



# GATEWAY

The Official Magazine of the Gippsland Gate Radio & Electronics Club Inc.

October 2019



NanoVNA  
10 KHz to 900 MHz

GGREC Working Bee  
PIM Testing  
Comms above the clouds  
And More

**Cover photo**, Rob's NanoVNA, usable from 10 KHz to 900 MHz, not bad for \$72 on Ebay. Rob says hang off buying, hang out till February next year, a new model from DC to 2 GHz is coming out for apparently the same price.

## Contents.

- 3 – Presidents Report
- 4 – Solar Challenge 2019 & DMR for JOTA
- 5 – From The Editor
- 6 – GGREC Working Bee October 2019 - Rob
- 12 – Passive Inter-Modulation (PIM) Testing
- 15 – GGREC Working Bee 6th October 2019 - Bruno
- 17 – Communications above the clouds
- 21 – Meeting 16/08/2019 – in pictures
- 22 – Club Information

Note: - club meeting minutes are on the club website

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## Event Queue

### October:

- 18<sup>th</sup> General meeting – Guide hall
- 19-20<sup>th</sup> JOTA 2019 (courtesy WIA)
- 27<sup>th</sup> Ballarat Amateur Radio Group, BARG Hamvention (courtesy WIA)

### November:

- 2<sup>nd</sup> Melbourne QRP by the Bay at 3pm. (VK3YE - WIA)
- 4<sup>th</sup> Prac night – in the club rooms
- 15<sup>th</sup> General meeting – Guide hall
- 17<sup>th</sup> Rosebud Radiofest November 17 (WIA)
- 23-24<sup>th</sup> Spring VHF-UHF field day

The GGREC is planning to hold some Club Events. These are the Summer Field Day, the John Moyle Memorial Event and possibly the Winter Field Day. Dates will be forwarded at a later date. The Clubs participation in these events means that, besides having fun in setting up and operating our gear, we also promote our club. Furthermore the club is equipped with a complete set of portable gear. Why not use it? Please consider to be part of these events. The Committee of the GGREC

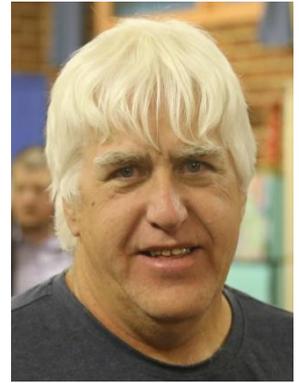
# President`s Report - Tony Doyle VK3QX

Hi Members,

Another month closer to Christmas and we were reminded by Bruno (VK3BFT), at the last GM, that the club Christmas party is nearing.

Please give some thought to possible dates and venues for discussion at October`s GM on Friday night. We need to agree and lock these details in as soon as possible.

We have also been advising of the proposed Foxhunt for November for some time now. We need to agree and lock in a date for this event as well so that a plan and an itinerary can be drawn up.



At this month`s Prac Night Rob (VK3BRS) got busy testing all the Foxhunt kits and Morse keys ready for the JOTI/JOTA day this coming Saturday 19<sup>th</sup> October.

Narre Warren Scout group have now also requested to attend the event and Rob (VK3BRS) has been busy successfully liaising with both groups. If you wish to come along and give us a hand please just let us know at the GM, it should be a great day hopefully furthering some interest from the young people who will be attending and contributing in some small way to our local volunteer community.

Also at Prac Night I installed the new club internet router and we were able to test the connection with the club PC.

The connection worked well, however, the club PC was found to be lacking in the speed department. Paul (VK3TGX) ended up taking it away to update Windows and look at the potential for upgrading the RAM. As it is a few years old now, we may need to investigate a more modern machine in the near future if the existing one can`t be upgraded. This will absolutely be necessary if we decide to take the next step and remote control the station.

I supplied a couple of external 4G antennas and cabling for the internet router to improve the signal level and reliability so some time needs to be put in to mount these outside and connect them to the router at some stage in the near future.

The relocation of the IRLP node can now proceed and I am just waiting on delivery of the 26 pin D-Sub accessory connectors before we can make up the interface cable between the repeater and the node.

Once this is in hand we can organise a working bee to get the equipment from Ian`s (VK3BUF) shed.

The club working bee was a great success.

Thanks to Bruno (VK3BFT), Rob (VK3BRS), Bryan (VK3FOAB), Max (VK3TMK) and Leigh (VK3FACB) for their hard work on the day.

Bruno VK3BFT very capably managed to lower the tower so that we could access the connections and antenna for testing, finding a damaged connector on the LDF4-50A feeder cable.

This was duly replaced with a new connector and tested whilst Rob VK3BRS took control of checking and retuning the diplexer (not duplexer), finding it off frequency and also replacing some sub-standard interconnecting cables.

This all culminated in a fantastic barbeque professionally cooked up by Bruno, as usual.

The reports so far look very promising with successful calls to Noel (VK3CJJ), operating portable in his lounge room, and Paul (VK3TGX).

See the stories from Bruno and Rob in this month's magazine.

See you at the GM on Friday night, 18<sup>th</sup> October.

Tony (VK3QX)

## From Michael Van Den Acker, via email/FaceBook

### LATEST CONTROL STOP TENNANT CREEK

TEAM	TIME*
40. Solar Team Eindhoven (NLD)	13:48
25. IVE Engineering Solar Car Team (HKG)	13:58
11. SolarCar-Team Hochschule Bochum (DEU)	14:10
75. Sunswift (AUS)	14:18
98. ATN Solar Car Team (AUS)	15:11

\*ACST

#BWSC19



**Michael Van den Acker**  
19 hrs · 🧑

IVE Engineering Solar car team Hong Kong currently in 2nd place at Tennant Creek 1000km south from Darwin.

👍 43      💬 3 Comments

👍 Like      💬 Comment

**Angie Berwick Cripps** Well done! Keep up the good work  
Like · Reply · 19h      👍 1

**Michael McCabe** Michael what an achievement!  
Like · Reply · 17h      👍 1

**Bernadette van den Acker** Woo hoo!  
Like · Reply · 16h      👍 1

Write a comment... 📷 📺 🗨️

## VK-DMR For JOTA

Thanks Bryan for spotting this on the VK-DMR facebook page.

