



Illawarra Amateur Radio Society

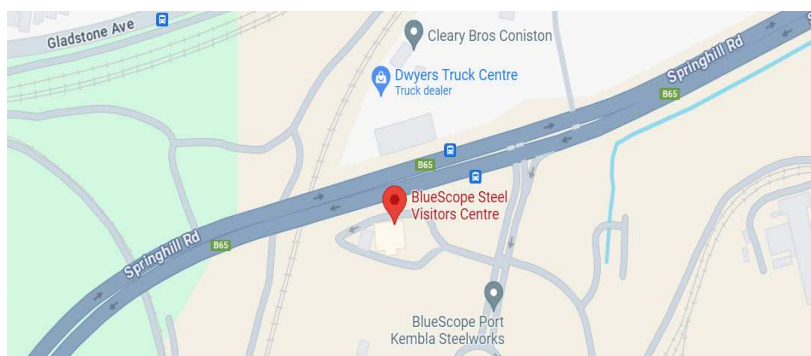
Propagator December 2025

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Upcoming Meeting on the 9th December 2025

The next meeting will be at the Blue Scope Steel visitors centre 7.30pm

Blue Scope Northgate entrance off Springhill Road (See website for detailed map)



VK2RUW (Knights Hill)
34.6231° S, 150.6942° E
QF55IJ



AMATEUR RADIO IN THE ILLAWARRA SINCE 1948



VK2RMP (Maddens Plains)
34°15'30.6"S 150°56'47.4"E
QF55LR



VK2AMW



Our last meeting 11th November 2025



Trivia Night Strikes Again at IARS!



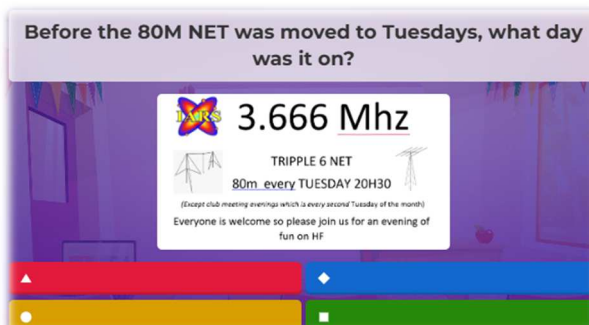
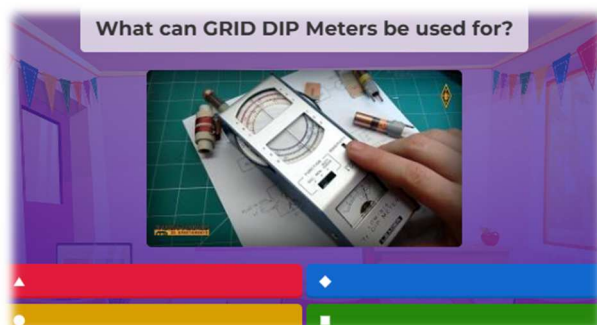
The ultimate test of knowledge made its grand return, and things got *intense*! From white-knuckle tension to the thrill of chasing the trivia crown, IARS members had a blast proving their grey matter is still firing on all cylinders.

With a shiny **NANO VNA** up for grabs, the competition was fierce and the banter even fiercer!

A huge **congratulations to Mark VK2MDS (St George ARC)**, who showed he's still got the brains *and* the lightning-fast reflexes to match—snapping up victory in **Fastest Finger First!** 🍌



Ready to Rumble, Nano VNA up for grabs , David KQY chatting to Steve BGL, Troy FHTW and Adam AEV



Easy questions but who has the fastest finger 😊 , that's what counts!



Getting ready for Snowball, Roger VRK with Simon KU discussing the new APRS and some nice refreshments

A great evening had by all

The “Empty” Disposables Table 🤔

With the IARS auction freshly wrapped up and the Picton Ham Fest just around the corner, it seems the table was a bit bare this week — almost as if the Grinch swung by and whisked everything away, leaving not even a crumb for a mouse!

Let's see what goodies the next meeting brings to the table! 😊

SNOW BALL

For \$5 you can earn some good cash, and all monies go to your society, win-win.

As usual see Simon VK2KU, the fella with the coloured balls and big smile



The Snowball number 33 was drawn and belonged to David VK2LDW, unfortunately for David he was not at the meeting and lost out, which was disappointing because David is a long time snowball player and it would have been nice to see a bit of cash going his way. The Snowball has snowballed, what does that mean? More cash in the kitty for you to take home at the next meeting. Because it is our Christmas draw, we will keep drawing until it gets won !!!!! extra Christmas cash to add towards your next radio

NEXT Meeting.....



Christmas Meeting with SHOW & TELL



It's our final meeting of 2025!

We're wrapping up the year in the best way possible, with **another legendary Pizza Night!**
Come hungry, because there'll be plenty of slices to go around, plus **soft drinks** to keep things bubbly.

For a bit of fun, we're bringing back **Show & Tell!**
Bring along your latest project, gadget, or creation and show us what you've been working on, we can't wait to see it!

And to wind down the evening, we'll have **tea, coffee, and biscuits** for a cozy finish.

Let's make this last meeting of the year one to remember!

There is No meeting or Propagator for January

The IARS Flying Gang



The Flying Gang is a volunteer team to support IARS members who are unable to install or repair their antenna systems due to age, injury, or other limitations. Many members are finding it increasingly difficult to stay active on the air—especially when antennas are damaged by storms or when new systems need to be installed. If you need assistance, simply reach out to the team using the email addresses listed below. We'll coordinate with you to provide the help you need.

The flying gang team members REACH OUT!!!!!!

Simon VK2XQX, Simon VK2KU, Keith VK2KQB, Adam VK2AEV, Phil VK2CPH, Tony VK2TS, Mal VK2DXM

If you need help from the team, please contact us using any one of the emails below.

iars.keithb@gmail.com ; iars.simonr@gmail.com ; simon.ferrie3@det.nsw.edu.au

Other contacts like phone numbers are on the club website at https://www.iars.org.au/?page_id=29



A Big Shoutout from John VK2XGJ!

John wants to send a massive *thank you* to the **Flying Gang** for swooping in and lending their expert hands! The crew pulled off some awesome work, setting up an 80m dipole, bringing a 2m Yagi back to life, and giving a few vertical antennas the TLC they deserved. You're very welcome, John! 😊

And a special nod to **Adam VK2AEV** for capturing all the action 📷 — though somehow *he* managed to dodge every photo this time. Don't worry, Adam... next round, we'll make sure to catch you *in the frame* (preferably mid-sweat and mid-solder)! 😊

Licensing and upgrades?



The IARS **can help** with obtaining your Foundation, upgrading to Standard or Advanced from *the comfort of your own home*, and its **FREE!!!** *

We have approved ACMA assessors that can offer remote or face to face assessments for the **ACMA**

Please contact Keith VK2KQB at iars.keithb@gmail.com for further information on training and assessments.

Your society supports further learning, please find out more on how we can help you.

This year the IARS has already assisted in getting 12 new amateurs licenced, is it your turn next?

