Darling Downs Radio Club Inc.

Newsletter

November 2023

CLUB INFORMATION

Postal address: PO Box 3257
Toowoomba QLD 4350
Email address
secretary@ddrci.org.au
Web Site: www.ddrci.org.au

EXECUTIVE COMMITTEE:
President Dougal Johnston VK4EKA
Vice President:David Curry VK4SP
Secretary: Theo Moller VK4ESK
Treasurer: Wayne Richter VK4ARW

STEERING COMMITTEE:
Sam Pascoe VK4SAM;
Cameron Scarvell VK4CSS;
Robert Hosking VK4FRH;
Bruce Boardman VK4MQ.

REPEATER COMMITTEE
Chairman Bruce Boardman VK4MQ
Members: Paul Stevens VK4CPS;
Cameron Scarvell VK4CSS;
Rod Webb VK4ZJ

Station Manager Theo Moller VK4ESK

2 Metre Net Convenor
Kevin Crandell VK4VKX

80 Metre Net Convenor
Theo Moller VK4ESK

CLUB MEETINGS:
2nd Monday of the month.
Start 7pm.
First half hour business matters, then social meeting incl a lecture.

Meeting place:
Community Venues, Level 3 City Library
Victoria St. Toowoomba

C LUB NETS:
80m on 3.650MHz, Saturday7.30pm
2m on 146.750MHz Toowoomba Repeater. Sunday 10am

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Other Regular Nets in the Toowoomba area:
Monday: UHF Net on 438.025MHz 7.30pm
Tuesday: The new Horizons Net on 147.050 MHz 7.30pm
Thursday: Scrub Turkey Net on 147.050MHz 7.30pm.
Friday: VK4 Friendship Net on 3.587MHz at 7.00pm

A note from the President

Summary of Minutes October 2023 Management Meeting

There were 18 in Attendance including some visitors.
Theo advised us he may not continue as secretary with health troubles. If anyone could take on the Secretary position please let us know.

The usual Minutes from the previous meeting and correspondence were accepted.
A good get together with the Border Ranges club at Leslie Dam was reported (see the previous Newsletter for further info).
The DDRCI is still financial with just over $6200 in the accounts.
With Bruce not attending Andrew commented on the new antenna coming for VK4RDD and the need for a welded bracket to mount it.

The Secretary has in hand the Obituary for Kurt for Amateur Radio and will write to BRARC thanking for their efforts for the Leslie Dam day.

Between David Toal VK4JPS (using a VNA) and Dougal a talk for November will be worked out. Information to be circulated as soon as available.

The DDRCi will plan to compete in the November VHF/UHF Field Day.
Sam Pascoe talked about additions to the DDRCi webpage “ddrci.org.au”

Next Management Meeting 13th November 2023. 7:00pm
Venue: Toowoomba City Library Rooms

After the Management Meeting, Alistair Elrick VK4MV gave a very enlightening lecture on the maintenance and repair & care of amateur radio stations, with the aim of preventing faults from occurring. He also drew from his and others’ experiences. With the overhead projector used well, we were sent home with some things to think about. Thank you very much, Alistair.

Dougal VK4EKA

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Table holder Application form now on line. $15.00 per table.

Gold Coast Amateur Radio Society
HAMFEST 2023
Sunday 12th November 2023
Venue: *Country Paradise Parklands*
231 Beaudesert Nerang Rd, Nerang QLD 4211

- Doors open to the public at 08:30 (Table holders can set up from 07:00).
- Everything is under cover.
- On-site parking.
- Entry only $5:00 per person.
- Further info **http://www.gcars.com.au**
- Table bookings ect please email - **hamfest@gcars.com.au**

See you there!

CLUB REPEATERS.

Both **VHF** and **UHF** repeaters are co-sited and have the same call identifier: **VK4RDD** 146.750 MHz, negative offset, no access tone required; **VK4RDD** 439.275 MHz, negative offset, 91.5 Hz, access tone required. ***VK4WID*** is the club's call sign for all nets on **HF, VHF and UHF,** as well as all contests. Please note that during contests which conflict with our regular net times, the contest has priority over the net in so far as the club call sign is concerned. The nets will then be conducted under the convener’s call sign instead of **VK4WID**.

