



Illawarra Amateur Radio Society

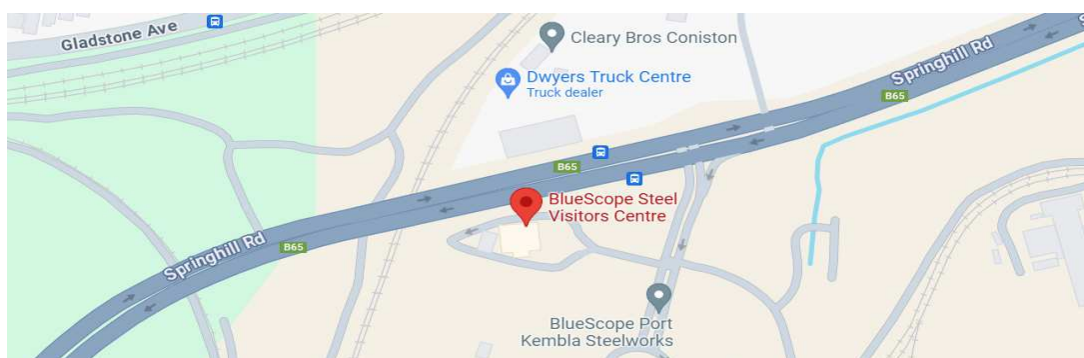
Propagator October 2025

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Upcoming Meeting on the 14th October 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

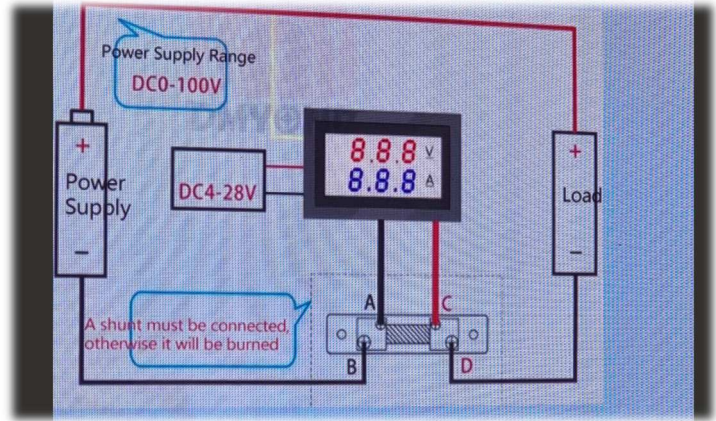
VK2AMW

Our last meeting 9th September 2025

PROJECT I.A.R.S. SimonVK2KU

A great turnout on Tuesdays meeting with Simon KU showing us the latest project to come out of the KU workshop.

This is a great power supply that can be built at a relatively low cost and will service most of your demand with a whopping 62Amps of DC power. The electrical noise of these power supplies is very low and well suited for HF work.



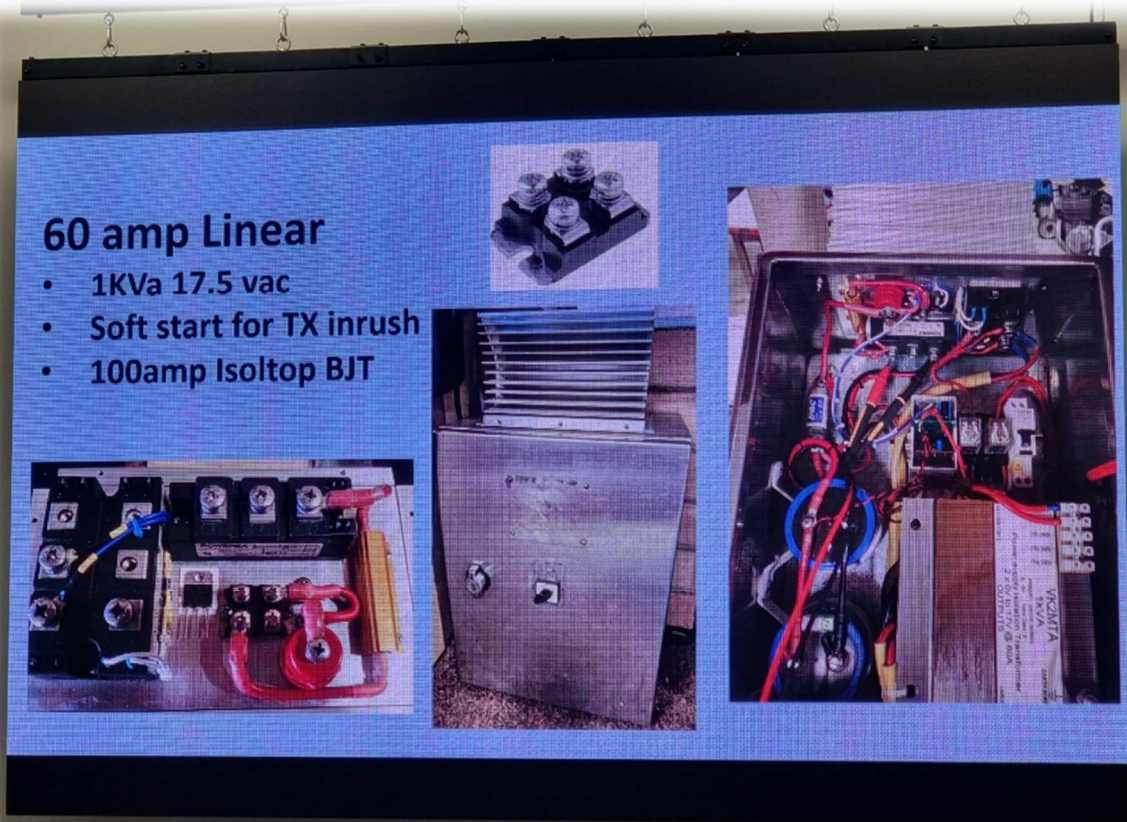
Final Thoughts

Although its pretty loud, it does the job. It is robust and effective.
Will have to re-cable the positive side around the old SHUNT site.



