Illawarra Amateur Radio Society

Propagator February 2023

Upcoming Meeting on the 14th February 2023

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 IARS FOLLOWS A COVID19 SAFE PLAN

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

AMATEUR RADIO IN THE ILLAWARRA SINCE 1948

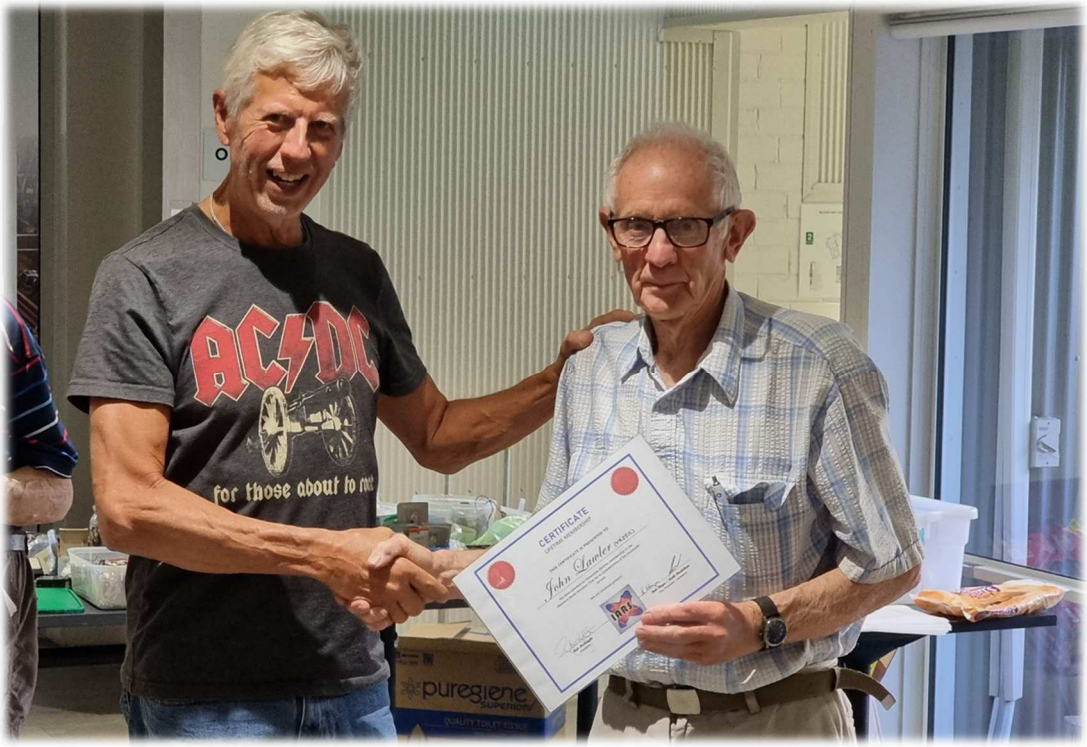
VK2RMP (Maddens Plains)
34°15'30.6"S 150°56'47.4"E
QF55LR

VK2AMW

Our last meeting 13th December 2022

IARS Christmas time at the Blue Scope Visitors centre .

It was a great evening out with two IARS members, John VK2EJL and John VK2AAL receiving lifetime memberships for all the hard work and dedication they have put into the IARS over the years.



Rob VK2MT presenting to John VK2EJL

Rob VK2MT presenting to John VK2AAL


INSIDE
AC/DC

Thanks to Mark VK2GOD, who kindly donated oodles of stuff he purchased at a radio spares sale.

There were two tables full, many of IARS members took advantage of the offering of bargains with all monies donated to the IARS.

We all enyoyed the Pizza spread, Christmas mince pies and nice choc lollies, what a great evening to send off 2022

