



Illawarra Amateur Radio Society



# Propagator December 2022

Upcoming Meeting on the 13<sup>th</sup> December 2022

Christmas meeting

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)

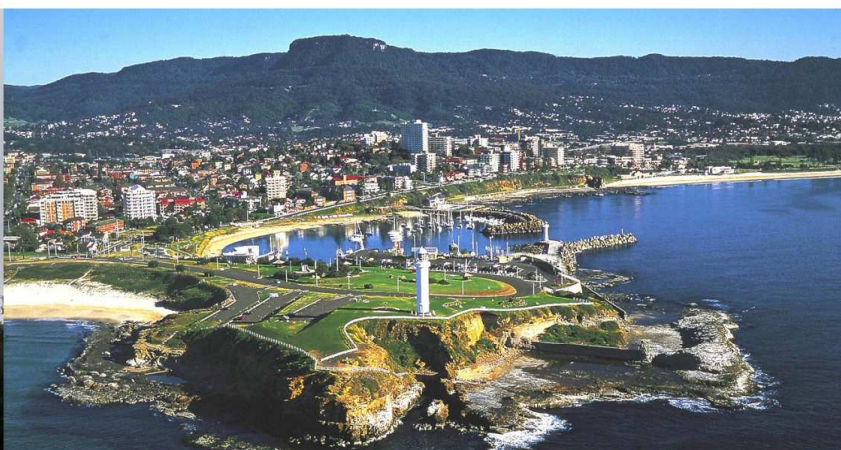
THE  FOLLOWS A COVID19 SAFE PLAN



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 8<sup>th</sup> November 2022

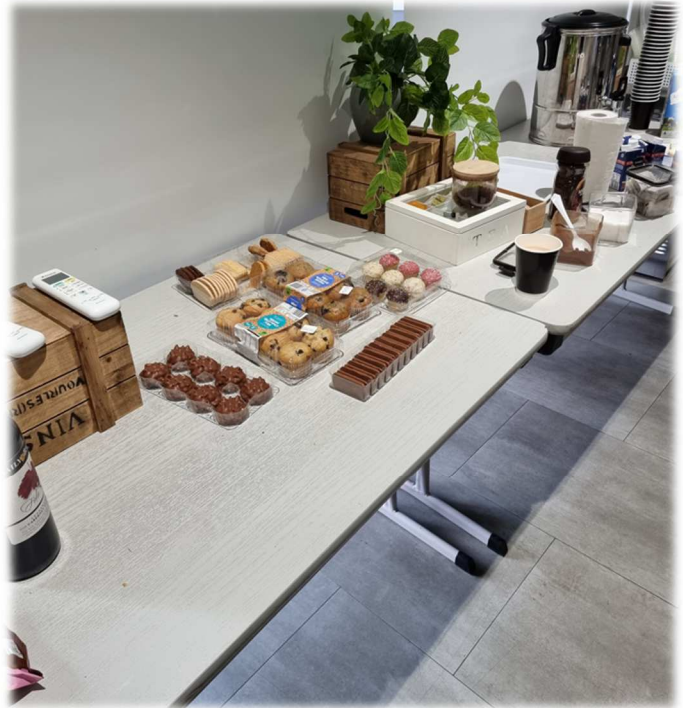


At the last meeting it was the auction business as usual with our very own auctioneer  
Simon VK2XQX

There was plenty of bargains and a 100% clearing of all items on offer.







Lucky door prize was a nice bottle of Red vintage 2016 😊 draw to lucky auction number 25  
And .... Of course there was the usual chocolate biscuits and muffins to enjoy with a nice cuppa.

# Next Meeting

13th December 2022 7.30pm

Show  
and  
Tell

&





The next meeting will be a Show and Tell with a Pizza evening sinner for Christmas

There is NO COST for IARS financial members, non- members are welcome to join in with a \$5 donation

Bring along some pictures or some equipment, share your story with us. There will be a projector ready for a USB stick or email your file to [iars.keithb@gmail.com](mailto:iars.keithb@gmail.com)

There will also be the usual coffee and cake as well, including having a catch up with all your mates.

As we will be catering, please RSVP by the 10<sup>th</sup>  
December 2023

Looking forward to seeing you there on the 13<sup>th</sup> at 7.30pm.



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 was put on hold this time around but should be back next meeting.

Remember, Christmas time we draw until there is a winner, some come along there is a very good chance you could win some cash.



## Disposables Donation Table

Each meeting we have the disposables table with items donated to the club.

