

***NEW SOUTH WALES ROCKETRY
ASSOCIATION (NSWRA)***



POLICIES AND PROCEDURES

November 2011

POLICIES AND PROCEDURES

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1.0 New South Wales Rocketry Association By-laws

1.1 Name

The name of this organization shall be the New South Wales Rocketry Association (NSWRA).

1.2 Purpose

It shall be the purpose of the NSWRA:

- to hold meetings for the purpose of aiding and encouraging those interested in rocketry, and,
- to operate and maintain a rocket range based on NAR *standards* (*National Association of Rocketry USA*), the NAR Safety Codes, and in accordance with local laws and regulations.
- to promote safe model rocketry in NSW.

1.3 Office holders

The administrative offices shall include President, Vice-President, Secretary, Treasurer and Senior Advisor. An individual may not hold two administrative offices except as an interim measure. The operational offices shall include the Launch Control Officer(s) and the Range Safety Officer(s). An individual may hold up to two operational offices and one administrative office. All officers must be current full members of the NSWRA.

1.4 Duties of the Officers

The duties of the officers shall be as follows:

President:

- To call and preside over meetings, organize events, and to see that activities proceed in an orderly and timely manner,
- To ensure that launch range equipment is appropriate and available for coming events,
- To assign duties to officers and members where necessary,
- To approve all launch days based on landowner's approval, CASA notification, fire brigade notification (if required), and insurance coverage.

Vice-President:

- To assist the President in administrative duties,
- To act as President in the absence of the President.

Secretary:

- To assist the President in administrative duties,
- To take the minutes of the meetings, and to preside at meetings in the absence of the President and Vice-President.
- To conduct internal and external correspondence.

Treasurer:

- To maintain finances and registrations, and to control disbursements and receipts.

Senior Advisor:

- To advise officers and members on technical and organisational matters.

Launch Control Officer:

- To control launch activities on launch day. *Refer to 6.0 Duties of the Launch Control Officer.*

Range Safety Officer:

- To enforce safety and assist in procedures and technical matters on launch day. *Refer to 7.0 Duties of the Range Safety Officer.*

1.5 Scheduling of meetings

An Annual General Meeting shall be held between the commencement of the financial year (one year being July to June) and the 6 months following. Other meetings may be held at the discretion of the President as needed. Notification is to be provided to members at least seven (7) days in advance.

1.6 Elections

General elections for every official role shall be held at the Annual General Meeting. A meeting will be held before or during the next launch day to elect officers to fill vacated positions.

1.7 Amendments

These policies and procedures may be amended by a majority vote of the committee members.

1.8 Removal of Officers

Any officer may be removed by the President for incompetence, negligence, or unlawful acts. There are three steps to this disciplinary process that the President must follow. First, a verbal warning is given. In the event that this warning fails to correct the problem, a written notice shall be delivered in person. As a last resort, an impeachment vote may be taken at a meeting of the members, a vote of two-thirds majority is required to remove the officer. If the President is the officer to be disciplined, then any other officer may initiate the actions.

1.9 Committees

A two-thirds majority of the membership at any official meeting may appoint or disband a committee. Regular reports from each committee shall be presented at meetings. The President shall be a member of all committees.

1.10 Incidents

All incidents shall be recorded and investigated. If the potential remains for a similar incident to occur in the future, actions to correct the issue shall be completed in a timely manner.

End of By-Laws

**2.0 New South Wales Rocketry Association -
Launch Operations Safety Policy**

The NSWRA values the safety of its members and visitors. To minimise any potential

risks involved in NSWRA launch operations, the following processes are in place:-