This was a fun build (not finished), but will not replace my linear just yet.





Simon also showed the transition from his 60Amp Linear power supply , massive difference !



We'd also like to extend a warm welcome to Elliot, a new IARS member who dropped by to see what we're all about.

It was a great evening spent with everyone, and as always, we wrapped things up nicely with muffins and coffee.

If you'd like more information about building the power supply, or if you have ideas you'd like to share, feel free to contact Simon (VK2KU) at: iars.simonr@gmail.com

The Disposables Table

As always, there were some fantastic giveaways at the table during last month's meeting, with many items finding new homes.

If you have any gear you no longer use, why not bring it along to the next meeting and give it a second life?
Parts, radios, microphones, antennas—anything that might be useful to someone else is welcome!

A big thank you to this month's donors: Tony VK2TS, Adam VK2AEV, and Mal VK2DXM.



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 63 was drawn and belonged to Chris Bates VK2CDB, unfortunately for Chris he was not a financial player and lost out. The Snowball has snowballed, what does that mean? More cash in the kitty for you to take home at the next meeting



NEXT Meeting.....

We're pleased to announce that our well-known auctioneer, [Simon VK2XQX](#), will once again be running the show—handling all auction sales and operations for the evening in **October????**

You may ask why October its normally November?

It was decided that due to the Picton Ham fest taking place in November, the committee thought it best to move the date of the famous IARS auction to October, making both events more viable.

If you have older gear that you no longer use, this is a great opportunity to bring it along and turn it into cash. And if you're on the hunt for a bargain, come along—you're bound to find something useful at a great price.

Sellers: Please complete the form below with the following details for each item: (Form can be downloaded from the website or make your own, if you still don't have a means to print a form, be at the auction at 6.30pm and we will supply a blank to fill out

- Call sign of goods owner
- Number on the item (This will be given to you at the Auction, leave that blank)
- Item description
- Condition (working, not working, or not sure if working)
- Serial number (if applicable)
- Your reserve price
- Any other information about the item

Call Sign	Item No.	Description	Condition (working, not working, not sure if working)	Serial No.	Reserved \$'s	Remarks

As always refreshments will be served such as Tea, coffee and biscuits.

The IARS Flying Gang



Yes, your eyes do not deceive you, we have our very own “A team”



Antenna Assistance for IARS Members

At our last meeting, Simon VK2XQX proposed an excellent idea: establishing 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 would like to join the Flying Gang team, or if you need help from the team, please contact us using any one of the emails below.

lars.keithb@gmail.com ; lars.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

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 nine new amateurs licenced, is it your turn next?

YES!!

The IARS is helping Amateur Radio grow in Australia!!! We are still maintaining an average of 1 per month



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 “*

****** note frequency changes as from 20th June 2025

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)

HELP !!!!

The IARS kindly asks all standard and advanced license holders for their help of to test our 6m repeater

We have an intermittent issue which seems to only appear during heavy rainstorms. To confirm if the issue is either weather or equipment related, we need the repeater to be used more often, with experiences fed back to us.

Please send your experiences to iars.keithb@gmail.com noting the time of the day, any rain or wind and the signal reports.

We would have welcomed support from Foundation license holders as well, but unfortunately, the 6m band is not available to them. However, upgrading your licence is available through the IARS — simply get in touch with Keith (VK2KQB) for assistance





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

Need a quick PCB in a hurry to put that latest project on, JLCPCB



<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>



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.

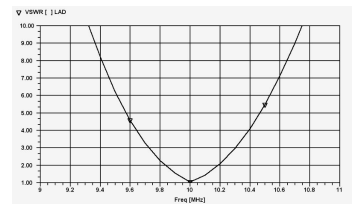
Send information to iars.keithb@gmail.com and we will publish it in the next propagator.



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

Standing Waves part4 ~ final



CONTINUED from last month's Standing Waves (4 parts)

Vertical antennas - how many radials are needed ?

A $\lambda/4$ vertical fed at the base requires a minimum of 60 radials of about 0.4λ in length to radiate efficiently, 120 radials would be better. The deciding factor is the ground loss resistance. Dry, sandy ground has a higher resistance than moist soil and requires more radials.

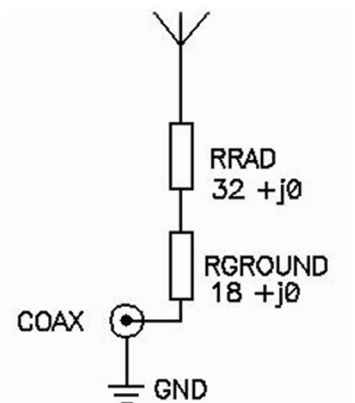
The ground loss resistance is effectively in series with the antenna.

A $\lambda/4$ vertical exhibits an impedance of $32 + j0 \Omega$ at resonance.

If the ground loss resistance is 18Ω , due to too few radials, the feed point impedance is $32 + 18 = 50 \Omega$ and presents a perfect 1:1 SWR to the feed line.

Although this looks good, we need to appreciate what is actually happening!

The power is divided between the antenna and the ground loss resistance. 36% of the power is wasted heating up the ground and only 64% is available for radiation



In this case the SWR is too low because a high percentage of the power is wasted in the ground resistance. It also stays low over a wide band because the ground loss is shunting the feed point.

Increasing the number of radials lowers the ground loss resistance to about 1Ω and now 98% of the power is radiated and only 2% is lost in the ground.

The feed point is now $33 + j0 \Omega$ at resonance. (SWR = 1.5:1) Reducing the antenna height by about 5% increases the feed point impedance and a good match to 50Ω is possible.

A better method is to increase the vertical height to about $3/8\lambda$ where the feed impedance is about 500Ω and the ground loss is now insignificant, so fewer radials may be used. In this method we now need to match from the 50Ω feed line to the higher impedance with a network.

True or False ?

