# NSWRA Newsletter

**New South Wales Rocketry Association Inc.  June 2021**

It's been a rather eventful 2021 so far. Our January launch day had to be cancelled due to the weather, so our first launch was held on 27th Feb, in drizzly conditions. More bad weather meant that the March launch day also had to be rescheduled to the following weekend.
We had a very large attendance at the Mullaley weekend on 10–11th April, with several members attempting HPR certifications. Congratulations to all who were successful! Unfortunately it was very windy, and we had no choice but to call an early halt to proceedings on Sunday. At this launch we also experienced further issues with the club launch controller. Thank you all for being so understanding as we tried to rectify the problem.
Our Whalan launch day in May was also affected by the weather, necessitating a reschedule to the June long weekend, and a postponement of the altitude-duration competition.
We were continually monitoring the COVID situation, especially leading up to the launch day scheduled for 26th June, when new cases were found in NSW. We were able to hold the launch in accordance with public health orders, and the next day NSW went into lockdown. Hopefully restrictions will be eased before our next launch day on 31st July.

# New Club Launch Controller

As most of you would be aware, we have encountered ongoing problems with our ageing launch controller, and these are expected to continue. The consensus of NSWRA and other rocket clubs is that we should replace this with a commercial, well-proven system. There are very few of these on the market, and they are quite expensive. The controller of choice is the Wilson F/X system. These are already used by clubs in Qld, WA and Vic; CRG will be purchasing a unit, and Tasmania also intends to do so.
Accordingly, we will be ordering one of these systems.

# Memberships Now Due

Memberships for 2020-21 expired on 30th June.

A number of members have already renewed for 2021-22. If you haven't already done so, you will need to renew before you are permitted to launch. Please do so ASAP!
Preferred payment method is by electronic funds transfer. The bank details are on page 2 of this newsletter.

We have had to increase the renewal fee to $70, to help cover the cost of new equipment, in particular the new launch controller. This amount is in line with the fees charged by other Australian rocket clubs, and the total cost per adult member (TRA + NSWRA memberships) equates to around the "typical" amount of $150 per year.

Note that your Tripoli membership is independent of NSWRA – each member is responsible for renewing their own TRA membership. You will receive a reminder from TRA when your membership is due. Please action this promptly so you can receive your new membership card before your old card expires. Current membership needs to be confirmed at flight safety review; presentation of an up-to-date card will help avoid awkward situations.

# Launch Liability Waiver Forms

In order to launch at Whalan or Mullaley, members are required to have signed a Launch Liability Waiver form for that particular site. These forms are valid for a calendar year. New forms will need to be signed after 1st January (this has been amended from what was previously advised by email).

# Next Mullaley weekend

The next weekend at Mullaley has been scheduled for 11 - 12th September. You will need to let Tim know if you intend to attempt a HPR certification. You should definitely contact Tim ASAP if you will be attempting L2, so you can arrange a time to take the exam beforehand.
Be aware that CASA has just recently reduced the altitude for Class "E" airspace to 12500 ft AMSL. Since Mullaley sits approximately 1000 ft above sea level, and we add a buffer of 500 ft, **the usual ceiling for Mullaley will be 11000 ft AGL.**

# Volunteers for Site Duties

It has been pleasing to see more members willing to help out at launch days, by volunteering to take on the roles of RSO, LCO, Flight Safety Review (FSR) and COVID Safety Officer (CSO) for a couple of hours. I encourage all members to please try to help out, to relieve some of the burden from the committee.

# COVID-safe launch days

NSWRA will continue to do everything it can to ensure that members stay safe from COVID at launch days. Information about protocols are on the NSWRA website, the Facebook page, and in emails sent out prior to the launch day. It is essential that you are familiar with these protocols. Typically these state:

*Do not attend if you feel unwell or have flu-like symptoms. Get tested.*
*Visit the NSW Health website [www.health.nsw.gov.au](http://www.health.nsw.gov.au) for further information*

*All attendees must sign in immediately upon arrival*
*Exercise social distancing*
*Obey all instructions given by site officials and on signs*
*Hand Sanitiser will be available for all attendees*
*Bring your own pen to complete your Launch Cards.*
*Toilets should only be used in emergencies*

**Regarding social distancing:**
Other than when signing in, presenting a rocket for flight safety review, or recovering your rocket, you must remain near your vehicle.
No members are to remain on the roadway between the RSO and LCO tables. This area must be kept clear when rockets are being launched, apart from the RSO.
Only those members with rockets yet to be approved may stand in the queueing area, maintaining 1.5m distance from other members.

