Illawarra Amateur Radio Society

Propagator April 2025

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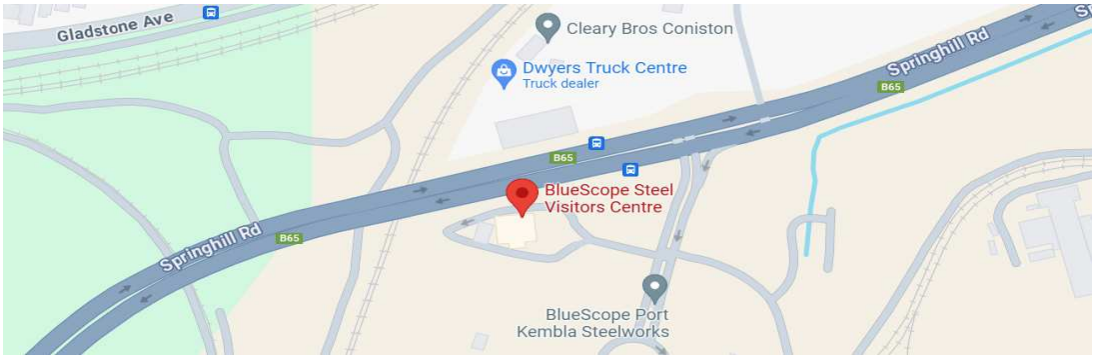
Upcoming Meeting on the 8th April 2025

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

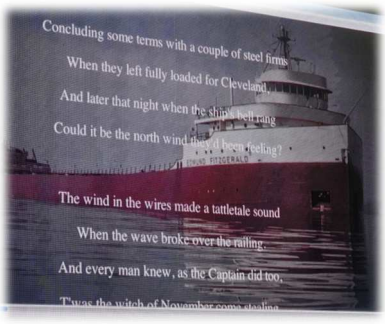
Our last meeting 11th March 2025

The sinking of the Edmund Fitzgerald *by Ned VK2AGV*

It may not be amateur radio related but the presentation was very interesting, with almost everyone still wondering, how and why? (there is more to come)

It was very obvious that Ned spent many hours researching this maritime mystery, the detail of the information shared was amazing. We ran out of time unfortunately but, we will be getting Ned back for part 2. Thanks to Ned for sharing this with us and if anyone that missed the presentation or would just like more information, please let us know and we will pass your details on the Ned. (This story will be finalized in the May meeting)

Ned made sure that the presentation was perfect including the audio, Ned's high tech 12channel audio mixing desk 😊



The wreck at the bottom of the lake and some heartfelt lyrics from the Gordon Lightfoot song, yes we had the music too 😊

Thanks to everyone that attended the meeting, looking forward to the next one.

If you would like to have more information about this presentation, please send us an email at iars.keithb@gmail.com and we will pass your details on to Ned.

After the presentation there was a good catchup with everyone and it was nice to see some familiar faces that have not been to the meetings in a while.

Part 2 will be continued at the May Meeting before TESTING INSERTION LOSS

NEXT MEETING !!!

RDAR

What is RDAR? Well, it stands for **R**apid **D**eployment **A**mateur **R**adio. These normally consist of a complete station in a box, ready to setup in a couple of minutes. IARS member Roger VK2VRK has built one of these magic boxes and will be sharing his project with us. Roger also has some "Hotspot" project information to share with everyone as well

Don't miss out, especially if you are looking at building one of these for yourself anytime soon

Disposables Table

Please bring along the stuff you forgot to take to the auction, someone will give it a new home. Roger VK2VRK has advised he will be bringing along some nice goodies looking for a second home, all donation proceeds to go to the IARS, thanks Roger.

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 was drawn and the IARS member was not present.

That can only mean one thing!!! The Prize money has snowballed for the next meeting 😊

Licensing and upgrades?

IARS

RES
RADIO & ELECTRONICS SCHOOL

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** accessors 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 **three** new amateurs licenced, is it your turn next?

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, (expect 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 CTCS 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 438.225 with – 5MHz 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

- **438.225 with a - 5MHz offset. OK**
- **146.975 with a -600kHz offset NO CTCSS, C4FM enabled OK**
- **146.850 with a – 600kHz offset (linked to 146.675) NO CTCSS OK**
- **146.675 with a – 600kHz offset (linked to 146.850) NO CTCSS OK**
- **53.650Mhz with a – 1Mhz offset (123Hz CTCSS tone enabled due to interference) -OK**
- **438.725Mhz with a -5mHZ offset DMR only, OK**
- **1296.850Mhz Experimental Beacon with simplex repeater function, located Maddens Plains – OK**
- **Echo-link VK2MT-R via 146.850MHz also linked to 146.675MHz and VK2BGL-L – OK**
- **APRS DIGI-PEATER on 145.175MHz - OK**
- **PACKET 2M on 147.575Mhz - OK**

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.

Any donations to help us maintain our great repeater system will be greatly appreciated. Please check our banking details on our website at www.iars.org.au under the Contact details page. As reference of the donation please add your Call sign and the words “Repeater Donation”

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

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Latest Repeater Report:

All systems A-OK, nothing to report

Yes we have “touched wood” in fact the whole forest 😊

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

element14 AN AVNET COMPANY https://au.element14.com

RS https://au.rs-online.com/web/

MOUSER ELECTRONICS https://au.mouser.com

DigiKey https://www.digikey.com.au

Minikits https://www.minikits.com.au

core ELECTRONICS https://core-electronics.com.au

Wagner Electronics Super Store https://www.wagneronline.com.au

Little Bird Electronics https://littlebirdelectronics.com.au

ATR
Amateur Transreceiver Radio Supplies

https://amateurradiosupplies.com.au

VK RADIO **YAESU Sales and repairs** https://www.vkradio.com.au

DXing https://dxing.com.au

TELCO ANTENNAS https://www.telcoantennas.com.au

ALTRONICS **https://www.altronics.com.au**

jaycar **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.

got an idea

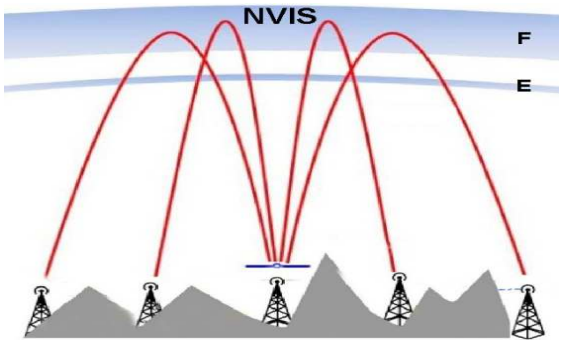
Tech corner

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

If you have some IARS related pictures or information that we can put on the IARS *website*, *please let us know and we can get that happening.*

Near Vertical Incidence Skywave (NVIS)



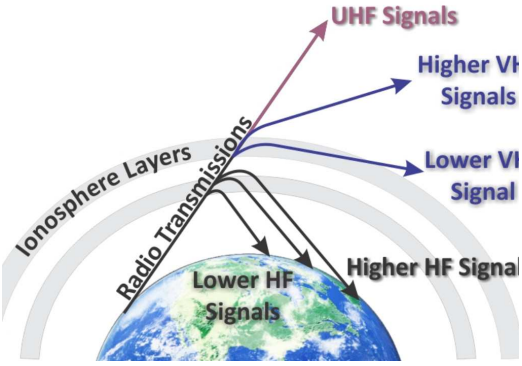
Near Vertical Incidence Skywave (NVIS) is an ionospheric skip operating technique that directs the strongest signals from a station vertically, or upward, rather than toward the horizon. Signals propagating nearly vertically approach the ionosphere with steep incidence angles and may be bent back to earth with similarly small angles. The operational result is skip communications effective within a radius of a few hundred miles. The NVIS technique can help to bridge the communications gap between the local range of VHF/UHF repeater or simplex communications and the longer distance skip propagation of low-to-the-horizon HF signals.