YES!!

The IARS is helping Amateur Radio grow in Australia!!! We have exceeded our quota for the year



**Australian
Communications
and Media Authority**

If you would like to find out more about amateur radio upgrades, here are some handy links to help.

<https://www.acma.gov.au/qualifications-operate-amateur-radio>

<https://www.acma.gov.au/amateur-radio-resources>

<https://www.acma.gov.au/amateur-radio-accredited-assessors>

<https://www.acma.gov.au/amateur-radio-licences>

<https://www.acma.gov.au/technical-details-amateur-radio-licences>

<https://www.acma.gov.au/amateur-radio-operating-procedures>

<https://www.acma.gov.au/amateur-radio-call-signs>

<https://www.acma.gov.au/amateur-class-licence>

<https://www.acma.gov.au/amateur-radio-related-fees>

IARS NETS



1. Saturday Morning, the EAST COAST NET hosted by Steve VK2BGL at 9.30am

You are invited to join Steve every **Saturday at 9.30am** on our **146.850MHz** repeater (linked to 146.675MHz) or **VK2BGL-R** on Echo-link for a very enjoyable morning of general discussions from amateurs who log in from all over the world. This NET is linked to multiple repeater systems including VK2RFS south coast.

Join Steve and everyone for a very enjoyable 2 hours on Saturday morning.

The IARS would also like to thank Doug VK2XLJ and Angelo, VK2NWT who are is always willing to assist whilst Steve is away.

2. **IARS Tuesday evening weekly 80m NET on 3.666MHz at 8.30pm hosted by Mal VK2DXM using VK2AMW.**
Every Tuesday evening, (except the second Tuesday of the month) for a great get together on 80m. Signal reports, news and general discussions are the agenda. Normally runs for around 60minutes.

3. **IARS Wednesday evening weekly 6m NET, 8PM on 53.650Mhz with a – 1Mhz offset Hosted by Geri VK2UTE or Simon VK2XQX, (123Hz CTCSS tone enabled due to interference) Maddens plains 6m Repeater**
General discussions about building antennas for 6m, transceivers and what else comes to mind, this net is normally between 30 and 60minutes.

4. **IARS Thursday evening weekly 10m NET, 8PM on 28.466Mhz +/- for QRM/QRN Hosted by Tony VK2TS**
General discussions about building antennas for 10m, transceivers and what else comes to mind, this net is normally between 30 and 60minutes.

5. **IARS Friday evening weekly 70cm NET , 8PM on 438.675MHz ** with – 7MHz offset (No CTCSS required) Hosted by Rob VK2XIC**
General discussions keeping the repeaters in work, *“If we don’t use it, we may lose it “*

IARS REPEATERS



VK2RUW (Knights Hill)

VK2RMP (Maddens Plains)

146.675 MHZ >>>>

[linked](#)

<<<<

146.850 MHZ

Current Repeater STATUS

- 439.675 with a – 7MHz offset, C4FM Enabled. **OK – On Air**
- 147.275 with a + 600kHz offset NO CTCSS, C4FM enabled **OK – On Air**
- 146.850 with a – 600kHz offset (linked to 146.675) NO CTCSS **OK– On Air**
- 146.675 with a – 600kHz offset (at Knights Hill, linked to 146.850) NO CTCSS **OK– On Air**
- 53.650Mhz with a – 1Mhz offset (123Hz CTCSS tone enabled due to interference) **OK– On Air**
- 438.725Mhz with a -5mHZ offset DMR only, **OK – On Air**
- 1296.850Mhz Experimental Beacon/Simplex repeater, Maddens Plains **OK – On Air ***
- Echo-link VK2MT-R via 146.850MHz also linked to 146.675MHz and VK2BGL-L **OK**
- APRS DIGI-PEATER on 145.175MHz **OK– On Air**
- PACKET 2M on 147.575Mhz **OK– On Air**

The IARS welcomes any feedback on our repeater systems.

Please send all your feedback to iars.keithb@gmail.com and it will be passed on to our repeater team.

If the repeaters are silent, why not just give out a call, who knows who may be on the other end of the tower.

Latest Repeater Report:

All systems A-OK

* Note, this will be changing to 1.293 800 GHz Simplex soon, however, plans are in place for it to become a Full Duplex repeater system, before the year end 2025. (Funding dependant)

Without being presumptuous, we **may** have an answer to the strange issues happening on the 6m repeater.

There is a small article dedicated to this phenomenon that was highlighted by John VK2AAL at his recent 83rd Birthday party. Fingers crossed this is the problem 😊 Check out **tech corner** in this month's propagator edition



LOOKING FOR SOMETHING to SWAP, BUY, SELL, an OLD PART

Parts you may need for repairs or some radio gear you no longer need that could go to a new home.....?

Email iars.keithb@gmail.com

Electronic component and service suppliers



<https://jlcpcb.com>



<https://au.element14.com>



<https://au.rs-online.com/web/>



<https://au.mouser.com>



<https://www.digikey.com.au>



<https://www.minikits.com.au>



<https://core-electronics.com.au>



<https://www.elitecommunications.com.au>



<https://littlebirdelectronics.com.au>



ATR
Amateur Transceiver Radio Supplies

<https://amateurradiosupplies.com.au>



<https://bncom.com.au>



YAESU Sales and repairs <https://www.vkradio.com.au>



<https://dxing.com.au>



<https://www.telcoantennas.com.au>



<https://www.altronics.com.au>



<https://www.jaycar.com.au>

If you know of a good supplier of electronic stuff or services 😊, please share it with us so we can all benefit.

Send information to iars.keithb@gmail.com and we will publish it in the next propagator.

TWR Technology

Radio Communications Equipment & Service

If Carlo Russo isn't busy turning your car into a top-tier amateur radio command centre, he's out there leveling up the IARS mission with some seriously impressive tech!

A huge shoutout to Carlo Russo from TWR for his awesome generosity, he's donated a brand-new 4G Teltonika Rugged Industrial Modem to power up our latest APRS project.

Thanks for keeping us connected and moving forward, Carlo!



Not only is Carlo the owner of TWR Technology but he is also the local ICOM dealer, right here in the Illawarra.

If you need an ICOM rig (to buy from your Snowball winnings 😊) and a real no worry professional installation done by someone who has years of experience, then you know who to contact. Carlo will make sure you get the best deal, and if it is a mobile rig, he can install it for you at the same time. The two installations he has done for VK2KOB have been awesome!

All we must do now is convince Carlo that he needs to become an amateur radio operator! Who's with me ?

Please let's support local business, Carlo's email address is carlo.twr@gmail.com

[illegible]

<https://bncom.com.au>

Another thanks goes out to BN Com, they have kindly donated a brand-new antenna for the club to raffle at the upcoming Picton Ham fest. All proceeds to go to the IARS!!! Thank you BNCom.