Education

If you would like to register for a Foundation License Course, or contest any of the exam levels available, please contact Steven Dudley who may be contacted:
steve@vk4fi.net.au
Mob0403 910 087,
or you may also contact Philip Webb from the Border Ranges Club via email
philip01@scisat.com

Assistance

Assistance to those in need.
This radio club offers assistance to those in need of physical work involved in the maintenance of their antennas etc. If you require assistance, please contact the club secretary via email on secretary@drci.org.au and we will organise your assistance.

Garden City Award.

The DDRC also has an award worthy of adorning the walls of your shack. This is the Garden City Award.
Please check with the web page for details.

Understand the correlation of **VSWR** to the percentage of reflected power that will return.

VSWR cheat sheet

Returned power (approximate)

1:1	= 0%
2:1	= 10%
3:1	= 25%
6:1	= 50%
10:1	= 65%
14:1	= 75%

Please be reminded that if your annual member fees are not yet paid, you are currently deemed by club laws as unfinancial.

Short summery of Lecture given by Alistair Elrick VK4MV at the October meeting about how to set up and look after your station.

1) Setting up your Shack and Station

When first setting up your station, take time to plan what you have available in the way of equipment, radios etc.

• Leave space to work around the equipment, cool air space and be able to access the rear more easily to make connections.
• Think about what you may want to add at a later date.
• Use a logical approach to keep it simple i.e. your No1 radio has antenna port 1 to tuner/switch port 1 to antenna No 1.
• Number or colour code leads to accessories, end to end and to connections on devices for quick and easy checking.
• Make a record of cabling and notes on parts used, cable lengths and measurements taken when testing at the finish.
• Consider the location either indoors or a corner of the shed, this may make a huge difference as to what protections you require to keep the station in best condition .
• Also a good earthing system is recommended with direct earths to the chassis of each your rigs and to common lead to an outside earth rod.

2) **Periodic Maintenance**

• Have a regular time or at least several times during the year to perform some inspections of your radio equipment, antennas and coaxials.
• Make sure the connectors on the back of the radios are firmly tightened, both the power and coax cables, over time with heating and cooling, power cables and fuses can lose effective connection and coax connectors come loose, particularly PL-259 plugs.
• Exercise the plugs and connections and fuses to minimise oxidation.
• If you can, check the coax connectors on antennas or make sure when they are installed that they are well sealed with rubber tape and insulation tape to keep moisture out. If done correctly, they will be right for many years.
• Measure the VSWR on your antennas occasionally unless you can rely on the meter on the radio to show any fault or the beginnings of a fault.
• Be mindful of what indications your meters are reporting of a drop in performance.
• Hopefully your regular QSO contacts will bring to your attention any changes in the way your radio sounds, as can you for them if noticed.

3) **Predicting Faults or Failings**

• Research using the Internet and Forums on your particular radio/s to get operational information on getting more out of the gear you have.
• Be informed if any common faults have been experienced by other users and what can be done to prevent these faults.
• If you have a main preferred radio and are lucky to have an older radio you stopped using and keep it as a spare or standby, make sure you use it regularly and be aware of any faults it may develop the same as for the main unit.
• Keep the Operational Manuals for your equipment safely stored and look for additional documents i.e. Service Manuals and Modification notices, just in case over time they become impossible to find.
• Digital information is just as useable as hard copy and many recent Manuals may only come on a CD or as a downloadable file.

4) **Repair and Maintenance Equipment - Basic Tools for any Amateur**

• Tools - screwdrivers, pliers, etc - Soldering Iron/s -Multimeter/s -VSWR Meter or Antenna Analyser - Advanced Equipment more for Repairing Power Supplies, variable and current limited, Component Tester / VNA - Oscilloscope – Analogue or Digital - Signal Generator or Comms Test Set Spectrum Analyser or SDR.
• These are in order of basic to advanced level and increased cost

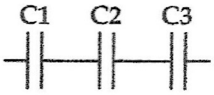
5) **Beginning to Repair**

• Try to get a good explanation of all the faults in the radio and any history of previous faults and repairs.
• Get hold of the Operation and Service Manuals and get familiar with the radio, its features and Specifications.
• Have a very close look at the condition of the radio and note any damage or modifications that are apparent. Take photos.
• Open the radio covers and do the same inspection, again take photos.
• Don't forget to employ all your senses in the inspection, look and smell, you can detect burnt components and leaky capacitors.
• You can divide faults into separate sections depending on the nature of the fault. Sometimes faults are in a single section which is utilised in more than one operation of the radio.
• Block diagram descriptions in the manuals help to isolate likely areas of failure. This gets you more directly to the area of the fault.
• Some faults appear in the same model of radio and if this can be reported in forums, then it makes it easier and saves diagnosis time.
• Try and avoid more faults by working slowly and carefully.