The NVIS technique relies upon a combination of station factors, most importantly the frequency used, the power of transmissions, and the antenna configuration. Let's consider each of these three factors in the context of the NVIS technique.

Frequency: The refractive effects of the ionosphere vary with frequency. The bending effect on signals is reduced as frequency increases. This is why the 2-meter band (144 – 148 MHz) and higher frequencies are almost never received via skip propagation. The HF bands of 10-meters (28 MHz) to 30-meters (10 MHz) are often effectively refracted back to earth's surface when directed toward the horizon where incidence angles into the ionosphere are closer to the horizontal, and this propagation geometry provides long skip distances with single skips up to 2500 miles. However, the ionosphere usually does not have sufficient bending strength to return these upper HF band frequencies to earth with the steep take-off angles necessary for the NVIS technique.

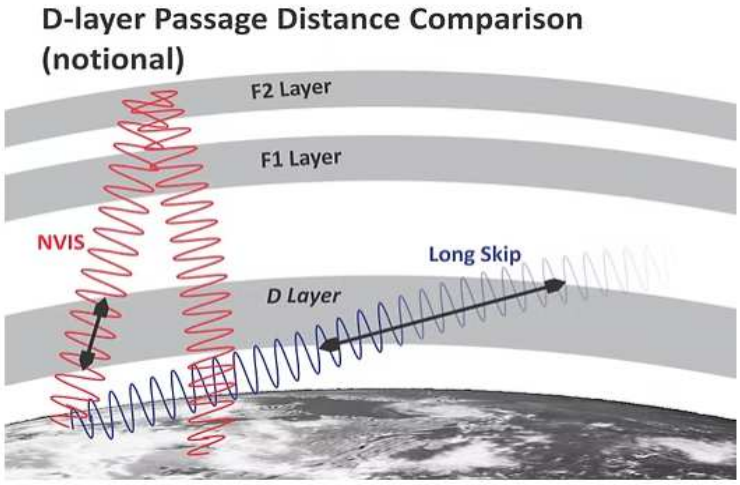
The ionosphere's bending effect is sufficient, even at steep "near vertical" angles of incidence, to bend back to earth the lower HF frequencies, particularly the 40-meter band (7 MHz), 60-meter band (5.3 MHz), and 80-meter band (3.5 MHz) signals.

These bands are most suitable for the NVIS technique, even during daylight hours when more distant skip propagation on these bands is ineffective due to D-layer absorption.



Transmitting Power:

Transmitting power with the NVIS technique does not need to be great. Very effective NVIS communication can be completed with the typical 100 watts of many HF transceivers "running barefoot." In good ionospheric conditions much lower power may be quite sufficient for effective QSOs. When atmospheric conditions are less favourable, increasing transmitting power with the use of an RF power amplifier can help to keep NVIS communications reliable. It is common for amplifiers to be employed by NVIS operators in the high daylight part of the day when the D-layer absorption attenuates signals more severely.



NVIS propagation minimizes transit through the D-layer with steep angles.

The D-layer of the ionosphere normally absorbs skip signals below the 30-meter band during daylight hours, so long distance skip is not effective on the low bands during the day.

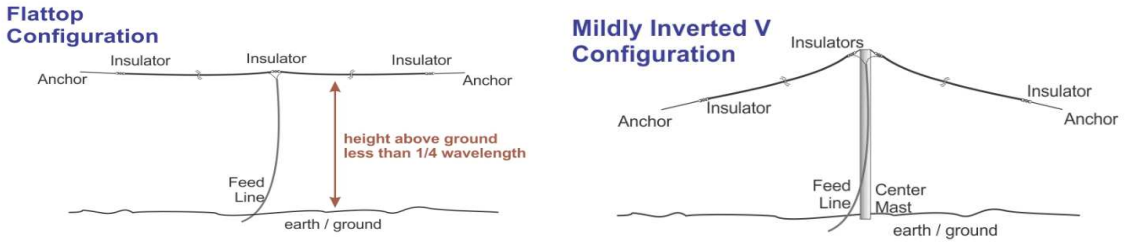
These bands open for long distance skip at night when the D-layer dissipates, and the F-layer refracts these frequencies. However, since NVIS signals travel through the D-layer at very steep angles, the transit distance through the layer is minimized, as compared to the long skip signals traveling low to the horizon.

As a result, D-layer absorption of NVIS signals is minimized, and NVIS is usually a viable technique throughout the daylight hours, with performance variations for ionospheric conditions.

Antenna Configuration:

Perhaps the most critical factor, and certainly the most controversial among ham discussions, is the antenna configuration for NVIS that produces the best vertically directed signals. Let's consider the basics first, and then we will address some details that are not universally agreed upon.

A horizontally polarized antenna provides the best NVIS propagation. A wire half-wave dipole trimmed for the frequency of use is very effective and also the most common type of antenna used for NVIS. Horizontal full-wave loop antennas are also very effective. In the half-wave dipole case, a flattop configuration or mildly down-sloped inverted V configuration works well. But, regardless of the specific type of horizontally polarized antenna used, the key factor in configuration is the antenna's height above ground.



Half-wave dipole antennas are great for NVIS, positioned a fraction of a wavelength above the ground.

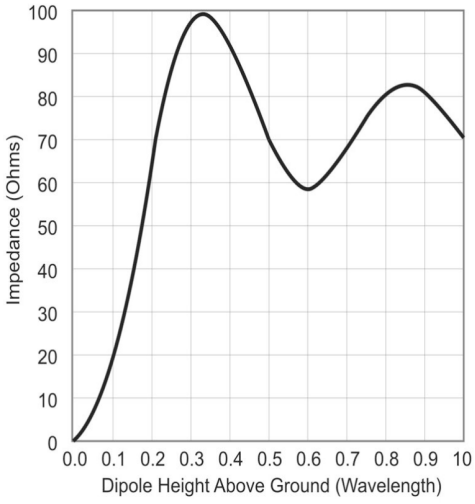
To direct the greatest portion of the transmitted signal vertically, the antenna must be positioned relatively low to the ground. The interaction of directly radiated signals with ground reflections results in more signal strength radiated in the vertical direction when the horizontal antenna is much less than ½ wavelength above the ground.
Height above ground is usually less than ¼ wavelength for the NVIS technique, and much lower heights are preferred by many operators due to reported performance improvement. A height of 1/8 to 1/10 wavelength is often used for effective NVIS. On the 40-meter band a dipole elevated just 4-meters (13 feet) above ground can provide very effective NVIS propagation in a radius of several hundred miles.