Share it with us, this could be suggestions, technical ideas, circuit diagrams, IARS community projects, pictures of your latest shack project, in fact **ANYTHING of interest**

Let us know by return email iars.keithb@gmail.com

Receiver Desensitisation Phenomenon

Caused by

Precipitation Static



A recent struggle with our 6m repeater almost had the repeater crew checking in to the local looney bin. Signals would be perfect until a large rainstorm came over the transmission tower area at Maddens Plains, wiping all the low end 6m signals off the map, until the storm passed. The first thought was water in the antenna; well this was not plausible for two reasons. One, the antennas are multiplexed and each antenna operates three other services which were all working, secondly the signals would return almost immediately once the rain clouds dissipated.

The second thought was that the heavy rain was absorbing the signals, however, this was discounted due to the fact 50MHz propagation **does not** really get affected by heavy rain.

I must re-emphasize that the equipment was thoroughly checked, over and over and over and over again, no faults found.

Just before we checked into the looney farm, a birthday get together at John VK2AAL's QTH got us chatting about this unusual issue. Although John is currently struggling with his mobility, this problem didn't miss the enormous RF experience that John had up his sleeve. After a few moments a smile on John's face said it all, "[I have the answer, participation static!](#)"

Everything after that made perfect sense except for the words "Precipitation Static". Further research has vindicated what John's thoughts were..... so what is this phenomena called "Participation static", this is what we found

Static charges from heavy wind and rain can affect receivers by creating a noise floor that overwhelms or "desensitizes" the receiver, causing it to be less sensitive to weaker radio signals. This happens because charged particles in the atmosphere, such as raindrops or dust, strike the antenna, creating an impulse of broadband noise that can increase the noise level by 20-30 dB or more. Of course it does not help that we have fibreglass verticals as the antenna choice, as fibreglass antennas make it worse.

How it happens

- **Precipitation static:** Electrically charged particles in the atmosphere (raindrops, dust, etc.) collide with the antenna, causing a sudden electrical impulse. This creates broadband noise, a type of electromagnetic interference (EMI), which is often called "precipitation static".
- **Corona discharge:** Similar to precipitation static, corona discharge is another form of atmospheric electrical noise that can interfere with radio signals.

- **Receiver desensitization:** The broadband noise from these static events raises the overall noise level in the receiver. When the noise level gets too high, the receiver can no longer effectively detect the desired, weaker radio signals, a phenomenon known as desensitization.

Why it affects the receiver

- **Noise floor:** All receivers have a baseline noise floor. The static from weather events pushes this noise floor higher, making it harder for the receiver to distinguish a real signal from the background noise.
- **Impact on reception:** This effect is more pronounced for weaker signals, which are the first to be drowned out by the increased noise. This can lead to dropped connections, reduced range, and other reception issues. Sound familiar?

How do we solve this problem?

Well the easiest way is to suck it up and just know that when heavy rain and wind crosses over the tower, we switch off the radio and off to the kitchen to make a cup of coffee, or change bands until the storm passes.

Or

Believe it or not but there are companies who build participation static dischargers which have been developed from aircraft applications. Static wicks for towers and antennas are designed to reduce radio noise caused by corona discharge and precipitation static. Improvements as great as 40dB have been noted.

An article written by Michael E. Norton explains how participation static comes about (for all the technical boffs 😊)

The ions and electrons are distributed within the ionosphere in layers of various altitudes and degrees of charge. In contrast the earth has surplus electrons. Its charge approximates 300,000V to 400,000V negative compared to the ionosphere. This potential difference together with the atmosphere's total conductive qualities is sufficient to cause the earth to lose electrons to the ionosphere continually. The entire surface and ionosphere may be oppositely charged plates of a vast capacitor with a leaky air dielectric. Along with ions that make the air slightly conductive, meteorological processes contribute to the earth-ionosphere "capacitors" leakage. The hydrologic cycle precipitation falling rain, for example tends to drop larger, less mobile ions toward the earth in moisture laden updrafts. Thus, most of the electrons are discharged at natural and man-made points such as peaks, trees buildings, towers and antennas that project into the air.

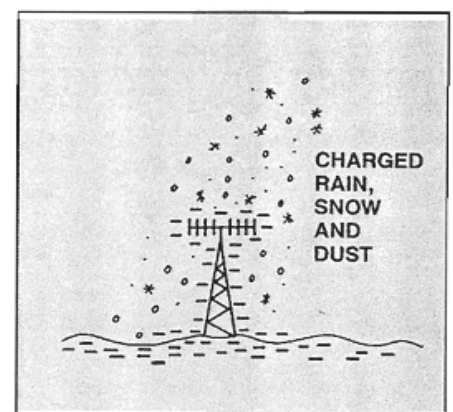


Figure 1. Electrically charged particles, such as raindrops, snow and dust, strike an antenna's tower, boom or elements and induce a current impulse that produces broadband noise. The noise is called precipitation static.

When electrically charged particles such as raindrops, snow and dust, strike an antenna's tower, boom or elements, they induce a current impulse that produces broadband noise (See figure 1 above) This noise is called participation static. It generally is defined to include all external atmospheric electrical effects that produce Electromagnetic Interference. This phenomenon is long known to cause HF interference. Although not particularly prominent, its effects—while not especially problematic—have been documented to occur on the VHF and UHF bands.

Summary: We will be investigating the installation and use of devices that could possibly solve our PS problem, keep an eye out in future propagators for updates into this issue.

Sodium as a Green Substitute for Lithium in Batteries?

Interest in developing batteries based on sodium has recently spiked because of concerns over the sustainability of lithium, which is found in most laptop and electric vehicle batteries.



So the age old question “Are we there yet?”

In the 1870 novel *20,000 Leagues Under the Sea*, writer Jules Verne imagined a submarine powered by sodium batteries. That idea has resurfaced, as several battery companies have begun manufacturing sodium-ion batteries as greener alternatives to lithium-ion batteries. Sodium is just below lithium in the periodic table of the elements, meaning their chemical behaviours are very similar. That chemical kinship allows sodium-ion batteries to “ride the coattails” of lithium-ion batteries in terms of design and fabrication techniques. Recent demonstrations of sodium-ion batteries both for power tools and for automobiles have highlighted the rapid progress in the technology.

“Sodium-ion technology is really a clone of lithium-ion technology,” says Jean-Marie Tarascon from the College of France, who has worked for 35 years on battery technologies. Development of sodium-ion batteries has lagged behind that of lithium-ion batteries, but interest in sodium has grown in the past decade as a result of environmental concerns over the mining and shipping of lithium and its associated materials. Sodium is 1000 times more abundant than lithium, potentially reducing supply chains and lowering battery costs, Tarascon says. Other advantages of sodium-ion batteries include high power, fast charging, and low-temperature operation.

But there are also downsides to sodium-ion batteries, the top one being a lower energy density than their lithium-ion counterparts. Energy density has a direct bearing on the driving range of an electric vehicle, which means that sodium-powered cars may have trouble appealing to consumers who want a large vehicle that can go long distances. Lower energy density also affects the overall environmental impact of sodium-ion technology because more batteries are needed to supply the same amount of energy as the corresponding lithium-ion technology.

