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## **ABOUT THE SPORTING CODE**

Model Rocketry is an activity that emphasizes safety, education, and sportsmanship. Competition modeling develops patience and skill, and encourages creativity and innovation. The National Association of Rocketry provides support for competition modeling as an excellent means of encouraging these aspects of model rocketry, and thereby ensures the continued advancement of the hobby.

The United States Model Rocket Sporting Code provides a standard set of rules by which NAR members may compete with one another on the basis of skill, ability, and expertise. The NAR Contest and Records Committee (the Contest Board) through its National Chairman and Regional representatives, administers this Sporting Code.

This edition of the Sporting Code replaces all previous versions and is effective as of July 1, 2017.

The Contest Board may add or revise rules by publishing the changes on nar.org, along with the date on which they are to be effective. Changes to the rules may be enacted by the Board of Trustees, the Contest Board, or through the Rule Change Process administered by the Rules Revisions Subcommittee.

Members who would like to contribute to the work performed by either the Rules Revisions Subcommittee or the National Contest Board can contact the National Contest Board Chairman.

Since the rules of the Sporting Code cannot cover all possible eventualities of competition, disputes over the rules are inevitable. Whenever the rules prove insufficient, competitors can often reach a satisfactory resolution of a problem by exercising common sense, fair play, and sportsmanship. When necessary, interpretation of the rules and disagreements shall be resolved by the Contest Board.

All NAR members are invited to join in sanctioned competition activity. Members who do not belong to a NAR section can obtain the name of a club in their area (or information on starting a new section) by writing to the NAR Section Activities Committee, in care of NAR Headquarters.

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## MODEL ROCKETRY SAFETY CODE

1. **Materials.** I will use only lightweight, non-metal parts for the nose, body, and fins of my rocket.
2. **Motors.** I will use only certified, commercially made model rocket motors, and will not tamper with these motors or use them for any purposes except those recommended by the manufacturer.
3. **Ignition System.** I will launch my rockets with an electrical launch system and electrical motor igniters. My launch system will have a safety interlock in series with the launch switch, and will use a launch switch that returns to the “off” position when released.
4. **Misfires.** If my rocket does not launch when I press the button of my electrical launch system, I will remove the launcher's safety interlock or disconnect its battery, and will wait 60 seconds after the last launch attempt before allowing anyone to approach the rocket.
5. **Launch Safety.** I will use a countdown before launch, and will ensure that everyone is paying attention and is a safe distance of at least 15 feet away when I launch rockets with D motors or smaller, and 30 feet when I launch larger rockets. If I am uncertain about the safety or stability of an untested rocket, I will check the stability before flight and will fly it only after warning spectators and clearing them away to a safe distance. When conducting a simultaneous launch of more than ten rockets, I will observe a safe distance of 1.5 times the maximum expected altitude of any launched rocket.
6. **Launcher.** I will launch my rocket from a launch rod, tower, or rail that is pointed to within 30 degrees of the vertical to ensure that the rocket flies nearly straight up, and I will use a blast deflector to prevent the motor's exhaust from hitting the ground. To prevent accidental eye injury, I will place launchers so that the end of the launch rod is above eye level or will cap the end of the rod when it is not in use.
7. **Size.** My model rocket will not weigh more than 1,500 grams (53 ounces) at liftoff and will not contain more than 125 grams (4.4 ounces) of propellant or 320 N-sec (71.9 pound-seconds) of total impulse.
8. **Flight Safety.** I will not launch my rocket at targets, into clouds, or near airplanes, and will not put any flammable or explosive payload in my rocket.
9. **Launch Site.** I will launch my rocket outdoors, in an open area at least as large as shown in the accompanying table, and in safe weather conditions with wind speeds no greater than 20 miles per hour. I will ensure that there is no dry grass close to the launch pad, and that the launch site does not present risk of grass fires.
10. **Recovery System.** I will use a recovery system such as a streamer or parachute in my rocket so that it returns safely and undamaged and can be flown again, and I will use only flame-resistant or fireproof recovery system wadding in my rocket.
11. **Recovery Safety.** I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places.