The precise height above ground for the very best NVIS performance is not a well-agreed value. Antenna models reported by Jack Swinden W5JCK (and based on work of L.B. Cebik W4RLN) seem to point to best performance on 40-meters at 0.175 wavelength (7 meters, ~21.7 feet) above ground, and on 80-meters a height of 0.165 wavelength (13 meters, ~41 feet).

Pat Lambert WØIPL has conducted extensive objective data collection in Colorado and reports an experience of better coverage with a height of only 1/20 wavelength above ground. He notes that noise is significantly reduced as the antenna is lowered below 1/8 wavelength, and that communications with close stations (up to 300 miles away) was greatly enhanced with such low antenna height, particularly using the 80-meter band.

Other Factors:

Beyond the antenna height, power, and frequency, other factors will impact performance. The height above ground effects the dipole feed point impedance. As the dipole is lowered below ¼ wavelength the feed point impedance will be significantly reduced in value, and SWR may rise. For best performance, trim the dipole antenna while at the height at which you intend to use it.



Approximate impedance of dipole antenna for height above ground in units of wavelength.

The local ground conductivity will impact performance, with the poor conductivity of rocky or sandy and dry soil reducing antenna gain. With a more conductive ground, such as richly conductive and moist soil, antenna gain will improve. This brings up another less-than-solidly-agreed factor, the use of a parallel ground wire under the horizontal dipole element. You may think of this arrangement as a vertically pointed, two-element Yagi directional, with the ground wire providing an enhanced “reflector” element. A parasitic wire reflector is usually implemented 5% longer than the driven element, or 5% longer than the half-wave dipole, and positioned below the driven element. The distance below the driven element is usually recommended as 0.15 wavelength, although other values are also advocated. Various sources recommend the ground wire be elevated above the surface of the earth 0.01 to 0.06 wavelength (1.24 to 7 feet for 40-meters) for best effectiveness and least impact on the antenna’s SWR bandwidth. Implementing the wire reflector narrows the SWR bandwidth somewhat, and Jack W5JCK indicates a substantial narrowing of 25% to 50% with the reflector wire on or near the earth. Further, his data claim a transmit gain with such reflectors of only 0.2 dB to 0.7 dB in the best cases, putting into question the value of the ground reflector wire. On the other hand, Pat WØILP reports up to 6 dB improvement of the transmitted signal with some experimental ground wire configurations he has tried.

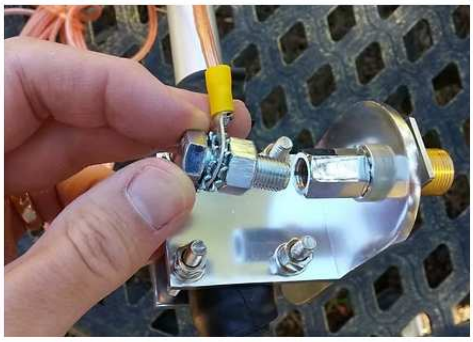
The upshot of these conflicting data and reports is that the arena of NVIS antenna configuration is ripe for experimentation! It is most likely that the variation among models, reports and claims is a result of uncontrolled factors that impact NVIS antenna performance. Soil conductivity, height above ground, reflector element implementation and configuration, other RF-coupling conductors in the vicinity, varying atmospheric conditions, transmitter power levels, transceiver and feed line quality, precision of signal strength measurements, and perhaps many other things can impact the measured performance of the NVIS antenna. So, perhaps the best policy is to familiarize yourself with some of the theory of these factors and then try a few things to see what seems to work best for your specific situation.

The Bottom Line on Antennas: If you are not aiming for the very optimal NVIS station by manipulating the somewhat controversial factors above, a horizontal wire positioned a fraction of a wavelength above the ground will likely provide you quite acceptable short radius communications via NVIS propagation paths. I often erect a 40-meter wire dipole in a gentle inverted V or flattop configuration at 1/10 wavelength (4m) above ground, with no reflector ground wire and above my

absolutely terrible rocky, dry soil. With a 100 watt signal I frequently make clear contacts of 40 to 800 km. The following describes my NVIS portable antenna solution, only one of many different ways to implement such an antenna.

A 40-meter NVIS Portable Dipole Concept: I constructed this 40-meter dipole to readily switch between wire elements and loaded hamstick elements. The center mast connecting component is the MFJ-347 Double T Pipe Mount. It mounts easily to any mast up to 1/25" diameter, and I use an extendable painter's pole supported by a second-hand utility tripod.

This MFJ connector sports an SO-239 coaxial connector and two standard 3/8"–24 thread antenna mounts. One threaded mount is electrically connected only to the coax center conductor, and the other only to the coax shield, as required for a dipole antenna. Simply connect the pair of dipole driven element conductors, one to each mount, and you have a simple dipole antenna. With the MFJ connector mounted to the painter's pole extended up to 13 feet, and with the driven element properly extended and anchored at the end points, the NVIS dipole is ready to operate.



The wire dipole element is connected to the MFJ-347 mount using soldered ring connectors, star washers, and 3/8″-24 bolt.

Both radiating wire elements and coaxial cable connected, ready for deployment.

For the full-length wire dipole, I connect a pair of 3/8"-24 thread bolts to the MFJ-347, and ring connectors with the dipole wire soldered solidly into them are snugged down using star washers and nuts. Alternatively, I sometimes opt for the convenience of two 40-meter hamsticks, specifically MFJ-1640T HF Stick. The HF Stick each fit into the same 3/8"-24 mounts, replacing the wire elements. The SWR bandwidth is narrower and performance is somewhat reduced (roughly -3 dB) when using the loaded and shortened sticks rather than the full length wire, but the stick dipole antenna can be quickly deployed with my portable station and it provides acceptable NVIS communications in most instances.

NVIS is one of my favourite operating techniques. I really enjoy connecting with hams in my local region, and NVIS is terrific for emergency communications across the local area outside of repeater range, or in the case of repeater failure. Throw up your own low altitude wire dipole and give NVIS a shot! **Stu WØSTU**

NVIS 40-meter dipole deployed using loaded HF Sticks in lieu of wire.

NVIS wire dipole deployed along with the truly ugliest "Ugly Balun" in the history of ham radio.

dB, dBm, dBi, dBd, EIRP and ERP

The dB (decibel)

The decibel can be used to express the ratio of two physical quantities such as power, sound intensity, sound pressure, voltage, and current on a logarithmic scale. We use decibel to express the ratio between two power levels usually given in watt (W) or milliwatt (mW).

The power ratio, N can be expressed in decibel using the formula, **$N = 10 \log_{10} (P_{out}/P_{in})$ dB**

Where P_{out} is the output power and P_{in} is the input power. When we are dealing with the power levels we use 10log units and voltage & current we use 20log.
For example, if an amplifier turns a 1 W signal into a 1000 W signal, its power ratio can be expressed as:

$N = 10 \log_{10} (P_{out}/P_{in}) = 10 \log_{10} (1000/1) = 30$ dB

Decibel doesn't provide an absolute value. By looking at the decibel value you can't say the input and output power of a device or cable etc, but you can say whether it offers a gain or a loss.