**Peter Brennan** ▶ Amateur (HAM) Radio Australia  
Yesterday at 12:40 PM · 🧑

The VK-DMR Network will have Time Slot 1 Available for Jota, with the Following Talk Groups, TG 30, 31, 32, 33, 34, 35, 36, 37 These will be all on TS1 and the rest of the TG's 5, 3809, 3810, State TG8's will be turned OFF for the Jota Weekend. Please added these to your Radios, for the Jota Weekend This will also be available for Hotspots for Jota as well, as the IPSC2 Repeater server and the IPSC2 Hotspot server will have these linked

👍 Geoff Emery, Gordon Taylor and 2 others      💬 1 Comment

👍 Like      💬 Comment

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## From The Editor



This month it was 'Fun with windows 10'.

At the last Prac night, the club's new wireless/4G router was setup in preparation for the upcoming installation of the club's IRLP (Internet Radio Linking Project) / Echolink node in the clubrooms.

This node has been hosted at a few locations over its life, and linked back to the club's 70cm repeater by a radio link. It has been decided to relocate it to the club rooms and to arrange our own broadband (non NBN) link. Anyway at this time the node is still at Ian's QTH, so the club's computer was an obvious choice to test out our latest installation.

The computer seemed to be having issues with updates, so instead of burning our 4G data allocation (and spending most of the night there doing so), I decided to bring it home and hook it up to my shiny new NBN link and burn the midnight oil here figuring out its possible multiple problems.

In the end it would appear the reason it would not update was because the installed version of Windows 10 was now quite old. In the world of computers, a few years is like an eternity. Anyway, I eventually found a 'standalone updater' and that did the job. After several hours we were back to current. Unfortunately this machine is quite low spec, to the point that its performance will disappoint many. It does have an empty RAM slot, so doubling its memory from 2 gig to 4 may help. If all we ever use it for is contest logs and light browsing, all's ok?

While I was at it I also had a go at upgrading a pile of other boxes to the latest Windows 10.

The first was a kerbside special (bottom of the stack), a Lenovo, 2g ram, Pentium E2160 that came with Windows XP, yes it runs W10, however its performance was on par with the clubs box. Next came an Acer, Core 2 duo E7500 which I upped the ram to 6 gig, this box looks promising, I have 2 more of these, courtesy of the Frankston tip shop. The next one you should recognise – it's the clubs PC, 2g ram, Atom 330, 1.5 GHz, Windows 32bit.

The top unit was the biggest surprise, it is an industrial controller PC, built up as you see from scrap from my former employer. It is a Pentium M, with 1 gig of ram, these usually run on Windows XP, and are the controller of one brand of portable police radar speed traps....

I had loaded up Windows 7 on it, and performance was absolutely awful, the highlight of any run is it successfully booting to the Windows desktop! I tried clicking on the 'Get Windows 10' icon (the free upgrade ended ages ago) just for the hell of it, expecting the up-grader to say there was no way it would work (or that the 'free Win10' upgrade was no longer available). So it was a case of 'Stone the Crows' when it went through, performance is a tad better than Win7.

# GGREC Working Bee October 2019

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On Sunday the 6<sup>th</sup> of October a few of the club members met at the club rooms to facilitate some repairs on the club repeater. The repeater had been playing up for a while and definitely required some attention.

The first task was to “drop” the tower, a 14M 2 stage Nally. There were some concerns about the wind that was about at the time but it died down enough for everyone to be comfortable to continue.

Bruno VK3BFT, Tony VK3QX, Max VK3TMK, Leigh VK3FACB and Bryan VK3FOAB focused on dropping the tower while I removed the Diplexer from the repeater cabinet and was getting it ready for a quick “lick”.

Initial testing before any adjustment showed that the Diplexer was slightly out of tune, up to 100 KHz off frequency on both the notches and a passband and the input VSWR was nearly 1 MHz out. I believe the temperature cycling inside the shack when unattended over the last year or so has contributed to this wandering of the diplexer settings.

When tuning a diplexer the 3 main things we adjust to ( there can be more ) are Notch depth, Insertion loss ( passband ) and input VSWR.

Input VSWR is important because occasionally the lowest input VSWR doesn't match the smallest insertion loss. This is especially important on the transmitter side of the cavities because if the VSWR is too high ( and you are running some healthy power ) the transmitter, if a modern one, will start folding back on the output power to preserve itself, an older transmitter may not and could destroy itself.

Secondly having an insertion loss that is too high equals a greater degradation of the signal/s, TX and RX. On the TX side this will show up as a reduced coverage ( received ) area as well as excessive heating of the cavities, yes, the transmit cavities do get warm even when tuned properly or are working near their maximum design ratings.

The Diplexer is a passive device, you get nothing for nothing with these pieces of equipment, therefore any loss on the transmit side will show itself as heating.

On the receive side of the cavities excessive insertion loss will show itself as a reduced sensitivity to received signals coming down from the antenna.

So you can see that insertion loss as well as input VSWR are very important for the healthy and successful operation of a repeater.

Notch depth is also critical especially on the receive side of the cavities due to the transmit power and the receive signal existing on the feedline and antenna at the same time. Half of the diplexers job is to notch ( attenuate ) the transmit signal from the receive signal as it heads to the repeaters receiver.