However, sodium-ion batteries are still improving, says Shirley Meng from the University of Chicago, who has been working on battery technology for 20 years. She says that the recent release of sodium-ion-powered products will accelerate development, as engineers will have data from real-world situations. “I have no doubt that the best sodium-ion batteries will work as well as lithium-ion ones in less than 10 years,” Meng says.

Sodium-ion batteries are not new. Lithium and sodium systems were equally studied up until the 1980s. Interest in the two technologies diverged when researchers began to make breakthroughs in lithium-ion batteries. By the 1990s, research on sodium-ion batteries had largely halted. But some, including Tarascon, kept dabbling in the technology, even as they developed lithium-ion systems. In 2012, Tarascon helped relaunch sodium-ion research in France. His reasoning was that sodium appeared more sustainable. “It became obvious, to me at least, that the green technology would have a place in the future,” he says.

However, sodium and lithium atoms have differences, two of which are relevant for battery performance. The first difference is in the so-called redox potential, which characterizes the tendency for an atom or molecule to gain or lose electrons in a chemical reaction. The redox potential of sodium is 2.71 V, about 10% lower than that of lithium, which means sodium-ion batteries supply less energy—for each ion that arrives in the cathode—than lithium-ion batteries. The second difference is that the mass of sodium is 3 times that of lithium.

Together these differences result in an energy density for sodium-ion batteries that is at least 30% lower than that of lithium-ion batteries. When considering electric vehicle applications, this lower energy density means that a person can't drive as far with a sodium-ion battery as with a similarly sized lithium-ion battery. In terms of this driving range, "sodium can't beat lithium," Tarascon says.

The energy density is also a problem when considering the overall environmental impact of a battery. Weil and his colleagues performed a comparison of sodium-ion batteries to lithium-ion batteries, looking at a number of environmental factors such as greenhouse gas emissions and resource usage.

Although sodium-ion batteries do not require as many of our planet's limited resources, they currently release more greenhouse gases during production than an equivalent energy's worth of lithium-ion batteries. The reason is that larger quantities of materials need to be processed into batteries to produce the same amount of energy. Weil says that this report provides a current snapshot, and in time, the environmental impact of sodium-ion batteries will likely improve. "We are convinced that they could have an even better overall performance than present lithium-based systems," he says.

	Crustal abundance (ppm)	Energy density (Wh/kg)	Lifetime (cycles)	Greenhouse gas emissions (kg-CO ₂ /kWh)	Resource usage (g-Sb/kWh)
Lithium	20	100–300	1000–5000	45–50	30 ↗
Sodium	24000	100–160	4000	55–90	5–35 ↘

A comparison of lithium-ion and sodium-ion batteries. From left to right the columns show abundance of lithium and sodium in Earth's crust (in parts per million), energy density (in watt hours per kilogram), battery lifetime (in number of charging cycles), greenhouse gas emissions from battery production (in equivalent kilograms of carbon dioxide emissions), and resource usage (in equivalent grams of the element antimony, based on a calculation that accounts for all of the abundances of the batteries)

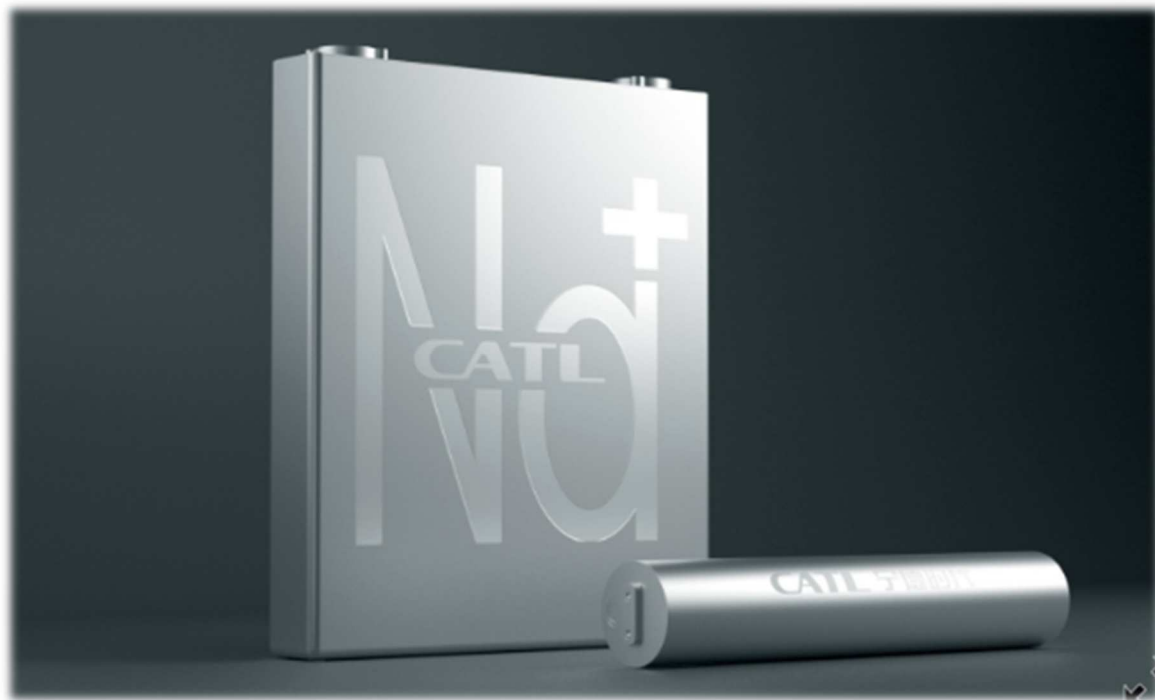
There are other differences between the two elements, some of which work in sodium's favor. For example, sodium ions can travel faster through the battery materials than lithium ions, which might seem counterintuitive, given that sodium is heavier. Tarascon explains that a sodium ion has a diffuse electron cloud that allows it to slip between atoms more easily than a lithium ion, with its highly concentrated charge. The faster motion of a sodium ion can lead to higher power and faster charging in sodium-ion batteries.

The current playbook for designing sodium-ion batteries resembles that of lithium-ion batteries. For the anode, most designs use "hard carbon," which is like the graphite in lithium-ion batteries. The cathode options can be divided into three families of materials (metal oxide layers, polyanionic compounds, and Prussian blue analogs) that resemble those used for lithium. And the electrolyte is a similar cocktail of organic solvents.

Several research teams have tried to create sodium-based layered oxides for the cathode in an attempt to generate the high energy density that these compounds give lithium-ion batteries. Tarascon and his colleagues have taken a different strategy.

They targeted a polyanionic compound—sodium vanadium fluorophosphate—as it seemed to be a promising material for making a high-power battery. And it appears that the bet paid off: last year Tiamat, a company for which Tarascon is a scientific advisor, produced a sodium-ion battery that is the first to be used in a commercial product—not a vehicle but a cordless power drill. The battery can charge in less than five minutes and can last a long time (over 5000 cycles), according to the company's website.