A power ratio greater than 0 dB is treated as a gain. For example, if an amplifier turns a 2 W signal into a 10 W signal, the power ratio is:

$N = 10 \log_{10} (P_{out}/P_{in}) = 10 \log_{10} (10/2) = 10 \log_{10} (5) = 6.9$ dB (gain)

A power ratio less than 0 dB is treated as a loss (negative gain or attenuation). For example, if 10 W of power is fed into a cable but only 8 W is measured at the output, the power ratio is:

$N = 10 \log_{10} (P_{out}/P_{in}) = 10 \log_{10} (8/10) = 10 \log_{10}(0.8) = -0.9$ dB (loss)

The power ratio of 0 dB means there is no gain or loss.

dBm (decibel per milliwatt)

If you use the reference input power (P_{in}) of 1 mW the power ratio, *N* can be expressed in dBm:

$N = 10 \log_{10}(P_{out} / 1)$ dBm

By using the above formula, P_{out} can be expressed in mW which is an absolute value.

$P_{out}/P_{in} = 10^{(N/10)}$

$P_{out} = 10^{(N/10)}$ mW

For example, if amplifier has an output power of 22 dBm, how much power does it generate in W?

$P_{out} = 10^{(N/10)} = 10^{(22/10)} = 10^{(2.2)} = 158.48$ mW = 0.158 W

Rule of 10s and 3s

By using only 10s and 3s, one can easily convert a dBm value to its corresponding absolute power value without using the logarithmic scale.

- 10 dB = x10 (makes output power 10 times as the input power, for example, input=10 W and output=100 W)
- -10 dB = ÷10 (makes output power 1/10 times as the input power, for example, input=100 W and output=10 W)
- 3 dB = x2 (doubles the power, for example, input=5 W and output=10 W)
- -3 dB = ÷2 (halves the power, for example, input=10 W and output=5 W)

For example, if you want to convert 1 dBm its corresponding absolute power value, 1 can be written as, 10 -3 -3 -3.
Then apply the rule:
1 dB = 10 dB -3 dB -3 dB -3 dB = x10 ÷2 ÷2 ÷2 = 1.25
Remember P_{in} is always 1 mW and 'm' in dBm stands for milliwatt. So we multiply the above answer by 1 mW.
1 dBm = 1 mW x 1.25 = 1.25 mW

When you write any dBm value using 10s and 3s remember,

- If possible avoid using 3s
- Never use more than five 3s

For example, if a transmitter has an output power of 17 dBm, how much power does it generate in mW?
17 can be written as, 10 +10 -3
Then apply the rule:
17 dB = 10 dB +10 dB -3 dB = x10 x10 ÷2 = 50
17 dBm = 1 mW x 50 = 50 mW

dBi Antenna gain

It is important to note that antenna gain is different to amplifier gain. Antennas do not have a power source that allows the antenna to create additional energy to boost the signal. An antenna is similar to a reflective lens in principle - it takes the energy available from the source and focuses it over a wider or narrower area.

Antenna gain is then a measure of the amount of focus that an antenna can apply to the incoming signal relative to one of two reference dispersion patterns.

dBi is the amount of focus applied by an antenna with respect to an *"Isotropic Radiator"* (a dispersion pattern that radiates the energy equally in all directions onto an imaginary sphere surrounding a point source). Thus an antenna with 2.1 dBi of gain focuses the energy so that some areas on an imaginary sphere surrounding the antenna will have 2.1 dB more signal strength than the strength of the strongest spot on the sphere around an Isotropic Radiator.

dBd Antenna gain

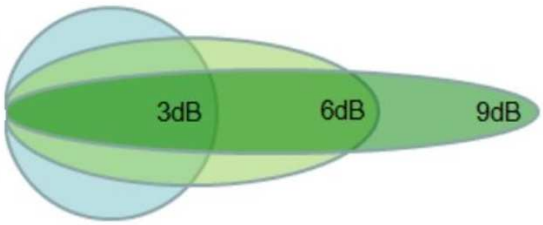
dBd refers to the antenna gain with respect to a reference dipole antenna. A reference dipole antenna is defined to have 2.15 dBi of gain. So converting between dBi and dBd is as simple as adding or subtracting 2.15 according to these formulas:

- dBi = dBd + 2.15
- dBd = dBi - 2.15

Specifying antenna gain in dBd means that the antenna in question has the ability to focus the energy x dB more than a dipole. Most antennas are specified in dBi, there is no magic in dBd, if you need to know the value of dBd, simply subtract 2.15. That will help you decide if the antenna's dBd is really better than another antenna's dBi.

Beam Width

Because higher gain antennas achieve the extra power by focusing in on a smaller area it is important to remember that the greater the gain, the smaller the area covered as measured in degrees of beam width (think of an adjustable beam flashlight). In some cases a high gain antenna could be counterproductive. If the system needs to have reception over a larger area than a specific area, you will prefer to use an antenna with less gain. A good example here would be a repeater system, if the antenna gain was too high, it would not have a full coverage of the area you need to reach, someone will most likely miss out. There is a careful balance between gain and coverage.

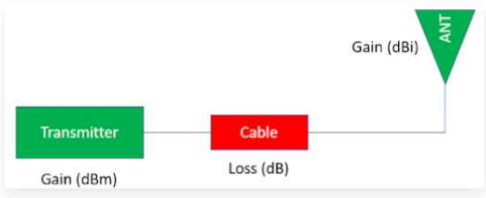


EIRP and ERP?

A radio needs an antenna to transmit or receive signals. The connection between the radio and the antenna is usually made by a piece of cable (for some devices it is a PCB trace). When transmitting, radio (transmitter) and antenna provide signal gain while antenna cable and connectors affect signal loss.

EIRP

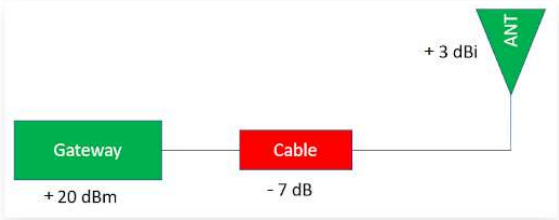
EIRP (Effective Isotropic Radiated Power) is the total power radiated by an isotropic antenna in a single direction. In this case, the antenna gain must be expressed in dBi.



The EIRP of a unit that consists of a transmitter, an antenna, and a cable can be calculated using the formula,

EIRP = Transmitter output power (dBm) + Antenna gain (dBi) - Cable loss (dB)

where the transmitter power in dBm, antenna gain in dBi, and cable loss in dB.