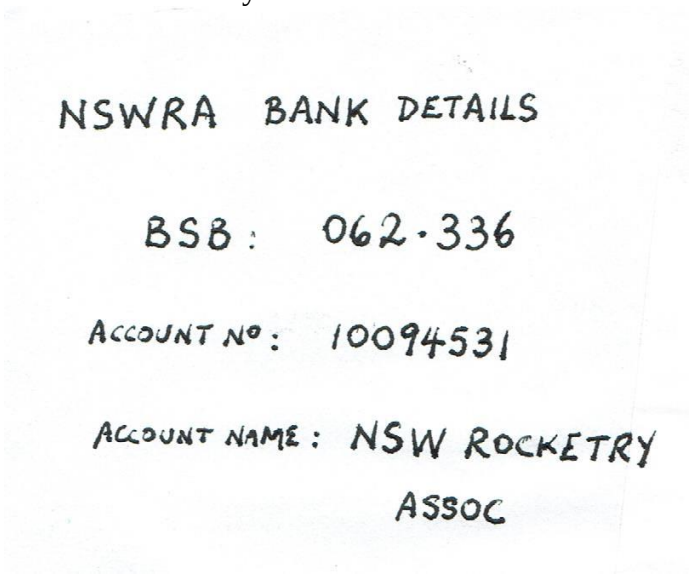
## Upcoming Events

All launches are at Whalan Reserve unless otherwise noted

**July**
31 Launch Day

**August**
28 Launch Day

**September**
11-12 Mullaley weekend
25 Launch Day




If you are interested in using GPS to help locate your rocket, Geoff Ingram has contributed the following article

# GPS Tracking

Article by Geoff Ingram

Recently, at Mullaley I qualified for my HPR Level 1. When attempting this certification, I sought some advice from a mentor. His advice was very straight forward… make it as simple as possible… no chute release, no pyro dual deploy. Simply launch, deploy an appropriately sized main at apogee and watch your rocket drift to the ground. Nice and simple, and pass your level 1.
However, on the day the wind was blowing at about 20kmh (about 6 metres per second). The chute I was using also had a descent rate for my rocket of about 6 metres per second. The maths wasn't hard. My rocket would fly to 700 metre. On its way down, for each metre of descent, it would drift sideways by a metre. I was in for a 700 metre walk to retrieve my rocket. I spent a fair amount of my afternoon, (with many other members) in the canola fields looking for my rocket… oh well the price to pay for achieving level 1.

This got me thinking about an easy way to recover my rocket and in particular a GPS tracking system. After several weeks of research, I've realised that is both an easy thing to implement and is also a comparatively cheap option, due mainly to the level of technology we have available to us today.

A GPS solution can be built for as little as about $50!!!

**How does it work?**
The solution is based around 2 electronic units. One in the rocket and one on the ground (your ground station) to receive the information from your rocket.

<u>In the rocket unit</u>

A GPS module is at the core of the solution. It's a small electrical component about 20mm square. Actually, most of what you see is the ceramic antenna that "talks" to many satellites overhead. The "talk" that happens between the GPS module and GPS satellites is in "NMEA Sentences". NMEA (National Maritime and Electronics Association) are plain text messages that give information about time, latitude, longitude, altitude. As I am suggesting software to "de-cipher" NMEA statements, I will not expand on them here.

A Long Range (LoRa) transceiver is used to accept the information from the GPS module and to transmit it to your ground station. Nothing complicated… receiver the data from the GPS and transmit it

A power supply
In its simplest form this is typically a LIPO battery. The GPS modules usually run on 3-5v and the transceivers on 3.3, so a power supply regulator of 3.3v is a prudent addition

<u>In your ground station</u>

A long Range (LoRa) transceiver to receive the signal from the rocket unit. Obviously the two transceivers must be tuned to the same frequency

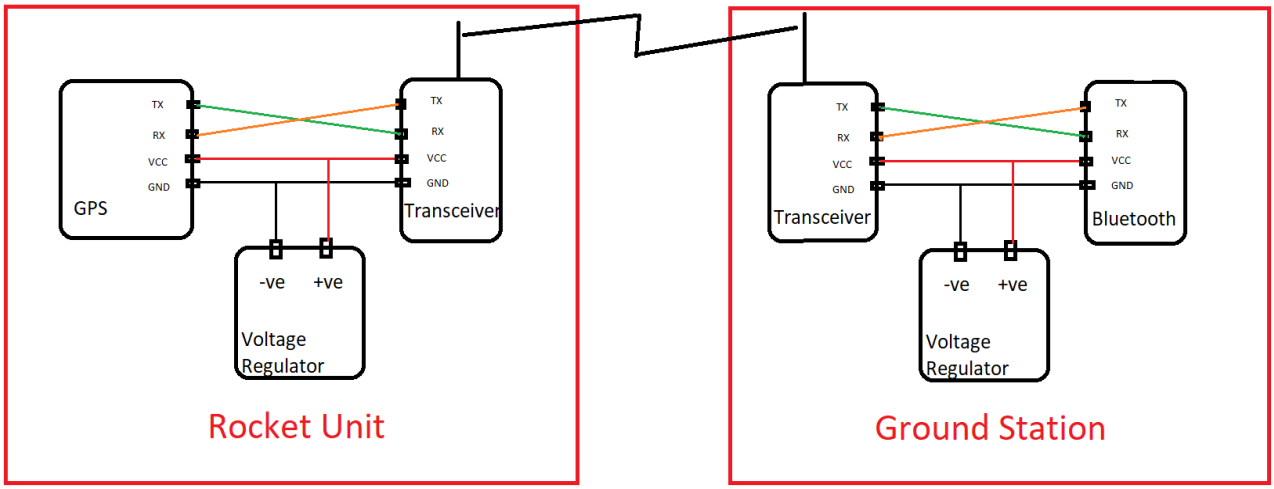
**What to do with the GPS data received at your ground station?**
You can build some sort of LCD driven device that reads out the GPS data… however, why re-invent the wheel? There are many pieces of software already written that do this for you. The most logical option would be to take this data received by the ground station transceiver and send it to a computer, laptop tablet or smartphone. This is best done using a simple USB cable, or for an even more convenient method, a Bluetooth module.