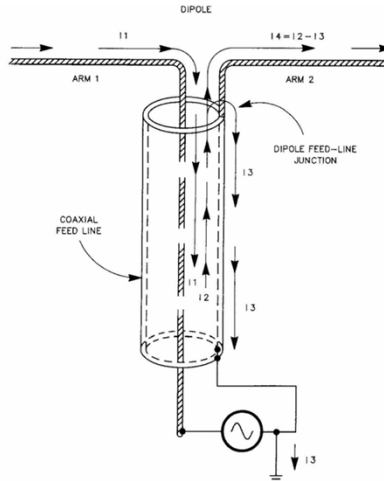
- A high SWR on the feed line causes power to be radiated from the outer of the coax cable which causes TVI.
- An antenna tuning unit does not tune the antenna.
- A high SWR causes excessive harmonics to be radiated.
- It isn't necessary to employ a balun with a dipole fed with coaxial cable.
- In multi-Yagi arrays the length of the cables running from the power splitter to the individual Yagis must be exact multiples of a half wavelength.

All these statements are incorrect !

The Truth shall set you free ! ☺

- The RF currents flowing in a coaxial cable (both forward & reflected) are all contained within and between the inner and outer conductors. No current flows on the outside of a coaxial cable due to a mismatch. Similarly with open wire balanced lines no RF is radiated because the currents are equal in value and flow in opposite directions and so the magnetic fields cancel.....
- One thing that causes RF current to flow on the outside is direct radiation from the antenna if the coaxial cable is placed close to radiating elements. Re-routing the coax can eliminate this effect.
- RF currents will also flow on the outside of the coaxial cable if a balanced antenna (dipole etc) is fed **without a Balun**.
- These currents have nothing to do with SWR, they are still present when the antenna is perfectly matched to the cable.
- These RF currents flow back down the outside of the cable and confuse the SWR meter when they reach it. In one case observed the SWR meter indicated *more reflected power than forward power* - **an impossible case!** Extra Power from nowhere for free. To correct this, we need to fit "RF choking networks" of ferrite beads on the coaxial cable close to the SWR meter. In RF design labs this is a common technique to obtain a true indication. Even lab-grade power meters sometimes need this technique.

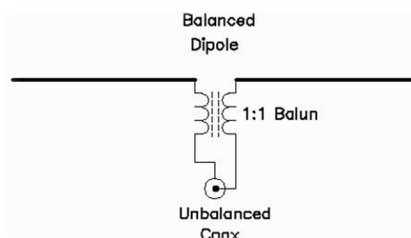
Unbalanced Coaxial Cable Current without a Balun



A balanced antenna fed with an unbalanced feed line generates an extra current path on the outer of the coax. This flows to ground and is wasted power.

There are two different types of Balun. One type is a **Voltage Balun** the other is a **Current Balun**.

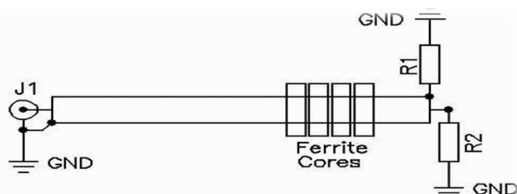
Of the two the **Current Balun** is far superior. The best example is the W2DU Coaxial Choke Sleeve design loaded with ferrite beads or toroids.



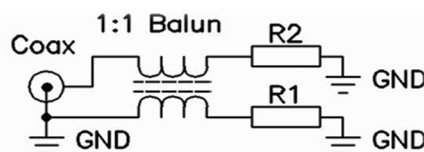
The W2DU 1:1 balun is simple to make and low cost. It can cover a very wide bandwidth with almost perfect amplitude ($\pm 1\%$) and phase balance ($\pm 1^\circ$).

The power rating is purely that of the coaxial cable it is made from. The example shown for 144 MHz uses PTFE cable and handles 1 kW without any significant heating. The power dissipation in the ferrite beads is negligible

W2DU Balun Test Circuit



Physical Test Circuit



Equivalent Circuit

To test a W2DU balun to prove it is a Current Balun we use the circuit shown. If the values of R1 & R2 are the same the voltage across each will be the same with a 180° phase difference. (Measured with a RF Vector Voltmeter).

If we change R1 to be twice the value of R2 then the voltage across R1 is now twice that across R2 because the RF currents are still the same value. The phase difference is still 180° .

If the ferrite cores did not choke the RF current on the outer of the coax no current could flow in R1 because the other end of the line is grounded. The W2DU balun behaves like a Common-Mode balanced transformer

Baluns

Baluns are also classified by the impedance ratio.

- A 1:1 balun transfers the impedance presented at one end to the other end. If the balun sees an antenna impedance of $300 - j100 \Omega$ the same impedance will appear across the unbalanced feed line end. In a 50Ω system this is a SWR of 6.7:1 and in a 72Ω system a SWR of 4.6:1.
- Connecting a 50Ω coax to a 1:1 balun **does not force** the antenna to look like 50Ω , only a 50Ω load resistor can do this. The coax will accept any impedance presented to it and simply convey this back to the sending end, with inversions in the reactive and resistive portions occurring every $\lambda/4$.
- A 4:1 balun if presented with the same $300 - j100 \Omega$ by the antenna will cause $75 - j25 \Omega$ to be presented to the unbalanced coax cable. In a 50Ω system this is a SWR of 1.7:1 and in a 72Ω system this is a SWR of 1.4:1.
- Both of these assume the balun is perfect, which is rarely the case in practice. Some error always occurs in the transformation process. Voltage baluns are far more likely to cause an incorrect transformation

Solid State Transmitter & SWR “Power Back Off”

Manufacturer’s of solid state transmitters (and Linear Amplifiers) normally design the SWR protection to begin reducing the power when the SWR exceeds a certain level, often as little as 2:1.