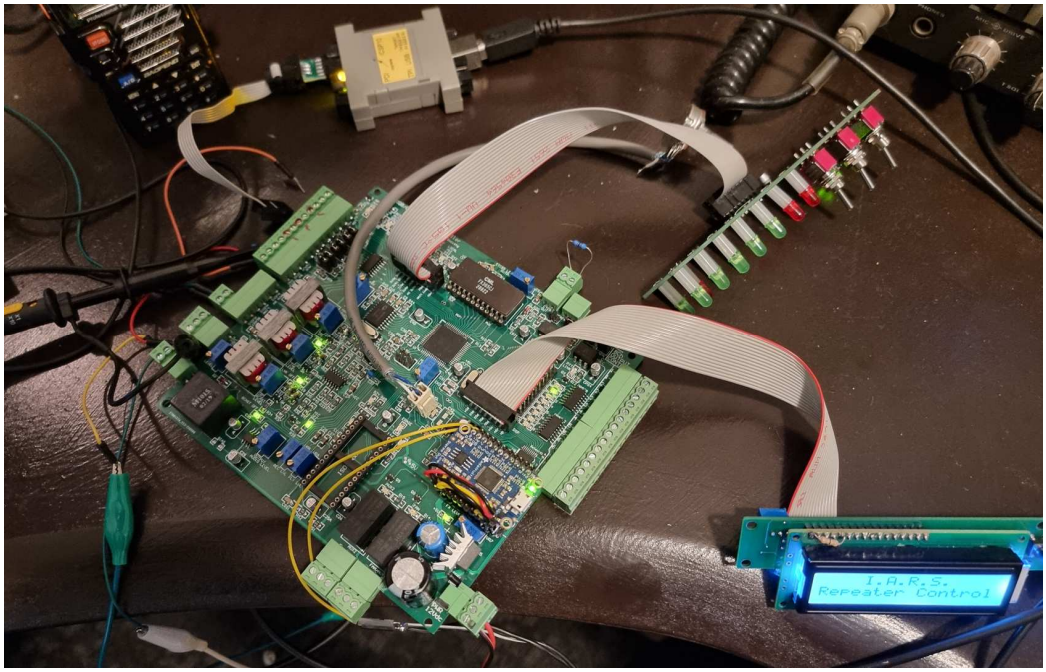
Wishing all our members a very ……

Next Meeting

14th February 2023 7.30pm

It is Valentines day, and therefore we invite you to spend it with your favourites at the next IARS meeting.

We will be presenting the NEW IARS repaeter controller system and allowing everyone to have a “Play”



Hope to see everyone there at the “Valentines I love amateur radio meeting”.

There will be the usual refreshments of coffee normal, Coffee barista Vinnie style, tea and some delicious cookies and cake.

SNOW BALL

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

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

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

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IARS

RES RADIO & ELECTRONICS SCHOOL

Looking to Upgrade to Standard or advanced and even obtaining your Foundation license we have remote assessing available.

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

We have approved AMC accessors that can offer remote assessments for the AMC.

Please contact Keith VK2KQB at iars.keithb@gamil.com for further information.

Your society supports further learning, please find out more on how we can help you. AMC website is Australian Maritime College - Australian Maritime College | University of Tasmania (amc.edu.au)

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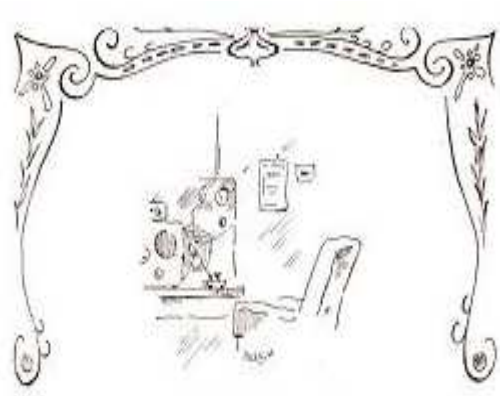
IN MEMORY OF OUR LATE RADIO AMATEUR FRIEND



Silent Key

VAUGHAN WILLIAMSON

VK2KBI

6 May 1959 ~ 28 December 2022

We pay tribute to long time member Vaughan VK2KBI who left us unexpectedly last year December.

Vaughan was a very active member who always had an interesting technical theory he wanted to share. He was always eager to learn new things and always listened when you had an idea.

He loved giving technical presentations, even though some of it was way above our heads, but, always willing to explain that extra bit to get us over the line. He was always cheerful (as you can see in the picture above), a good friend, mentor and a walking electrical encyclopedia 😊.

There is not enough space in the propagator to share what a true gentleman he was.

THE DIALS ON YOUR RADIO REMAIN UNTOUCHED, THE SPEAKER SILENT FOR ALL TIME TO COME. ALL THOSE HOURS, TALKING TO UNSEEN VOICES, YOU TALKED NEAR AND FAR, AND HAD FRIENDS YOU NEVER MET, YOU TRAVELLED THE WORLD FROM YOUR CHAIR.

YOU HAVE BECOME SILENT KEY, GONE TO MEET THOSE UNSEEN VOICES FROM THE PAST.

YET IN THE STILLNESS, I CAN HEAR YOUR CHAIR SQUEAK AND HEAR THE FAINT VOICES CALLING FROM AFAR, REST IN PEACE MY DEAR FRIEND.

ANONYMOUS

During the memorial service, Vaughan's daughter shared her father's love for amateur radio, after which she aptly finished off by saying

"This is VK2KBI, signing off"

Vale, Vaughan Williamson VK2KBI

Don’t forget the two weekly IARS nets as below

TUNE IN **to the IARS NETS** Echolink

IARS Tuesday evening weekly 80m NET on 3.666MHz at 8.30pm hosted by Mal VK2DXM and Rob VK2MT

Don’t forget to join us 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.
There have been some really good conversations so if you are bored on Tuesday evenings, pop in for a chat.

Saturday Morning EAST COAST NET hosted by Steve VK2BGL

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, who stands in for Steve when he is away
(My apologies to Doug for getting his call sign incorrect in the last Propagator)

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 an 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 literlley trash 😊 no rubbish please*

Last month’s awesome donation was fantastic thanks to Mark, VK2GOD

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REPEATERS

VK2RUW (Knights Hill) **VK2RMP (Maddens Plains)**

146.675 MHZ >>>>> *linked* <<<<< 146.850 MHZ

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 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”

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

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

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.

SWR - the persistent myth PART 2

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

John Fielding ZS5JF

We continue on from Part 1 in the last propagator

(This is an edited version of the actual documentation; this was done to condense the information for the propagator. If you wish to have the whole document, please email the secretary at iars.keithb@gmail.com)

True or False ? (continues……)

- 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.

