

Tripoli Competition Events (amended 9/2014)

1.0 Introduction:

Tripoli encourages all members to participate in the Competition Event. This event is intended to bring recognition to the achievements of Tripoli members who have succeeded in attaining difficult goals.

The TRA Top Gun Hall of Fame web page will keep an ongoing record of these flyers and their records with both data and visual information for others to see. The intent of the Competition Event is to bring a level of fun to the rocketry community, while encouraging innovation with the new technologies that emerge each year.

This document describes the competition rules, procedures and categories of competition. All TRA Prefects are encouraged to fully understand these for implementation at their launches.

The following competition categories are approved for Tripoli high power launches. Tripoli launch organizers are encouraged to hold these competition events at their launches. Individuals may participate in these events when they are held at these Tripoli launches, or attempt to set the record for the event on their own when no competition event has been scheduled for the launch. The Tripoli Contest and Records Committee will maintain records in the Top Gun Hall of Fame for each event in the categories indicated.

1.1 Safety is of primary importance. TRA and Prefects request that launch competitors, competitor's assistants, RSO's and LCO's take all precautions to prevent any accident or injury to TRA members, launch spectators, and other competitors. The TRA safety code must be followed.

1.2 Tripoli awards records for flights made less than 30,000 feet MSL based on flyer-supplied barometric flight computers. All flights anticipated of achieving records 30,000 MSL and over are to use flyer-supplied, TRA-approved GPS units for altitude verification.

1.3 Violation of the rules and disputes-

1.3.1 Violation of these rules will lead to disqualification of the entry.

1.3.2 Violation of the applicable TRA safety codes will lead to disqualification of the entry.

1.3.3 Decisions of the TRA Competition Committee are final and cannot be brought before the TRA BOD or other TRA body.

1.3.4 The deliberations of the TRA Competition Committee are confidential.

2.0 Rules and procedures

2.0.1 Flights less than 30,000 feet MSL: TRA flyers may use any commercially manufactured, barometer-based altimeter for their flights. No modifications to these commercially manufactured units are allowed. Optionally, a TRA-approved GPS unit may be used.

2.0.2 Flights to 30,000 feet MSL and over: TRA flyers are required to use a TRA approved GPS unit (as listed on the TRA website) to generate altitude data. See section 3 below for more details.

2.1 Each contestant must submit a TRA Records Application form to the launch Prefect, either prior to launch or at launch, and announce to Prefect their intent to launch along with any requirements. The Prefect must insure contestant satisfies proper TRA safety rules including RSO approval of rocket and proper launch distance conformance. The flyer is encouraged to have the flight announced as a TRA record attempt.

2.2 After the flight, flyer must return their rocket to Prefect for inspection to validate conformance to TRA rules per section 2.8 below. The rocket must be recovered.

2.3 The record application form must be signed, on the same day as the flight, by the flyer and the launch Prefect witnessing the maximum altitude as read from the altimeter or GPS unit. If the rocket is not recovered on the same day, the Records committee may, at its discretion, approve the flight. Backdating of record applications is not permitted.

2.4 Along with application, flyer is required to submit pictures of rocket and of themselves. Pictures can be e-mailed to the TRA Committee should a record be set. Flyers are encouraged to take the pictures at launch site.

2.5 Should a new highest altitude be set in a category, or certified as within 10% of the highest in that category, the flyer will be notified. Their flight will be posted on the TRA Top Gun Hall of Fame web page along with flight information, pictures, and graphs of altimeter data.

2.6 For events which are based on total impulse, the motor class will be determined by the total impulse of all motor(s) as tested and not the manufacturer's designation or estimated total impulse.

2.7 Only certified motors may be used to set Tripoli Records and the total impulse of all motors must not exceed 40,960 newton-seconds. (Research motor competitions shall include motors up to and including Q designations)

2.8 For every event, rockets must successfully deploy their recovery device(s) and have a safe descent. The same standards used in certification flights shall apply to Tripoli Records.

2.9 No modification to certified motor hardware is allowed.

2.10 All rockets must be launched without any "boost assist" of sabot tubes, air pressure, external forces, propellant not part of the rocket, or any other method other than the energy generated directly from the rocket motors used. Launch rails, rods, guides and towers are allowed.

3.0 Rules and procedures for GPS Based Flights

3.1 Rockets expected to achieve altitudes of 30,000 MSL and over are required to contain a flyer-supplied GPS unit approved by TRA, (as listed on the TRA website) to generate altitude data. This data must be recorded and sent to the TRA Competition committee for review and validation.

3.2 Flyers are required to submit the GPS data file as recorded on the in-flight GPS unit for review and validation. Downlinked radio data (i.e. packet radio data) is not sufficient.