Please keep the support for this going and bring oddities in and take some home for a small donation to the IARS. With the next meeting please bring along and donate those old items that you no longer use and may even have thought about throwing it in the bin, someone else may be looking for that very part. Wire, pieces of coax, old parts, plug packs, power supplies, capacitors, resistors, coils, tubes, knobs, anything that someone can use.

**If you have some trash\*\*\*, please bring it along to the next meeting and give it new life**

\*\*\* Trash , just in case the wrong impression is given, it is not literally trash 😊 no rubbish please

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## REPEATERS



VK2RUW (Knights Hill)

146.675 MHZ >>>>



VK2RMP (Maddens Plains)

<<<< 146.850 MHZ

[linked](#)

### Current 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 **OK**
- 438.725Mhz with a -5mHZ offset DMR only, **OK**
- 1296.850Mhz Beacon with simplex repeater function – **OK**

The IARS welcomes any feedback on our repeater systems.

Please send all your feedback to [iars.keithb@gmail.com](mailto: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](http://www.iars.org.au) under the Contact details page.

As reference of the donation please add your Call sign and the words "Repeater Donation"



### 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](mailto:iars.keithb@gmail.com)

### UHF Power RF booster for sale

13.8VDC supply, has been modified to take 5W input and deliver 30Watt output  
Its all yours for a \$35.00 donation to the IARS



Give that UHF CB a boost with this great little amp





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](mailto:iars.keithb@gmail.com)

Also, 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.

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**This Month we have Arthur, VK2KBI sharing some information with us**

## **Proposed Formation of an Illawarra Energy Realists Group**

Arthur Day

I was so impressed by Keith's article on batteries in the November issue of the Propagator that I forwarded it to a developing national network of 'energy realist' groups. Their aim is to form an opposition movement against the massive so-called *net zero* renewable energy rollout currently underway across the country. As a result, I have been invited to convene a local group of energy realists in the Illawarra. The national network of groups we'll be part of will collate and redistribute information against the rollout. This will include videos and readable summaries of scientifically and technically valid material about the practical limitations of renewables. **These are issues the mainstream media refuses to cover.** We will demonstrate why **the zero emissions aim of the rollout is fundamentally impossible** without destroying the integrity of the electricity grid and the modern industrial economy that is dependent upon it.

The public profile of the national network will grow as more and more people are individually impacted by out-of-control electricity prices, systematic load shedding, blackouts, and ultimately industrial shutdowns and job losses. As the lights go dim the real causes of the power crisis will come into focus.

### **About the Illawarra Energy Realists Group:**

- The new group will form part of a growing national confederation of independent but coordinated energy realist groups across the country, primarily focussed on the looming self-inflicted power crisis we face.
- Where available, the best way to communicate the issues is via short well produced 5-minute videos. A selection of short well written and easy to understand essays and articles will also be used. Group members can then spread this material further and discuss it with others who might otherwise not be so engaged, and hence reach a much wider audience.
- The challenge is to **keep the controversial politics to a minimum** while concentrating on the technology and engineering. That is, we will concentrate on the noncontroversial **facts of economics and energy physics** that demonstrate the impossibility of the renewables 'dream' at this time.

- My role will be to serve as a conduit and intercept relevant information as it is circulated between the other groups from many sources all around the world. There is a lot of information available but much of it is impenetrable by normal people. We will attempt to lift the lid on that.
- Initially, a mailing list will be formed to disseminate information. The aim is for the mailouts to be infrequent – perhaps only one or two a month, or one a week or so, focussing on **quality material** of direct relevance distilled from around the world, and specifically aimed at educating relatively disengaged non-technical friends and family. That is the key to success here because winning the information war is essentially a numbers game.

To subscribe to the “Illawarra Energy Realists Group”, send an email to: [arthurday2000@yahoo.com](mailto:arthurday2000@yahoo.com)

As an example of the videos we hope to circulate, please watch this one from PragerU<sup>##</sup>. It features Mark P. Mills who has been named energy writer of the year by the American Energy Society. It can be viewed at:

<https://www.prageru.com/video/how-much-energy-will-the-world-need>

This is an example of the use of a highly intuitive production style that conveys complex technical content in a manner that can be easily accessed by a non-technical audience. This is just what is needed. The video might be centred on the US but the Australian situation is almost the same.