Again **all** these statements are incorrect ! yikes

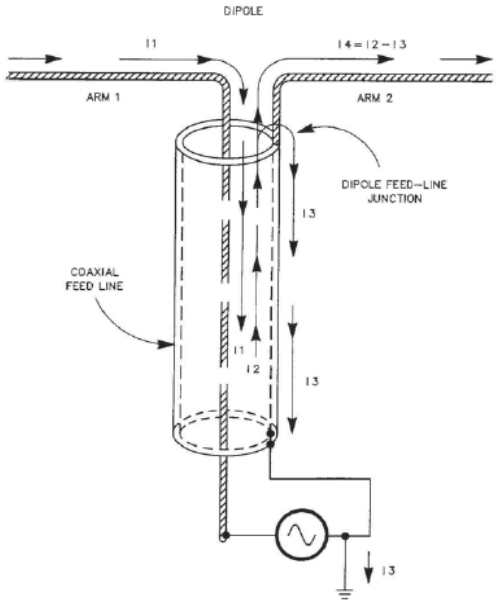
• The RF currents flowing in a coaxial cable (both forward & reflected) are all contained within and between the inner and outer conductors. No current flows on the outside of a coaxial cable due to a **mismatch**. Similarly with open wire balanced lines no RF is radiated because the currents are equal 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.

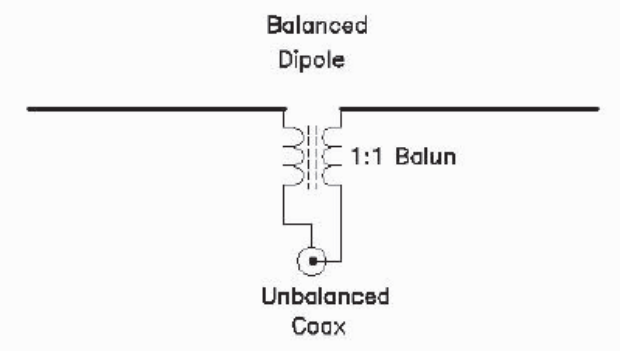
• RF currents will also flow on the outside of the coaxial cable if a balanced antenna (dipole etc) is fed without a Balun. These currents have nothing to do with SWR, they are still present when the antenna is perfectly matched to the cable.

• 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!** 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



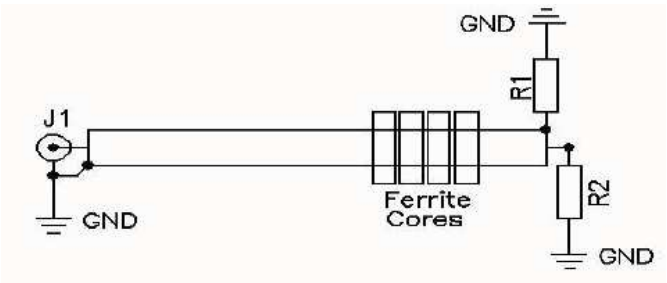
A balanced antenna fed with an unbalanced feed line generates an extra current path on the outer of the coax. This flows to ground and is wasted power. Baluns, there are two different types of Balun. One type is a Voltage Balun the other is a Current Balun. Of the two the Current Balun is far superior. The best example is the W2DU Coaxial Choke Sleeve design loaded with ferrite beads or toroids.

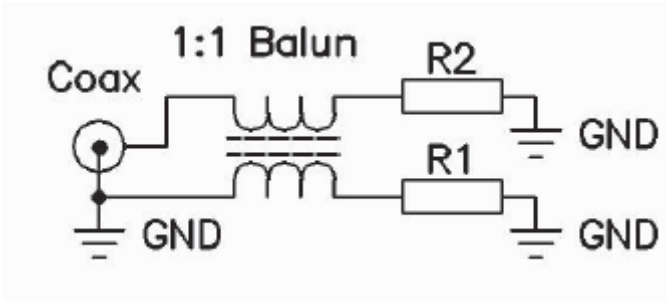


• The W2DU 1:1 balun is simple to make and low cost. It can cover a very wide bandwidth with almost perfect amplitude (± 1%) and phase balance (± 1°).

• 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 Circuits shown below





Physical Test Circuit **Equivalent electrical 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.

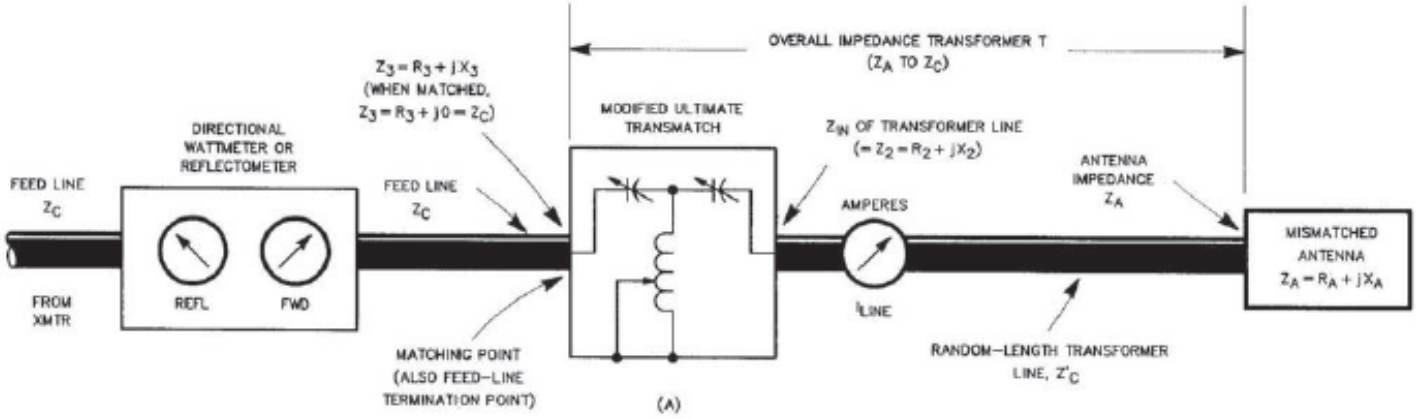
Baluns - some incorrect assumptions (Baluns are also classified by the impedance ratio.)