- The reason usually given for this in the manual is: *To reduce the possibility of damage to the power transistors.* Normally this is an incorrect statement.
- The manufacturer’s of the power transistors test them at 30:1 SWR at all phase angles at maximum power and an elevated supply voltage (about 25% greater than normal) in a “load pulling test jig” to ensure they do not become spurious or suffer damage. This is far greater than they will ever experience in practice.
- Solid state transmitters, *because they are fixed tuned*, cannot tolerate large reactive currents and voltages being reflected back to the output stages. For the types using wideband ferrite transformers the ferrite cores can saturate because of the large reactive currents.
- When this occurs the intermodulation performance suffers and by reducing the power output they are held to an acceptable level.

Solid State Transmitters With Built-In ATUs

The trend today is for manufacturer’s to incorporate an ATU in the HF transceiver.

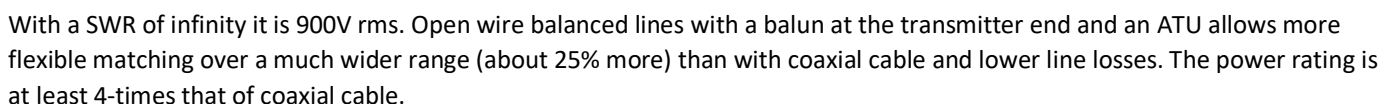
Is this is an admission of defeat? (sounds like it)

- And you thought that modern amateur equipment is better than types made 30 years ago ? 😊***

Feeding a $\lambda/2$ Dipole

- If you have a dipole fed with 50 Ω coax and a 50 Ω SWR meter, then when the SWR meter indicates $\approx 1.5:1$ you are bang-on resonance, nothing more to do 😊*

Balanced open wire lines can be made in any required impedance for little effort or expense. The higher the line impedance the lower the attenuation losses. 200 Ω open wire balanced line has an attenuation loss less than 25% that of average size 50 Ω coaxial cable. (The main cause of losses in coaxial cable are due to skin effect resistance due to the high current flowing and dielectric loss).



Additional Feed Line Loss with a High SWR

When a high SWR exists on a transmission line additional loss occurs. This is normally quite low. For a coaxial cable of 3dB loss and a SWR of 2:1 the additional loss is less than 0.4dB. (The total loss is 3.375dB).

The additional loss in coaxial cable is mainly dielectric loss because of the higher RF voltage at the standing wave maximum points. This imposes an upper limit on the SWR the cable can safely handle. The other cause of loss is the higher current flowing at the current maximum points. The skin resistance causes power to be dissipated and hence the attenuation increases.

For balance wire lines the higher RF voltage isn't normally an issue but the skin effect loss due to the higher current can be a problem. If the extra loss amounts to 0.5dB the radiated signal is reduced by an additional 10%.

A typical amateur receiver S meter is calibrated in 6dB per S point. For an extra 0.5dB of feed line loss the distant station will measure a reduction in signal level of 1/12th of an S point, which is insignificant and probably impossible to discern. Fading (QSB) on a long path is likely to be at least 3dB so the reduction in signal strength will be unnoticed.

What is the correct length of cable between the transmitter and the antenna ?

The simple answer is: Whatever the physical length required to cater for the cable run. There is no special condition, the cable simply needs to be long enough to reach from the transmitter to the antenna, with adequate mechanical strain relief. We do not need $\lambda/2$ multiples or any other magic number.

If the cable can be re-routed to shorten the length then the attenuation will be lower. If the cable run is long then consideration of an alternative cable type (lower loss) or transmission line type should be made.

Blindly Following Myths

If you blindly follow some of the articles published about the correct cable length then you are potentially wasting a lot of money and power!

If you believe that an antenna must only be fed with exact multiples of a half wavelength then your cable run is probably too long. If you move frequency by 1% then the feed line is no longer a true $\lambda/2$.

This also confines us to less of the available band because we are hung up about SWR. The 80m band covers 3.5 - 3.8MHz, a bandwidth of 8.2%. The Velocity Factor of the lower cost coaxial cable can vary by as much as 10% from the nominal value. Amateurs who believe they have a true $\lambda/2$ by simply measuring the length in reality are often a long way from the true case! The only way to be sure is to measure the cable electrical length using complex test equipment and trim it to the correct length. What do you do with the extra coax? Coil it up and waste space?

If the cable required between the antenna and the transmitter happens to be just too short to comply with the half wavelength rule then you have added an extra half wavelength of cable. If the band is 80m you will have a lot of spare cable - about 26m - which wastes power. RG213 at \$6.50 per metre is \$170.00 wasted and the power into the antenna is less than possible.

Shouldn't power be dissipated in the antenna and not in a Dummy Load ? 😊

Feeding Multi-Yagi Arrays

Many published articles insist that the electrical length of the cables running from the power splitter to the individual Yagis must be exact multiples of $\lambda/2$. ***This is another false assumption.***

Whereas all the cables must be the same electrical length (not necessarily the same physical length due to variations in the Velocity Factor of the cable) the relationship between the length and the number of electrical degrees (wavelengths) is not critical.

As long as the phase and amplitude at each antenna is the same all the Yagis will be fed in phase. It is immaterial what the electrical length is. It may be that a cable length of $5\lambda/4$ is sufficient to cater for the cable run and this will give the same amplitude and phase at each Yagi as any other electrical length.

Shorter cables mean more power into the antenna!

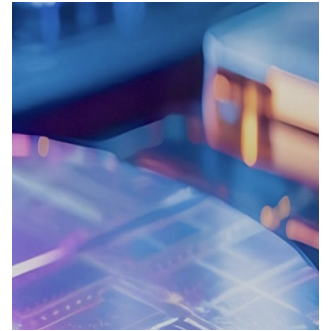
This concludes our SWR Myths and Truths series. All information was gathered from various sources, which we're happy to share upon request. Feel free to email us if you're interested iars.keithb@gmail.com

[illegible]

SweGaN, Ericsson, Saab, and Chalmers Team up to Develop High-Efficiency GaN Power Amplifiers for 6G

SweGaN, a European semiconductor manufacturer specializing in GaN-on-SiC epitaxial wafers, has announced the launch of a Vinnova-funded project with Ericsson, Saab, and Chalmers University of Technology, aiming to revolutionize GaN-based power amplifier (PA) technology for next-generation 6G networks.