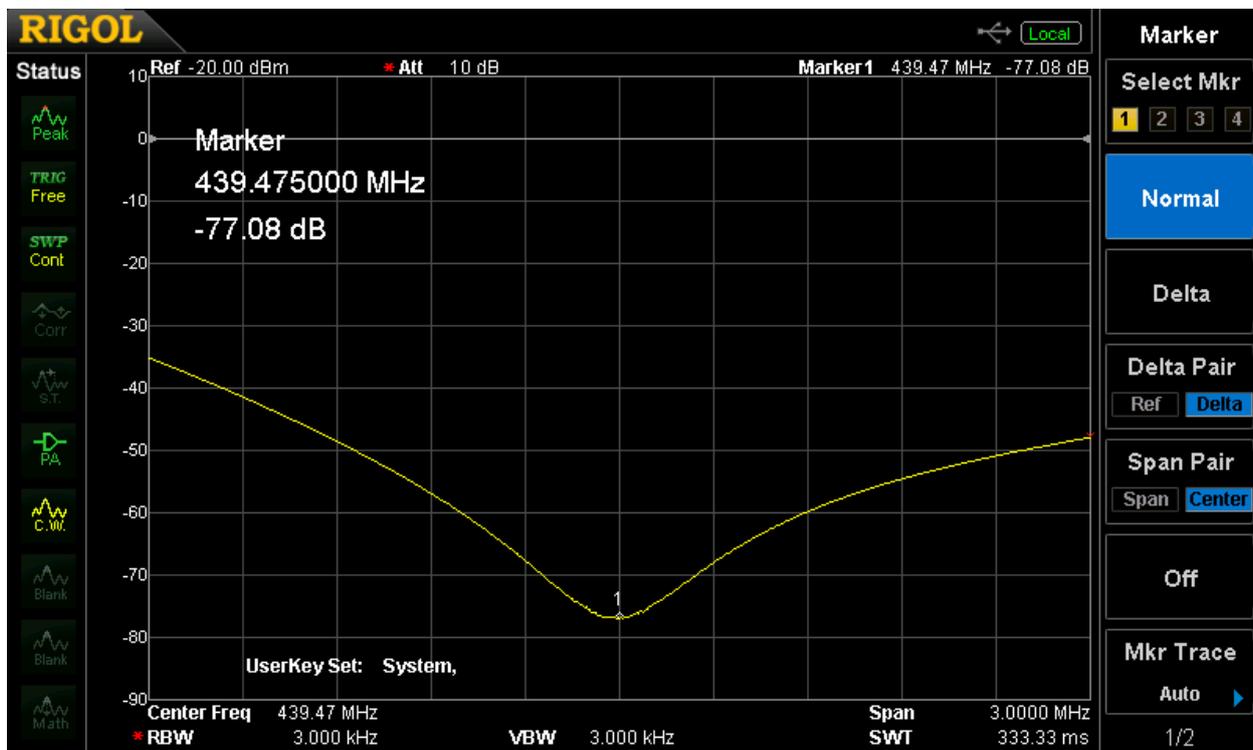
Any mistuning here will show up as an overloading of the receiver which in turn reduces the sensitivity of the repeater installation.

With Bryan VK3FOAB assisting with the tuning of the Diplexer, the following results were obtained,

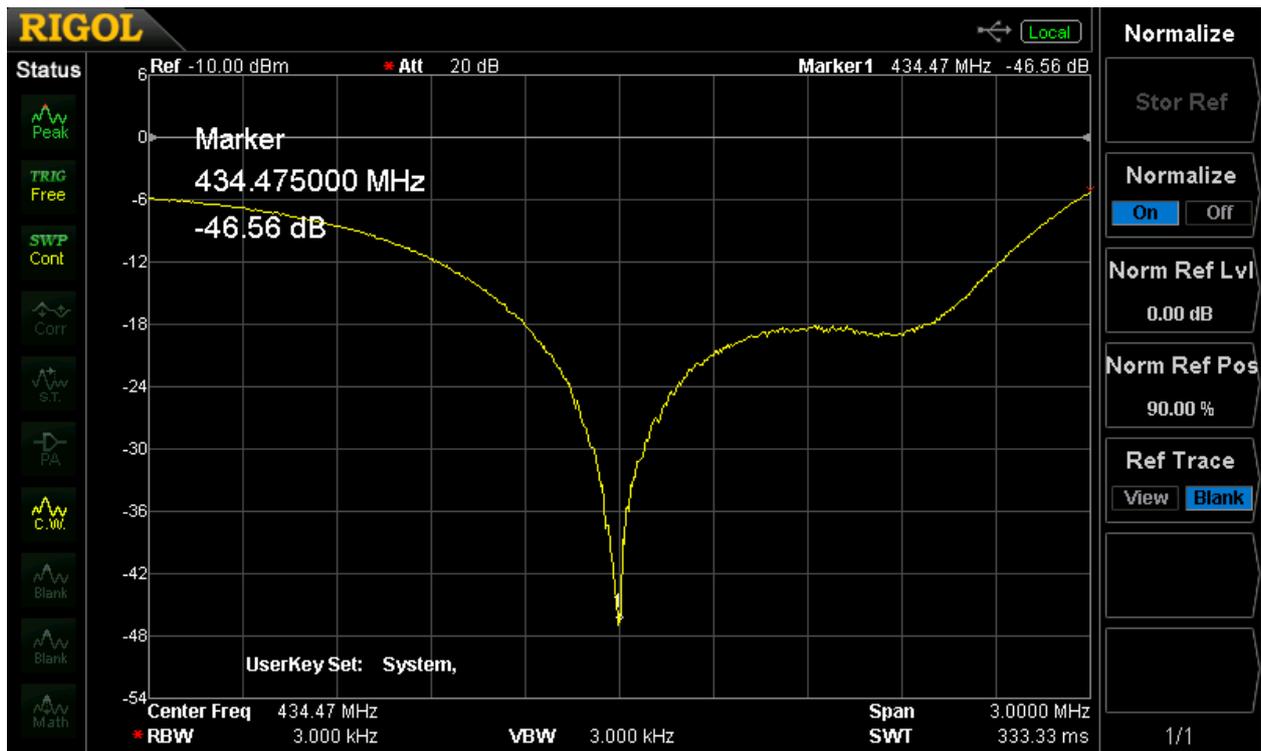
### Diplexer Receive Insertion loss ( remember, a repeater works "opposite" to your rig )



