Australian Youth Rocketry Challenge

PO Box 84, Browns Plains QLD 4118

Australian Youth Rocketry Challenge 2017 Event Rules for Secondary School Students

31 March 2017

1. **SAFETY**. All rockets must be built and flown in accordance with the Model Rocket Safety Code of the Australian Model Rocket Society (AMRS), any applicable local fire regulations, and Civil Aviation Safety Authority (CASA). Rockets flown at all rounds and the final fly-off must have previously flown successfully. They will be inspected before launch and observed during flight by an event official, whose judgment on their compliance with the Safety Code and with these rules will be final. Teams are encouraged to consult with designated Australian Youth Rocketry Challenge (AYRC) officials who are running this event well before any round or the final fly-off to resolve any questions about design or flight safety, about the Safety Code, or about these rules.

2. **TEAMS**. The application for a team must come from a single school or a single Australian incorporated non-profit youth organisation (excluding the Australian Model Rocket Society, National Association of Rocketry, Tripoli Rocketry Association, or any other rocket club or organisation). Team members must be students who are currently enrolled in grades 1 through 12 in an Australian school or youth organisation. Teams may have members from other schools or other organisations and may obtain financing from any source, not limited to any sponsoring organisation. Teams must be supervised by an adult approved by the principal of the school, or by an officially-appointed adult leader of the youth organisation. Minimum team size is two students and maximum is six students. Each student member must make a significant contribution to the designing, building, and/or launching of the team's entry. No part of any of these may be done by any adult, by a company (except by the sale of standard off-the-shelf components available to the general public) or by any person not a student on that team. No student may be on more than one team. The supervising teacher/adult may supervise more than one team. The AYRC has a limited number of positions available.

3. **ROCKET REQUIREMENTS**. Rockets may be any size, but must not exceed 1500 grams gross weight at liftoff. They may not be commercially-made kits designed to carry egg payloads with the only modification being the addition of an altimeter compartment. They must have only one stage. They must be powered only by commercially-made model rocket motors that have 62.5 grams or less of propellant each and are listed on the AYRC Certified Engine List posted on the AYRC website and provided in the AYRC Handbook. Any number of motors may be used, but the motors used must not contain a combined total of more than 125 grams of propellant based on the propellant weights in the AYRC list. Rockets must not contain any pyrotechnic charges except those provided as part of the basic commercially-made rocket motor used for the flight, and these must be used in the manner prescribed in the instructions for that motor. The portion of the rocket containing the egg and altimeter must return to the ground using only one parachute as its sole deployed recovery system. The rest of the rocket may be attached to the portion of the rocket containing the egg, altimeter, and this parachute, or may return separately with a different recovery device of any size as long as it does so safely.

4. **PAYLOAD**. Rockets must contain and completely enclose one raw hen's egg of 57 to 63 grams weight (no more than 45 millimeters in diameter), and must return this from the flight without any cracks or other external damage. Eggs will be issued to the teams by event officials during finals, but teams must provide their own egg for testing before the fly off. Rockets must be allowed to land at the end of flight without human intervention (catching) and will be disqualified if there is such intervention. The egg and altimeter must be removed from the rocket at the end of the flight in the presence of a designated AYRC official observer and presented to that official, who will inspect the egg for damage and will read the altimeter score. Any external damage to the egg will mean disqualification of the flight.

5. **DURATION SCORING**. Scores shall be based on total flight duration of the portion of the rocket containing the egg and altimeter, measured from first motion at liftoff from the launch pad until the moment of landing or until the rocket can no longer be seen due to distance or to an obstacle. Times are to be measured independently by two people not on the team, one of whom will be an AYRC official, using separate electronic stopwatches that are accurate to 0.01 seconds. The official duration will be the average of the two times, rounded to the nearest 0.01 second. If one stopwatch malfunctions, the remaining single time will be used. The flight duration goal is a range of 48 to 50 seconds. Flights with duration in the range of 48 to 50 seconds get a perfect duration score of zero. Duration scores for flights with duration below 48 seconds will be

computed by taking the absolute difference between 48 seconds and the measured average flight duration to the nearest 1/100 second and multiplying this by 3. Duration scores for flights with durations above 50 seconds will be computed by taking the absolute difference between 50 seconds and the measured average flight duration to the nearest 1/100 second and multiplying this by 3. These duration scores are always a positive number or zero.