Several large battery manufacturers have also announced sodium-ion projects that target the electric vehicle market. For example, CATL, a large Chinese battery company, announced last year that its first-generation sodium-ion battery—with an energy density of 160 Wh/kg—will be placed in an electric vehicle from the Chinese company Chery Automobile. Similar deals have recently been announced by the battery manufacturers HiNa and Farasis Energy, and several sodium-ion-powered vehicle prototypes have recently rolled off the assembly line. Meng calls these developments “very encouraging” as the companies will be collecting data under real-world driving conditions. “That information is vital for making the batteries better,” she says.



It may take some time before sodium-ion powered electric vehicles are widely available. One hurdle is economics. “The price of lithium has returned to a relatively low level, which makes sodium-ion batteries less competitive,” says a spokesperson from CATL. Moreover, they say, the lower energy density of sodium-ion batteries means the first target market will likely be smaller cars and two-wheeled vehicles.

In time, sodium-ion batteries will improve, but their driving range will never surpass the top-of-the-line lithium-ion batteries, Tarascon says. He imagines instead that sodium-ion technology will fill specific niches, such as batteries for smaller, single-person electric vehicles or for vehicles that have a range of only 30–50 miles (50–80 km). Weil agrees, but he says that society may have to change the way it views automobiles.

“We cannot only point to the technology developers and say, ‘We need more efficiency.’ It’s even more important to stress that we need more ‘sufficiency,’ which is people being satisfied with a small car,” he says.

But whether sodium-ion or lithium-ion batteries come out on top, the world needs more battery-technology options if it is to reduce fossil-fuel consumption and combat climate change, Meng says. “If we always dream that one day a magic molecule is going to enable us to store solar and wind and use electricity when we need it, then I’m afraid that we will miss the golden opportunity to actually make some positive change.”

—Michael Schirber

Michael Schirber is a Corresponding Editor for *Physics Magazine* based in Lyon, France.



CTCSS , old tech- Yes, still around- Yes, leaving us anytime soon - No way Jose'

Most modern radios have built in CTCSS codes which stands for **Continuous Tone Coded Squelch System**.

The system filters transmissions to permit communication only between users who share the same tone while reducing interference from others using the same frequency.

CTCSS stands as the correct name but manufacturers give this feature different proprietary titles.

- Motorola: "Private Line (PL)"
- GE/Ericsson: "Channel Guard"
- E.F. Johnson: "Call Guard"
- RCA: "Quiet Channel"
- Different manufacturers refer to this feature alternatively as "tone squelch," "privacy codes," or "interference eliminator codes."

The fundamental technology does not change regardless of how it is branded.

How Does CTCSS Work?

Your radio receives transmissions based on sub-audible tones that CTCSS technology utilizes. The tones used in CTCSS operate between 67.0 Hz and 250.3 Hz which falls below human hearing capabilities because the audible range starts at 300 Hz so these tones remain silent when played through the radio speaker. Operators using CTCSS-controlled radios will hear transmissions when their device settings match the transmitted tone because the radio sends this tone during all conversations.

Why Use CTCSS?

CTCSS reduces the distraction of overhearing irrelevant conversations on shared frequencies in busy radio environments including events or public service operations. CTCSS technology allows your group to communicate more directly because other radios can still pick up your transmissions when using the same tone but does not provide complete privacy.

The Technical Side of CTCSS

CTCSS tones are called sub-audible but they are actually audible since they travel as part of your radio's transmission at frequencies under 300 Hz. The built-in filter of the radio eliminates audio signals below 300 Hz which prevents users from hearing the tone. Only a very small signal is needed for the circuitry to detect the tone and open the squelch. The transmitter sends an encoded tone during transmission while the receiver decodes this tone to unmute the speaker which facilitates communication flow.

CTCSS successfully reduces channel interference among shared radio channels but falls short in delivering genuine privacy protection. All individuals who know the tone you are using can listen to your conversations. CTCSS proves to be an effective solution for crowded radio channels where interference poses a greater threat than privacy concerns.

Part 1		Continuous tone coded squelch system			
67.0 Hz	79.7 Hz	94.8 Hz	114.8 Hz	141.3 Hz	167.9 Hz
69.0 Hz	82.5 Hz	100.0 Hz	118.8 Hz	146.2 Hz	173.8 Hz
71.9 Hz	85.4 Hz	103.5 Hz	123.0 Hz	151.2 Hz	179.9 Hz
74.4 Hz	88.5 Hz	107.2 Hz	131.8 Hz	156.7 Hz	186.2 Hz
77.0 Hz	91.5 Hz	110.9 Hz	136.5 Hz	162.2 Hz	192.8 Hz

Handy On Line Calculators

Send us your favourite handy calculator link so we can post it here!



Ladder line calculator www.smrcc.org.uk/tools/OpenWire.htm

Cavity Filter designer https://www.changpuak.ch/electronics/Coaxial_Tank_VHF_Filter_Designer.php

Cavity resonance calculator https://learnemc.com/ext/calculators/cavity_resonance/index.html

COAX LOSS Calculator <https://kv5r.com/ham-radio/coax-loss-calculator/>

Impedance <https://www.omnicalculator.com/physics/rlc-impedance>

Wavelength <https://www.omnicalculator.com/physics/wavelength>

PI attenuator values <https://www.omnicalculator.com/other/pi-attenuator>

Xc <https://www.omnicalculator.com/physics/capacitive-reactance>

XL <https://www.omnicalculator.com/physics/inductive-reactance>

Cut Off <https://www.omnicalculator.com/physics/cutoff-frequency>

VSWR <https://www.omnicalculator.com/physics/vswr-voltage-standing-wave-ratio>

LM317 Regulator resistor selector <https://www.omnicalculator.com/other/lm317>

Resistor Colour code calculator..... <https://www.digikey.com.au/en/resources/conversion-calculators/conversion-calculator-resistor-color-code>

Resistor Heat rise <https://calculator.academy/resistor-heat-calculator/>

Volt Drop Calculator AC and DC <https://www.rapidtables.com/calc/wire/voltage-drop-calculator.html>

Helix antenna calculator <https://sgcderek.github.io/tools/helix-calc.html>

Parabolic dish calculator <https://www.everythingrf.com/rf-calculators/parabolic-reflector-antenna-gain>

We are looking for more handy on-line calculators, if you have one that isn't listed above, please share with us so that more amateur radio enthusiasts can benefit 😊

OR

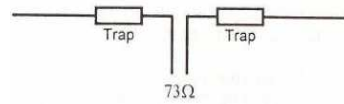
If you have any links to handy hints or information, please send it to us!



How many of these can you still answer correctly?

Q1. In the 3.5 and 7 MHz trapped dipole antenna shown, the impedance of the traps should be?

- A. Higher at 7MHz than 3.5 MHz.
- B. Equally high on both frequencies.
- C. Very low at both frequencies.
- D. Higher at 3.5 MHz than 7 MHz.



Q12. A balanced transmission line feeding RF energy to a match, balanced load will radiate very little RF energy because:

- A. The outer conductor shields the field between conductors.
- B. The currents in each conductor are, at any point, equal and opposite.
- C. There is too much capacitance between the conductors.
- D. In a matched condition the conductors carry no RF energy.