• 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 Ω the same impedance will appear across the unbalanced feed line end. In a 50 Ω system this is a SWR of 6.7:1 and in a 72 Ω system a SWR of 4.6:1.
• Connecting a 50 Ω coax to a 1:1 balun does not force the antenna to look like 50 Ω, only a 50 Ω 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 λ/4.
• A 4:1 balun if presented with the same 300 -j100 Ω by the antenna will cause 75 -j25 Ω to be presented to the unbalanced coax cable. In a 50 Ω system this is a SWR of 1.7:1 and in a 72 Ω 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.

Antenna Tuning Unit

• An ATU **does in fact tune the antenna**, despite what many amateurs believe. (Call it what you want)
To understand this this have to examine the reactance problem in more detail.
We have seen that a λ/4 line inverts reactance whereas a λ/2 line does not. If the transmission line is exactly λ/2 in length (or multiples) the impedance and reactance occurring at both ends of the line are identical. If we need a reactance of, say, +100 Ω to be placed across the antenna feed point to correct a SWR, then it is more convenient to place this at the transmitter end where we can adjust it if necessary. If the feed line is not an exact λ/2 it doesn't matter because we can vary the value and sign of the reactance to compensate. If the feed line happens to be odd multiples of λ/4 then we simply change the sign of the reactance from +100 Ω to -100 Ω.

To be strictly correct The ATU tunes the antenna AND the feed line, because the two work in conjunction.



• When we insert an ATU between the transmitter and the input to the feed line we are introducing an additional conjugate matching network. This is a case of two wrongs making a right.
• By adjusting the ATU we make the transmitter see a low SWR. But the SWR occurring at the output terminals of the ATU is still the same as before. All we have done is to install a one-way valve to help prevent power flowing back into the transmitter.
• Any reflected power from the antenna is re-reflected by the conjugately matched ATU and it is sent back to the antenna reinforcing the forward power.
• What is important is the insertion-loss of the ATU. If this is more than the power increase obtained from the transmitter when the ATU was used then we are no better off, or we could be worse off compared to the high SWR condition without the ATU.
• If a 100-W solid state amplifier backs off the power to 80-W when a SWR is present and the ATU has an insertion loss of 1dB (20%), then we are no better off with the ATU in circuit. We still only have 80-W entering the feed line but 20-W is now being turned into heat in the ATU.

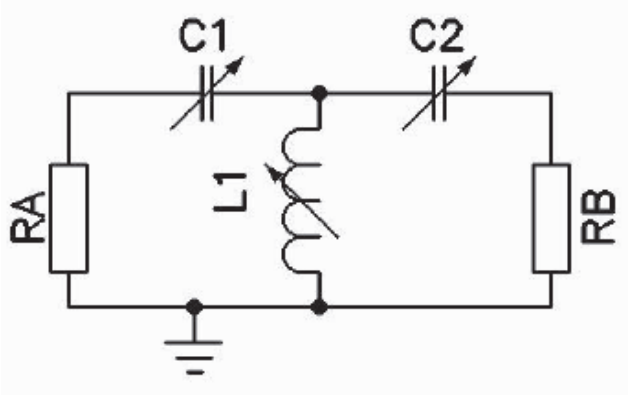
ATU types - the good and the bad !

There are two main types of ATU, the Pi network and the T network.

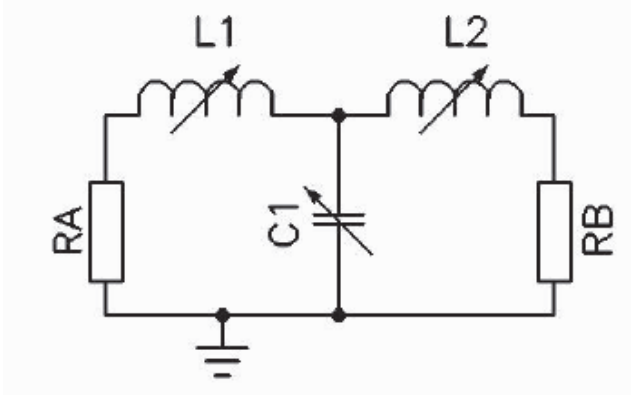
• The normal Pi network behaves as a low pass filter and hence reduces the harmonic levels passed to the feed line.