- Portable fire fighting equipment is to be available.
- Portable first aid equipment is to be available.
- Safety barriers (tape) shall be erected to keep spectators behind a control line.
- No launch shall be conducted without a Launch Control Officer (LCO) and Range Safety Officer (RSO) taking charge of proceedings. For launch days where crowd numbers are less than 20, the two roles can be performed by the same person if that person has approval from the President to do so. These officers have certain responsibilities for ensuring that the range is safe. Members and visitors are required to follow their instructions.
- No rocket shall be launched prior to an entry being made in the launch day logbook. The LCO shall not launch a rocket without a logbook entry.
- All rockets are to be scrutinised by the RSO before their first flight of the day. The RSO, at their discretion, may re-scrutinise any rocket that is deemed to be potentially unsafe. Failed flights must be re-scrutinised before their next flight.
- People in the launch area shall be made aware of an impending launch with an audible countdown from 5 seconds (a 3 second countdown may be used in some circumstances at the discretion of the LCO).
- Range launch equipment must be electrically isolated prior to any person approaching a rocket on a launcher.
- Any misfire will result in a minimum one-minute wait before any person can approach the launcher.
- Launches will take place from a cleared area, free of any combustible materials to a radial distance of 2m.
- Launches will be cancelled if high wind or weather prevents observation of the full duration of the flight.
- No rockets will be launched during a fire ban. Compressed-air, water, and mechanical propulsion systems are excepted.
- Appropriate stability & pre-flight checks shall be performed before the first flight of all modified and scratch-built rockets.
- Parents are responsible for the actions of their children. Children must also adhere to all safety guidelines as stipulated in the policies and procedures and the range rules.
- No pets or animals are allowed in the launch area.
- During NSWRA launch events the decisions of the RSO on matters of safety are final. If a member or visitor refuses to abide by the applicable safety codes, the RSO has the authority to bar that person from further participation at that event.
- At the end of the event, the field must be returned to its original condition (or better). This includes the removal of all empty engine casings, igniters, plugs, rocket parts, litter and other debris.

Safety, it's everyone's responsibility.

3.0 General Guidelines for Launching Model Rockets

Model rocketry has an excellent safety record and everyone would like to see it stay that way. If you have trouble with your model rocket, read the instructions supplied with the model or get assistance from an experienced flier. Please follow the Safety Rules and you will find model rocketry to be an enjoyable and safe hobby/sport for everyone.

Construction:

Model rockets will be made of lightweight materials such as paper, wood, plastic and rubber without any metal as structural parts.

Launch System:

The system to launch the model rocket must be remotely controlled and electrically operated, and will contain a switch that will turn off when released.

Only electrical igniters that will ignite the model rocket engine within one second of electrical actuation shall be used.

All persons shall remain at a certain distance away from the rocket that is being launched. This distance will vary depending on what is being launched (refer to the following table).

Installed Total Impulse (Newton-Seconds)	Equivalent Motor Type	Minimum Diameter of Cleared Area (m)	Minimum Personnel Distance (m)	Minimum Personnel Distance (Complex Rocket) (m)
<30Ns	A – E (Blackpowder)	5	5	10
30.01 – 160.00	E – G (Composite)	10	10	20
160.01 – 1,280.00	H, I, J	15	30	60
1,280.01 – 2,560.00	K	25	60	90
2,560.01 – 5,120.00	L	30	90	300
5,120.01 – 20,480.00	M, N	40	300	450
20,480.01 – 40,960.00	O	40	450	600

Model rockets will be launched from a stable device that provides rigid guidance until the rocket has reached a speed adequate to ensure a safe flight path.

To prevent accidental eye injury, the launcher tip should be above eye level, or the tip should be capped with a hand when approached. A person should never place their head or body over the launch rod.

Stability:

The stability of a model rocket must be checked before its first flight, except when launching proven commercial models.

Launch Safety:

People in the launch area must be made aware of an impending launch with an audible countdown from 5 seconds (a 3 second countdown may be used under certain circumstances at the discretion of the LCO).

No person shall approach a model rocket on a launcher until either the safety interlock key has been removed or the battery has been disconnected.

No person shall approach a model rocket on a launcher within one minute after a misfire.

Launch Area:

Model rockets must be launched from a cleared area, free of any readily combustible materials to a radial distance of 2m.

Only flame resistant recovery wadding may be used in model rockets.