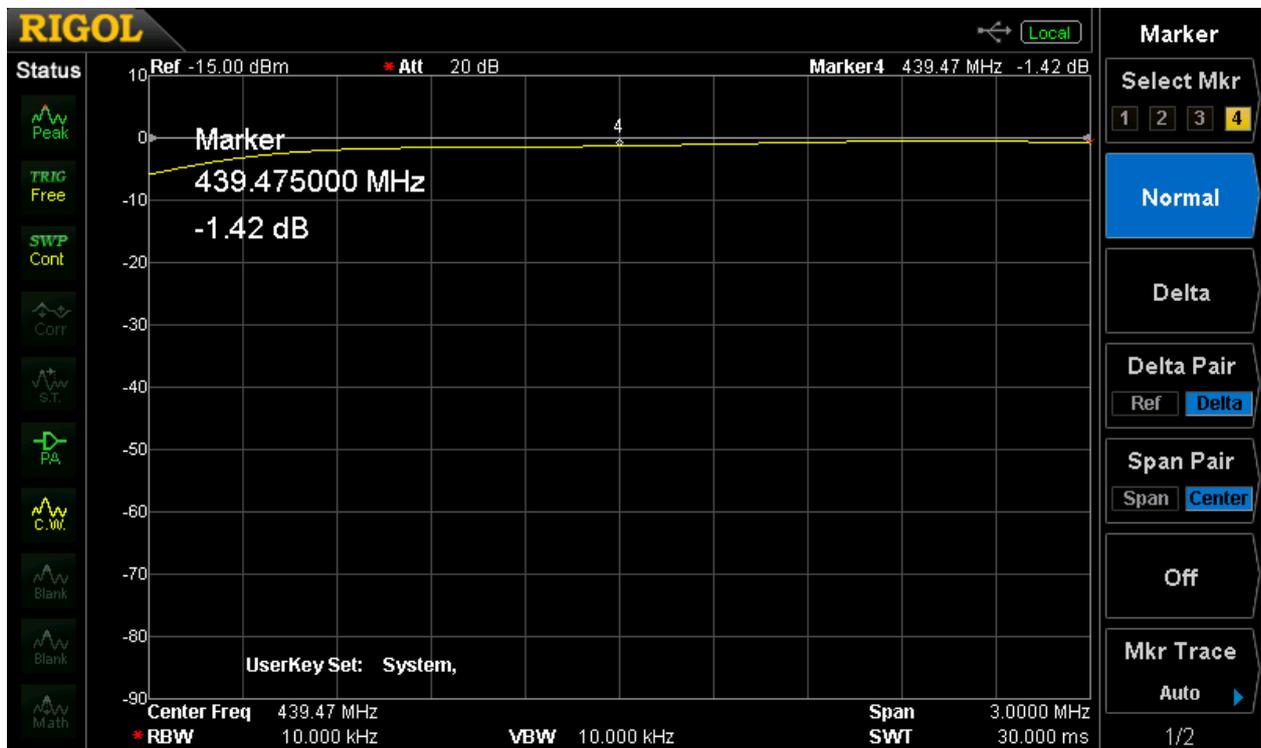
### Diplexer Receive Notch depth.



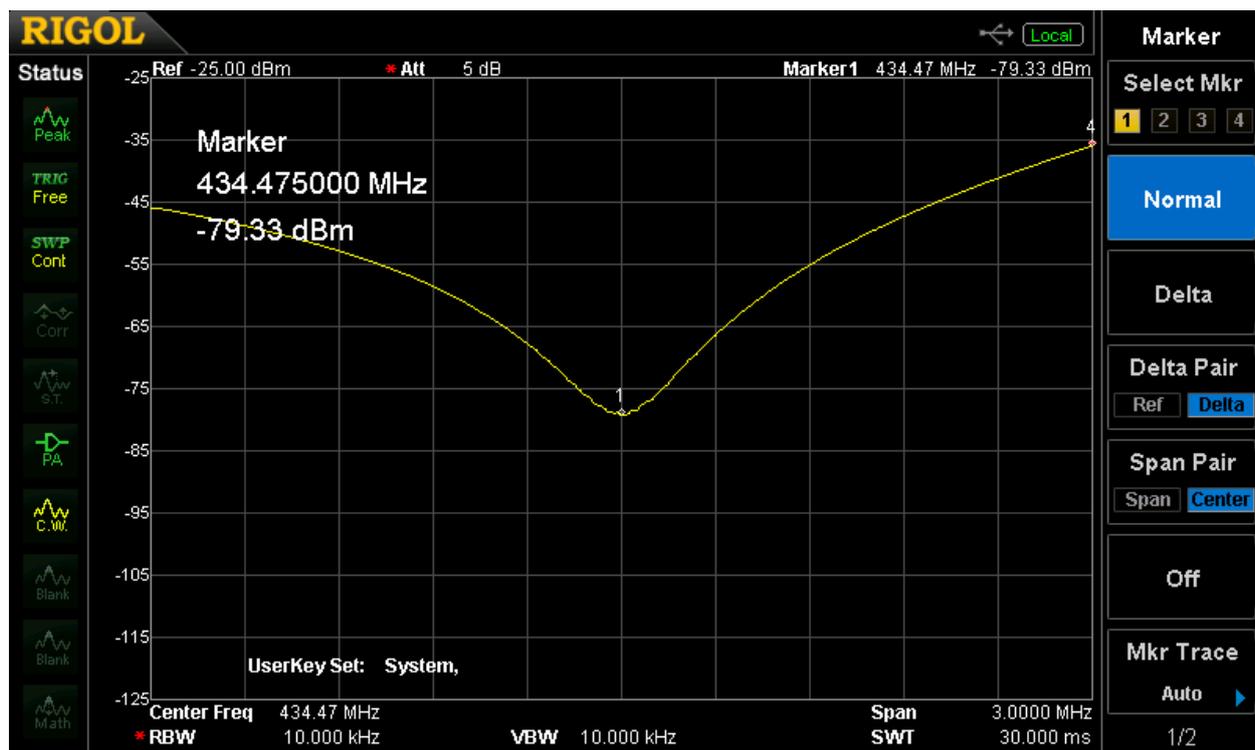
Diplexer Receive Return Loss. 46.56 dB = VSWR of 1.01 to 1