• The normal T network behaves as a high pass network and does not significantly reduce harmonic levels. (In fact it can accentuate them with a particular phase angle of reflected power!) This can make the SWR appear higher than it actually is.

• The alternative T network topology acts as a low pass filter but has less matching capability and is more bulky.

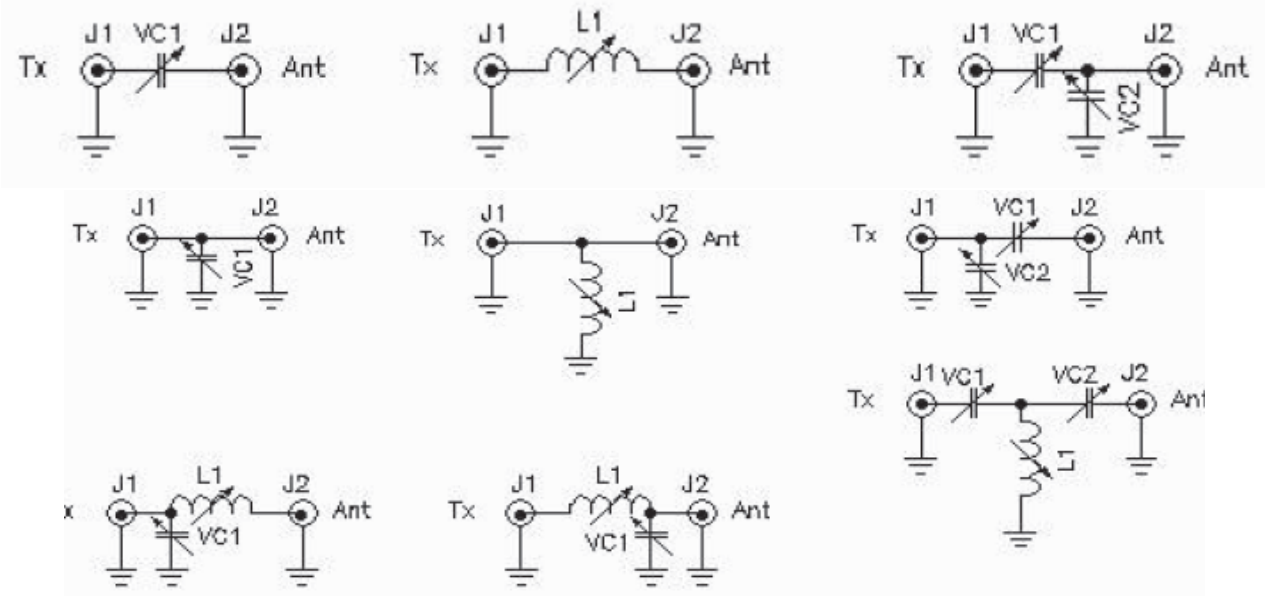


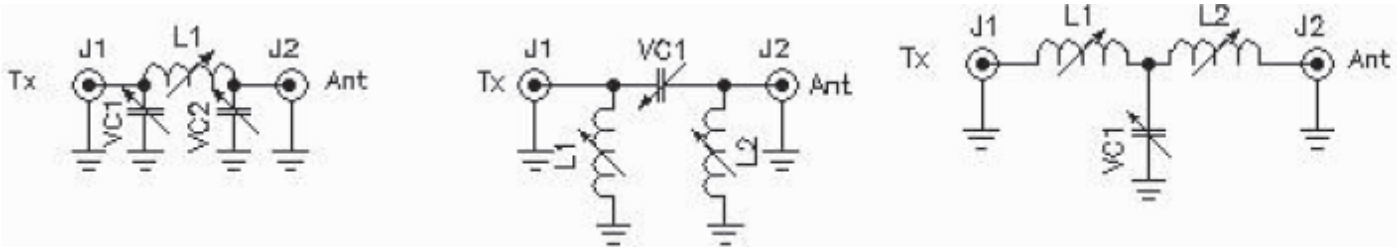
Standard T network for an ATU



Alternative T network

All the possible combinations !





No commercial ATU caters for all these combinations, some are very limited. A homebrewed ATU can be configured to any circuit required by suitable switching.

Solid State Transmitter & SWR "Power Back Off"

• Manufacturers 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 manufacturers 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 manufacturers to incorporate an ATU in the HF transceiver. ***This is an admission of defeat!***

The volume available for the ATU is often limited and so the inductors are wound on ferrite cores to reduce the volume. The Q it is possible to attain is well short of that of an external ATU using a high Q (physically large) air-wound inductor. The RF capacitors are also limited in Q. Low Q means the resistive losses are high. The result of this is that the insertion loss is often quite high, as much as 2dB in some cases. 2dB is 40% power loss in the ATU.

The inductors because they are wound on ferrite cores are also capable of saturation with large reactive currents flowing. These de-tunes the network and cause an incorrect conjugate match. Above a certain SWR the amplifier simply gives up the fight and backs off the power to virtually zero!

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

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 λ/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 λ/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 λ/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. At $$$$ per metre, this is 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 ?

