiss of me and personally unconscionable if I were to just shake my head in dismay and disbelief at this latest alarming episode of 'The Bouvet Show' and maintain a diplomatic silence for fear of upsetting the egos of a few well-known DX celebrities or being trolled by their supporters.

Truth be known, if Bouvetøya were not on the DXCC list then the vast majority of DXers would have difficulty pointing it out on a map, let alone want to go there to set up an amateur radio DX station.

It's time to acknowledge and accept that cashed-up, amateur hobbyists with well-intentioned but oft-times misguided enthusiasm are not the rugged Antarctic explorers or heroes of yore, nor are they a realistic representation of today's "Ham Spirit". The DX Community needs to address this issue as a matter of some priority and apply broader principles of responsibility and societal well-being to the world of DX and DX chasing.

In a nutshell: It's time for the 'Bouvet Show' to come to an end before someone gets killed.

Finally, I am well aware that this letter is going to be controversial and liable to make me very unpopular indeed within some quarters of the worldwide DX Community.

However, I would remind everyone that I am not the 'Elephant in the Room' here; I am merely the person who has recognized the Elephant and

pointed it out to everyone else, so it serves little purpose to make me the focus of any vituperative response or general abuse regarding the matter.

Sincerely,

Alan Cheshire BSc MRGC GDipIT MInstP MIET MIEEE

VK6CQ VKØLD VP8PJ 9VØA, ex-VKØMM etc.  
Former British Antarctic Survey Radio Officer and Australian National Antarctic Research Expeditions Senior Communications Technical Officer.

Perth, Western Australia, 25 February, 2023.



#### Notes:

\* SANAP: South African National Antarctic Program

\*\* TAAF: Terres Australes et Antarctiques Françaises (French Southern and Antarctic Lands)

\*\*\* Norsk Polarinstitut: Norwegian Polar Institute, Oslo. The Norwegian government authority responsible for Bouvetøya

\*\*\*\* Serac: Large blocks of ice that have detached from the snout of a glacier or ice cliff  
+ Types of empty voids found at rock/ice boundaries caused by the warmer rock melting the ice from beneath. In most cases, they are not immediately obvious to the eye from the surface.

++ Water temperatures around Bouvetøya hover around -1 to +1 Centigrade in the sub-Antarctic summer months and without an immersion suit, mean survival time in the water is measured in minutes, not hours. Sudden full-body immersion into such temperatures minus an immersion suit is a common cause of cardiac arrhythmia and/or Sudden Cardiac Death at any level of fitness. Sea water freezes at around minus 2.2 Degrees Centigrade, depending on salinity.

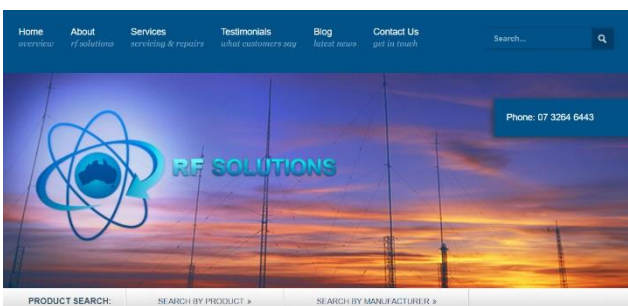




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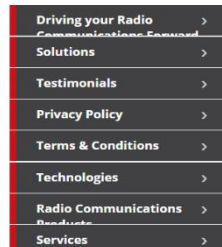


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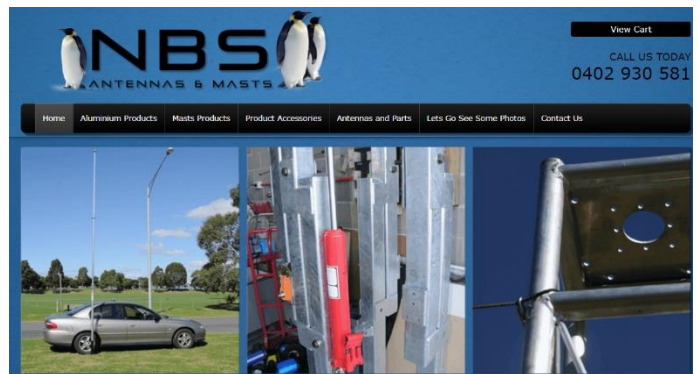
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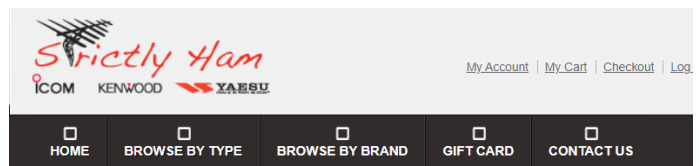
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