Q13. An electrical quarter wavelength of transmission line is short-circuited at its far end. The impedance at the input will appear to be:

- A. A high resistance.
- B. Capacitive.
- C. Inductive.
- D. A low resistance.

Q14. A radio wave which has followed the most direct path between transmitter and receiver is said to have travelled by:

- A. Multi-hop propagation.
- B. F2 reflection.
- C. Low radiation angle.
- D. Short path.

Q15. The expression relating the absorbing ability of the D layer to a particular frequency is the:

- A. M.U.F.
- B. A.L.F.
- C. F.O.T.
- D. O.W.F

Q17. High power transmitting equipment in perfect working order may create harmonic interference due to:

- A. A broadcast receiver having a high pass filter.
- B. Non-linear elements in the antenna system.
- C. Linear electrical elements in the antenna.
- D. Poor SWR condition in the feed line.

Answers next propagator 😊

Answers to the last propagator questions ... Q1 = C ; Q2 = B; Q3 = D ; Q4 = C; Q5 = C ; Q6 = D

How well did you do, will you still pass the Amateur Radio test?



OLD
PROPAGATOR
MEMORIES

THE PROPAGATOR

NO 12/77

DECEMBER 1977

NO12/77

THE MONTHLY NEWSLETTER OF THE
ILLAWARRA AMATEUR RADIO SOCIETY

A Member Club of the Wireless Institute of Australia.
Published by the Illawarra Amateur Radio Society.

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NOTICE OF MONTHLY MEETING - DECEMBER 1977

Members are advised that the monthly meeting of the Illawarra Amateur Radio Society will be held at the Wollongong Town Hall Meeting Room on Monday 12 December 1977 at 7.30 pm.

AGENDA

- 1 Apologies and welcome to visitors.
- 2 Minutes of previous General Meeting.
- 3 Correspondence.
- 4 Financial Report.
- 5 General Business.
- 6 Lecture.
- 7 Drawing of WARC 79 Raffle.

LECTURE

This month we do not have a lecture set up just yet but listen to the broadcast on Sunday for any further developments. If you listen to John 2BHO giving the broadcast please call back after it to let us know of your interest.

Sideband Electronics Sales

HF TRANSCEIVERS

ASTRO - 200 digital solid state 200 W.P.E.P. \$1000

TRIO KENWOOD new model TS-520-S

160 to 10 M, with optional digital readout connected externally. Can be used as a frequency counter self contained separately powered by 12 volt DC. Price will be shortly announced.

TRIO KENWOOD model TS-820S AC only 160 to 10 M with digital readout. \$1000

TRIO KENWOOD model TS-820 AC only 160 to 10 M. \$850

TRIO KENWOOD model MC-50 Microphone. \$ 49

TRIO KENWOOD model TS-700-A FM-AM-CW-SSB transceivers. Full 144-148 MHz coverage, 10-Watt output, VFO controlled, self-contained, AC-DC operation. \$650

TRIO KENWOOD model TS-600-A FM-AM-SSB transceiver full 50-54 MHz coverage 10 Watt output variable from 1 Watt to full power. VFO controlled AC DC operation. Styling as TS-700-A. \$650

TRIO KENWOOD model TR-7400 2 meter FM transceiver 10 to 25 watts output. Frequency range 144.00 to 147.995 MHz No. of channels 800, Double conversion super-heterodyne sensitivity better than 0.4 UV for 20 DB. \$385

Universe 224 model 15 watts pep 23 channel AM SSB for as low as \$215

Universe base 240V and 12V DC. The best value for money only \$260

ICOM

VHF TRANSCEIVERS SSB

ICOM model IC-202 2 M SSB portable transceiver 144-144.4 MHz \$215

ICOM 22-S synthesized 22 channel 2 M transceiver 10 channel pre programmed. Supplied with 50 extra diodes for the programming. \$269

ICOM model IC-502 6 M SSB portable transceivers 52-53 MHz. \$215

YAESU MUSEN model FT-101-E AC-DC transceivers 10 to 160 M with speech processor \$800

YAESU MUSEN model FT-301. \$960

YAESU MUSEN model FT-301-D \$1140

YAESU MUSEN model FT-301-S \$660

YAESU MUSEN model FL-2100-B Linear Ampl. \$525

YAESU MUSEN model FP-301 \$165

YAESU MUSEN FR G-7 Uses Wadley loop princ. \$300

YAESU MUSEN FT221-R 2 meter all receiver. \$628

FREQUENCY COUNTERS

YAESU MUSEN model YC-500-E S J P.O.A.

AUSTRALIA'S SOLE DIST. OF KLM PRODUCTS

KLM SOLID STATE POWER AMPLIFIERS

(MHz)	144-148	PA10-	80BL	80	OUTPUT (watts)
"	"	PA10-	140BL	140	"
"	"	PA10-	160BL	160	"
"	"	PA 2-	70BL	70	"
400-470	PA10-	70CL	70	"	
	PA 2-	12-B	12	Watts	
	PA 2-	25BL	25	Watts	P.O.A.

HY-GAIN ANTENNAS

18AVT WB 10-80 M. verticals, 23' tall no guys	\$ 95
TH3MK3 10-15-20 senior 3 el. Yagi 14' boom	\$220
TH6DXX 10-15-20 senior 6 el. Yagi 24' boom	\$250
HY QUAD 10-15-20 cubical quad Yagi 8' boom	\$250
TIGER ARRAY 204BA 20M4 el. Yagi 26' boom	\$250
BN-86 balun for beam purchases only	\$ 25

MARK MOBILE ANTENNAS

HW 80, 6' long for 80 M.	\$ 28
HW 40, 6' long for 40 M.	\$ 25
HW 20, 6' long for 20 M.	\$ 23
Swivel mounts & chrome-plated springs for all	\$ 13

CUSH CRAFT ANTENNAS

A144-11-11 Element 2M Yagi	\$ 45
A147-11-11 Element 2 M Yagi	\$ 45
A147-20 combination horizontal vertical 2 M	\$ 70

ANTENNA ROTATORS

Model CDR Ham-11 for all hf beams except 40 M	\$200
Model CDR AR-22 L junior rotator for small beams	\$ 65
KEN model KR-400 for all medium size hf beams with internal disc brake	\$110

All models rotators come complete with 230-volt AC indicator control units.

6-conductor cable for KR-400-500 65 cents per metre

COAX CABLE CONNECTORS

PL 259	\$1.20
SO 239 Chassis Mount	\$1.20
Male to male joiner	\$1.20
Female to female joiner	\$1.20
Angle connector	\$1.70
T-connector	\$2.00

COAX CABLE

RG-8-U foam filled per metre \$1.20

SWR METER

Twin meter model: Y.M. I.E. 3.5 to 145 MHz prof quality	\$ 28
DRAKE TV-3300 TVI lowpass filter	\$ 31
SSR-1 Receivers	\$270

CRYSTAL FILTER, 9 MHz, similar to FT-200 ones. With carrier crystals. Soon Avail. \$ 15

APOLLO 3 position co-ax switches

All prices quoted are net SYDNEY, N.S.W., on cash-with-order basis, sales tax included in all cases, but subject to changes without prior notice. ALL-RISK INSURANCE from now on free with all orders over \$100; small orders add 50c for insurance. Allow for freight, postage or carriage; excess remitted will be refunded.