*As you watch this, think about how material presented in this way can be discussed with a much wider audience of friends and family, and so on.*

#### **Some key factoids about the electricity cliff we are headed for:**

- As each coal-fired power station closes, every wind drought at night will increasingly threaten the power supply. Prolonged wind droughts will be potentially catastrophic because there is **no plan** for **adequate** economically viable electricity storage to cover such inevitable weather events.
- If the coal capacity is not maintained, then more gas will need to be burned instead, at a **crippling cost**.
- So-called ‘renewable energy’ is **not** cheap. Not when you include the cost of the **estimated 28,000 km** of extra transmission lines that will be needed to carry the electricity generated for 100s of km across regional areas into the cities. These will need to be built and **maintained** at a cost of many tens of billions of dollars.
- Then, there is the cost of an entire **parallel non-weather dependent electricity generation network** devoted to filling in the inevitable renewable energy shortfalls arising from shortages of wind and sunshine due to the variability of the weather, **and our imperfect ability to forecast it**.
- Until an **economically viable** storage technology becomes available with a **capacity hundreds of times greater than currently exists**, that parallel non-weather dependent network will need to have a similar capacity to the renewables it supports. But whether it is generating electricity or not, the full operating cost of that backup supply will still need to be added to the electricity price.

<sup>##</sup>**PragerU** is a leading conservative non-profit that is focused on changing minds through the creative use of digital media. While some of their work on other topics is considered to be politically controversial, Mark P. Mills is a prominent scientist with a physics background. He is a senior fellow at the Manhattan Institute as well as a faculty fellow at Northwestern University’s McCormick School of Engineering and Applied Science. He has written extensively about various aspects of energy, including energy policy, energy-related technologies, fracking, the Cloud, and the relationship between energy and data.

Thank you Arthur

# SWR - the persistent myth

## PART 1

*What you always wanted to know about SWR, but were too scared to ask!*

**John Fielding ZS5JF**

True or False ?

- An antenna must have a SWR of 1:1 to radiate efficiently.
- For every watt of reduced reflected power achieved an extra watt of forward power enters the antenna and is radiated.
- Reflected power is absorbed by the transmitter and causes damage due to excessive dissipation in the amplifier output stage.
- An antenna must only be fed with a feed line that is an exact multiple of half wavelengths.
- A quarter wave base fed  $\lambda/4$  vertical antenna only requires 3 or 4 radials to radiate efficiently.



**King SWR**



How did you score ?

If you answered False to all the questions you were correct. These are just some of the erroneous statements made over the years in amateur publications.

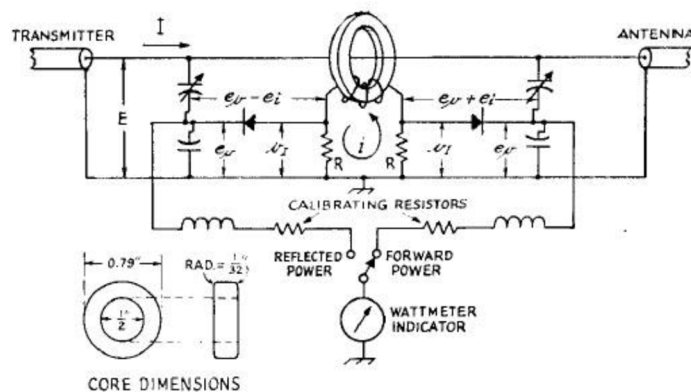
### VSWR & SWR - what's the difference ?

- VSWR is short for Voltage Standing Wave Ratio
- SWR is short for Standing Wave Ratio

In reality the two are exactly the same. The reason we often see VSWR written is because it is more practical to measure RF waves by detecting voltage rather than RF current. Most measuring instruments measure the voltage and then convert to power. ( $P = V^2 / R$ ). If the measurement were made by measuring the RF currents flowing we could use ISWR as the notation. Knowing the line impedance and the applied voltage we can calculate the value of current since  $I = V / Z$ .

### Measuring Forward & Reflected Power,

Measurement of RF power flowing in a coaxial transmission line is performed with an item known as a Directional coupler



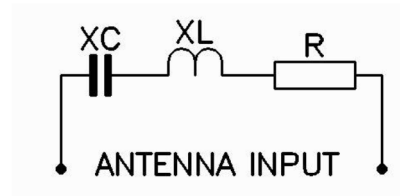
Bruene Bridge SWR meter

Before the SWR Meter - The Dark Ages !

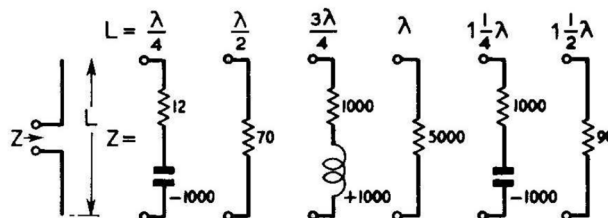
- The Directional Coupler and hence SWR meters are relatively recent inventions. Prior to their invention in about the late 1950s by Warren Bruene (W0TTK) of Collins Radio, transmitter output power was determined in a different way.
- Until about half way through World War 2 no commercial RF power meters existed, and these were only dummy load types.
- RF power measurement was performed with an Aerial Ammeter which measured the RF current being generated by the transmitter. The operator simply tuned for maximum current into the feed line. (Maximum Smoke !)
- In actual fact this was a better system because maximum current equals maximum power. Today, because we can measure SWR, we spend far too much time worrying about it - instead of operating in blissful ignorance!
- A low SWR does not mean the antenna is radiating efficiently, it can mean quite the opposite. If the SWR stays low over a large frequency range, something is very wrong!