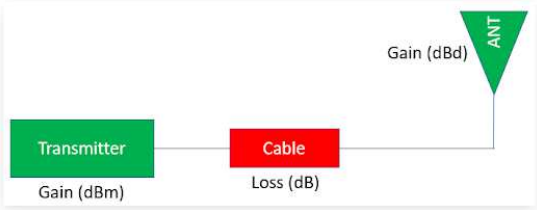


EIRP = Transmitter output power (dBm) + Antenna gain (dBi) - Cable loss (dB)
EIRP = 20 +3 -7 = 16 dBm

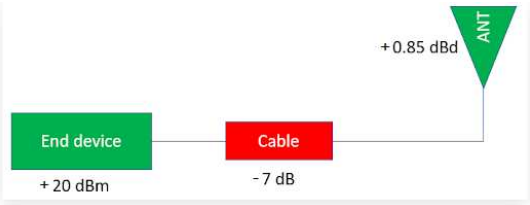
ERP

Sometimes, the maximum output power is measured in ERP (Effective Radiated Power) instead of the EIRP.

ERP is the total power radiated by an actual antenna relative to a half-wave dipole antenna. In this case, the antenna gain must be expressed in dBd.



The ERP of a unit that consists of a transmitter, an antenna, and a cable can be calculated using the formula,
ERP = Transmitter output power (dBm) + Antenna gain (dBd) - Cable loss (dB)
where the transmitter power in dBm, antenna gain in dBd, and cable loss in dB.
ERP is also expressed in dBm.



ERP = Transmitter output power (dBm) + Antenna gain (dBd) - Cable loss (dB)
ERP = 20 +0.85 -7 = 13.85 dBm

Conversion between EIRP and ERP

You can easily convert EIRP to ERP and vice versa using the following equation:
EIRP (dBm) = ERP (dBm) + 2.15
Example: Convert the EIRP value 16 dBm to ERP.
ERP (dBm) = EIRP (dBm) - 2.15 ERP (dBm) = 16 -2.15 = 13.85 dBm

Next Month we have a look at Choke design for the 160–10M Bands from the "Cookbook"

“Home Brew”

Ladder Line

Ladder line seems to be popping up in many conversations and articles these days and rightly so, it is so simple but so versatile for low loss connections. Yes, it does have imitations but if you can overcome them, then you have an almost perfect feedline.

The problem with ladder line is the price and availability, its not that cheap. However, there is a solution, why not make it yourself. Amateur radio is about experimentation after all, give it go.

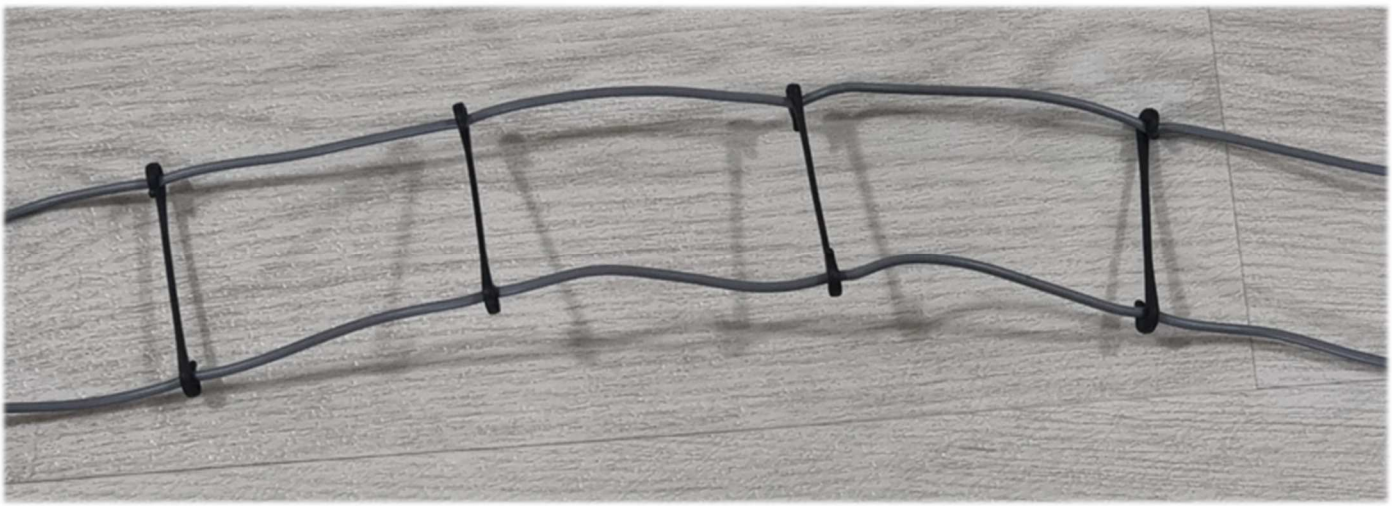
IARS member Mal VK2DXM has the perfect cost-effective solution for the wire spreaders, and you can contact Mal at vk2dxm@gmail.com for information on where to buy the wire spreaders.

These spreaders are very economical and all you need is a packet of these and of 0.75 to 1mm² wire (approx. 1.5mm to 2mm Outside diameter with insulation) you can make up a ladder line very close to 450 Ohms.

Here is an easy on-line calculator to use. (It has also been added to the “Calculator page” in the Propagator)

www.smrcc.org.uk/tools/OpenWire.htm

The spreaders are approx. 54mm center to center and you can put as many if them on the wires to make a secure and firm feedline.



Handy On Line Calculators

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

NEW >>>>>>> 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 ☺

How many of these can you still answer correctly?

Q1) The voltage standing wave ratio for a properly matched transmission line is:

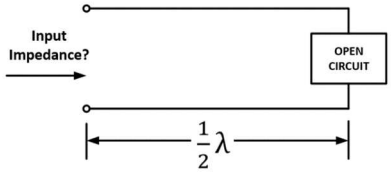
(a) 0:1
(b) 1:1
(c) 10:1
(d) 100:1

Q2) The most effective method of matching between transmission lines of differing impedances is by means of a:

(a) quarter wave stub
(b) balun
(c) coupling capacitor
(d) halfwave stub

Q3) The input impedance of an un-terminated transmission line half a wavelength long is:

(a) maximum resistive
(b) minimum resistive
(c) maximum inductive
(d) minimum capacitive



Q4) In a transmission line which is terminated in its characteristic impedance:

(a) the ratio of the rms values of voltage and current is constant at all points
(b) all energy arriving at the receiving end is reflected
(c) voltage and current are out of phase at all points and increase with frequency
(d) no energy is absorbed by the load

Q5) The velocity factor of a transmission line is:

(a) the relationship between electrical length and physical length
(b) the speed of the electron flow within the line
(c) a measure of the efficiency of the line
(d) a measure of its usefulness as a matching stub

Q6) If the RF voltage on a long transmission line decreases over its length from 50 volts to 0.5 volt, the line loss is:

(a) 10 dB
(b) 20 dB
(c) 40 dB
(d) 60 dB

Answers next propagator ☺

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

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

OLD PROPAGATOR MEMORIES

THE ILLAWARRA AMATEUR RADIO SOCIETY - P.O. BOX 1838 WOLLONGONG 2500

Meetings; Second Tuesday of every month except January, at 7.30 p.m. in the S.E.S. Headquarters, Montague Street, North Wollongong. Committee Meeting - 3rd Tuesday of each month.