6. **ALTITUDE SCORING**. Rockets must contain one and only one electronic altimeter of the specific commercial type approved for use in the AYRC, being any of the following Jolly Logic units: AltimeterOne, AltimeterTwo or AltimeterThree; or Perfectflite units: Stratologger, MAWD, Alt15K/WD, APRA or PNUT. The altimeter must be inspected by an AYRC official both before and after the flight, and may not be modified in any manner. The altimeter must be confirmed by this official to have reset to zero before flight. The altitude of the portion of the rocket containing the egg, as recorded by this altimeter, will be the sole basis for judging the altitude score and this altimeter may be used for no other purpose. The altitude score will be the absolute difference between 850 feet and the altimeter-reported altitude in feet (always a positive number or zero).

7. **FLIGHTS**. All team members must be listed on the original entry form. Only team members on record at AYRC with valid parent consent forms are eligible to receive prizes. Only one flight is allowed per team at any round or the final fly-off, except as specifically noted in these rules. A rocket that departs the launch pad under rocket power is considered to have made a flight, even if all motors do not ignite. If a rocket experiences a rare "catastrophic" malfunction of a rocket motor (as determined by the AYRC official observer), a replacement flight may be made, with a replacement vehicle if necessary. Flights which are otherwise fully safe and qualified but which result in no altimeter reading or a reading of less than 50 feet will be counted as “no flight” due to false triggering of the altimeter and may be re-flown without penalty. This year’s challenge has three major flying events as follows:

- Victoria – Saturday 17/06/2017 (rain date – Sunday 18/06/2017)
- Western Australia – Saturday 24/06/2017 (rain date – Sunday 25/06/2017)
- Queensland (National Finals) - 22/07/2017 (rain date – Sunday 23/07/2017)

8. **SAFE RECOVERY**. Each part of the rocket must either contain a recovery device or be designed to glide, tumble unstably, or otherwise return to earth at a velocity that presents no hazard. Any entry which has a major part (including but not limited to an expended engine casing) land without a recovery system (lightweight gliding/tumbling tube sections are considered to have a system), or at a velocity that is judged by an event official to be hazardous, due to recovery system absence, insufficiency, or malfunction, will be disqualified.

9. **RETURNS.** Return of the portion of the flight vehicle containing the egg and the altimeter is required by the deadline time established at the beginning of the day's flying. Entries whose egg and altimeter are not returned after flight may not be counted as a qualified flight. If this portion cannot be returned after an otherwise safe and stable flight because it landed in a spot from which recovery would be hazardous (as determined by an AYRC official), a replacement vehicle may be substituted for a replacement flight. Return of the other portions of the rocket is required only if there is a question from the AYRC official concerning the safe operation of the vehicle (e.g. a question as to whether the vehicle ejected a part that landed in an unsafe manner). An entry which has any such portion that is not returned when its return is required shall be disqualified.

10. **LAUNCH SYSTEMS**. Teams may use the electrical launch system and the launch pads (with 1 metre long, 3mm and 6mm rods or 1.7 metre 1010 rails) provided by the event officials at all rounds and the final fly-off, or may provide their own system. Systems provided by teams for their own use must be inspected for safety by an AMRS official before use, and must provide at least 1.5 metres of rigid guidance, including use of a rod diameter of at least 6mm, if a rod is used. All launches will be controlled by the event Range Safety Officer and must occur from the ground.

11. **FLIGHT CONTROL.** Rockets may not use an externally-generated signal such as radio or computer control (except GPS navigation satellite signals) for any purpose after liftoff. They may use autonomous onboard control systems to control any aspect of flight as long as these do not involve the use of pyrotechnic charges. Any onboard flight-control electronics must use only commercially-made altitude and/or timing devices that are available to all AYRC participants.

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12. **PLACES.** Places in rounds and the final fly-off of the competition will be determined on the basis of the sum of the altitude and duration scores above. Judges will also assess the aesthetics of each rocket and how close the rocket is recovered to the launch pad. The top three final places will be ranked on the basis of overall scores. Ties will result in pooling and even splitting of the prizes for the affected place(s) -- for example, a two-way tie for 2nd place would result in a merger and even division of the prizes for 2nd and 3rd places. Australian Youth Rocketry Challenge reserves the right to make all last and final contest determinations. Judges decision is final and no correspondence will be entered into.

You can download copies of the Australian Youth Rocketry Challenge rules at www.rocketcontest.org.au