## Antenna Equivalent Circuit

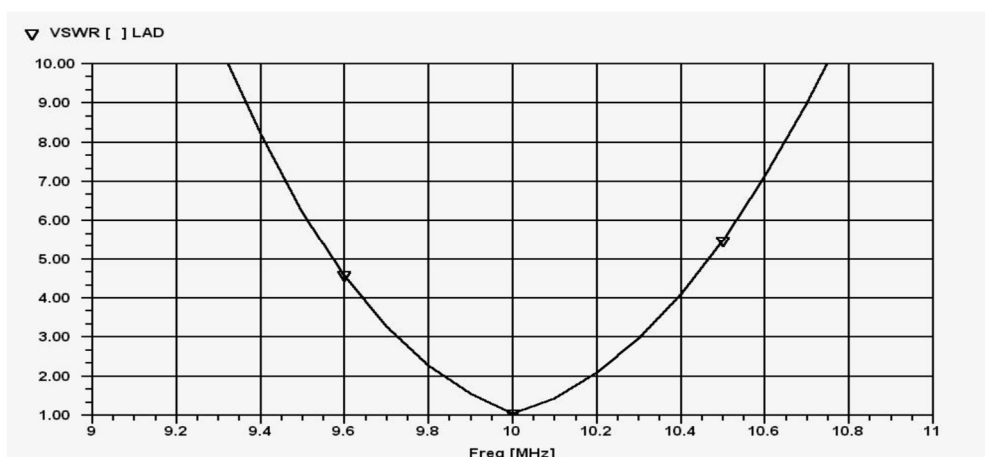
- An antenna is a complex device exhibiting resistance and reactance, hence we refer to it as an impedance.
- The resistance is made up from two types of resistance connected in series, one a real resistor and one an imaginary resistor. This is what we measure when we evaluate the feed point resistance or impedance.
- The imaginary resistance is the radiation resistance and is due to the transformation between the antenna and the free-space impedance of  $377 \Omega$ .
- The real resistance is due to RF current losses in the material, the ohmic resistance, and is due to skin resistance and other factors. It can also be caused by ground current in a radiator over a lossy ground.
- Reactance occurs when the antenna is operated away from its resonant point. At resonance the antenna behaves like a real resistance.
- A  $50 \Omega$  antenna does not measure  $50 \Omega$  when measured with a ohm-meter, it is either a short or an open circuit. Only a Dummy Load



At resonance  $XC$  &  $XL$  are equal and opposite values and so cancel out, leaving just the resistance  $R$ . Below resonance only  $XC$  is present and above resonance only  $XL$  is present. Hence for these two conditions the load will appear to be either capacitive or inductive. Note that power cannot be dissipated in a reactance because the voltage and current are 90 out of phase.



**Impedance of various dipole types**, all of the types shown radiate with equal efficiency when correctly matched to the feed line although their radiation patterns are different.



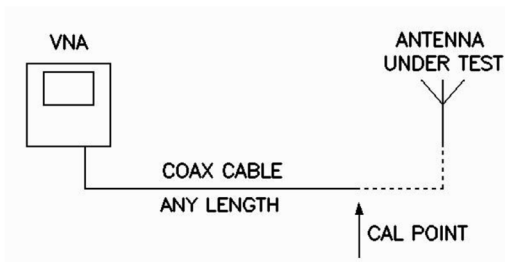
Typical SWR plot versus frequency

If your antenna doesn't behave like this then it probably has high ohmic losses which are dissipating the RF instead of radiating it !

So what exactly is SWR ?

- SWR is the ratio between two different impedance's, one being the measuring impedance. This today is normally  $50\ \Omega$ .
- If we measure in a  $50\ \Omega$  system and the load impedance is  $100\ \Omega$  then the SWR is  $100 / 50 = 2$ . This is written as  $SWR = 2:1$  because it is a ratio. When the load and the measuring impedance are the same then  $SWR = 1:1$ .
- If the load is lower in value than the measuring impedance we simply swap the two numbers around because SWR cannot be lower than 1:1. If the load were  $25\ \Omega$  the SWR would be  $50 / 25 = 2:1$ .
- Hence, our SWR meter doesn't tell us much of any use, except that we are off the ideal case. All it tells us is the margin of error, but not which way to go to correct the condition. In order to ascertain this we need more complex equipment, such as a Vector Network Analyser or an Impedance Bridge.