Repeaters: VK2RAW - 6850 VHF Mount Murray. VK2RIL - 7275 VHF Sublime Point.

VK2RUW - 8225 UHF Hill 60 Port Kembla. VK2RIL - 8725 UHF Sublime Point.

Broadcasts: On Sunday night prior to Club Meeting - 7.00 p.m. - RTTY on 6850 and 7275 VHF; 7.15 p.m., voice on 6850 VHF , 7275 VHF and by relay on 3.562 Mhz. Call backs after voice broadcast.

W.I.A. Relay: On 6850 VHF at 11.00 a.m. and 7.30 p.m. each Sunday.

Club Nets: 3.562 Mhz SSB on Sunday at 8.00 p.m. and slow morse net on 28.440 Mhz on Tuesday at 8.00 p.m.

Newsletter: "The Propogator", published monthly to reach financial members in week prior to meeting. All articles, ads etc. to the editor by 3rd Tuesday each month.

Membership: The Secretary, I.A.R.S., P.O. Box 1838, Wollongong 2500. Full membership is $10.00 per annum; students and pensioner concessional members $5.00 per annum.

Awards: The award of the I.A.R.S. is "The Lawrence Hargrave" award. VK stations require 10 contacts with I.A.R.S. members; overseas stations require 5 contacts with I.A.R.S. members. Contact with the Club station VK2AMW is sufficient in itself for the award. Band details - time, day, date, frequency, station worked + $2.00 or 4 I.R.C.'s to Award Manager, I.A.R.S., P.O. Box 1838, Wollongong 2500. No QSL cards required.

Store: The Club store operates at each Club meeting.

Committee: President - Keith Curle VK2OB, 24 Beach Drive, Woonona.

Vice President - Bill Chadburn VK2DYU, 45 Beltana Avenue, Dapto.

Secretary - Jim Hayes VK2EJH, 1 Kathleen Crescent, Woonona.

Treasurer - Andrew McEwan VK2XGC, 7 Nioka Avenue, Keiraville.

Auditor - Geoff Cuthbert VK2ZHU, 1 Nioka Avenue, Keiraville.

General Committee: Ian Callcott VK2EXN, Wojciech Tomczyk VK2OE, Martin Hutchins, Jim Mead VK2EJM, Gerhard Meuller VK2XGA, Dave Routledge VK2NGS, Paul Suters VK2PGS.

Repeater Chairman: Graeme Dowse VK2CAG.

Repeater Committee: Bill Jut VK2KWJ, Rob McKnight VK2JRC, Morrie Van De Vorstenbosch VK2EMV, Peter Woods VK2VCK, Ian Callcott VK2EXN, Mike Keech VK2DFK,

EME Co-Ordinator: Lyle Patison VK2ALU.

Store: Ray Ball VK2XCC.

Publicity Officer: Dave Myers VK2DFL.

Life Members: Graeme Dowse VK2CAG, Keith Curle VK2OB, Lyle Patison VK2ALU.

VISUALISING SWR (refer page 13) Most amateurs have a working knowledge of Standing Wave Ratio (SWR) and are aware that it is preferable to have minimum SWR on feeders so that power lost in the antenna feeder is kept to a minimum. However, this writer has heard numerous remarks on the air which indicate that many theories exist on the subject of how the SWR can be varied, including the erroneous idea that SWR can be varied by changing the length of the feeder.

To help clear the air of such misinformation, this article contains a graphical presentation of the relationship between the SWR on a transmission line and the length of the line. The presentation, usually referred to as the "SWR CIRCLE", shows how the feed-point impedance can be found when the SWR and electrical length of the transmission line are known.

The SWR on the transmission line between the transmitter and the antenna coupler, "A" in Figure 1 (Page 13) can be varied by tuning and adjusting the length to equal , a half-wavelength or any multiple of a half-wavelength. Point Y is the feedpoint impedance when the feeder is equal to a quarter-wavelength or odd multiples of a quarter-wavelength. The feed-point impedance at Point Z is due to the feeder length being equal to one-eighth-wavelength.

It should now be clear that varying the length of the feeder cannot vary the SWR on the "B" line, nor can it vary the feeder losses per foot. When the feeder length is increased, simply "go around the SWR circle" in a clock-wise direction. Remember that one full trip around the SWR Circle is equal to a half-wavelength of feeder.

The use of different feeder lengths to obtain variation in feed-point impedance is known to hams as "pruning the feeder to get the antenna to load." "Pruning the feeder" is sometimes necessary because of the limited impedance-matching capabilities of the coupling circuits. In this manner, a feed-point impedance which will more easily coupled by inserting a device such as an impedance bridge in the "A" line. In this manner, a "flat" or nonresonant line (SWR = 1.0) can easily be realised.

The SWR circle applies to the "B" line coupler to antenna or, if no coupler is used, transmitter to antenna. Although optimum tuning of the transmitter and coupler assures that the maximum r-f power is being transferred to the feeder terminals, it has no effect on the SWR.

In Figure 2, the SWR circle is plotted for a 52 ohm cable. Similar SWR circle can be drawn for any other cable characteristic impedance and the procedure will be described later in this article.

Referring to Figure 2, suppose an SWR of 2:1 is measured on the "B" line because a 52 ohm coaxial feeder is terminated by a 26 ohm resistive antenna impedance. Depending on the feeder length, the feed-point impedance could be 26 ohms resistive at Point X, 104 ohms resistive at Point Y, or any one of the infinite number of complex impedances, such as Point Z. Point Z represents a feed-point impedance of 65 ohms resistive in series with a 39 ohm inductive reactance. The convenient way to write this mathematically is:- 65 + J39. Point X is the feed-point impedance which is found when there is no feeder, or when the feeder match the feeder to the transmitter (or coupler) can be obtained.

It is important to note that although the feeder length has been changed, the SWR remains constant. You are simply going to another point on the SWR circle.

The SWR on transmission line "B" can be adjusted for minimum only by doing one of the following: (1) changing the transmitter frequency, (2) adjusting the length of the antenn element or elements, or (3) adding or adjusting a matching device at the junction of the antenna and the feeder.

.....RADIOTRONICS.

RESTORING NICAD CELLS AND BATTERY HOLDERS. The failure mode in NICad cells is caused by fine conducting whiskers which grow between the electrodes and prevent the cell from accumulating a charge. A momentary high-current through the cell will sometimes disintegrate the whiskers, allowing the cell to charge normally. I have successfully restored several cells by charging a 35,000-uF capacitor from a 12-volt supply and discharging the capacitor across the cell. After two discharges of the capacitor, each cell was recharged according to the manufacturer's recommendations.

The spring clips in battery holders lose their gripping ability after about a year and should be replaced. A poor connection will result in a small resistance in series with each cell, causing a significant voltage drop when current is drawn from the battery pack.

.....Ed. Piller, W2KPQ ... Q.S.T.

Wow, even the Lyrebird which is a similar publication to the IARS propagator has been going for a long time!

This was a page from the April 1985 edition of the IARS propagator

Sale of Amateur Radio Equipment.