• Remember, if it ain't broken, don't fix it!

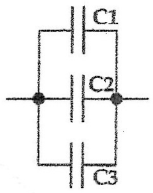
CAPACITORS

Capacitors in Series
Capacitors in series can be calculated by:
Note:- The new value will always be lower.



$$C_{Total} = \frac{1}{\left(\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \text{etc .....}\right)}$$

Capacitors in Parallel
When capacitors are placed in parallel they can be simply added together.



C_{Total} = C1 + C2 + C3 + etc....

Note :- The new capacitance value will be higher.

POWER (WATTS)

Power (Watts)	=	Current (Amps)	x	Voltage (Volts)
P	=	I	x	V

Where: V = Volts, I = Amps

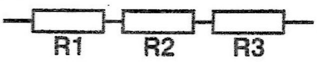
P = Power
This formula is used in many situations, from calculating the wattage of a resistor, to working out if an appliance will overload a particular power source. A useful variation of this formula is :-

$P = I^2 \times R$

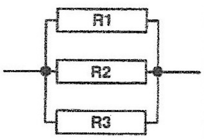
RESISTORS

Resistors in Series
When two or more resistors are placed in series, (in line with each other), the overall resistance of the resistor network will change. The new value can be calculated from:-

R_{Total} = R1 + R2 + R3 + etc...

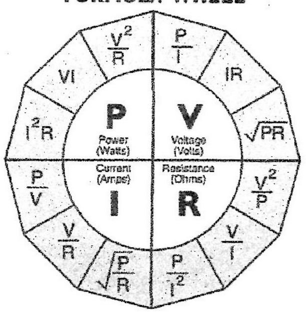


Resistors in Parallel
Calculating resistors in parallel is a little more complicated than resistors in series.



$$R_{Total} = \frac{1}{\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \text{etc .....}\right)}$$

FORMULA WHEEL



Using this formula wheel it is possible to calculate power, volts, amps or resistance for a given problem. ie. if you have two of the variables, for example power and volts, it is possible to find the amps in a circuit.

This wheel expresses volts as V, however, if you are studying old text books, you may see volts shown as E.

POLARISATION OF ELECTROMAGNETIC WAVES.
Electromagnetic waves travel away from the wire in horizontal, vertical, slanted, or circular waves.
If the antenna wire runs horizontal or parallel to the earth, the radiation will be horizontally polarised.
A wire or conductor that runs at right angles to the earth produces vertical radiation. A slanted wire has components of both horizontal and vertical radiation.
Crossed wires connected by proper phasing lines that shift the phase from one wire to the other wire by 90 degrees will produce circular polarisation.

Amateurs working orbiting satellites at VHF, UHF, and microwave frequencies use circular polarisation. When your high frequency signals are reflecting off the ionosphere, it isn't important if the other station's antenna has the opposite polarisation from yours (the polarisation does matter for line of sight communication).

The reflected polarised waves passing through the ionosphere are slowly rotated causing fading signals (QSB). The reason the polarisation of antennas is most important is that it determines the angle of radiation.
Horizontally polarised antennas at ordinary heights used by hams produce mostly high angle radiation and weaker low angle radiation, but this doesn't mean there is no low angle radiation. It is there but is weaker than high angle radiation.
However, you must put a horizontally polarised antenna up more than one-wavelength high to get a strong low angle radiation. One wavelength is 85m (280 feet) on 80 meters, 42m (140 feet) on 40 meters, and 21m (70 feet) on 20 meters. approx.
High angle radiation works nearby stations best and low angle radiation works distant stations (DX) best.
A vertically polarised antenna produces mostly low angle radiation, with its high angle radiation being weak.
For this reason, vertical antennas do not work as well as horizontal antennas do at ordinary heights for working stations less than about 500km away.