No launches shall take place if a fire ban is declared.

LAUNCH SITE DIMENSIONS

Model Rockets and Small Model Rockets		
Total Impulse (Ns)	Motor Type	Minimum Site Dimensions
0-1.25	¼A & ½A	15m
1.26-2.50	A	30m
2.51-5.00	B	60m
5.01-10.00	C	120m
10.01-20.00	D	150m
20.01-40.00	E	300m
40.01-80.00	F	300m
80.01-160.00	G	300m

High Power Rockets		
Total Impulse (Ns)	Motor Type	Minimum Site Dimensions
160.01-320.00	H	500m
320.01-640.00	I	750m
640.01-1,280.00	J	2000m
1,280.01-2,560.00	K	2000m
2,560.01-5,120.00	L	3000m
5,120.01-10,240.00	M	5000m
10,240.01-20,480.00	N	6000m
20,480.01-40,960.00	O	8000m

Jet Deflector:

The launcher shall have a jet deflector device to prevent the exhaust hitting the ground directly.

Launch, Targets and Angle:

A rocket must never be launched on a flight path that would impact on a target on the ground. Explosive or combustible payloads must never be used.

Live vertebrate animals must never be carried as payloads.

The launcher must be pointed to within 30° of vertical.

Rocket motors must never be used to propel anything horizontally unless specifically authorised by another NSWRA approved safety procedure.

Prelaunch Test:

When conducting research activities with unproven designs or methods, isolated pre-launch tests must be undertaken to determine the reliability and safety of the rocket.

Recovery:

A recovery system should be used to return the rocket to the ground safely and in a re-usable state.

A pre-flight test should be undertaken to ensure the recovery system functions properly. Only flame resistant wadding should be used.

Flying Conditions:

A model rocket should not be launched in high winds (over 30 kph), near buildings, power lines, tall trees, low flying aircraft or under any conditions that may be hazardous to people or property.

A person should not attempt to recover a rocket from a power line or other dangerous location.

The launcher should not be closer than one half of the Minimum Site Radius, to the periphery of the site.

Rockets must not be flown into clouds or in any other low visibility conditions unless otherwise authorised by CASA.

Loaded Rockets:

A loaded rocket must never be stored or left unattended.

A loaded rocket should be in a launcher or firmly restrained.

A loaded rocket or its exhaust nozzle should never be pointed towards a person. During flight preparations, there should be no persons in the flight path of the loaded rocket.

Operations:

Rockets must not be launched near any active airport or aerodrome zones or in a manner that could create a hazard to low flying aircraft.

Persons should observe and listen for any aircraft prior to any launch.

The Civil Aviation Safety Regulation (*CASR Part 101 Unmanned Aircraft and Rockets*) must be followed. Large penalties apply for non-compliance.

Age:

Persons under the age of 18 years shall be supervised by a responsible adult who is competent in the preparation and launching of model rockets and can follow the necessary safety requirements and regulations.

Solid Propellant Motors:

Only factory-made, pre-loaded model rocket motors or reload kits may be used and only in the manner recommended by the manufacturer and certified by a recognised body (NAR, Tripoli).

Motors must not be modified in any way, and single use motors must not be reloaded.

Weight Limits at Doonside:

Rockets shall not weigh more than 1500g at lift-off *including* the weight of the motors.

4.0 General Guidelines for Members

4.1 Registration and Membership

Only current members and registered participating visitors will be allowed to fly rockets on launch days - no exceptions.

4.2 Dues

NSWRA dues (2010) shall be as follows:

Type of membership	Cost	Description
Full Member (18yrs & over)	\$150 per year	Full use of equipment, voting, access to E+ motors, etc.
Family Membership	\$160 per year	Up to two parents and any number of children under 18years.
Junior Member (Under 18yrs)	\$55 per year	Parent/guardian supervision required.
Student Membership	\$55 per year	For students above the age of 18 years. Not entitled to vote or hold an office position.
Regional Membership	\$65 per year	For members flying at NSWRA approved sites other than Doonside. Access to insurance, motors, certification, and voting.
Participating Visitor	\$10 per meeting	For non-members who want to fly rockets on the day. Not entitled to vote. Maximum 3 meetings.
Non-participating Visitor	-	Feel free to come along and ask questions or watch

Dues are payable in advance. All membership applicants and participating visitors will need to provide identification and contact details. A membership card will be issued before the next event.