### LAUNCH SITE DIMENSIONS

Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Site Dimensions (ft)
0.00 – 1.25	1/4A, 1/2A	50
1.26 – 2.50	A	100
2.51 – 5.00	B	200
5.01 – 10.00	C	400
10.01 – 20.00	D	500
20.01 – 40.00	E	1,000
40.01 – 80.00	F	1,000
80.01 – 160.00	G	1,000
160.01 – 320.00	Two Gs	1,500

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## 1 DEFINITIONS

### 1.1 Model Rocket

Model rocket means an aero-model that ascends into the air without the use of aerodynamic lifting forces against gravity; that is propelled by means of a model rocket motor; that includes a device for returning it safely to the ground in a condition to fly again; and that contains no parts, particularly metal parts, that are likely to create a hazard. Model rocket motors and recovery system protectors or wadding, if present, do not constitute portions of a model rocket.

### 1.2 Model Rocket Motor

Model rocket motor means a reaction motor produced by a commercial manufacturer using pre-loaded combustible solid propellant as fuel or a rocket motor designed to be reloaded with commercially manufactured combustible solid propellant charges.

### 1.3 Glossary of Definitions

A Glossary containing the official definitions is provided in [Appendix A](#).

### 1.4 Headings

Section and subsection headings are for the convenience of the reader. Their inclusion or omission is not considered a part of these rules.

### 1.5 Rounding

When scoring must be rounded the following schedule shall be followed:

- $\geq 0.5$  is rounded up
- $< 0.5$  is rounded down

## 2 GENERAL

### 2.1 Scope

This United States Model Rocket Sporting Code shall govern the design, construction, and operation of all model rockets and model rocket motors used in conjunction with:

- All competition sanctioned by the National Association of Rocketry (NAR); and
- All attempts to establish or surpass United States Model Rocket Performance Records.

### 2.2 Safety Code

The Model Rocketry Safety Code of the NAR shall be the general safety criteria to be followed in the interpretation and administration of this United States Model Rocket Sporting Code. The Safety Code must not be overridden by Sporting Code rules. Any changes to the Safety Code apply immediately to the Sporting Code.

### 2.3 FAI Rules

This United States Model Rocket Sporting Code shall not be construed to amend or otherwise serve as a substitute for the Sporting Code of the Federation Aeronautique Internationale (FAI) for the purposes of establishing or surpassing world model rocket performance records. Contestants who wish to attempt such records should obtain a copy of the current FAI Sporting Code.

## 3 MODEL ROCKET SPECIFICATIONS

### 3.1 Compliance

A model rocket must comply with all specifications in this section and the Model Rocketry Safety Code before, during, and after flight.

### 3.2 Gross Launching Mass

The gross launching mass of a model rocket, including model rocket motor or motors, must in no event exceed 1,500 grams. See also [Rule 9.11](#).

### 3.3 Propellant

No more than a total of 125 grams of solid propellant materials may be contained in its model rocket motor(s) at the moment of launch.

### 3.4 Stages

There must be no more than three consecutively fired stages. The staged configuration of the model is considered to be that of the model at the instant of first motion on the launcher.

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## 3.5 Reusability

A model rocket must be so constructed as to be capable of more than a single flight; and must be provided with a means for retarding its descent to the ground so that its structure may not be substantially damaged, and so that no hazard is created to persons and property. If a model descends in more than one unattached part, each part must conform to the above specification.

## 3.6 Materials

Construction of the airframe must be of wood, paper, rubber, plastic, or other similar materials consistent with the Safety Code.

## 3.7 Stability

Design and construction must include suitable means for providing stabilizing and restoring forces necessary to maintain a substantially true and predictable flight path. If required by safety officers or judges, the builder of the model must present data demonstrating that their model meets this requirement.

## 3.8 On-Board Ignition Systems

A model rocket possessing a self-contained powered ignition system (e.g., for remote ignition of upper stages) must be provided with a safety switch or other device capable of preventing actuation of the system and resultant ignition until immediately prior to the launch.

## 3.9 Dethermalizer

A model rocket equipped with a dethermalizer or other auxiliary device designed to operate via ignition or combustion must be designed so that ignition of the device presents no imminent hazard to the person igniting the device. In addition, the rocket must be designed so that the device is extinguished as soon as possible after performing its function (e.g., by the inclusion of a snuffer tube).

# 4 MODEL ROCKET MOTOR STANDARDS

## 4.1 Definition

Model Rocket motors must meet the requirements of the NAR Standards and Testing Committee and NFPA 1122.

## 4.2 Limits

A single solid propellant model rocket motor must not contain more than 125 grams of propellant, and must not produce any more than 160.00 Newton-seconds of total impulse.