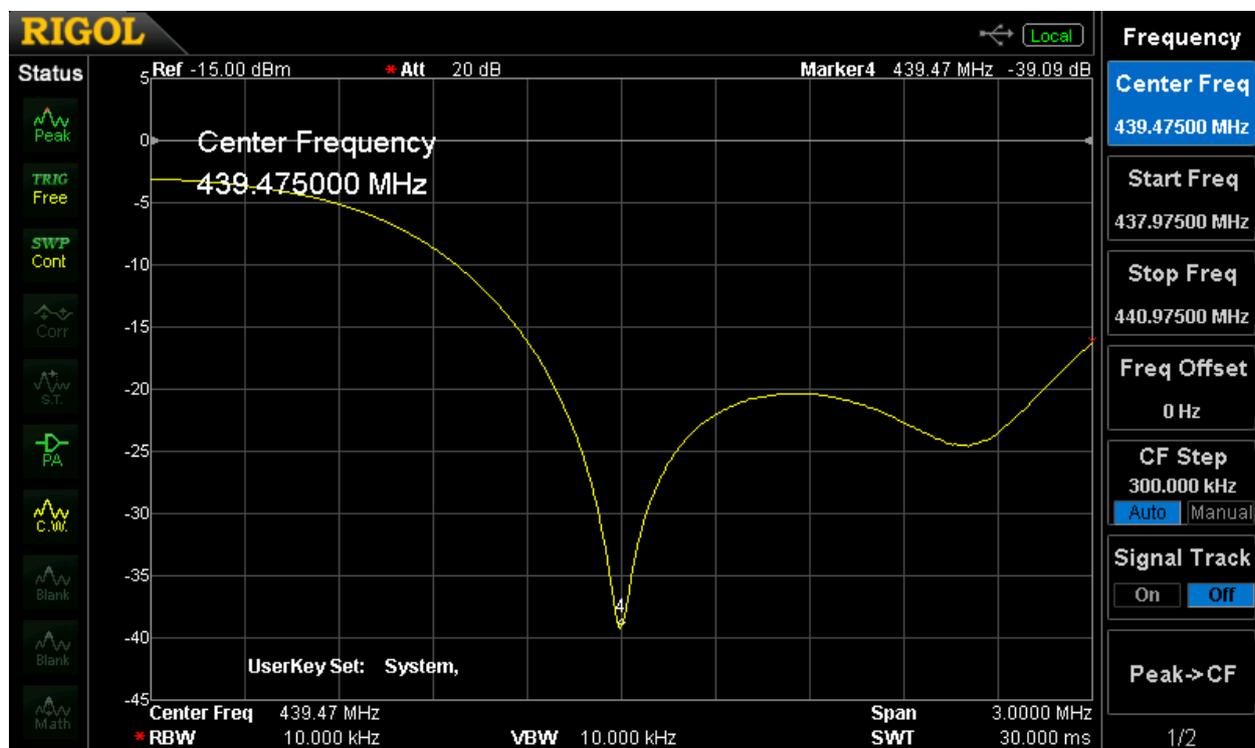
Diplexer Transmit Insertion Loss.



### Diplexer Transmit Notch Depth.



Diplexer Transmit Return Loss.  $39.42 \text{ dB Return Loss} = \text{VSWR of } 1.022 \text{ to } 1$



As you can see we obtained some quite respectable figures with the tuning of the Diplexer. Something to think about is with an insertion loss of 1.42 dB on the TX side of the cavities, that equates to approx. 36 watts of RF power leaving the Diplexer heading toward the antenna when we are transmitting 50 watts of RF power into it. At first glance it would appear that we were losing a considerable amount of power but not so. This is normal for a passive device and is also better than the manufacturer's specification of  $\leq 1.75$  dB Insertion Loss.

2 other parts of the repeater were looked at as well, the short coaxial cables between the RX and TX of the repeater and the Diplexer as well as the connection between the heliax and the RG213 fly lead up to the antenna.

We found 2 X RG58 leads and adapters that connected the RX and TX ports of the repeater to the RX and TX ports on the Diplexer. Both of these leads were replaced with RG142 high quality BNC to N connector leads improving any desense issues due to the RF radiation of the RG58 coax within the repeater cabinet.



The second and probably most successful improvement on the day was the discovery of a corroded "N" connector on the end of the heliax mounted up near the rotator where the RG213 "fly" lead is connected to and then continues up to the collinear antenna at the top of the tower mast. Tony VK3QX with the assistance of Max VK3TMK and Bryan VK3FOAB replaced the N connector on the heliax as well as the RG213 fly lead with a short RG214 (better quality) double shielded fly lead for the rotating section followed by a length of FSJ4-50A "Superflex" up to the antenna. This stabilized the installation as proved by the PIM testing of the feedline and antenna, where before the repairs we were seeing a difference of over 20 dB when "shaking" the feedline and mast. This changed to less than 1 dB variation after the repairs. The antenna was also removed from the mast and with my NanoVNA we tested the antenna for any loose connections between the elements, it tested ok.

**A picture of the uncooperative N connector. Note the corrosion ( and signs of arcing ? ) on the center pin and outer shield.**



Max VK3TMK found the Balun on the Log Periodic beam had deteriorated with the “weather proofing” being almost non existent due to our feathered friends having a bit of a nibble. It is still working at the moment but a new balun will need to be obtained and fitted soon before the old one fails completely.

Bryan VK3FOAB and Leigh VK3FACB assisted with the work being carried out and I’m sure they took away a lot more knowledge from the day that isn’t in the “books” and Bruno VK3BFT ( as well as assisting with the work ) cooked up a delicious BBQ lunch for all involved.

All in all a successful working bee, Thank you to everyone who attended. VK3RGW is now stable and a few more issues have been identified that will need some attention in the near future.

Now to move the IRLP Node back to the shack ☺

Cheers and 73,

Rob VK3BRS

# Passive Inter-Modulation (PIM) Testing

Recently we undertook testing of the RGW repeater antenna system to see if there were any other issues that could be contributing to the noises being heard.

In testing the antenna, we performed a couple of different tests on the antenna system being Return Loss/VSWR plots and PIM.

Return Loss/VSWR is good for looking at the impedance and resonance of the antenna system i.e. is the antenna properly tuned for the frequencies we are using or is there a fault that will affect the performance of the antenna such as an open circuit feeder or antenna etc.