Harmonics

One of the claims made by some published articles is that a high SWR generates excessive harmonics that cause TVI. This is normally incorrect. 99% of all TVI cases are due to fundamental-overload or swamping because the TV receiver has insufficient immunity to strong out of band signals. In valve transmitters working into a SWR as high as 5:1 the harmonic rejection is largely the same as into a SWR of 1:1 because the Pi tank can be adjusted to cater for the reactive load. The harmonics fall to minimum at resonance of the Pi tank network. This occurs at the maximum anode current dip.

What can be a problem is a Voltage Balun with high reactive currents flowing. In these the ferrite becomes non-linear due to saturation and this generate harmonics. A common problem is the incorrect indicated SWR when significant levels of harmonics exist due to insufficient harmonic filtering at the transmitter.

Using a low SWR for the correct reason

There are only two special cases where a low SWR is essential. Both of these apply to broadcasting stations.

In television transmitters standing waves on the feed line cause multiple over-lapping pictures to be displayed on the receiver, this is known as ghosting. This is due to the time delay caused by the reflected wave traveling from one end of the transmission line to the other and then back again. The way broadcasters overcome this is to use Isolators and Circulators to dump the reflected power on its first return into a dummy load. In this case the reflected power is lost but the transmitter always sees a low SWR. **This proves that the re-reflected power is radiated by the antenna !**

In FM stereo transmitters the standing waves due to the reflections cause inter-channel interference which transfers left and right channel energy to the opposite channel. Again isolators and circulators can eliminate this effect, at the expense of lost power.

Check your 50 Ω SWR meter !

Using low inductance resistors (carbon composition) we can check if our SWR meter indicates correctly. (Make the resistor leads as short as possible). Use a relatively low frequency to reduce the effects of lead inductance.

Set the transmitter to about 1-W output.

• Connect two 100 Ω / 2W resistors in parallel (makes a 50 Ω load) Measure the SWR, it should indicate exactly 1:1.

• Connect four 100 Ω / 2W resistors in parallel to make a 25 Ω load. It should indicate exactly 2:1.

• Connect one 100 Ω / 2W resistor to make a 100 Ω load. It should indicate exactly 2:1.

• If the SWR meter passes this test then make up more load resistors to cater for 3:1, 4:1 etc and check these points.

• Many amateur SWR meters indicate incorrectly even with a pure resistive load, and we haven't considered the reactive components here!

• If the indicated SWR increases with higher power then the meter is defective. This points to a lack of directivity and hence the ability to distinguish between forward and reflected power. Very few amateur SWR meters have the necessary directivity to make accurate measurements when the forward power is high.

More checks on your feed line and SWR meter if inserting an additional λ/2 length of coaxial cable causes the SWR to change there is something wrong. Adding an extra λ/2 should not change the line impedance or SWR. Either there are RF currents flowing on the outer of the coax, or the SWR meter is defective or both. Similarly, adding an additional λ/4 in series - if the line is not matched by an ATU - should not change the SWR. Although the λ/4

section inverts the resistive and reactive portions and the impedance and sign of the reactance are different, the SWR is the same value.

• Hence adding any random length of coax should not significantly alter the indicated SWR.

Summary

1. High SWR on a transmission line is not a problem at the power levels used by amateurs. In fact it can be a blessing in disguise because we can fit a shorter antenna into the available real estate.
2. For most flexibility when using non-resonant wire antennas the use of an ATU will allow more bandwidth to be covered.
3. Open wire balanced lines offer more flexible matching and lower transmission losses, much lower than coaxial cable can offer. The power rating is also much higher.
4. Any SWR less than about 2:1 is perfectly acceptable and any further reduction yields an insignificant increase of radiated field strength. Typically at best 1/6th of a S point.
5. Finally - Do not believe everything you read in articles!

As noted before, this is an edited version with an overview to the Myths of SWR. Please contact me at iars.keithb@gmail.com if you require the complete PDF sent to you.

John is a well-known and respected electronics engineer who has written countless books on RF engineering .