Barry Goodman VK2ZAG has moved out of the district and is giving up his interest in the hobby for the time being.. He has collected quite a lot of equipment and "bits and pieces" over the years which he has asked me to try to sell for him. Most of the following items will be at the April meeting of the club either for direct sale or auction - as indicated,

For Auction

Oscilloscope - "Heathkit" - Laboratory type Model O-12
Freq. 8Hz to 5MHz - with Instruction Manual.

Digital Frequency Counter - "Lunch" - range 20Hz to at least 300MHz with prescaler.

Transceiver - "Multi Palm II" - 2 metre FM hand held - with crystals installed for several repeater channels.

Transceiver "Bigear Type 2" - 2 metre PLL mobile transceiver with digital frequency display.

For Sale

Two - mobile Transceivers for CB use on 27MHz - multichannel
Two - Handy Talky transceivers for CB use on 470MHz band.
Sanyo - cassette tape recorder - battery type
Transmitter - Receiver Unit - similar to those used by IARS for 70cm repeaters
Two - Racal Modulation/Deviation Meters - Freq. Range 48-600MHz.
Signal Generator 4.5 - 150KHz - with inbuilt attenuator.
Home brew receiver with digital readout - 2 metres??
Sweep Generator - "Mega-Sweep" - Freq. range 50KHz to 500MHz with extension to 1000MHz - with Instruction book.
12 Volt regulated power supply - 3amp.
High Voltage power supply unit - 300VDC 100ma??
Coaxial cable with plugs - including RG8 & RG58 cable
Transformers, high voltage and low voltage
Feed through and bypass capacitors for UHF use
Coaxial capacitors for UHF use - 1 to 10pf variable, etc
Various other small items, such as tuning capacitors, mica capacitors carbon resistors, BNC connectors, milliameters and microameters etc, etc.
Solid aluminium Dish, 4 foot diameter, good for use up to 10000MHz.

Lyle VK2ALU

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/2020/09/1985-04-April.pdf

Not a WIA member?   Why not join?   Support our hobby

Use this link and check out WIA Member benefits, information and WIA services under the "For Members" Tab at
https://www.wia.org.au/

Upcoming Contests ……………………………

Harry Angel

Harry Angel Memorial 80m Sprint

Contest Manager

Dr. Kevin Johnston VK4UH, Glenn Mathison VK4GMI
Harry Angel Sprint Manager
c/- Redcliffe and District Radio Club
PO Box 20, Woody Point. Qld 4019

Contest Introduction

The Harry Angel Sprint is an annual 80m contest event, first established in 1999, to commemorate the life of Harry Angel VK4HA who at the time of his becoming a Silent Key was the oldest licensed amateur in Australia.

The duration of the contest is 106 minutes one minute for each year of Harry's life.

The "HA" is held on or around the first Saturday in May each year and is open to all grades of licence holder. This contest is structured to suit both seasoned contesters and operators new to contesting.

More information link here >> https://www.wia.org.au/members/contests/harryangel/

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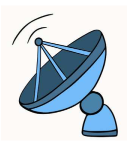


23cm Fun day on the 23rd of EVERY MONTH !!

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**

################## <<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>> ###############

John Moyle Field day weekend 2025

FEEDBACK

It was a great outing with the IARS clan operating the remote Penrose club station under the call sign VK2AMW.

Equipment used ; Icom 7300, AH4 Remote antenna tuner, ladder line to a non-resonant 84ft centre fed dipole wired between some tall pine trees. Thank you Simon VK2KU for lending us your IC 7300 and AH4 tuner, (obviously trusts the IARS gang 😊)

Power source; Solar panels charging a 360Ah 12 Volt battery bank

Contacts; Just under 500 points

Category ; Multi OP, Multiband, Low power (<= 100W), 24hour , phone

Operators; Simon VK2FO (XQX), Keith VK2KQB, Vinnie VK2VIN, Rob VK2MT, Ron VK2XIX,

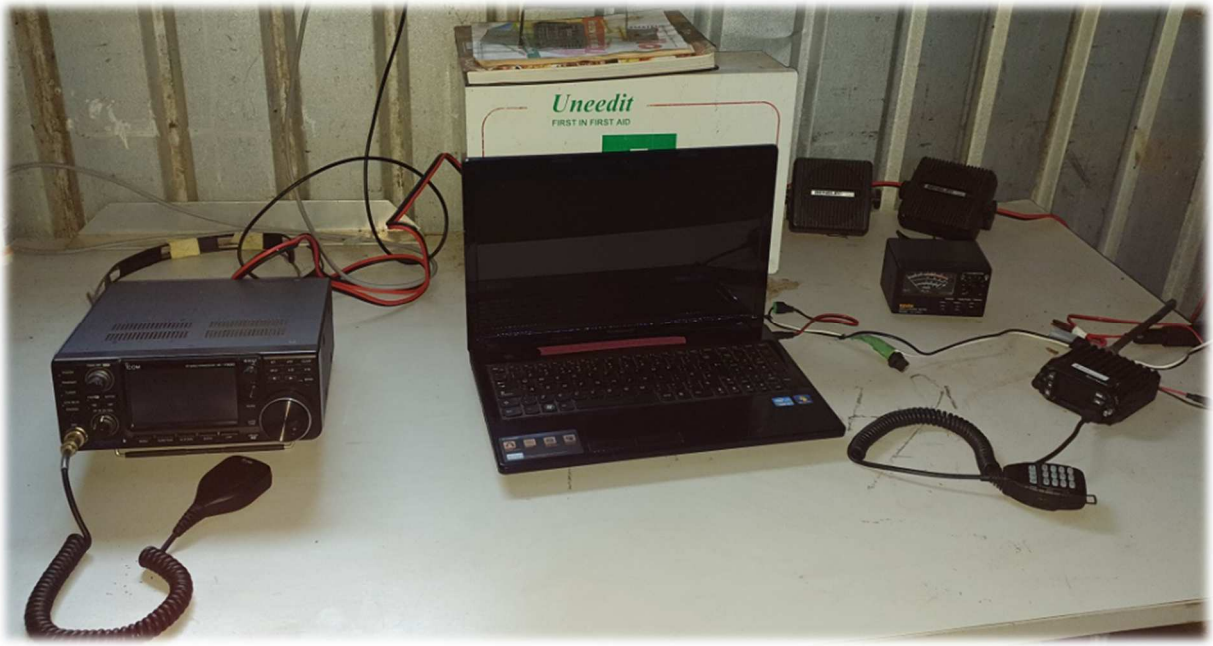
Shane VK2HCO, Daniel VK2FDSD,

Spectators and fans; too many to mention 😊

Thanks to Phil VK2CPH and Simon VK2XQX for mowing and maintaining the place, looks like a park !!

We did ensure that the fire place was far away from the “Methane Gas Generator Room” 😊

The AH4 ATU & ladder line(was lifted off the ground before the contest) , the bludging department open for business



Ready to Roll

A very special thank you to Simon VK2XQX, who made this all possible by organising the Penrose site, including all the planning and cleaning as well, kudos to Simon 😊

Let's hope we can do it again next year

IARS outing planned in MAY

Join us and the MSCARC for a great day out and about

Pencil the date in your diary for the Saturday the 3rd May 2025

AR NEWS

Amateur Licensing 1 year on

Date : 16 / 03 / 2025
Author : Justin Giles Clark VK7TW

ACMA Class Licence Performance Survey

It has been a year since the introduction of the new amateur radio licence conditions.