Regional Membership

This is for persons who do not fly at Doonside. This requires access to an NSWRA designated site. In order to obtain this, the NSWRA is required to obtain necessary approvals from CASA, the landowners, local council, Workcover, insurance company, etc. The NSWRA will provide guidance and procedures for launch activities and once all approvals are obtained the NSWRA will approve the site as a designated NSWRA site. This membership fee is based on the fact that no other specific costs are incurred for using the site and is subject to change as a consequence.

HPR certifications can be arranged. As per NSW legislation, HPR motors cannot be purchased until the individual has obtained a Pyrotechnician's License through Workcover. Remember, Workcover and CASA regulations must still be adhered to and can override any approvals given by the NSWRA. In addition, the NSWRA insurance policy will not cover unregistered sites.

4.3 Certification

There are several levels of certification for members:

Certification	Flight test	Privileges
LPR Level (Model Rocket)	None	Fly rockets up to 20Ns D motor
MPR Level (Large Model Rocket)	E to G motor, 20.01Ns to 160.00Ns	Buy and fly up to G motors
HPR Level (High Power Rocket)		Buy (conditional) and fly motors to:
▪ Level 1 certification	H,I 160.01-640.00Ns	I 640.00Ns
▪ Level 2 certification	J,K,L 640.01-5,120.00Ns	L 5,120.00Ns
▪ Level 3 certification	M,N,O 5,120.01-40,960.00Ns	O 40,960.00Ns

Upon registration, members will have Low Power Rocketry (LPR) Certification. This will allow them to fly rockets up to a total impulse of 20Ns (D motor).

Refer to 'NSWRA Certification Procedures 2011' for further details regarding the certification program.

4.4 Launching of High Power Rockets

High Power Rocket launches shall only take place in the presence of a person with a Pyrotechnics License issued by Workcover NSW.

4.5 Guidelines for launching High Power Rockets at Doonside

The primary requirement is that rockets land within the allocated area. In addition, the rocket must fall under CASA's description of a model rocket. These requirements are:

Maximum launch weight of 1,500g

Maximum propellant weight of 125g

Constructed of breakable materials – no metal as structural components.

A licensed pyrotechnician must be present at the launch.

Setting up on the launch pad

The rocket must be placed on a suitably rigid rod or rail. The rod or rail must be twice as long as the distance between the launch lugs on the rocket. This is to provide sufficient guidance until the aerodynamic stability of the rocket can take effect. The rocket/rail must always be pointed in such a way that the trajectory points away from the land's public areas (generally in a north-westerly direction).

Conditions for launching HPR

Under no circumstances can a high power rocket be launched in high-wind conditions. Maximum wind speed is 20kph. It is recommended that HPR launches take place when conditions are calm.

Range Safety Officer

It is at the discretion of the RSO whether a HPR launch takes place or not. The RSO must consider the safety of the public (not associated with the launch activities) above all else.

4.6 Guidelines for the use of electronic ejection charges

It must be understood that electronics can be affected by radio signals, vibration, movement, air pressure, etc. Without appropriate safeguards from radio signals (like CB radios), an ejection charge through an electronic device can be accidentally triggered at an inappropriate time.

Before a rocket is prepared for launch, the individual must notify the RSO that an electronic charge is to be used in a rocket. The individual must take all precautions when other people are in the vicinity of the rocket being prepared and must inform them of the activity taking place. All persons not associated with the preparation of the rocket must keep away. The use of a black powder charge greater than 1g must be questioned. Once prepared, the individual must inform the RSO that the rocket is to be placed on the launch pad.