Professional Antenna Measurements, today the instrument most often used for antenna impedance measurements is the Vector Network Analyser (VNA). Using any arbitrary length of cable between the VNA and the test site we can see the exact impedance occurring at the antenna feed point.



Before use the cable is normalised. An open circuit, short circuit and a  $50\ \Omega$  load are connected in turn. The VNA stores the Calibration Data for later use. The cable length can be any value necessary to reach between the VNA and the antenna. Once the cal-data is stored it can be recalled as often as needed. The VNA resolves the resistive and reactive portions and displays the results. The antenna measurement is normally performed in an anechoic chamber - a RF Dark-Room - to exclude any strong transmitted signals.

### Matched Line Condition

- In an ideal case the transmission line would have zero loss. This never happens in practice.
- When the source of RF energy, the line and the load are all of the same impedance (resistance) the line is matched and all the power sent from the source will be dissipated in the load. Because all the power sent down the line is accepted by the load there is no reflected power and so the SWR is 1:1. The RF current and voltage anywhere along the line are constant and in phase.
- In a practical transmission line there will be some loss (attenuation) so the power arriving at the load is less than the source fed into the line. In a lossy line some of the power is developed as heat in the line losses and the rest is accepted by the load.

### Mismatched Line Condition

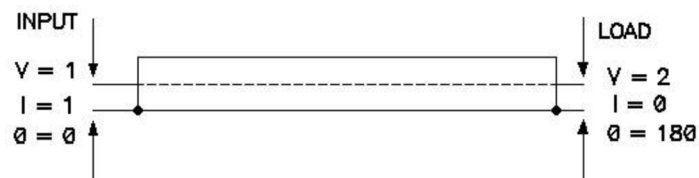
- In a mismatched line the load is a different value to the transmission line impedance and not all the power sent down the line is accepted by the load.
- Some of the power is reflected away from the load and it travels back down the line to the source.



- Note that the power level existing at the load end of the line is not the same as the power fed into the line by the source. It can be more and it can be less, depending on the phase relationship due to the mismatch condition and the attenuation (loss) of the line. If the line has loss the power sent by the source will be attenuated by the line loss.

### Open Circuit Line

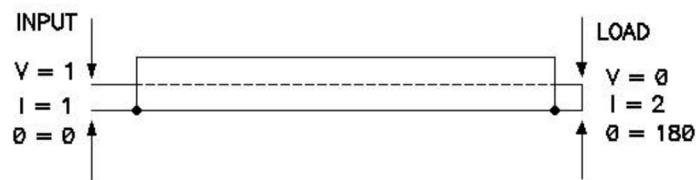
In an open circuit line (at the load end) the electromagnetic wave travels forward from the source along the line until it arrives at the load. Before it reaches the load the voltage and current are in phase and a constant value.



At the open end the current falls to zero and the collapsing magnetic field causes the voltage to rise to a value of twice that of the matched line condition. The phase of the current reverses by  $180^\circ$ . (Lenz's Law) All of the power arriving at the open end is turned around (reflected) and travels back towards the source. In this condition the SWR is infinite.

### Short Circuit Line

In a short circuit line (at the load end) the electromagnetic wave travels forward from the source along the line until it arrives at the load. Before it reaches the load the voltage and current are in phase and a constant value.



At the shorted end the voltage falls to zero and the collapsing, electrostatic field causes the current to rise to a value of twice that of the matched line condition. The phase of the voltage reverses by  $180^\circ$ , all of the power arriving at the shorted end is turned around (reflected) and travels back towards the source. In this condition the SWR is infinite.