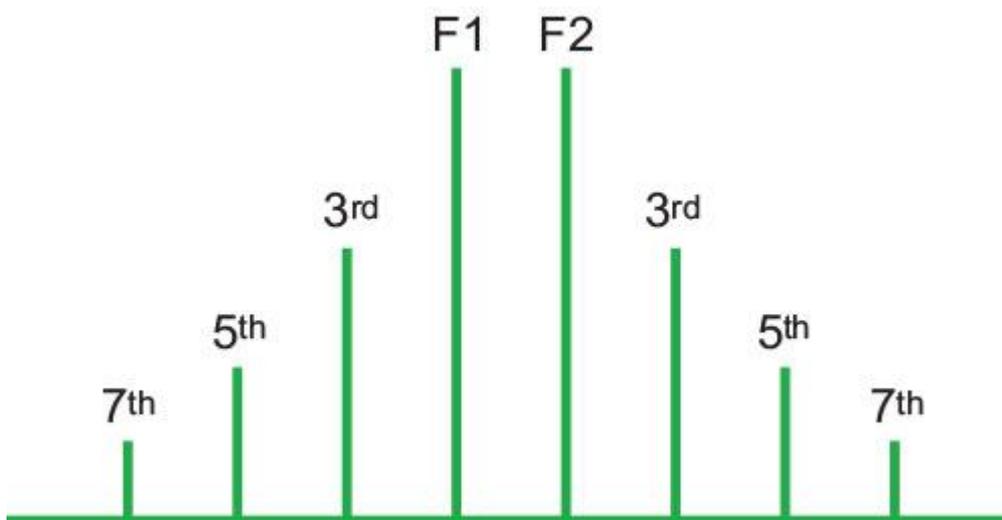
This test showed a wideband antenna with good VSWR.

PIM (Passive Inter-Modulation Distortion) measurement is a test used by most of the major telecommunications companies to determine the electrical health of the antenna and associated connectors and is a comprehensive measure of linearity.

PIM is a form of intermodulation distortion that occurs in components normally thought of as linear, such as cables, connectors and antennas.

Often, we see poor connections in antenna systems due to bad or ill-fitting connectors and non-welded joints in antennas

When subject to high levels of RF power, these poor (non-linear) contacts can get excited and, as a result, can generate intermodulation signals at  $-80$  dBm or higher.



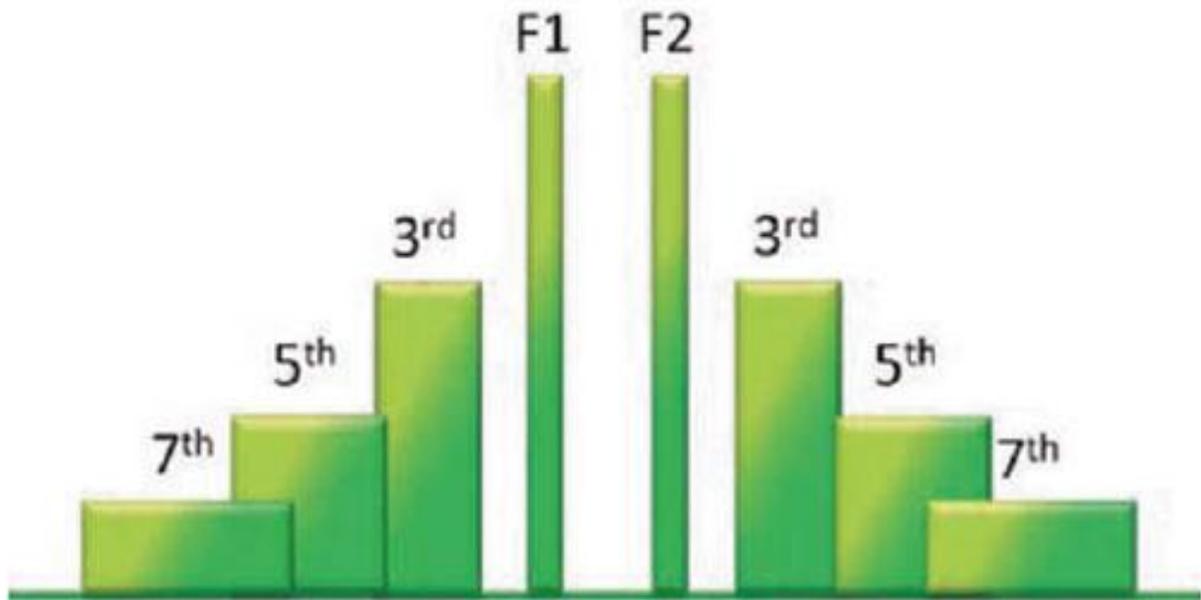
**Figure 1. Carriers F1 and F2 with 3<sup>rd</sup> through 7<sup>th</sup> order products.**

Inter-modulated signals are generated late in the signal path (at the antenna and feedline) and so they cannot be filtered out and may cause more harm than the stronger, but filtered, IM products from active devices such as the transmitter.

The PIM tester feeds two separate carriers, F1 & F2, into the antenna system and measures the levels of the known intermodulation products (3<sup>rd</sup>, 5<sup>th</sup> and 7<sup>th</sup> order) reflected from the antenna system.

The levels of the intermodulation products become much higher when they transit a nonlinear device, such as a loose or corroded connector, or nearby rust.

Note: Other names for PIM include the diode effect and the rusty bolt effect.



**Figure 2. PIM bandwidth increases with the order of the product.**

In a multi-channel system, such as a shared site, trunking network such as SMR or cellular network, the PIM can generate signals or, in extreme cases, unstable wideband noise which affect the adjacent receivers.

Whilst PIM in a single channel system is less of an issue than multi-channel systems, it is still a good measure of the health of the antenna and poor connections can result in arcing inside the antenna and noise.

We aim for a PIM of -120dBc (decibels relative to the carrier) or lower.

Therefore, if the level of the carriers is 0dBm, the intermodulation products should be 120dB lower or -120dBm.