As in the case of the rocket unit, the ground station components would also require a power supply. As typically the transceiver and Bluetooth module both work on 3.3v a power regulator would again be suggested.

So, in summary, the rocket unit contains a GPS module to receive telemetry data from overhead satellites. This data is then passed to the transceiver to be broadcast (to your ground station). A regulated power supply is added to power the rocket unit. NOTE Transceivers TX/RX over a broad range of frequencies however in Australia 919 to 928Mhz is suggested

Your ground station receives the data via an identical transceiver and then passes this data to your phone/tablet/laptop or PC via either USB or Bluetooth. Again, a regulated power supply is required.

Some of the components, such as the GPS, have many connections, however only 4 are required, those being VCC – Positive power, GND – Ground or negative power, TX – Transmit Data and RX – Receive data
Below is a very simple schematic for both the Rocket and Ground Station units.




A quick search on eBay and you will find: GPS UNIT - $15 each, Transceivers -$20 for 2, Power Regulator - $5 each, HT06 Bluetooth - $15 each, 2 LIPO batteries (2S 7.4v) about $15 each. Antenna can be a simple ¼ wave stick (8cm copper rod) or for better TX/RX a small dipole $5 each

**Software options**
As mentioned earlier, why re-invent the wheel, when software is already available.
There is a set of Apple or PC options, Windows options and Android Phone/Tablet options (not too much for iPhone ever since Motion-X was discontinued)
Windows – Mapsphere
Android – Bluetooth GPS and Rocket Locator

**Additional Information**.
As soon as power is applied to the GPS module in will immediately “talk” with satellites and transmit all data received.
A Microprocessor (such as Arduino) can also be added. This will allow a human “interface” which can be used to program the functionality of certain pins, programming the frequency of the transceivers or even limit the amount of GPS data being transmitted (to limit the stream of data between the 2 transceivers). A microprocessor is NOT required for a basic system, but does add functionality if required.
Without a microprocessor, the transceiver will still require to be “programmed” for the appropriate frequency. This can be achieved by connecting the transceivers to a PC (via USB) and the necessary vendor programming software.

**Commercially available options**
These fall into 3 categories: build yourself, simple off-the-shelf, and all the bells and whistles

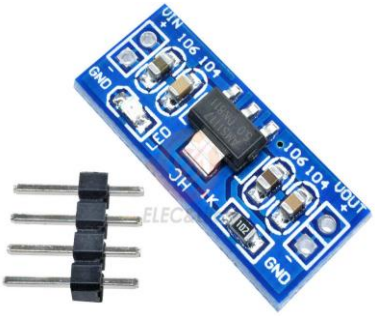
*EggRocketry* offer the Eggfinder – Basically you solder all the bits yourself. The kit contains a Rocket PCB, A GPS unit ready to be soldered to the PCB and a transceiver also ready to be soldered to the board. There are a few other small components that also require soldering to the PCB, and these make up the regulated power supply.
The Ground station PCB also has the transceiver soldered to it as well as a few other small components that form the power regulator. Header pins are also added for connection of either USB or Bluetooth. $US100 plus postage and use generic software

*Missile Works* also offer a simple Rocket Unit/Ground station, these are already assembled and are pretty much ready-to-go. $US200 plus postage and use generic software

*Altus Metrum* offer a range of higher end solutions. They can be stand-alone GPS tracking, right up to an integrated flight computer that will also implement dual deploy as well as “call out” flight telemetry such as altitude, drogue deployed, main deployed, rocket is now so far down range. Starts at $UR350 plus postage the kit includes proprietary software that is based on Java and is therefore ready for a Windows or Imac platform. They also offer an Android version.

The Major Components of a GPS Tracking System

GPS Module – The one shown has a separate antenna (The white ceramic square) and the receiver, mounted on a breakout board, ready to have the header pins attached
Keyword - NEO6M




Voltage Regulator – 2 Pins are added to one end and 2 to the other end. Simply add a battery to the input end with the output end supplying a regulated 3.3v output
Keyword - LMS1117


LoRa Transceiver – Again with header pins provided. These pins will be used initially to program the frequency of the LoRa via USB, but will operationally be used for +voltage, -voltage, transmit (TX) and Receive RX) data
Keyword - HOPERF HM-TRP-900