3.3 Flyers are required to submit any recorded barometer and accelerometer flight computer data along with the GPS data file for the flight.

3.4 Should the GPS fail to record some fixes, no interpolation will be allowed. Only physical data logged can be used.

All data will be posted on the TRA website should a new Hall of Fame flight be attained.

4.0 Requirements for setting a Tripoli Record (in addition to the above)

A. Tripoli Competition Record form must be completed and signed by the flyer and the launch Prefect witnessing the altitude data

B. A clear photograph of the rocket and the flyer in JPEG. Pictures should be e-mailed to the TRA records committee administrator for posting on the TRA site.

C. Include a \$5.00 filing fee payable to Tripoli

D. Send all of the above to the Contest and Records Committee within 30 days of the flight

E. Flights certified as new maximum altitude or certified to be within 10% of the existing highest altitude for that class will be posted on the TRA website with flight information, pictures, and graphs of altimeter data.

F. Only one record application can be completed per flight.

5.0 Altitude Competition- single motor configuration

Only rockets using single motors are permitted under this category. No staged or clustered flights permitted in this section.

The following altitude record classes will be maintained:

| | | | |
|---|----------|----|----------------------|
| F | 40.01 | to | 80 newton-seconds |
| G | 80.01 | to | 160 newton-seconds |
| H | 160.01 | to | 320 newton-seconds |
| I | 320.01 | to | 640 newton-seconds |
| J | 640.01 | to | 1280 newton-seconds |
| K | 1280.01 | to | 2560 newton-seconds |
| L | 2560.01 | to | 5120 newton-seconds |
| M | 5120.01 | to | 10240 newton-seconds |
| N | 10240.01 | to | 20480 newton-seconds |
| O | 20480.01 | to | 40960 newton-seconds |

The purpose of this altitude competition is to obtain the greatest altitude possible for a given total impulse for single motor configuration. The event is open to all rockets using certified motors. The motor class will be determined based on the total impulse of all motor(s) as tested.

Record Information: Records are established in the F through O motor classes. All flights to within 10% of the highest altitude for that class will be posted.

5.1 Altitude Competition- staged motor configurations

. Only rockets using staged configuration motors are permitted under this category. No clustered, strap on boosters or boosted darts allowed in this section.

The following altitude record classes will be maintained:

| | | | |
|---|----------|----|----------------------|
| F | 40.01 | to | 80 newton-seconds |
| G | 80.01 | to | 160 newton-seconds |
| H | 160.01 | to | 320 newton-seconds |
| I | 320.01 | to | 640 newton-seconds |
| J | 640.01 | to | 1280 newton-seconds |
| K | 1280.01 | to | 2560 newton-seconds |
| L | 2560.01 | to | 5120 newton-seconds |
| M | 5120.01 | to | 10240 newton-seconds |
| N | 10240.01 | to | 20480 newton-seconds |
| O | 20480.01 | to | 40960 newton-seconds |

The purpose of this altitude competition is to obtain the greatest altitude possible for a given total impulse for staged motor configurations. The event is open to all rockets using certified motors. The motor class will be determined based on the total impulse of all motor(s) as tested.

Record Information: Records are established in the F through O motor classes. All flights to within 10% of the highest altitude for that class will be posted.

6.0 Hybrid Altitude Competition

Due to the recent introduction and popularity of hybrid motors, a separate record category has been created to include records for the following motor sizes-

| | | | |
|---|----------|----|----------------------|
| H | 160.01 | to | 320 newton-seconds |
| I | 320.01 | to | 640 newton-seconds |
| J | 640.01 | to | 1280 newton-seconds |
| K | 1280.01 | to | 2560 newton-seconds |
| L | 2560.01 | to | 5120 newton-seconds |
| M | 5120.01 | to | 10240 newton-seconds |
| N | 10240.01 | to | 20480 newton-seconds |

The purpose of the hybrid competition is to obtain the greatest altitude possible for a given total impulse. The event is open to all rockets using Tripoli certified motors. The motor class will be determined based on the total impulse of all motor(s) as tested. This current hybrid category allows single motor configurations, clusters and staging. All flights to within 10% of the highest altitude for that class will be posted.

7.0 Handicapped Rocket Category

The purpose of the handicapped rocket altitude competition is to achieve the greatest possible altitudes when there are restrictions on both the total impulse used and the minimum rocket diameter and length. This event should also appeal to those who fly on limited sized fields and allow a large number of rockets flown at typical launches which are not minimum diameter to be competitive. By restricting both the total impulse and diameter of a rocket, the emphasis must be shifted towards modifying weight, drag, and design to increase altitude.