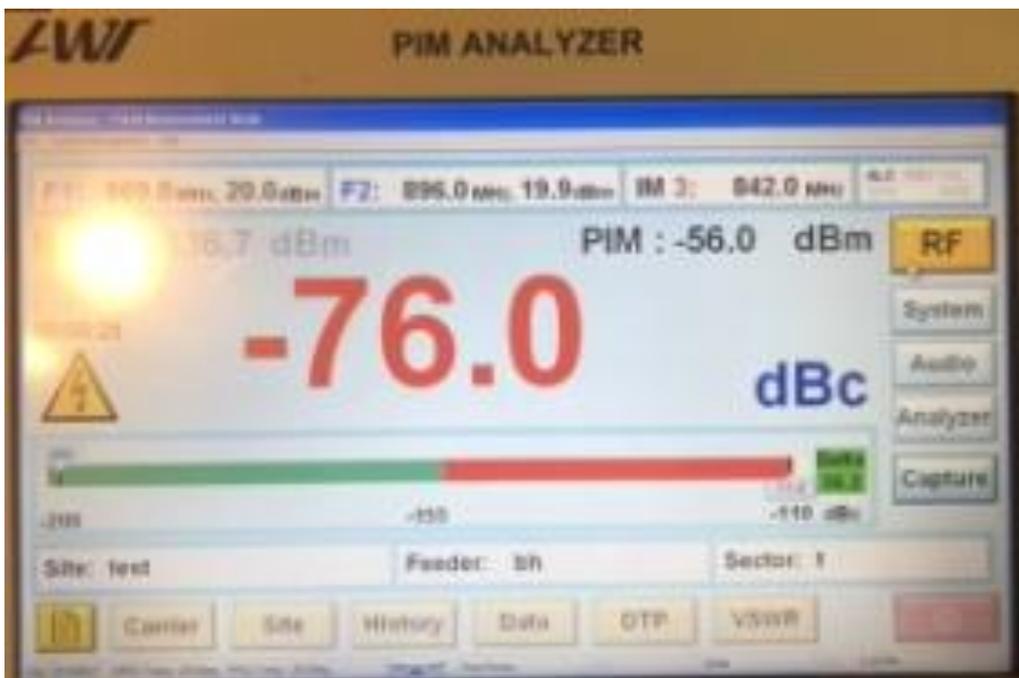
As the PIM tester operates at 900MHz rather than the 400MHz, the values are not calibrated but they are indicative. However, poor connections are usually not frequency dependant.

When we tested the RGW antenna we saw an initial PIM of -95dBc.



**Figure 3. Initial PIM result**

We then decided to shake the tower and then the feeder cable whereupon the PIM became unstable and rose to -76dBc.



**Figure 3. The highest PIM noted**

These values and the instability noted indicate that we either have a faulty connector or loose components inside the antenna.

The next steps are to repeat the tests with a known good dummy load at the top of the feeder cable in place of the antenna and retest.

This will determine if the cable is at fault or whether we need to start thinking about the antenna or steelwork.

That is for a weekend with nice weather.

Tony VK3QX

(Credits: Anritsu)

## GGREC Working Bee 6<sup>th</sup> October 2019

10am on a warm clear Sunday morning we got stuck into fixing up our repeater antenna cable and connectors. Tony Doyle VK3QX was riding high on the ladder to get stuck into re-terminating and testing the heliax cable and repeater antenna. Max Hill VK3TMK was busy assisting Tony, and Max also noted that the balun on the end of the log periodic antenna was all corroded and needed re-terminating. Well spotted Max! Another problem that was spotted on the day was one very mouldy refrigerator that had experienced a couple of exploding soft drink cans. The refrigerator was emptied, taken outside and thoroughly cleaned out.

Meanwhile, inside the Club shack, Rob Streater VK3BRS was carefully re-aligning the repeater Diplexer assisted by Brian Simm VK3FOAB. Leigh Findlay VK3FACB arrived to lend a hand which was very much appreciated.

With every one working hard all morning, it was time to break for a well-earned BBQ lunch and another cup of coffee/tea.

After lunch we all got stuck into our work again and finally cranked the tower back up at around 4:00pm. Testing with Noel King VK3CJJ (on a hand held in Clayton), Paul Stubbs VK3TGX in Frankston and Alan Fowler VK3SLR in Cranbourne went very well.....except for the smell of something getting very hot in the repeater power supply! This issue will be addressed shortly.

Thank you to the members that were able to help on the day and together we got a lot of hard work done. The on-air results are a vast improvement with solid reliable communications restored to our 70cm repeater VK3RGW. A job well done.





Bruno Tonizzo

VK3BFT

# Communications above the clouds

Tuesday, 03 September, 2019



High-altitude balloons, long-duration UAV and centimetre-accurate positioning are under test in Japan.

Japan's [SoftBank](#), a telecommunications and internet service provider, is taking to the skies with new technology that aims to improve connectivity across the globe.

The company is working with unmanned aircraft manufacturer [AeroVironment](#),

and also with Alphabet and its [Project Loon](#), to study the potential for providing high-altitude communications platforms that can stay airborne for weeks or months at a time.

In April 2019, AeroVironment announced that it had achieved a significant milestone with its solar HAPS project, with assembly of the first HAWK30 solar HAPS for the [HAPSMobile](#) joint venture with SoftBank. HAPS stands for high-altitude pseudo-satellite or high-altitude platform station.

HAWK30 has a wingspan of approximately 28 metres and has 10 electric motors powered by solar panels covering the surface of the wing, propelling the craft to a cruise speed of 100 kilometres per hour. High-energy-density lithium-ion batteries will store electricity to power the craft at night.

Cruising at a typical altitude of approximately 65,000 feet — well above almost all clouds and turbulent weather — the craft is designed for continuous missions of up to months' duration without landing.

HAPSMobile's communications relays will use the same frequencies as those used by ground-based cellular networks, which means that ordinary smartphones will be able to connect. The low altitude compared to satellite orbits will contribute to low latency, and handovers between the HAPS and terrestrial stations are expected to be smooth and undisrupted.

SoftBank said that HAPSMobile will be useful for establishing stable internet connection environments at locations not presently served by telecommunication networks, such as mountainous terrain, remote islands and in many developing countries.

The system's independence from conditions on the ground means that it should prove very useful during times of crisis and natural disaster, when traditional telecommunications networks might be off the air.

"The result of decades of experience developing and flying solar HAPS, our team designed, developed and assembled the entire HAWK30 in only 24 months. This is very rapid for a HAPS of such large size and significant payload capacity," said Wahid Nawabi, AeroVironment's President and CEO.

The HAPSMobile joint venture will conduct R&D and flight tests in coordination with authorities in a number of countries, targeting 2023 for HAWK30 serial production and service launch.

## Up, up and away

In another deal, SoftBank's HAPSMobile and Alphabet's Loon have formed a long-term relationship to advance the use of high-altitude vehicles such as balloons and unmanned aircraft systems for telecommunications connectivity.

So serious are the two parties about the future of these kinds of systems, that HAPSMobile has invested US\$125 million in Loon while Loon has acquired the right to invest the same amount back in HAPSMobile in the future.