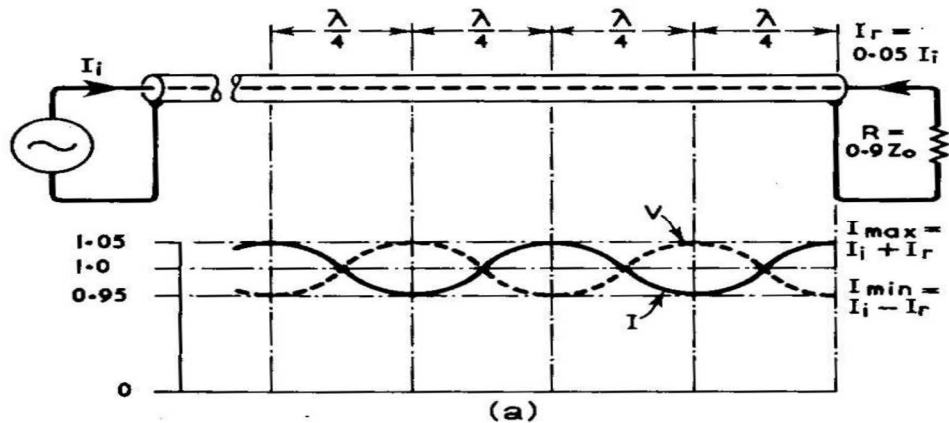
### Open & Short Circuit Line

For power to be dissipated we need voltage and current to be present.  $P = VI \times \cos \theta$  where  $\theta$  is the phase angle between voltage and current. In the open circuit condition although the voltage is 2-times the normal line voltage there is no current flowing. In the short circuit condition although the current is 2-times the normal line current there is no voltage present. For both of these cases the resultant voltage and current are  $180^\circ$  out of phase. Hence, no power is dissipated at the end of the line and all the power is reflected back towards the source. No power is lost because of an infinite SWR.

The reflected wave contains real power since  $P = VI \times \cos \theta$ . When  $\theta = 0$  the result is 1, when  $\theta = 180^\circ$  the result is -1.

## Standing Waves on a mismatched line

It is the  $180^\circ$  difference in the reflected wave current and voltage that sets up Standing Waves. The two electromagnetic waves existing on the transmission line are separate entities, but they interact with one another. As the two waves travel up the line (the forward wave) and down the line (the reflected wave) the voltage and current vectorially add. At the sum points the voltages and currents rise to a maximum. At the other points they vectorially subtract to give a minimum voltage or current. is traveling in the opposite direction.



**standing waves of voltage or current maximum occur every  $180^\circ$  ( $\lambda/2$ ).**

Higher and lower value for ZL. For the case where ZL is higher than the transmission line impedance the voltage and current behave in the same way as when the far end is open circuit. The voltage rises to a higher level, the current falls to a lower level and changes phase by  $180^\circ$ . For the case where ZL is lower than the transmission line impedance the voltage and current behave in the same way as when the far end is a short circuit. The current rises to a higher level, the voltage falls to a lower level and changes phase by  $180^\circ$ . In both these cases the power remains constant and the phase between voltage and current in the reflected wave is  $180^\circ$ .

## 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.

To find the answers .....

We will continue with Part 2 in the next propagator, or if you cannot wait that long I am happy to share the full PDF from John, send email to [iars.keithb@gmail.com](mailto:iars.keithb@gmail.com)

Remember to send us your suggestions, technical ideas, circuit diagrams, IARS community projects, pictures of your latest shack project, in fact ANYTHING of interest.

[illegible]



## OLD PROPAGATOR MEMORIES

### Moonbounce Report - July 1976.

A scheduled EME test was carried out on 5th June by Charlie VK2ZEN, with the assistance of Ian Proctor.

A one hour test was made with W1JAA, resulting in our first contact with him at his present QTH which is in Massachusetts. We had previously worked him under the callsign W6FZJ when he was located in California. His signals were running at 2 to 3dB over noise.

Chart recordings were made from the tape of EME signals received from W6LET on 24th May, to obtain data on fading characteristics of the EME path. Indications of scintillation fading were present in addition to the very marked libration fading pattern.

As the signal was above noise level at all times, even at the deepest part of the fades, these chart records are the most useful information obtained to date for determining what type of emission and processing of received signals could be used to obtain the greatest advantage from the characteristics of the EME propagation path.

A copy of portion of the chart was sent to the Stanford Research Institute Group for their analysis.

Eric Jamieson VK5LP advises that he intends to visit Wollongong this month for inspection of the dish at Dapto and discussion of equipment as part of his planning for the construction of a 28ft. dia. dish and gear for EME experiments.

Now we have heard of everything department - W3CCX and crew plan to operate portable EME in Columbia, South America in July-August on 432mhz. Their antenna will be an array of 16 large Yagis, with a measured gain of 1dB more than of their 20ft. dia. dish. This DXpedition promises to be quite an operation! A schedule has been circulated for EME tests with various stations, including VK2AMW, over the period July 31st to August 2nd.

Lyle VK2ALU.

### BILL-DIT RAFFLE.

The Bill-Dit Carphone Raffle was drawn at the December General Meeting. The lucky winner was Graeme East who held ticket number 017. Congratulations Graeme.

Our sincere thanks to Bill Calvert VK2DJ for his efforts in assembling the unit.