The intent is to allow as many rockets as possible to participate in the event. The minimum length ensures that rockets with transitions, boat tails and multiple diameters may participate provided they have the required minimum diameter for the specified length.

7.1 The classes have been chosen to reflect industry standard tubing sizes. They are slightly below the standard diameters and have been rounded down to the nearest quarter of an inch. Note: the diameter listed is the minimum diameter, not the maximum diameter.

G Class -- Minimum diameter of 2.50 inches for at least 2 feet
Maximum total impulse of 160.00 newton-seconds

H & I Class -- Minimum diameter of 3.75 inches for at least 3 feet
Maximum total impulse of 320.00 newton-seconds

J & K Class -- Minimum diameter of 5.00 inches for at least 5 feet
Maximum total impulse of 1280.00 newton-seconds

L & M Class- Minimum Diameter of 7.5 inches for at least 8 feet. Maximum total impulse of 10,260 newton-seconds.

N & O Class- Minimum diameter of 11.5 inches for at least 12 feet. Maximum total impulse of 40,960 newton seconds.

If a multistage rocket is used, then the uppermost stage must conform to the above diameter and length restrictions. This does not exclude the use of multistage rockets, but does not provide them with an advantage over single stage rockets.

Record Information: Each motor class has the diameter restrictions as listed above. While unlikely to occur, rockets that set a large rocket altitude record are eligible to set an open altitude record. All flights to within 10% of the highest altitude for that class will be posted.

8.0 Research Motor Altitude Competition- Individual

The purpose of the research motor altitude competition is to challenge contestants to achieve the highest possible altitude for each motor class. These Tripoli altitude records will recognize these individuals whose rockets have attained the highest altitudes.

The following rules apply to research motor competitions-

- 1- Only individuals are permitted to enter into this research competition. No groups allowed. The contestant must make the motor and the rocket to qualify.
- 2- The term "research motor" in this activity shall mean any motor made by that specific individual consisting of AP and AN based motors.
- 3- All individuals engaged in commercial motor manufacturing, shall not be permitted to compete individually even if they make the motor separate from their business activity.

- 4- All rockets having motors in class 75 mm and above must have dual electronics onboard for recovery. Tripoli Research Safety Codes, dated April 1, 2002 must be followed for each flight.
- 5- Only single motor configuration flights allowed in this category.
- 6- All attempted altitude flights must have the Tripoli contest application submitted to Prefect on site, at time of RSO review to qualify. Prefect must sign-off the application form prior to flight and maintain the form until retrieved rocket is returned for altitude verification. Prefect must witness altitude verification as one of the witnesses.
- 7- All flights to within 10% of the highest altitude for a given class will be posted.

The following altitude record classes will be maintained:

| Motors with casing diameter (Max O.D.) | Max. casing length | Approx. class |
|---|--------------------|---------------|
| 24 mm | any | E |
| 29 mm | any | F, G, H |
| 38 mm | Under 12" | I |
| 38 mm | Over 12" | J |
| 54 mm | Under 12" | J |
| 54 mm | 12" – 24" | K |
| 54 mm | Over 24" | L |
| 75 mm | Under 26" | L |
| 75 mm | Over 26" | M |
| 98 mm | Under 29" | M |
| 98 mm | 29" – 48" | N |
| 98 mm | Over 48" | O |
| 5" | any | O-P |
| 6" | Under " | P |
| 6" | Over " | Q |

8.1 Research Motor Altitude Competition - GROUP PROJECTS

The purpose of the research motor altitude competition is to challenge contestants to achieve the highest possible altitude. These Tripoli altitude records will recognize these individuals whose rockets have attained the highest altitudes.

The following rules apply to research motor competitions-

- 1 Only groups are permitted to enter into this research competition. The group must contain a member who made the motor to qualify. That person must be present at all times
- 2 The term "research motor" in this activity shall mean any motor made by that specific individual consisting of AP and AN based motors.
- 3 All individuals engaged in commercial motor manufacturing, shall not be permitted to compete individually in this category even if they make the motor separate from their business activity.
- 4 All rockets having motors in class 75 mm and above must have dual electronics onboard. Tripoli Research Safety Codes, dated April 1, 2002 must be followed for each flight.
- 5 Only single motor configuration flights allowed in this category.
- 6 All attempted altitude flights must have the Tripoli contest application submitted to Prefect on site, at time of RSO review to qualify. Prefect must sign-off the application form prior to flight and maintain the form until retrieved rocket is returned for altitude verification. Prefect must witness altitude verification as one of the witnesses.
- 7 All flights to within 10% of the highest altitude for a given class will be posted.