The RSO must decide the most appropriate time for the rocket to be placed on the pad in order to minimise exposure to other individuals. Ideally, it should be the last rocket to be set up. It is the RSO's responsibility to notify all individuals that a rocket with an electronic charge is being armed on the pad.

The LCO must notify the spectators and members that no one other than the owner is to approach the rocket after it has landed.

In the case that the ejection charge was not triggered, the owner of the rocket must wear appropriate personal protective equipment before approaching the rocket. At a minimum, this will be safety glasses. In addition to this, gloves, face shield and a long-sleeve cotton shirt should be worn. No one else is to be in the vicinity of the rocket until it has been disarmed.

4.7 Members' responsibilities

It is the responsibility of all members and participating visitors to:

- abide by all safety requirements of the NSWRA procedures and the instructions of the NSWRA officers on launch days,
- have a valid membership or visitor registration to launch rockets,
- ensure that a log book entry is made for every launch,
- ensure that rockets are built to a high safety standard according to manufacturers' instructions and NSWRA procedures,
- ensure that all rockets, components, debris, litter, tools, etc. are collected before leaving the site,
- ensure that the property is left in the same condition.

In addition,

- Parents are responsible for the behaviour of their children.
- No animals or pets are allowed.
- If in doubt, ask the LCO or RSO for assistance.

4.8 Launch day procedure for members

Below is a sample procedure to follow when you want to launch a rocket.

- Get your rocket ready to fly. Make sure that you are using a properly certified engine, safe recovery system, and fire-retardant wadding.
- All new and/or unproven designs must be inspected by the RSO before launching. **The RSO has the final decision on whether or not a rocket will be allowed to fly.**
- Choose an open pad that is suitable for your rocket. If you are unsure which one would be appropriate, ask the RSO for assistance. Each person is allowed a maximum of one pad per session unless authorised by the LCO.
- Enter all details in the launch day logbook at the signup table.
- When all the rockets are ready for the launch session, the LCO will ask everyone to clear the launch area and stay behind the safety line. The RSO will conduct a final inspection of the launch pad area and give their approval to the LCO. Issues will need to be raised with the LCO who will determine whether to postpone the launch session or pass on individual rockets.
- It is everyone's responsibility to ensure all the launches occur safely. If there is any hazard, eg. overhead aircraft, people in harm's way, yell out 'HALT', 'STOP', etc.
- The LCO will go through the log book and launch the rockets. If you want to push the button to launch your rocket, you need to be at the launch control table when the LCO gets to your rocket.
- Do not retrieve your rocket until the LCO gives the OK. Once all the rockets are launched in that session, the LCO will isolate the controller and state 'the range is safe'. Do not retrieve other people's rockets without their authority. Some rockets may have charges that may not have triggered. Only the owner will know how to safely disarm the rocket.
- If your rocket fails to launch, wait until the LCO gives the OK. Then, you will need to remove your rocket from the launch pad, replace the igniter (or whatever is necessary) and sign up again for a new pad in a later session.

If you ever have any questions about proper launch procedures, ask the range officers on duty.

Have fun and be safe!

5.0 Duties of the Launch Control Officer

On a launch day, the following positions must be present for launches to take place:

Launch Control Officer (LCO)
Range Safety Officer (RSO)
Pyrotechnics Licensee (for High Power Rockets only)

Where participation numbers are small (less than 20 people), multiple roles can be performed by the same person, but only with the approval of the President.

Launch Control Officer (LCO)

The LCO has the following responsibilities:

- Opening the access gates to the launch site.
- Verifying that the launch site and facilities conform to the applicable safety codes.
- Ensure that the ignition system is set up correctly.
- Ensure that an area has been set up for recording launch information.
- Ensure that all rocket launches are logged in the launch day logbook and that all rockets are retrieved and accounted for. It is the responsibility of the rocket owner to enter all details accurately.