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The number of times the polarity of an AC voltage changes per second determines its frequency. Frequency is measured in cycles per second or Hertz (Hz). A thousand cycles per second is a kilohertz (kHz). One million hertz is a Megahertz (MHz).

The only difference between the 50 Hz electric power in your house and radio frequencies (RF) is the frequency, but 50 Hz electricity in a wire also produces electromagnetic radiation just like radio waves.

Useful radio waves start at 30 kHz and go upward in frequency until you reach the infrared light waves. Light is the same kind of waves as RF except light is at a much higher frequency.
Light waves are used like radio waves when they are confined inside fibre optic cable.
Above the frequencies of light are found x-rays and gamma rays.

Ground wave works only with vertical polarisation.
One side of the antenna is the metal vertical radiator and the other side of the antenna is the earth ground.
The surface wave in the air travels faster than the part of the wave flowing through the ground.
The surface of the earth is curved like the curved part of a racetrack. On the curved track, a car on the outside of the track has to travel faster than the car on the inside lane to stay even, and the two cars travel in a curved path.
Although the wave in the air travels faster than the wave on the ground, the two parts of the wave cannot be separated. Because of this, the radio wave also travels in a curved path that follows the curvature of the earth.
The AM broadcast stations use ground wave propagation during the day and sky wave propagation at night. Since radio waves at lower frequencies conduct better through the ground, an AM broadcast station on 540 kHz will be many dB stronger than a station on 1600 kHz, if both run the same power.
This fact is important in understanding why ground mounted verticals do not work as well at high frequencies as they do on the broadcast band.

Social Lunch

Our next social lunch will be held Saturday 9th December 2023 at the Blue Mountain Hotel.
We ask you to be there at around 11:30am for a 12:00pm start. Please email your response to secretary@ddrci.org.au You may also phone your responses to: Mob: 0483 843 662 or Phone 46 933 574. Please leave a message if no answer.

Solar Rhythm

Although earthlings go for a spin around the planet's axis once every 24 hours no matter whether they stand on Mount Everest or deep in a coalmine, the sun is a lot more complicated.

The top 30% rotates once every 25 earth days, but the deeper 70% takes 27 days. And the poles take 35 days, while the equator whips around in 25,

"We got this ball of gas spinning faster in the middle than at the poles" says scientists and when theorists are asked why, they throw up their hands. It is suspected that this uneven rotation helps drive the solar dynamo, the mysterious engine that somehow produces sunspots and ignites flares.

In an earthly dynamo, or generator, powerful currents of electricity create magnetic field lines. The sun's dynamo originates in or just below what's called the convection layer, the outer 30% of the star, where hot gases rise and cool ones sink.

Because the sun spins at many different rates, its hydrogen and helium gases are a mishmash of motion that causes shearing where layers rotating at one speed meet those rotating at a different speed. This shearing, suggests Astronomers from Howard University, winds up magnetic lines like thread around a spool "But the lines can't get infinitely strong".

So as the fields become more and more taut over the course of 11 years, something eventually gives.

According to one theory, the magnetic field lines become so strong that they repel gases below and rise to the surface.

When they reach the surface the erupting magnetism may appear as sunspots, dense points of magnetism some 2000 times stronger than elsewhere and may prevent some of the sun's heat and light from escaping.

Or else the field may self-destruct, going out in style in the form of a solar flare.

Why do the magnetic field lines twist up for 11 years in one direction before snapping?

It appears that the sun's brightness changes by about 0.1% during the sunspot cycle. More spots, more heat.

So somehow magnetism, the cause of sunspots, is linked to the sun's energy output.

It is believed that magnetism distributed over the surface of the sun causes changes in the brightness, however details are not yet understood. Nor is it understood whether the sunspot cycle causes the brightness cycle or whether both get their rhythm from some undiscovered metronome.

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Next Meeting:

2nd Monday of the month.

13. November 2023

Just a little note on something a bit different.

Brief history of high-speed rail systems

Railways had their beginnings in the 1550s with Germany's wooden "wagonways." By the late 1700s, iron supplanted wood, bringing about Europe's "tramways." The steam-powered locomotive's advent in the early 19th century in Great Britain marked a pivotal turn, with trains first serving coal routes before transitioning to passenger transport. However, the 20th century saw steams decline as electric and diesel locomotives rose to prominence in Europe, paving the way for modern high-speed rail.