The project targets the 7–15 GHz frequency range (X/Ku bands), a critical spectrum for future 6G applications. Ericsson, Nokia, and other leading industry players are actively exploring this frequency band for 6G, as it offers an ideal balance between capacity and coverage, while also simplifying component development and enabling reuse of existing network infrastructure.



By leveraging SweGaN's proprietary QuanFINE® epitaxial GaN-on-SiC solutions, the collaboration will deepen understanding of the material properties and the HEMT device characteristics and develop high-efficiency PA circuits that support energy-efficient, high-capacity wireless systems.

"This Vinnova-backed collaboration is a major milestone for SweGaN and our partners," said Jr-Tai Chen, CEO of SweGaN. "With this project, we're combining world-class expertise from telecom, defence, and academia to unlock the full potential of our QuanFINE® materials for 6G." The project ensures vertical integration across materials, device processing, and system-level design, and it follows a dual-track approach:

Academic Track: Focuses on the influence and process variations on HEMT device-level performance by advanced modelling. The goal is to extract empirical models and define design boundaries for optimal PA efficiency.

Industrial Track: Centres on PA design, fabrication, and benchmarking using state-of-the-art foundry processes. Industry partners will supply high-performance devices for modelling and validation, ensuring alignment with real-world system needs.

The collaboration will deliver insights into how epitaxial design, processing, and circuit architecture impact device and system-level performance.

"This collaboration strengthens the bridge between civilian and defence technologies. By working closely with leading partners across the value chain, we accelerate the development of RF technologies that will have real-world impact in both defence and civilian domains," said Johan Carlert, Head of Microwave and Antenna Design at Saab.

"At Chalmers, we're thrilled to contribute our modelling and device expertise to a project with such high industrial relevance," said Christian Fager, Professor at Chalmers University of Technology.

- 6G will utilize higher frequencies than 5G, focusing on the "terahertz gap," specifically the sub-terahertz (sub-THz) range from 100 GHz up to 10 THz to achieve extremely high data rates. This will likely also include existing and new mid-band frequencies between 7-24 GHz to complement the terahertz bands. While no specific frequencies are officially assigned yet, research and industry are actively exploring bands like the 100-300 GHz range for their vast bandwidth potential.
- The sub-THz range (100-300 GHz) is a major focus for research, aiming to enable speeds of up to 1 Tbps.
- These bands offer vast amounts of spectrum for high-capacity, high-speed communication but will likely be used in specific scenarios like hyperlocal deployments.
- These higher frequencies help address the spectrum scarcity issues faced by current wireless networks by providing wider available bandwidths.
- 6G is still in the early R&D phase, so the exact spectrum bands are not yet officially defined.
- International bodies like the ITU and national agencies are actively involved in studies and negotiations for spectrum allocation for future mobile services, including 6G.



Next Month for those fearful of 6G, we will share the link for

Update on Super capacitors from a previous Propagator article

Australian engineers have come to the rescue !

Supercapacitor tech outperforms batteries in power delivery

Engineers have made a major leap forward in the race to build energy storage devices that are fast and powerful — paving the way for next-generation applications in electrified transport, grid stabilisation and consumer electronics.

In a study published in *Nature Communications*, the researchers revealed a new kind of carbon-based material that allows supercapacitors to store as much energy as traditional lead-acid batteries, while delivering power far faster than conventional batteries can manage.



Supercapacitors are an emerging class of energy storage device that stores charge electrostatically, rather than through chemical reactions like batteries. Until now, a major barrier has been that only a small fraction of the carbon material's surface area — essential for storing energy — was accessible for use.

Professor Mainak Majumder, Director of the ARC Research Hub for Advanced Manufacturing with 2D Materials (AM2D), based in Monash's Department of Mechanical and Aerospace Engineering, was a member of the research team.

"Our team has shown how to unlock much more of that surface area by simply changing the way the material is heat-treated," Majumder said.

"This discovery could allow us to build fast-charging supercapacitors that store enough energy to replace batteries in many applications, and deliver it far more quickly."

The secret lies in a new material architecture developed by the team, called multiscale reduced graphene oxide (M-rGO), which is synthesised from natural graphite — an abundant Australian resource.

Using a rapid thermal annealing process, the researchers created a highly curved graphene structure with precise pathways for ions to move quickly and efficiently. The result is a material that offers both high energy density and high power density in a single device.

Dr Petar Jovanović, co-author of the study, said when assembled into pouch cell devices, the Monash supercapacitors delivered:

- Volumetric energy densities of up to 99.5 Wh/L (in ionic liquid electrolytes)
- Power densities as high as 69.2 kW/L
- Rapid charging capabilities with excellent cycle stability.

"These performance metrics are among the best ever reported for carbon-based supercapacitors, and crucially, the process is scalable and compatible with **Australian** raw materials," Jovanović said.

Dr Phillip Aitchison, a co-author of the study, said the technology is now being commercialised.

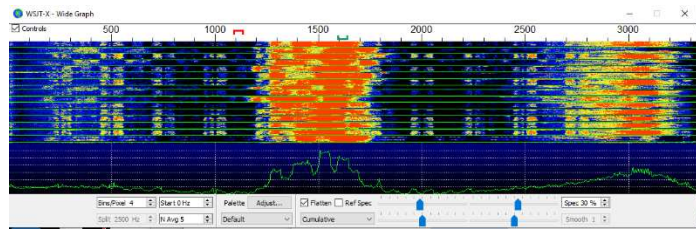
"We are now making commercial quantities of these graphene materials; we're working with energy storage partners to bring this breakthrough to market-led applications — where both high energy and fast power delivery are essential," Aitchison said.

Image credits: Monash University.





FT8



In 2017, **FT8** started to become the most popular of the various data modes and it works by a computer running specialized software (like WSJT-X) to generate digital radio signals, which are then transmitted and received by amateur radio equipment.