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## COMPONENTS FOR SALE

### GREENCAP CONDENSERS 100V

.0047, .01, .022

8c each

.047, .1

12c each

### METERS

1. S Meter 400 uA movement, calibrated in S units  
1 to 9 and 10 to 40 over S9. Cutout size  $1\frac{3}{8}" \times 5/8"$  \$2.50
2. Level Meter This is a dual movement meter indicating  
L and R level. Each side from -20 to +3. Each movement  
is 200 uA F.S.D. The dual scale is translucent, for  
illumination from the back. Very pretty. Cutout size  
 $1\frac{7}{8}" \times 1\frac{1}{2}"$ . Probably the same as the meter used in an  
Electronics Australia mixer/preamplifier project a few  
months ago. Only two left. \$3.00
3. 0 - 1mA Meter A standard 2" square meter. \$4.00
4. 0 - 1mA Meter A standard 3" x 2" meter. \$5.00
5. 0 - 10A Meter A standard 3" x 2" meter. \$5.00

### RESISTORS

Bags of 130  $\frac{1}{2}W$  resistors plus 4 Greencaps.

10 each of 13 values : 22, 47, 82, 100, 470 ohm

1K, 2.2K, 10K, 22K, 47K, 100K.

\$3.00 per bag

Greencaps 2 - .1, 2 - .0047, .01 or .022 to bring  
cost of resistors down to 2c each and still make a  
round \$3.

### NEOSID CANS

Single cans.

9c



## The beginnings of the Mid South cost Amateur radio society

### MSCARC

#### MID SOUTH COAST AMATEUR RADIO CLUB.

At the November monthly meeting of I.A.R.S., John Telfer, VK2YBQ, from Mollymook, spoke of the formation of this group at a meeting held on 6/11/76. There are 15 foundation members, including Jim VK2BBG and Jim VK2YCH who represented I.A.R.S. at the inaugural meeting.

They are intending to instal and operate a repeater in the Ulladulla area with coverage from Geringong to Narooma and it is anticipated that Channel 3 will be used. So far, only in the planning stages, with Jim VK2YCH being I.A.R.S. representative on their Repeater Committee.

We wish them evry success and we have offered our support for their venture.

Will share more oldies next month



# UPDATE

On the 5<sup>th</sup> of November 2023 the IARS had their second Shack crawl.

We visited Simon VK2KU, John VK2AAL, Dan VK2FDSD and Keith VK2KQB.

It was a great outing including an nice cuppa with scones, jam and cream (yummy) at

Johns QH and a lunch spread finishing off at Keith's QTH. (No dieting ☺)

















**Enjoying the great weather under the tower and the Home repairs and projects room**

XX

**If you would like to participate in the next Shack Crawl, please advise by return email**

XX

## Contests

More info <https://www.wia.org.au/members/contests/vhfuhf/>



Ross A. Hull 1902 - 1938

## Ross Hull Memorial

## VHF/UHF Contest January 2023

### Contest Introduction

The Ross Hull Contest is a VHF/UHF++ DX contest, with points awarded for distances worked. There are also band multipliers to encourage activity on the higher bands.

### Aim Of The Contest

The aim of the contest is to encourage and to reward achievement in working the greatest possible distances on the VHF, UHF and microwave bands.

### Upcoming Contest Date & Time

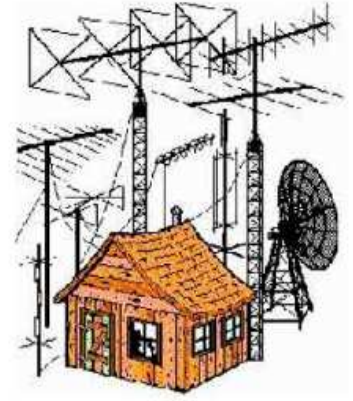
The month of January 2023.

More information link <https://www.wia.org.au/members/contests/rosshull/>





# Send us a pic of your shack



Even though the SHACK CRAWL was great to “*share your shack*”, not everyone can participate.

“Send us a picture of your Shack”

It will be great to have everyone send in a picture of their shack again, or you're your antenna system.