Loon's experimental stratospheric balloons so far have floated more than 30 million kilometres around the globe and connected hundreds of thousands of people, according to Alphabet.

In April 2019, HAPSMobile and Loon entered into negotiations concerning a number of areas of potential collaboration, such as:

- A wholesale business that would allow HAPSMobile to use Loon's vehicle and technology. In return, Loon would be able to use HAPSMobile's aircraft, currently in development, upon its completion.
- A jointly developed communications payload that is adaptable to multiple vehicles and various ITU compliant frequency bands.
- A common gateway or ground station that could be deployed anywhere in the world and used by both parties to provide connectivity via their platforms.
- Adapting and optimising Loon's fleet management system and temporo-spatial SDN for use by HAPSMobile.
- Forming an alliance to promote the use of high-altitude communications solutions with regulators and authorities worldwide.
- Enabling vehicles from each company to connect and share the same network in the air.

"Building a telecommunications network in the stratosphere, which has not been utilised by humankind so far, is uncharted territory and a major challenge for SoftBank," said Junichi Miyakawa, Representative Director and CTO of SoftBank and President and CEO of HAPSMobile.



*A Project Loon high-altitude balloon.*

"Working with Alphabet's subsidiary Loon, I'm confident we can accelerate the path toward the realisation of utilising the stratosphere for global networks by pooling our technologies, insights and experience.

"Even in this current era of coming 5G services, we cannot ignore the reality that roughly half of the world's population is without internet access," Miyakawa added. "Through HAPS, we aim to eliminate the digital divide and provide people around the world with the innovative network services that they need."

Loon CEO Alastair Westgarth said that he sees joining forces with HAPSMobile as "an opportunity to develop an entire industry, one which holds the promise to bring connectivity to parts of the world no-one thought possible".

## Precise positioning

Not content with boosting communications from above, SoftBank has announced that from the end of November 2019 it will provide a positioning service with centimetre-level accuracy in Japan.

The solution will use real-time kinematics (RTK), a positioning method that uses fixed and mobile stations to receive signals. Data is exchanged between the two points to achieve highly accurate positioning.

Since July 2019, SoftBank has partnered with Yanmar Agribusiness, Kajima Corporation and SB Drive Corp to conduct joint trials in phases to achieve commercialisation in different industries, such as agriculture and transport.

The service will use signals received from the GNSS network, such as QZSS (Quasi-Zenith Satellite System), to conduct RTK positioning with centimetre-level accuracy.

SoftBank will use its nationwide network of 4G and LTE base station locations to install over 3300 unique control points that are necessary for RTK to work.

More specifically, a 'Positioning Core System' provided by ALES Corp. will generate correctional data based on signals received and transmitted by SoftBank's own control points.

This correctional data will be sent to agricultural and construction machinery, self-driving cars, drones and other equipment embedded with GNSS receivers (mobile stations) using SoftBank's mobile communications network.

By conducting RTK positioning using this correctional data and signals received by GNSS receivers, highly accurate positioning can be done in real time.

Furthermore, by having a dense distribution of control points across Japan, stable positioning within extremely short time spans and handovers can be achieved.

Accordingly, highly accurate positioning can be achieved continuously across long distances when GNSS receivers cross over control points.

SoftBank's control points will use the Geospatial Information Authority of Japan (GSI)'s approximate 1300 GPS-based control stations.

SoftBank is developing proprietary GNSS receivers that can be installed at low cost so that more companies can utilise centimetre-level positioning services, and new services and market expansions can be achieved.

The company is also advancing the development of services that enable cloud-based RTK positioning, which enables services for devices without GNSS receivers.

Cloud-based RTK will enable centimetre-level, location-based services for equipment that needs to be miniature and energy efficient, such as infrastructure surveillance sensors and wearable devices.

*Pictured, top: An artist's impression of the HAWK30 high-altitude pseudo-satellite aircraft. Images courtesy AeroVironment and Loon.*

Read more: <http://criticalcomms.com.au/content/industry/article/communications-above-the-clouds-736907554#ixzz5yhXVKxsP>



# Club Information



Meetings 20:00hrs on third Friday of the month at the  
 Cranbourne Guide Grant Street Cranbourne  
 Prac nights first Friday in the Peter Pavey Clubrooms Cranbourne 19:30hrs  
 Visitors are always welcome.

## Office bearers

President	Tony Doyle	VK3QX	Web Master	Megan Woods	VK3TIN
Admin Sec	Rob Streater	VK3BRS	Magazine Editor	Paul Stubbs	VK3TGX
Treasurer	Megan Woods	VK3TIN	Property Officer	'committee'	
General 1	Helmut Inhoven	VK3DHI	Assoc. Secretary	Rob Streater	VK3BRS
General 2	Leigh Findlay	VK3FACB			

## Call in Frequencies, Beacons and Repeaters

The Club Station VK3BJA operates from the Cranbourne Clubrooms.  
 6m Repeater Cranbourne VK3RDD, In 52.575 Out 53.575 CTCSS none  
 70cm Repeater Cranbourne VK3RGW, In 434.475MHz Out 439.475MHz CTCSS 91.5Hz  
 VK3RGW Repeater supports Remote Internet access (IRLP), Node 6794.  
 70cm Repeater Seaview VK3RWD, In 433.575MHz Out 438.575MHz CTCSS 91.5Hz  
 Simplex VHF - 145.450MHz FM, Simplex UHF - 438.850MHz FM  
 VK3RLP Beacons 1296.532MHz & 2403.532MHz (currently inactive)

## Membership Fee Schedule

- Pensioner member rate \$40.00 Extra family member \$20.00
- Standard member rate \$50.00 Junior member rate \$25.00
- Fees can be paid by EFT to BSB 633000 - Account 146016746
  - Always identify your EFT payments
- Membership fees are due by each April Annual General Meeting (AGM)

Magazine Articles to [editor@ggrec.org.au](mailto:editor@ggrec.org.au) Cut off, 10<sup>th</sup> of the month  
 All other Club correspondence to: [secretary@ggrec.org.au](mailto:secretary@ggrec.org.au)  
 or via post: GGREC, 408 Old Sale Rd, Drouin West 3818  
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