

## **Team America Rocketry Challenge 2009 Event Rules**

July 18, 2008

1. **SAFETY**. All rockets must be built and flown in accordance with the Model Rocket Safety Code of the National Association of Rocketry, any applicable local fire regulations, and Federal Aviation Regulations. Rockets flown at the 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 NAR officials who are running this event well before the fly-off to resolve any questions about design or flight safety, about the Safety Code, or about these rules.

2. **TEAMS**. No more than four teams may be entered by any sponsoring organization. The application for a team must come from a single school or a single U.S. incorporated non-profit youth organization (excluding the National Association of Rocketry, Tripoli Rocketry Association, or any other rocket club or organization). Team members must be students who are currently enrolled in grades 7 through 12 in a U.S. school or homeschool. Teams may have members from other schools or other organizations and may obtain financing from any source, not limited to their sponsoring organization. Teams must be supervised by an adult approved by the principal of the sponsoring school, or by an officially-appointed adult leader of their sponsoring youth organization. Minimum team size is three students and maximum is ten 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, but not kits or designs for the event), 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 Team America Rocketry Challenge is open to the first 750 teams that submit a completed application, including payment, postmarked no later than December 1, 2008.

3. **ROCKET REQUIREMENTS**. Rockets may be any size, but must not exceed 1500 grams (3.3 pounds) gross weight at liftoff. They may not be commercially-made kits designed to carry egg payloads. 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 TARC Certified Engine List posted on the National Association of Rocketry website and provided in the TARC Handbook. They must have only one stage. Any number of motors may be used, but the motors used must not contain a combined total of more than 125 grams (4.4 ounces) of propellant, based on the propellant weights in this List. Loose black powder, separate from the certified rocket motors and their as-designed ejection charges, may not be used in rockets as its use requires a federal license not available to minors.

4. **PAYLOAD**. Rockets must contain and completely enclose one raw large hen's egg of 57 to 63 grams weight and a length of 60 millimeters or less, and must return this from the flight without any cracks or other external damage. This egg must be placed in the rocket "on its back" with its long axis perpendicular to the rocket's intended direction of flight. The external diameter of the rocket at the point where the egg is placed must be no less than 59 millimeters. Eggs will be issued to the team by event officials during finals, but teams must provide their own egg for their qualifying flights. 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 must be removed from the rocket at the end of the flight in the presence of a designated NAR official observer and presented to that official, who will inspect it for damage. Any external damage to the egg is disqualifying.

5. **DURATION SCORING.** Scores shall be based on total flight duration of the portion of the rocket containing the egg, 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 must be measured independently by two people not on the team, one of whom is the official NAR-member adult observer, using separate electronic stopwatches 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. Duration scores will be computed by taking the absolute difference between 45 seconds and the measured average flight duration to the nearest 1/100 second (this difference is always a positive number, or zero), and multiplying this by 2.

6. **ALTITUDE SCORING.** Rockets must contain the commercial electronic altimeter (Perfectflite Model ALT 15K or ALT 15K Rev 2) approved for use in the Team America event, in a compartment that is properly vented to the atmosphere. The altimeter must be inspected by an NAR 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. This score will be the absolute difference between 750 feet and the altimeter-reported altitude in feet (this difference is always a positive number, or zero).

7. **FLIGHTS.** Team members cannot be changed after the first qualification flight. Only team members on record at AIA with valid parent consent forms are eligible to receive prizes. Only one flight is allowed per team at the final fly-off, except as specifically noted in these rules. In order to be eligible for the fly-off, a team is required to fly a qualifying flight observed in person by an adult (senior) member of the NAR (unrelated to any team members and not a paid employee of their school or member of their youth group) between September 3, 2008 and April 6, 2009. Each team may conduct a maximum of two qualification flights, and will be ranked based on the better of these two scores. A second qualification flight is not required if the team is satisfied with the results of their first flight. A qualification flight attempt must be declared to the NAR observer before the rocket's motor(s) are ignited. Once an attempt is declared, the results of that flight must be recorded and submitted to the AIA, even if the flight is unsuccessful. 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 NAR 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 an altimeter reading of greater than zero but less than 50 feet will be counted as "no flight" due to false triggering of the altimeter and may be reflown without penalty. The results from qualification flight attempts must be faxed to and received at the offices of the AIA by Monday, April 6, 2009. As soon as we receive your qualifying score, "Qualification Score Received" will appear under your team information on the "Registered Teams" page at [www.rocketcontest.org](http://www.rocketcontest.org). The top-scoring 100 teams will be notified no later than April 10, 2009, and invited to participate in the final fly-off to be held on May 16, 2009 (alternate fly-off date in case of inclement weather will be May 17, 2009).

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 NAR 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 NAR 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 for this safety inspection shall be disqualified.

10. **LAUNCH SYSTEMS.** Teams may use the electrical launch system and the launch pads (with six-foot long, 1/4-inch diameter rods) provided by the event officials at the fly-off, or may provide their own system. Systems provided by teams for their own use must be inspected for safety by an event official before use, and must provide at least 6 feet of rigid guidance, including use of a rod diameter of at least 1/4 inch, if a rod is used. All launches will be controlled by the event Range Safety Officer and must occur from the ground.

11. **FREE FLIGHT.** Rockets may not use an externally-generated signal such as radio or computer control (except GPS navigation satellite signals) for any purpose, including flight termination, after liftoff. They may use autonomous onboard control systems to control any aspect of flight.

12. **PLACES.** Places in the final fly-off of the competition will be determined on the basis of how close the portion of the rocket containing the egg comes to the designated target duration of 45 seconds and the designated target altitude of 750 feet, as determined by the sum of the altitude and duration scores above. At the fly-offs, 20 teams will be invited to make a second flight at the last flight round of the day based on the results of their first flights. Cash prizes, which are awarded to the top ten places, will be awarded only to those teams that make a second fully qualified flight. In this final round, rockets which have issues which would otherwise rate a replacement flight under TARC rules #7 or #9 will not receive a replacement flight. The top ten final places will be ranked on the basis of the scores from the two qualified flights made at the fly-offs. Places eleven up to one hundred will be awarded to the remaining teams based on the scores from their first flight. 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. Aerospace Industries Association reserves the right to make all last and final contest determinations.