Example of log book column titles

Date	Name of Rocket owner or membership number	Name of rocket	Launch Pad No.	Engine/s used	Kit Y/N	Comments on flight
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- Ensure all owners of rockets launched on the day are registered - no exceptions. Expired memberships are not valid and must be renewed before any participation in rocket launches.
- Together with the RSO, ensure the range is safe for launches before any launches take place.
- Announce all flights. An audible countdown must be given before each flight (refer Section 2.0 and 3.0). After every flight a comment about the flight and recovery should be recorded. The LCO will call 'heads up' and warn spectators in the case of any flight failure. A 'heads up' shall be called on all first flight rockets, modified rockets, rockets with engine clusters, staged rockets, or on any rocket that the RSO deems necessary.
- On completion of a launch session, the LCO will isolate the ignition system by removing the interlock key and will call 'range is safe' to allow members to collect their rockets from the range. A misfire will require a minimum one-minute wait after the last ignition attempt before any person is allowed to approach the rocket.

6.0 Duties of the Range Safety Officer

On a launch day, the following positions must be present for launches to take place:

Launch Control Officer (LCO)
Range Safety Officer (RSO)

Pyrotechnics Licensee (for High Power Rockets only)

Where participation numbers are small (less than 20 people), multiple roles can be performed by the same person, but only with the approval of the President.

Range Safety Officer (RSO)

The Range Safety Officer has the following responsibilities:

- Ensure the environmental conditions are safe for launching. Things to consider are wind speed, wind direction, rain, light, ground conditions, fire hazards, etc.
- Ensure that the launch rods and thrust deflectors are set up correctly and away from any fire hazards.
- Ensure that fire safety equipment is accessible.
- Ensure that first aid equipment is accessible.
- Scrutinize all modified and scratch-built rockets before their first flight ensuring flight stability and correct trajectory. Any issues are to be communicated between the owner and the LCO.
- Ensure that the CASA approved ceiling of the flying area will not be compromised.
 - Provide constructive feedback to owners of rockets, which were deemed unsatisfactory for launch.
- Abort any launch if deemed to be unsafe.

RSO Pre-launch checks

The RSO must scrutineer all rockets before their first launch of the day and scrutineer all modified and scratch-built rockets before their first flight ensuring flight stability, correct trajectory, and structural integrity.

Rocket construction elements to be considered by a model inspector or RSO before allowing a launch are:

1. Airframe – structurally intact, sturdy, and undamaged.
2. Launch Lug/s – securely affixed & clear of (internal) obstructions. They need to be of an appropriate size for the weight and thrust of the rocket. When the rocket is mounted on the launch rod/rail, it must be able to move freely. Any rod bind may cause the rocket to either stick to the launcher or cause the rocket to become airborne at an unsafe velocity.
3. Nosecone – ensure that the fit is tight enough to not fall loose during the end of the thrust phase, or during inversion, but still loose enough to come loose under ejection. High-flying rockets may need a breather hole so that an equilibrium in air pressure is maintained between the inside of the rocket and the atmosphere.
4. Motor mount – ensure the motor is secured in the airframe to handle thrust and ejection forces without coming loose (unless part of the recovery design).
5. Fins/Aerodynamic control surfaces – These need to be securely mounted to the airframe, and in a manner which supplies the control forces in an appropriate manner and direction. Fins must be parallel to the intended direction of flight. Poorly aligned fins will cause an unintended trajectory or a spinning flight (unless part of the design).
6. Recovery System – The recovery system will be checked to ensure shock cords, attachment points, and materials are in good order, packed appropriately, and protected from ejection gases and particles. The shock cord must be strong enough to handle the ejection charge as well as a high-speed parachute deployment. The size of the parachute must be checked to ensure an appropriate recovery speed for

the rocket.