[iars.keithb@gmail.com](mailto:iars.keithb@gmail.com) or [secretary@iars.org.au](mailto:secretary@iars.org.au)

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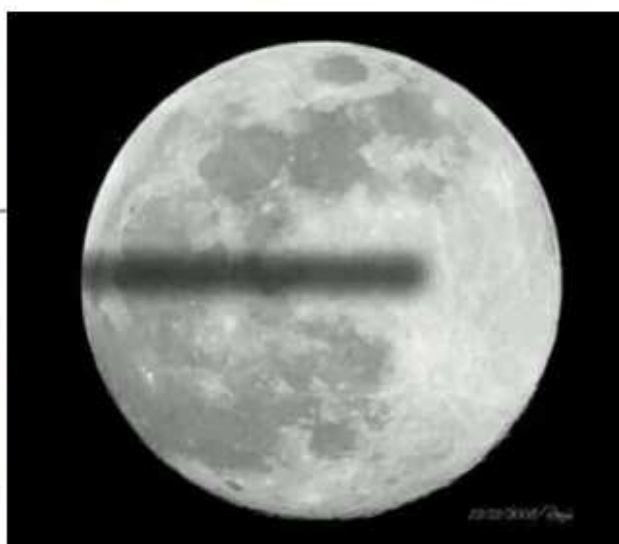
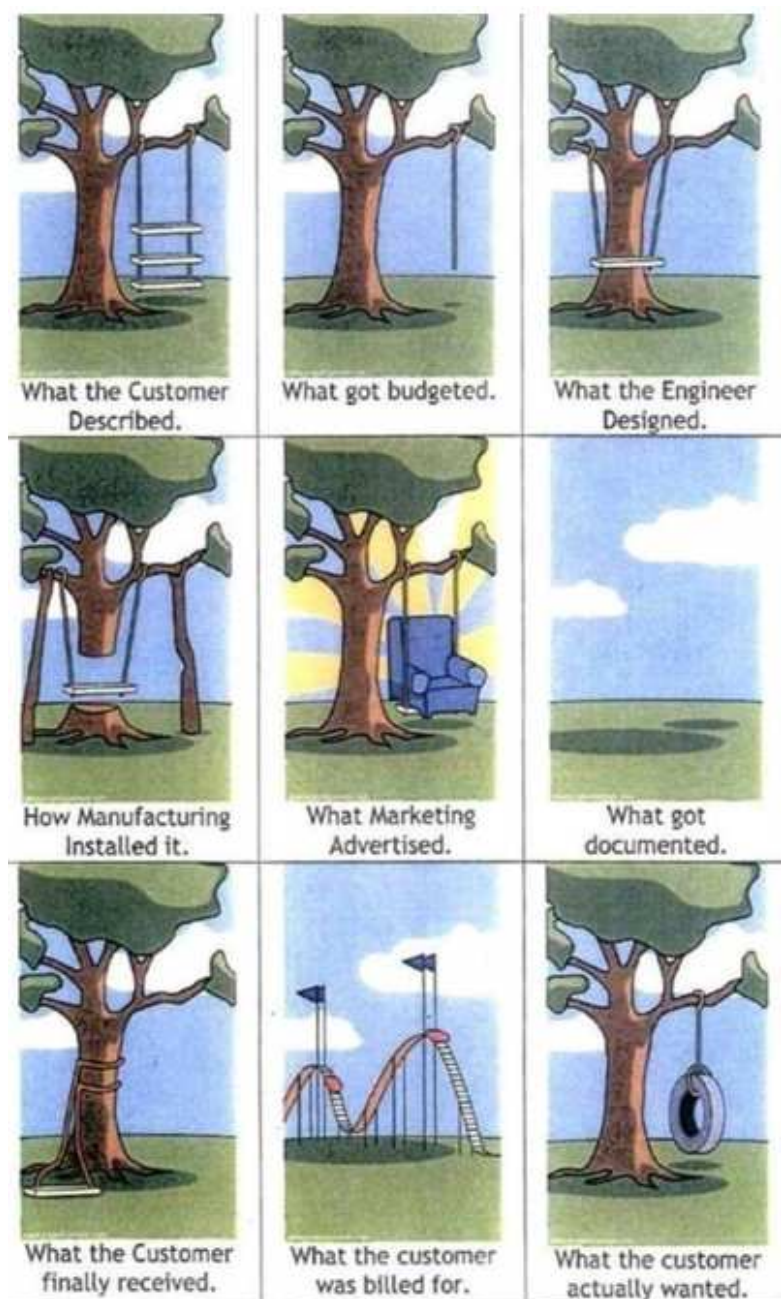
## Upcoming meeting presentations .....

- December 2022 : Christmas dinner with show and tell (pizza night,)
- February 2023 : Hands on use of signal generators, oscilloscopes and spectrum analysers to test and setup filters and cavities



# Fun Corner

Please send in your funnies to [iars.keithb@gmail.com](mailto:iars.keithb@gmail.com)



**Flat earther eclipse view**

## Engineering

That's all for now, hopefully catch you all at the **Blue Scope visitors centre on the 13th of December 2022**

Stay Safe

**73's**

**Keith VK2KQB**

**IARS Secretary**

**IARS, Amateur Radio in the Illawarra since 1948**