High-speed rail began with Japan's Shinkansen in 1964, a precursor to Europe's developments like Italy's 1977 Rome-Florence line and France's 1981 Paris-Lyon service. Korea's Seoul-Pusan was operational by 2010.

The 21st century marked China's ascent, from no high-speed lines to a 38,000 km network, targeting 70,000 km by 2035. The US. has the Acela line with advancements stymied by challenges, though the 2021 Infrastructure Act promises $66 billion for rail. Notably, Switzerland introduced the Gotthard Base Tunnel in 2016, a significant global rail milestone.

Today, high-speed rail underscores continuous engineering advancements in transportation. As global needs shift toward efficient connectivity, the focus will be on further refining rail technologies to enhance speed, reliability and cost-effectiveness.

Principles and technologies

The underpinning of high-speed rail systems is track design. Choices are chiefly between ballasted tracks, utilising a bed of crushed stone for load distribution and drainage, and slab tracks, which employ a concrete foundation for enhanced stability, especially in high-speed operations or limited space scenarios.

Aerodynamics is a significant concern, particularly the "tunnel boom" resulting from rapid air compression and decompression when trains move between tunnels. This is managed through specific train nose designs and optimized tunnel entrances.

The incorporation of lightweight materials such as aluminium ensures speed and weight efficiency. Coupled with innovations in wheel design and modern suspension systems, this ensures maximum rail contact, reduces wear and noise, and enhances passenger comfort.

Traditional high-speed rail systems predominantly rely on steel wheels on steel rails. The older turbo trains, previously prevalent in North America and powered by gas-turbine engines, have now been succeeded by electric variants, exemplified by Japan's Shinkansen. These draw power from overhead wire systems and boast specialised safety features, like advanced braking systems.

A centralised computerised facility rigorously monitors train movements and track conditions for maximum safety.

A breakthrough in high-speed transit was the magnetic levitation (Maglev) system. Unlike conventional trains, Maglevs employ electromagnetic force for levitation. There are two prominent Maglev types: Electromagnetic suspension (EMS) and Electrodynamic suspension (EDS).

EMS, and its variation Transrapid, rely on the attractive force between train magnets and those on the guide way to maintain a levitation of about 1.3 cm above the guide way. In contrast, EDS utilises supercooled, superconducting magnets that repel the train from the guide way, resulting in a levitation typically between 1 cm and 10 cm. EDS trains initially utilise wheels below speeds of 100 km/h but transition to levitation at higher speeds, propelled forward by alternating guide way coil polarity.

Maybe one day in Australia also.

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STEADY DIRECT CURRENTS

It is not possible to tell whether a metal wire is carrying an electric current merely by looking at it.

There are, however, two detectable effects which we ascribe as being due to an electric current.

Firstly, a heating effect. One of the main practical uses of electricity is to heat a wire. A nichrome alloy wire, heated by an electric current, forms the basis of all electric room heaters, immersion heaters and other heating elements. A tungsten wire, kept white hot by an electric current, in a low- pressure atmosphere of inert gas, is the filament of an electric lamp.

The other effect, the magnetic effect, is less readily detected.

Oersted announced in 1820 his discovery of the effect. He used a battery made of copper and zinc electrodes in sulphuric acid, a wire, and a pivoted magnetic compass needle.

Both effects have been employed in instruments for measuring the strength of an electric current.

The hot-wire ammeter, in which the expansion of a wire when heated by the current was made to move a pointer over a scale, is now obsolete.

The moving-coil and moving-iron meters both make use of the magnetic effect for their operation.

To investigate the properties of steady direct currents, one can do some experiments with simple circuits and ammeters.

Suppose we we have a circuit, consisting of 3 torch lamps connected in series to 3 dry cells.

A current, we say, flows when we have a complete circuit.

It ceases to flow, it appears (because the lamps go out), at the instant the circuit is broken.

In our investigation of electric current, we can ask the question: When the circuit is made, what is the current strength at different points in the circuit?

We find that when we insert an ammeter in different positions in the circuit we get the same readings every time.

This suggests that the current at every point in a series circuit has the same value.