7. Motor - The motor needs to be checked for chipped or cracked nozzles, damaged ejection caps, structural distortions in the case, and general condition. The motor also needs to be checked to ensure it is of adequate impulse to safely propel the rocket.
8. Stability – Scratch-built rockets and any modified rockets need to be checked for stability. The C.G. of the loaded rocket must be at least one calibre forward of the rocket's C.P. The C.G. of the rocket can be measured simply by finding the balance point of the loaded rocket. The C.P. can be calculated through various software programs. A swing test can also be used.
9. Altitude prediction – Rockets must be checked to ensure they do not attain altitudes greater than that allowed for by the waiver.
10. Delay charge calculation – This must be checked so that ejection does not occur too early (can cause structural damage to the rocket) or too late (hits the ground without the parachute deploying).

7.0 Range Preparation / Setup Procedures

7.1 Launch pads / level surfaces

A launching device or mechanism must be used that shall provide rigid guidance until the rocket has reached a speed adequate for the aerodynamic controls to ensure a safe flight path. Launching devices may comprise:

- A rod composed of 3mm diameter steel approximately 800mm to 1 metre in length - for light models and models using less than 20 Newton-seconds of impulse.
- A rod composed of 5 or 6mm diameter steel approximately 1 metre in length - for heavier or higher powered rockets.
- A supported rail that provides superior rigidity for heavier and higher power rockets.

A launching angle of less than thirty degrees from the vertical must be used.

The launcher shall be set up on reasonably level ground, be stable, and must allow the rocket to travel smoothly along the full length of the launcher. The launcher will have a jet deflector device to prevent the motor exhaust from hitting the ground directly. A clear area (clear of dry grass & weeds, or other combustible materials), of a two metre radius around the launch device shall be maintained at all times during launching activities.

The top of the launch rods should be 1.8m above the ground in order to avoid eye injuries. Smaller launch rods shall have a large cap or ball placed on them when not in use.

7.2 Launch Ignition System

Launching or ignition of a model rocket must be conducted by remote electrical means from a distance as required by the safety code, and must be under the control of the person launching the model (ultimately under the control of the LCO). All persons in the vicinity of any launching must be advised that a launching is imminent before a model rocket may be ignited or launched. All persons need to check for any aircraft in the vicinity. A minimum five second audible countdown must be given before ignition

or launching of a model rocket. Contestants will always be allowed to use their own launchers, and to launch at the session of their choice, within limits placed by the RSO and LCO.

7.3 Spectator barriers / separation from launch area

Prior to launching, spectator barriers shall be erected to separate people from the launch area by 30 metres for LMR and HPR launches and 5 metres for MR launches.

Barrier tape shall be placed on the ground to highlight this distance. Appropriate highly visible tape shall be used e.g. fluorescent yellow or orange, red/white striped, or yellow/black striped. An access point shall be on the side where the LCO sets up the table for logbook entries.

The spectator and parking area should not be located upwind of the launch pad. Rockets fly into the wind and people and property should not be in this area.

7.4 Safety considerations when running cables to launch pads

All cables shall be completely unwound and laid flat on the ground in such a way as to avoid any trip hazards. Cables shall be placed at the launch rods in the corresponding number to that they are attached to the launch controller.

7.5 Logbook entry / Inspection point

The LCO shall set up a table where logbook entries can be written. This will typically be the location from where the LCO will co-ordinate proceedings. The RSO shall operate from this area for the purpose of scrutinising.

8.0 Emergency Procedures and Contact Numbers

In case of personal injury the first aider is the first point of call. If further assistance is required the emergency services should be called on '000' or '112' from mobile phones.

In case of fire, extinguishers shall be used. If the fire grows out of control the fire brigade must be called on '000' or '112' from mobile phones.

9.0 Abbreviations and Definitions

BP	Black Powder. A slow-burning form of gunpowder. Motors made of this propellant generally have casings made of wound paper and range in impulse from ¼A to E.
CASA	Civil Aviation Safety Authority.
CASR	Civil Aviation Safety Regulation.
CATO	Catastrophe At Take Off - An extremely rare occurrence where the manufactured motor will suffer a failure in operation or

structure at the time of ignition, or immediately after. The cause may include a cracked or chipped nozzle, premature ejection, or failure of the casing. The risks can be minimised by proper storage and installation.