Using efficient 8-frequency shift keying (8-FSK) modulation, FT8 allows communication with extremely weak signals, even those below the noise floor, by transmitting short, fixed-format messages in 15-second intervals. The software decodes these signals and automates the exchange of contact information, such as call signs and grid squares, making long-distance contacts possible under poor conditions and with low power.

How it Works?

1. Digital Signal Generation:

A computer program, such as WSJT-X, generates a digital signal from the radio operator's input, connecting to the radio via an audio interface.

2. Radio Transmission:

The radio then transmits this digital signal over the airwaves to another station.

3. 8-FSK Modulation:

FT8 uses a form of 8-frequency shift keying (8-FSK) to encode information, allowing it to convey more bits of data per symbol compared to simpler modes.

4. Fixed-Format Messages:

To maximize efficiency, FT8 uses fixed-format, minimal messages to exchange essential information (like call signs, grid squares, and signal reports) to confirm a contact, rather than engaging in conversation.

5. Weak Signal Decoding:

The software's advanced digital signal processing can decode signals at signal-to-noise ratios as low as -20 dB, far below what's possible with conventional voice or Morse code. It achieves this by using the fixed message format as a form of "a priori" decoding assistance, which helps the software deduce the message content even when bits are lost due to noise.

6. Automated Contact:

FT8 operates in 15-second intervals, with each station transmitting for 15 seconds and then receiving for 15 seconds. The software automates the process, displaying decoded information on the screen and even logging the contact.

7. Computer Time Synchronization:

Accurate computer time synchronization is crucial for FT8 to work correctly, as all stations must operate on the same precise timing intervals.

Weak Signal Capability:

FT8 enables communication over long distances even in challenging propagation conditions or high-noise environments where other modes would fail. It is also Low Power (QRP) Friendly and is particularly useful for low-power operation and with compromised antenna systems.

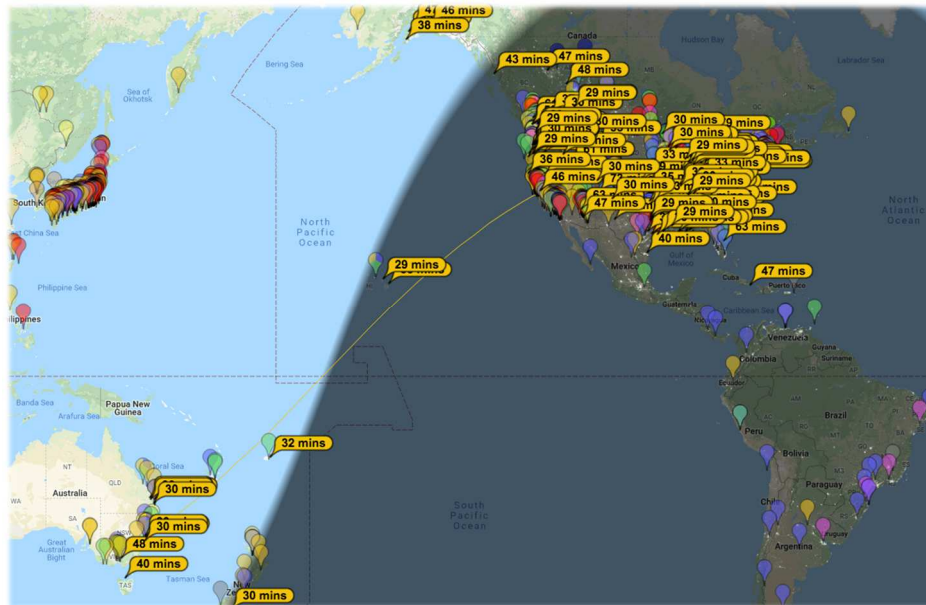
Simplicity, the automation provided by the WSJT-X software makes it easy for operators to make contacts, even with limited technical skills.

As with modes such as JT65 and PSK31, you interface your HF rig to a computer and send out text encoded by your computer over the amateur bands. With FT8, you're restricted to very small messages, with a limit of 13 characters per message.

Each message of up to 13 characters takes 13 seconds to send. There are 4 slots per minute, and you transmit for one 15 second block, then listen for replies for 15 seconds, and transmit again for 15 seconds. The average exchange would therefore take about 90 seconds (compared with seven minutes on JT65).

The application WSTJT-X is one of the most common used for FT8 (As well as JT65), and was written by the inventor of the mode, Joe Taylor K1JT.

FT8 handles very weak signals very well, meaning that a Foundation licence holder with just 10 watts should be able to make some impressive contacts with a modest antenna – something not possible with voice or some other data modes. You can also use the excellent online PSK Reporter website, <https://www.pskreporter.info/pskmap.html> to see where your FT8 CQ calls are reaching, as seen below.



Is FT8 Killing ham radio?

There is even an Internet poll asking, “Is FT8 damaging amateur radio?” Many articles and videos agree on one undeniable fact – FT8, has since its introduction in June of 2017 achieved “killer app” or tipping point status.

Some think it will kill amateur radio, and others believe that such innovations give the hobby new life. So, what makes FT8 a “killer app”?

- FT8 counters the current dearth of sunspots, opens “dead bands”
- FT8 is addictive – see em, click em, work em... Boom!, lets little pistols work DXCC like a big gun
- FT8 lets you work the world from small or deed restricted lots
- FT8 is a weak signal – not a low power mode (power works the really weak ones)
- FT8 lets you work DX on 6m when there would be none and it is suddenly dominating VHF/UHF contesting
- FT8 lets you work weak signal DX without proficient CW skills, it's like having constant DX beacons on every band
- FT8 puts the DX, WAS, WAZ, etc. on the air when they might not be
- FT8 let's you work DXCC on 160m without a big station, let's you call CQ and become the DX
- FT8 is amazing literally space age technology

So, will FT8 kill ham radio as some have posed?

True, it is mostly automated. **True**, it reduces the skill required to make DX contacts. **True**, it removes conversation from the QSO the same as is true of most DX chasing contacts on any mode anyway. **True**, it removes some of the human factor.

But does that make it bad for amateur radio's future?