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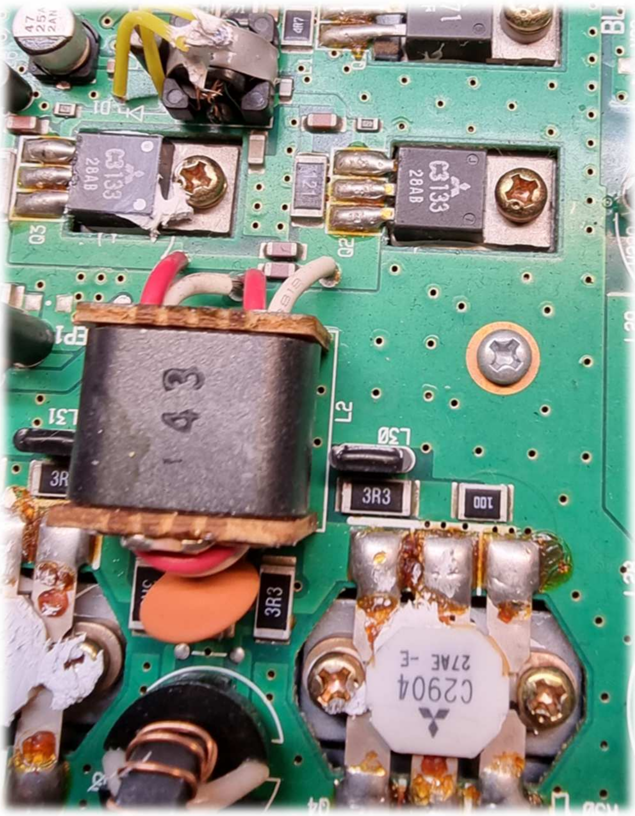
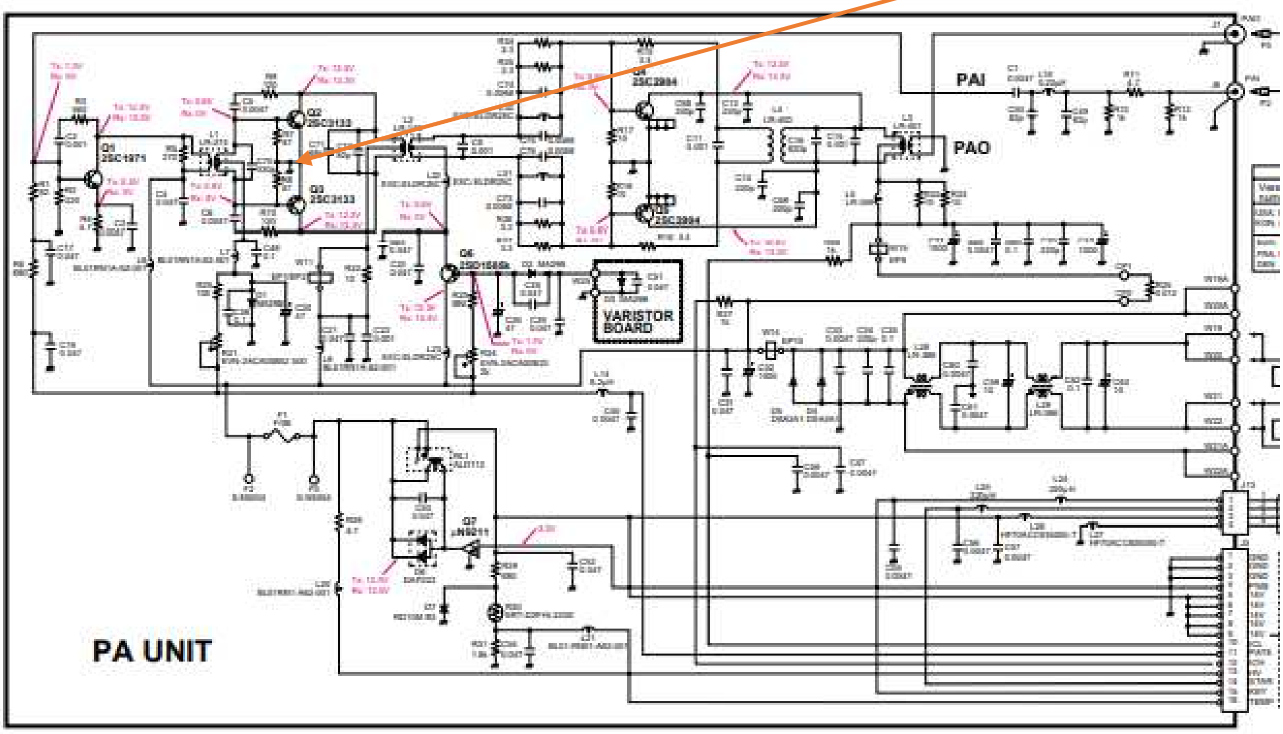
Pesky EBAY fake parts discovered during repair. WARNING!

Repairing a older ICOM IC-718 for a friend, I found that the PA output transistors and the drivers were damaged and needed replacements.



I proceeded to do the usual part hunting on “Flea Bay” noting that the driver transistors 2SC3133 had a unique pin out connection compared to most TO-220 packages.

With the IC718, there are no insulating washers between the heatsink and the device, which means the collector is not at the usual place. 99% of TO-220 style packages have the collector as the TAB and centre leg. With the 2SC3133, the emitter is connected to the TAB and middle leg which allows the transistors emitter to be connected directly to the heatsink which is grounded to -V. In the circuit of the IC-718 this forms the **ground point** for the drivers.



Unfortunately the IC-718 did not function after replacing the transistors as these fake 2SC3133 have the collector in the middle. I am still in the process of finding the original parts to finish off the project. NOT from EBAY.

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

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BLAST FROM THE Past

OLD PROPAGATOR MEMORIES

NO. 9/76 SEPTEMBER 1976 NO. 9/76

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A PRACTICAL HINT.

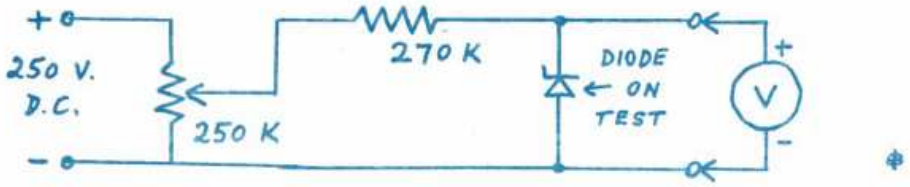
From "A.R.C.", newsletter of Moorabbin & District Radio Club.

TESTING UNKNOWN ZENER DIODES.