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OPEN ON SATURDAYS TILL 12 NOON

TELEPHONE: 521-7573

PETER SCHULZ, VK2ZXL

Moonbounce Report - December 1977.

Still no more EME tests carried out since the last report because of absence of test schedules. The 432 EME News for December has not yet been received.

A letter has been sent to K2UYH to ensure that our mail problem is publicised. We can only hope that this sorts itself out soon.

The details of the newly designed hybrid for achieving circular polarisation from the feed dipoles have been received and is being looked at to see if it is applicable to our feed arrangement.

Contact is being maintained with the City Council with regard to their proposals for a possible garbage dump in the area of the dish site. Nothing has been finalised yet.

We are looking forward to increased activity in the New Year.

Oscar Satellite Activity.

It has been noted that the Satellite has been operating in Mode A instead of Mode B on several occasions last month. This was corrected prior to the next Mode B period. I have been told that this may have followed the use of excessive power transmissions by some stations in the Northern Hemisphere. 100 watts ERP is more than adequate.

Very interesting visits were made to the QTH's of Oscar stations VK3ZBB and VK3ACR while in Melbourne last month.

Several new stations (for me) were worked on Mode B last month.

RTTY Activity in the Wollongong Area.

How about one of you keen RTTYers in this area running an item in the Propagator? I'm only a beginner in this field (you can do only so much in the hobby time available!!) and am sure that we would all like to hear what is going on. My thanks to Richard Ewell (hope I've spelled your name right!) for help with the Model 14 Reperforator, and clues on its operation which will be a big assistance in getting the system working.

Lyle VK2AIU.

Will share more oldies next month.

To read more information about this old propagator and others, use the link below

<https://www.iars.org.au/wp-content/uploads/2020/09/1977-12-December.pdf>

Keith's backyard by Ned VK2AGV

As an interesting continuation from last month's thrilling tale of Keith's driveway, masterfully conjured by Ned VK2AGV, it seems Ned's imagination has once again escaped its cage! Each morning on my commute to work, he's been spinning new yarns about the mysterious backyard at my QTH, a place where shadows linger a bit too long, and the garden gnomes seem to whisper when the wind blows.

Though these tales may wander off the usual Amateur Radio frequency, the hilarious feedback from last month's story has only fuelled the madness! So brace yourself for tales of unsuspecting neighbours living beside half-buried UFOs, lurking alligator swamps, and secret dungeons that echo with strange beeps on the 80-meter band... and so it begins.....

If Keith's driveway is challenging, his backyard is equally interesting and has several unique features which make it a case-study in the design and construction of an amateur-radio antenna-farm. At first sight, it doesn't look large, but on closer inspection, it is a lot bigger than you think. This is due to the forced perspective given by some artificial hills Keith had constructed in order to conceal antenna-rigging from curious neighbours or inquisitive passers-by. In doing this Keith also created topography well-suited to the unique requirements of an antenna-farm.

Pride of place must go to the seven-mile-long Beveridge antennas which he has installed on poles at about nine feet above the ground. Several of these fan-out from a switchable feed-point and point in the directions Keith likes to work his DX; one towards South Africa so he can stay in contact with his old mates, one towards the United States and Canada, one towards Europe and one towards the South Pole, not just for the Antarctic research stations which are active from time to time but also for long-path propagation from the other side of the world.

Because these are made of relatively thin wire and the supporting posts are disguised as supports for tomato-plants, Keith's Beveridges are very hard to spot. They perform beautifully, a tribute to his perseverance and ability to source long lengths of wire at reasonable prices. He calculated he has about twenty-eight miles of wire in these Beveridges, and there is a few tons of copper in the air. By the way, Keith's tomatoes are well-known for their flavour and texture – apparently RF exposure enhances their growth.

Towards the rear of the yard is a grove of tall, straight trees. None are real, they are in fact a phased-array of vertical HF direction-finding antennas for the HF bands, disguised as Poplars and Larches, which can grow to a height of over 60m, and thus make especially good stealth-antennas.

These are connected to a phase-switchable coax multiplexer via remotely-controlled Ledex motorised switches from a central control-panel inside his shack, which is discretely disguised from outside to look like a room in his house, but is in fact a completely separate self-contained building in and of itself, proofed against bushfire and small-yield tactical nuclear weapons. More on that later.

Even Keith's boundary fence is not quite what it seems, for the wires pass not through the fence-posts directly, but through glass tubes cleverly set into the wooden posts, thus insulating them from direct ground contact. This forms a very large loop (the VLL) which is used for receiving near-vertical incidence skywave signals with relatively low noise, slightly above that of a "Loop On Ground" antenna. A series of baluns of differing impedance-ratios can be switched in to optimise receive signal-to-noise ratio, again by remote-control from the shack. Actually, calling it a shack is a bit of a misnomer, it really is a control-room.

VHF and UHF work is more than adequately handled by a series of stacked Yagis and log-periodic antennas, all mounted on heavy-duty industrial-grade rotators of his own design and construction. By draping plastic foliage, vines and fake Mistletoe over them they look like strange forms of trees, and Keith explains to anyone curious who enquires they are some of his favourite trees from the veld in South Africa, which satisfies their curiosity. One features a plastic leopard lounging on the elements to add verisimilitude to the South Africa connection. Keith has to move it around regularly to maintain the deception. He has a second plastic leopard, a female, but she is very shy and is only seen during the breeding-season.

Some idea of how rugged and tough these home-brew rotators can be gained by the fact the housings for them are in fact old differential casings from trucks, which adequately house the components and give excellent weather protection. Very ingeniously Keith has incorporated Bluetooth technology to remotely relay the bearing each rotator is pointed to, saving a lot of cabling back to the control-room. Commands for each rotator are multiplexed into a single radio-channel in the amateur microwave band using an algorithm Keith designed himself with multiple levels of encryption to prevent his antennas being hacked. Power is supplied by a bank of solar-panels, home-brew inverters and large storage batteries in a corner of the property well away from the road.

An antenna farm would not be complete with largish dish antennas, and these are cleverly located in a man-made depression nearly a half-kilometre in diameter in the middle of his backyard, to prevent terrestrial interference from being received. Keith uses these for monitoring interstellar noise, cosmic microwave background radiation and radio emissions from pulsars, planets, the sun etc, for assistance with predicting when paths to various DX locations are likely to open. The biggest dish is 15m and is fully steerable with some excellent cryogenically-cooled low-noise amplifiers unofficially obtained from the Parkes radio-telescope workshops.