FT8 is at the very heart of what amateur radio has been about from its inception – amateurs who love the art of radio, enhancing the art of radio with experimentation and learning.

What will ultimately kill amateur radio is not FT8. To the contrary, FT8 is an example of what will keep it alive and relevant.

What will kill amateur radio is if we cease to innovate, become old and grumpy, and no longer bring new blood into the hobby.

Amateur radio is alive and well. FT8 is one just one element of keeping it that way 😊

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?

Question 1 The DC voltage output of a full wave rectifier circuit varies with load due to:

- (a) RF affecting the operation on the rectifier diodes
- (b) mains voltage variations
- (c) the resistance of the transformer windings
- (d) variation in ripple frequency

Question 2 A quarter wave vertical antenna with an artificial ground plane consisting of four wires each a quarter wave long and arranged at 90° to each other will have a feed impedance of approximately 50 Ohms when the angle between the antenna and the ground plane is approximately:

- (a) 90°
- (b) 45°
- (c) 180°
- (d) 120°

Question 3 A sinusoidal waveform viewed on an oscilloscope has a peak-to-peak voltage of 18 volts. The RMS voltage of the waveform is approximately: -

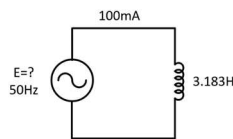
- (a) 9 volts
- (b) 14.4 volts
- (c) 12.7 volts
- (d) 6.4 volts

Question 4 The transformer turns ratio used to match a source impedance of 250 ohms to a 10 ohms load is:-

- (a) 25:1
- (b) 2500:1
- (c) 5:1
- (d) 1:25

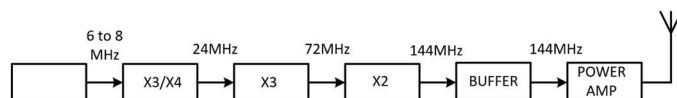
Question 5 The voltage applied across this inductor is:

- (a) 1 volt
- (b) 10 volts
- (c) 100 volts
- (d) 1000 volts



Question 6 The unidentified block in this diagram is the:

- (a) detector
- (b) power supply
- (c) beat frequency oscillator
- (d) crystal oscillator



Answers next propagator ☺

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

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

THE PROPAGATOR

NO. 10/77

OCTOBER 1977

NO. 10/77

THE WIRELESS INSTITUTE OF AUSTRALIA

- INFORMATION
- EDUCATION
- FREE MONTHLY MAGAZINE "AMATEUR RADIO"
- VALUABLE MONEY-SAVING SERVICES:
Components, disposals, surplus gear — Magazines and books
QSL Bureaux — Sales and exchange facilities
- REPRESENTATION
- ADVICE
- SOCIAL ACTIVITIES
- CONTESTS
- AWARDS
- Modest membership target is 8000 for WARC 79.

GET WITH IT — GET FACTS NOW

SIMPLE CIRCUITS.

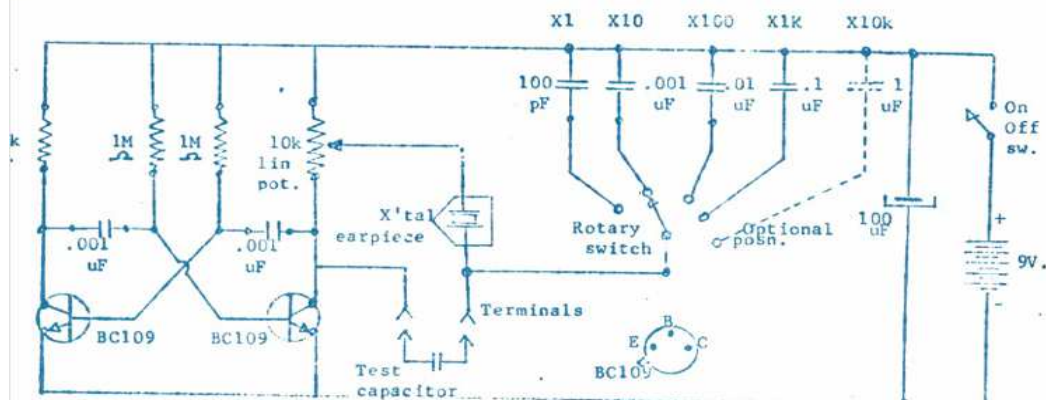
THIS IS THE CIRCUIT OF THE CAPACITOR BRIDGE I HAD AT THE LAST MEETING. IT IS BEST BUILT ON PCB OR MATRIX BOARD & THE LEADS KEPT SHORT TO REDUCE STRAY CAPACITY. THE 10K POT MUST BE LINEAR AND FITTED WITH A POINTER FOR CALIBRATING ACCURATELY.

AFTER BUILDING IS COMPLETE SWITCH THE UNIT ON — A 1KC TONE SHOULD BE HEARD IN THE EARPIECE. SWITCH ROTARY SWITCH TO X1 POSITION & TURN POT UNTIL A NULL IS REACHED. THIS IS THE ZERO POSITION OF BRIDGE AND SHOULD BE MARKED AS SUCH. NEXT CONNECT A 100PF CAPACITOR TO THE TEST TERMINALS AND THEN FIND THE NULL WHICH WILL BE NEAR MID WAY ON THE DIAL & MARK WITH 100. SWITCH TO X10 AND FIND THE NULL WHICH WILL BE NEAR THE ZERO AND MARK THAT 10. THIS PROCESS IS THEN REPEATED WITH A CAPACITOR OF 1000PF AND DIAL MARKED ACCORDINGLY. CONTINUE CALIBRATING WITH ANY VALUES YOU WISH — PREFERRED VALUES ARE IDEAL UNTIL THE SCALE AROUND THE DIAL IS TO YOUR SATISFACTION.

FOR THE GREATEST ACCURACY 1 OR 2% CAPACITORS CAN BE USED BUT I FOUND THAT THE MICA CAPS I USED WERE ALL WITHIN 2% ANYHOW. THIS UNIT CAN BE EXTENDED TO 10UF BY USING A 1UF 1% POLY IN A X10K POSITION ON THE ROTARY SWITCH.