The Wireless Institute of Australia (WIA) is interested in your experience with the transition to these new conditions and the administrative framework surrounding them.

We have created a short 10-minute survey for all Australian radio amateurs and encourage everyone to participate. This is an opportunity to share your experience with the transition and the new class licence arrangements.

We are also keen to hear from amateurs who have used the new documentation in situations where proof of a valid amateur radio licence was required.

More information link here >>>>>>> https://www.wia.org.au/newsevents/news/2025/20250316-2/index.php

>>

WIA Annual General Meeting 2026

Date : 11 / 03 / 2025
Author : Peter Clee - VK8ZZ

The WIA is seeking expressions of interest to hold our 2026 AGM

The WIA are seeking expressions of interest from affiliated clubs to hold our 2026 AGM.

It is hoped that our AGM can be held in conjunction with a field day, expo or car boot sale. Perhaps even a car boot sale or another special event.

Affiliated clubs in South Australia and Western Australia are encouraged to apply.

Information and enquiries can be directed to the secretary @ wia.org.au

The Wireless Institute of Australia Annual General meeting in 2025 will be held in Bendigo Victoria in May in conjunction with the Bendigo Technology Expo so perhaps we can come to your area in 2026.

Peter Clee VK8ZZ
WIA Director and Secretary

>>

Bendigo Technology Festival - MAY 2025

Date : 10 / 03 / 2025
Author : Bendigo Amateur Radio and Electronics Club

The Bendigo Amateur Radio and Electronics Club are excited to advise that they will be holding a Technology Festival in conjunction with the WIA Annual General Meeting in May.

Join us at the Bendigo Technology Festival, hosted by the Bendigo Amateur Radio and Electronics Club.

This exciting event will bring together enthusiasts, experts and hobbyists from all over to celebrate and explore the world of amateur radio, electronics, and technology of all types.

More information link here >>>> https://www.wia.org.au/newsevents/news/2025/20250310-2/index.php

World Amateur Radio Day

Date : 02 / 02 / 2025
Author : IARU Region 3 Secretary

World Amateur Radio Day

Every April 18, radio amateurs worldwide take to the airwaves in celebration of World Amateur Radio Day. It was on this day in 1925 that the International Amateur Radio Union was formed in Paris. 2025 will celebrate 100 years.

Amateur Radio experimenters were the first to discover that the short wave spectrum — far from being a wasteland — could support worldwide propagation. In the rush to use these shorter wavelengths, Amateur Radio was "in grave danger of being pushed aside," the IARU's history has noted. Amateur Radio pioneers met in Paris in 1925 and created the IARU to support Amateur Radio worldwide.

For more information >>> https://www.wia.org.au/newsevents/news/2025/20250202-1/index.php

IARU QRP Day

Date : 10 / 03 / 2025
Author : Secretary IARU R3

IARU R3 has announced QRP Day as 17 June 2025.

The interest in QRP activities is everlasting in amateur radio community worldwide. QRP radio communications testify high ability of radio amateurs, and offers advantages concerning, among others, the reduction of QRM on the amateur bands.

The 10th IARU Region 3 Conference held in September 1997 in Beijing has resolved the following recommendations based on the document (97/X/14) submitted by NZART, which says;

"That Region 3 Societies help to promote the IARU objectives for QRP operation, specifically:

More information link here >>>>>> https://www.wia.org.au/newsevents/news/2025/20250310-1/index.php

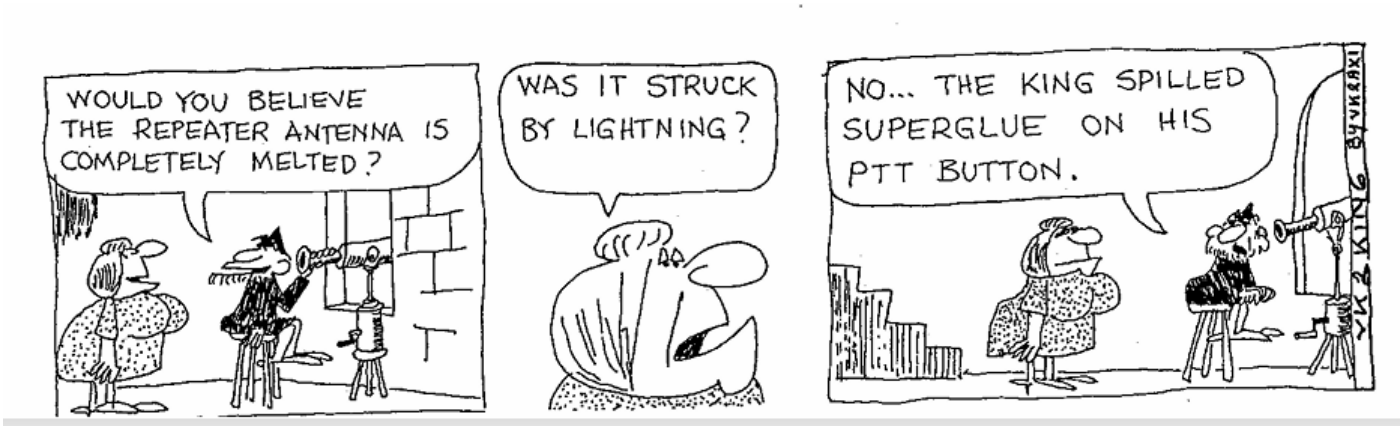
Upcoming IARS meeting presentations ……

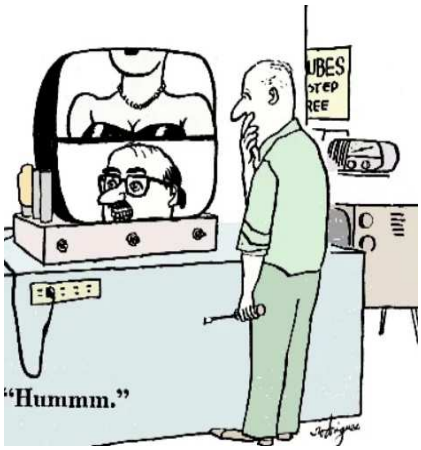
- **April 2025** : Roger VK2VRK, portable comms. RDAR, the easy way 😊
- **May 2025** : Ned VK2AGV, The Edmund Fitzgerald Part 2 the Conspiracies? (30min): After which we will have a TESTING the insertion loss of coaxial switches, relays, triplexers, duplexers and coax feedlines. Bring along your parts to be tested.
- **June 2025** : **SHOW and TELL,** bring along that latest project ot share with us.
- **July 2025** : Surface mount soldering and reworking "HANDS ON" workshop. Let's do it!
- **August 2025** : IARS AGM

Fun Corner

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

Thanks to all that sent in funnies.





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 8th April 7.30pm,

73

Keith VK2KQB

IARS Secretary

IARS, Amateur Radio in the Illawarra since 1948