Centre of Gravity	(Centre of Mass) The point in an object where its weight is balanced.
Centre of Pressure	The point along the axis of an object where the aerodynamic forces balance.
C.G. Composite Motor	Centre of Gravity (Centre of Mass) Motors that use a propellant mixed and cured to hardness based on ammonium perchlorate as the oxidiser. They generally have a phenolic, fibreglass, or metal casing (metal casings used in RMS motors).
C.P. HPR	Centre of Pressure High Power Rocket. Any rocket containing more than 160Ns (H motor) of thrust at lift-off.
High Power Rocket	A High Power Rocket refers to a rocket whose construction technique is similar to a model rocket but exceeds the limits for a model rocket. A high power rocket weighs more than 1500g and is propelled by one or more motors having a total impulse greater than 160Ns. The rockets are generally manufactured from higher strength materials including heavy gauge cardboard, phenolic, fibreglass, carbon fibre, and plastics.
Impulse	The total energy provided by a rocket motor (generally measured in Newton-seconds). Rocket motors are classed by their impulse level. An A motor has a total impulse of 2.5Ns. A B motor has a total impulse of 5Ns. A B motor has twice the impulse of an A motor and a C motor has twice the impulse of a B motor and so on.
Instrument (CASA)	A permit issued by CASA for the use of additional airspace. Commonly (incorrectly) referred to as a waiver in Australia.
Large Model Rocket	Any rocket containing more than 20Ns (E motor) and less than 160Ns (G motor) of thrust and weighing no more than 1,500grams at lift-off. It is made of balsa, wood, paper, or plastics or a combination of those materials, but contains no metal as structural parts.
LCO	Launch Control Officer - controls launch activities on launch day
LMR	Large Model Rocket.
LPR	Low Power Rocketry. Small Model Rocket
MPR	Medium Power Rocketry. Large Model Rocket.
Model Rocket (CASR)	Any rocket weighing not more than 1500g which is propelled by one or more rocket motors producing not more than 320Ns total impulse, carries no more than 125g of propellant, is made of balsa, wood, paper, or plastics or a combination of those materials, but contains no metal as structural parts. A model rocket contains a device for returning it to the ground in a condition to fly again.
MR	Model Rocket
NAR	National Association of Rocketry (USA)
N	Newton, the SI unit of force. The force required to accelerate 1kg by 1metre/second/second. Equivalent to 102 grams-force.
NOTAM	NOtice To AirMen. A notification produced by CASA to alert aircraft pilots of any hazards at a specific location.

Ns	Newton Seconds, the impulse of a rocket motor.
Reloadable Motor System	A rocket motor consisting of a metal casing and a reload kit allowing the motor to be re-used. This provides for users a more cost effective option in the longer term.
RMS	Reloadable Motor System.
Rocket Motor	The rocket motors referred to in this document are commercially available units which have been independently batch tested and verified for compliance with advertised parameters as marked on the rocket motor body.
Rod bind	Excessive friction between the lugs on the rocket and the launch rod/rail due to a complication or unusual interaction between the model and the launcher. In these instances, the motor will ignite, and propel the model up the rod a short distance, or at a very slow speed, and fail to become airborne at a safe velocity. This problem is typically caused by residue accumulating on the launch-rod, undersized launch lugs, inappropriately placed launch lugs, or strong cross winds.
RSO	Range Safety Officer - enforces safety and assists in procedures and technical matters on launch day
Propellant	The chemical component of a rocket motor which provides the thrust for the duration of the motor burn.
Small Model Rocket	Any model rocket weighing less than 500g and having 20Ns or less total impulse at lift-off. It is made of balsa, wood, paper, or plastics or a combination of those materials, but contains no metal as structural parts.
Static Centre of Pressure	A crude method of determining the Centre of Pressure of an object. A two-dimensional image of the central cross section of the object is made and the balance point of this image is the Static Centre of Pressure – the centre of the area.
Waiver	A term used in the USA for a permit for the use of additional airspace (see Instrument).