KEITH VK2CB.

CAPACITOR BRIDGE.



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or Contact Barry Hartley VK2FE.



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/2020/09/1977-10-October.pdf>



NEWS



<https://www.wia.org.au/newsevents/events/>

THE WIA IS WORKING FOR AUSTRALIAN AMATEUR RADIO

Again, and again, the WIA has proven to be totally committed to amateur radio in Australia, not just talk!

This time they have put their hands in their pockets to assist YOUR CLUB!

The WIA Grants Scheme which was announced at this year's AGM is now open for applications.

Date : 14 / 09 / 2025

Author : Peter Clee - VK8ZZ

Applications are now open for the WIA Affiliated Clubs Grants Scheme.

Details of the WIA Grants Program, originally announced at the AGM in May 2025, were released at the WIA Affiliated Clubs forum today.

Applications are now open for the WIA Grants Program



For more information see this link <https://www.wia.org.au/newsevents/news/2025/20250914-1/index.php>

Join the WIA and show your support for the hobby. While membership may cost a little more than other organisations, the value and support they provide make it well worth it.

<<<<<<<>>>>>>>>>>

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

Upcoming Contests

Oceania DX Contest

Oceania DX (OCDX) Contest

Contest Manager

The Oceania DX (OCDX) Contest is managed by the Oceania DX Contest Committee.

Contact email is info@oceaniadxcontest.com

Contest Introduction

The OCDX contest is Oceania's only international style contest where contacts with stations all over the globe are able to participate.

Oceania stations may contact any station for QSO points whilst non-Oceania stations are required to contact any station in Oceania for QSO points.

The contest runs over the first two full weekends in October and has SSB, CW and SWL categories. Go to the contest web site for more information.



More information click this link > <https://www.wia.org.au/members/contests/oceania/>



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

Feedback *Joint picnic/day out*



Illawarra Amateur Radio Society
Amateur Radio in Wollongong since 1948

The Fisher's Ghost, Mid-South Coast, and Illawarra amateur radio clubs came together on the 13th of September at the Fitzroy Falls picnic area for a fantastic day in the sun. The weather was absolutely perfect, making for an ideal outing. While there wasn't much action on the remote radio station setup front, the conversation was lively and enjoyable.

One interesting highlight was seeing all the different mobile antennas—each one was unique in its own way. It was great for neighboring clubs to meet up, with some members connecting in person for the very first time. A big thank you to everyone who joined us for the event! For those who couldn't make it, don't worry—there's another meet-up planned in the near future. Be sure to keep an eye out for the details in the next issue of *The Propagator*.



A few of the vehicles that showcased the variety of antenna selection

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



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

[illegible]

- **October 2025** : **IARS AUCTION !!!!** Moved from November to avoid clashing with Picton Ham Fest in November 2025
- **November 2025** : Amateur Radio Trivia with Kahoot – Prize will be a Nano-Vna 😊
- **December 2025** : Christmas dinner Pizza Night
- **January 2026** : No Meeting
- **February 2026** : Presentation Roger VK2VRK
- **March** : SMD Soldering workshop

Fun Corner

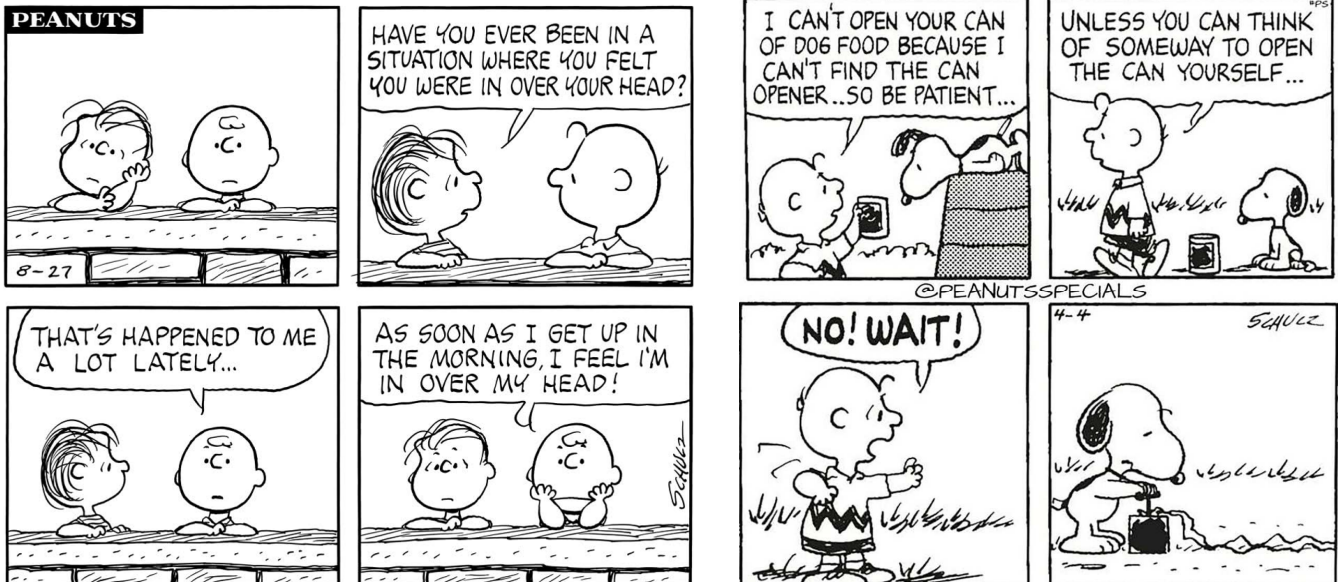
Please send in your funnies to iars.keithb@gmail.com

Thanks to all that sent in funnies.

VK2KING



PEANUTS



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 14th October 7.30pm,

73

Keith VK2KQB
IARS Secretary

IARS, Amateur Radio in the Illawarra since 1948