The diagram shows a simple method for determining the zener point of unknown zener diodes. All that is needed is a sensitive voltmeter and a few small parts. The 250k linear pot. is used as a voltage divider and the 270k fixed resistor is used as a current limiter.

The diode is placed in circuit with the cathode to the positive side of the supply. The voltage is adjusted upwards (with the pot.) until the meter shows no further increase in voltage; the indicated voltage on the meter is then the zener breakdown voltage of the device under test.

If the meter reads zero, the zener diode is short circuit and if the meter reads the supply voltage, the diode is open circuit.



Moonbounce Report - September 1976.

We were advised by K3JJZ of the W3CCX group, which had operated portable 432MHz EME in Columbia Sth. America, in July-August that they had experienced a number of power failures during the scheduled test periods. Unfortunately one of these had occurred during the scheduled test with VK2AMW. They were successful in working a number of other stations, some of whom made 432MHz WAC with their contact with HK1TL.

Our scheduled tests for August were carried out on 29/8. A transmitter power supply problem prevented contacts during the 'W' test period in the morning but VK2ZLN heard W4ZXI,'M' copy, while VK2ALU worked on the power supply.(including removal of a mouses nest)

During the evening, a further group of tests were scheduled with stations in Europe. SM5LE was not heard and was probably not on. Signals were heard during the F2TU test period, but bad QRM from another French station, who was peaking to 10dB over noise, prevented copy. The moon set prior to the scheduled test period with LX1DB due to an error in scheduling by the hardworking ham who provides the worldwide test schedules each month.

A check was made on 29/8 for received signal strength of emanations from the concentrated star mass at the centre of the Galaxy. This is a good reference signal level, as it is not subject to the same fluctuations in level as the emanations from the Sun and is also more comparable in strength to the lower level EME signals received from some stations.

A QSL card was received during the month from SM5LE for our first Australia - Sweden 432MHz contact, made on 30/7/76.

Lyle VK2ALU.

Will share more oldies next month

Contests

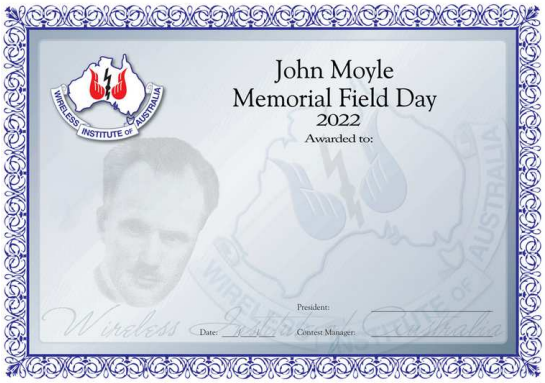
Ross Hull Memorial currently running

VHF/UHF Contest

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

Australia Day Contest 26th January 2023

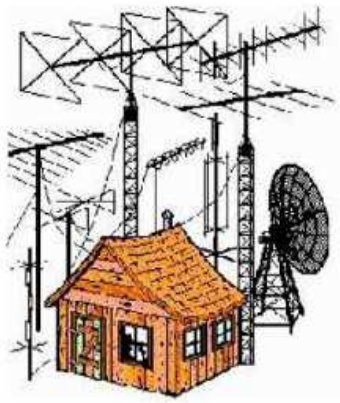
Link with more information https://www.wia.org.au/members/contests/australiaday/



John Moyle Memorial Field Day Contest 18~19th March 2023

Link with more information https://www.wia.org.au/members/contests/johnmoyle/

Send us a pic of your shack



“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 or secretary@iars.org.au

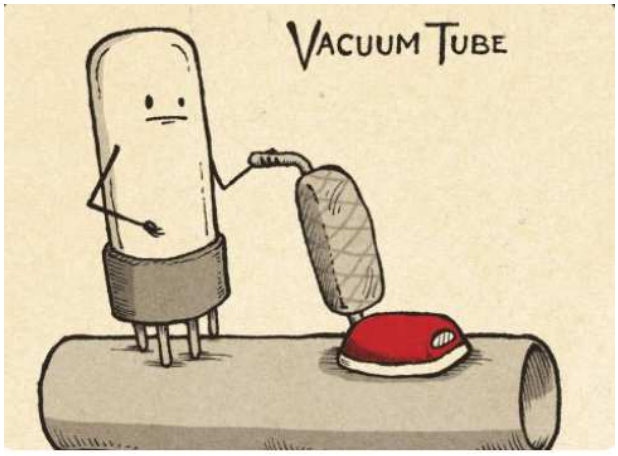
Upcoming meeting presentations ……

- February 2023 : IARS repeater controller presentation.
- March 2023 : Hands on use of signal generators, oscilloscopes and spectrum analysers to test and setup filters and cavities
- April 2023 : Ned VK2AGV will be sharing the life story of Alan Blumlein, electronics inventor.
- May 2023 : Mal VK2DXM, SDR using the software on your PC.

Fun Corner

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

"Mr. Nelson...I'm afraid you will have to leave the air for a while during this procedure."



That's all for now, hopefully catch you all at the **Blue Scope visitors centre on the 14th of February 2023**

Stay Safe

73's

Keith VK2KQB

IARS Secretary

IARS, Amateur Radio in the Illawarra since 1948