When you enter it, the control-room itself reminds the visitor of the control-room at NASA for the Apollo missions, with multiple displays and desks for various invited guests and other radio amateurs who share his hobby. A fully-computerised logging-system is used, and all aspects of day-to-day operations are handled by several desktop computers attached to a server which has several hundred Quettabytes (a Quettabyte is 10 to the power 30 bytes) of mass-storage in solid-state drives for extremely rapid access, all using Linux of course.

A visitor once remarked "it's like the TARDIS – bigger on the inside than the outside", which is due to the bulk of the control-room being built into a large underground space excavated before the shack structure was built. This also helps keep the temperature a remarkably constant 21degrees year-round with no heating or cooling necessary except for the computers which use a self-circulating passive-heat transfer system originally developed for geostationary satellites. Keith bought a decommissioned one and reverse-engineered the system for his own use.

So that is an overview of Keith's backyard and his antenna farm. There's a lot more to it, but that is a subject for another time.

Thanks, Ned! ... Word to the wise — chat too much with Ned on air, and you might wake up as a character in his next best-selling novel (probably the one involving UFOs and talking alligators ☺).



NEWS



The WIA Working for YOU!!

WIA Launches Major Australian Amateur Band Plan Review

Date : 01 / 11 / 2025

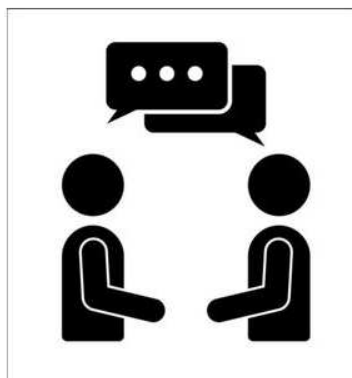
Author : WIA Technical Advisory Committee

WIA Launches Major Australian Amateur Band Plan Review

The last major revision of the Australian national Amateur Radio band plans administered by the WIA was carried out almost a decade ago. At that time, major changes were mostly made to the 30m, 2m and 70cm bands.

With various changes to the Amateur Radio regulations since that time, including some spectrum losses and gains, it is now necessary to update the band plans to both reflect those regulatory changes as well as update them with information on current centres of activity. We have also used this as an opportunity to address many of the requests that have been received over the past 2-3 years for changes to various bands.

WIA TAC committee has reviewed each band and made recommendations for changes where appropriate. Areas being addressed include:



More information use this link <https://www.wia.org.au/newsevents/news/2025/20251101-1/index.php>

WIA AGM to be held in Albury in 2026

Date : 02 / 08 / 2025

Author : Peter Clee - VK8ZZ

The date for the 2026 AGM has been finalised by the Board of the Wireless Institute of Australia.

The AGM is to be held in conjunction with the VK SUMMIT being conducted by the Albury Wodonga Amateur Radio Club [Link](#)

More details about the Annual General Meeting will be issued later this year.

So save the date for the VK SUMMIT to be held over the weekend of 2nd and 3rd May 2026 including the WIA Annual General Meeting.

More details about the VK SUMMIT will be issued by the Albury Wodonga Amateur Radio Club in the next few months.

Peter Clee
WIA Secretary



2026

AGM



23cm Fun day on the 23rd of EVERY MONTH !!



If you are interested in 23cm or higher communications, the local IARS members are getting together with the MSCARC members on the 23rd of every month to have a fun day around the Illawarra area.

The SHF team are even looking at 13cm fun day on the 13th of every month, for more information please contact the SHF organiser Rob Heyer VK2XIC at vk2xic@gmail.com



Happy 83rd Birthday John VK2AAL



Simon KU, Rob XIC, Keith QQB, John ELL, Simon XQX, Tony TS, Steve BGL and John AAL (sitting in front)

What a cracker of a day we had on October 18th!

It was fantastic catching up with our legendary repeater wizard, **John VK2AAL**, a long-time mate and pillar of the Illawarra Amateur Radio Society. There were plenty of laughs, tall tales, and a good bit of friendly banter about the “good old days.”

Of course, John didn’t just come for the yarns, he also put his technical hat on to help us unravel the great *6-metre mystery*!

These days John’s based up in Sydney, only occasionally venturing down to his Wollongong hideaway, so it was an absolute treat to spend the day with him. Can’t wait for the next visit, mate!

If you would like to get in touch with John, please email us at iars.keithb@gmail.com and we will organise 😊

DX ATLAS DOWNLOAD <https://dxatlas.com/Download.asp>



<https://ararm.org/status.html>

[illegible]

- **January 2026** : No Meeting or Propagator
- **February 2026** : Presentation Roger VK2VRK
- **March 2026** : Show And Tell
- **April 2026** : Project Mania Simon KU



Fun Corner



Please send in your funnies to iars.keithb@gmail.com
Thanks to all that sent in funnies.

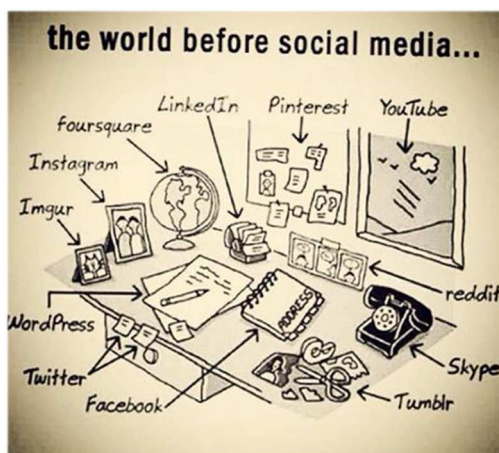
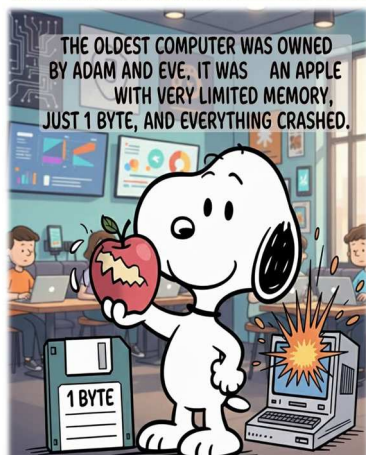
I've reached an age where my train of thought often leaves the station without me.



THE 3 STAGES OF LIFE:



1. **WANTING STUFF** -
2. **ACCUMULATING STUFF**
3. **GETTING RID OF STUFF**



Life is the most difficult exam.

Many people fail because they try to copy others, not realizing that everyone has a different question paper.



The IARS needs **YOUR input and support**, any technical items, amateur radio news, any projects you would like to share, in fact any AR related goings on are welcomed.

Feedback is also very important for us as it helps maintain a good read, if you would like to see more of something, or would like to see a subject added. Please let us know iars.keithb@gmail.com

That's all for now, hopefully catch you all at the
Blue Scope visitors centre on the 9th December 7.30pm,

73

Keith VK2KQB
IARS Secretary

IARS, Amateur Radio in the Illawarra since 1948

Merry Christmas, everyone! Wishing you all a joyful, laughter-filled, and absolutely amazing New Year in 2026!



Next Propagator and meeting will be for February 2026