## 4.3 Contest Approval

All motors used in a model rocket in NAR sanctioned competition, or for the purpose of establishing a United States Model Rocket Performance Record, must be listed in the NAR Certified/Combined Motor List found on NAR.org as holding NAR Contest Approval.

## 4.4 Alterations

A model rocket motor must not be altered in any manner that changes its dimensions and/or its performance characteristics. No material may be permanently affixed to the motor.

## 4.5 Classification

A model rocket motor is assigned a motor classification based on its mean sea level total impulse when tested at a temperature of 20 degrees Celsius. A motor becomes NAR certified when its test data is accepted by the NAR Standards and Testing Committee. NAR certified model rocket motor classifications are as follows:

Motor Class	Total Impulse (N-sec)
1/8A	0.00 – 0.3125
1/4A	0.3126 – 0.625
1/2A	0.626 – 1.25
A	1.26 – 2.50
B	2.51 – 5.00
C	5.01 – 10.00
D	10.01 – 20.00
E	20.01 – 40.00
F	40.01 – 80.00
G	80.01 – 160.00

**Note:** All motor classes listed above will be recognized for certification purposes regardless of current commercial availability.

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## 4.6 Published Values

The total impulse values published in the NAR Certified/Combined Motor List found on NAR.org will be the values used in all NAR sanctioned competition and for United States Model Rocket Performance Record attempts.

## 4.7 Total Impulse

When multiple motors are used in a single entry (e.g., clustering and staging), the total impulses of the individual motors must be summed to compute the total impulse of the configuration and to determine the impulse class of an event for which the entry qualifies. Only those motors actually intended to ignite and produce useful thrust are to be included in this total.

## 4.8 Acceptance

Only model rocket motors that are currently and readily available commercially, and meet the requirements of [Rule 4.1](#) through [Rule 4.7](#) shall be accepted for NAR contest approval.

## 4.9 Contest Use

NAR sanctioned competition allows the use of all contest approved motors for which the total impulse of the motor is appropriate for the event and in compliance with state and local laws. Booster stage, single stage, and upper stage motors may be used in locations other than their primary intended stage.

# 5 LAUNCHING REQUIREMENTS

## 5.1 Range Safety Officer

During all operations concerned with the launching and flight of model rockets, all authority for the safety of operations on the flying field shall be vested in a Range Safety Officer (RSO) who must be a Senior member of the NAR in good standing. If the RSO leaves the flying field, he must relinquish his/her duties and responsibilities to a new RSO who must be a Senior member of the NAR.

## 5.2 Flying Field

The flying field must have a ground area whose shortest dimension is no less than one-fourth (1/4) the anticipated maximum altitude of the rockets to be flown. The flying field should not contain or be adjacent to high voltage lines, major highways, multi-story buildings, or other obstacles. The launching location must be no closer than 10 meters to the boundaries of the flying field.

## 5.3 Safety Check

All model rockets presented for operation on the flying field may be permitted or denied flight by the RSO/SCO on the basis of his/her considered judgment with respect to safety.

## 5.4 Launching Device

A launching device or mechanism must be used that restricts the entry in its pitch axis until sufficient flight velocity is attained for safe, predictable flight. At a minimum, it is recommended the launch device be a steel launch rod of approximately 36 inches of 1/8 inch diameter rod for entries using less than 20 Newton-seconds of impulse. For entries using greater than 20 Newton-seconds of impulse, a steel launch rod of approximately 36 inches of 3/16 inch or 1/4 inch diameter is recommended. A launching angle of zero to a maximum of thirty degrees from the vertical may be used.

## 5.5 Launcher Height

No entry may be launched with its aft most part more than 3 meters above the ground.

## 5.6 Momentum

A launcher must not impart to the entry any velocity or change of momentum except that caused by the model rocket motor(s) contained in the entry.

## 5.7 Ignition

Launching or ignition of an entry must be conducted by remote electrical means from a distance as required by the safety code, and must be fully under the control of the person launching the entry. All persons in the vicinity of any launching must be advised that a launching is imminent before an entry may be ignited or launched. A minimum five-second audible countdown must be given before ignition or launching of an entry. Contestants will always be allowed to use their own launchers, and to launch at the time of their choice, within limits placed by the RSO.

# 6 SANCTIONED COMPETITION

## 6.1 NAR Contest Board

The NAR Contest Board will sanction competition, which will be conducted in accordance with the rules set forth in this United States Model Rocket Sporting Code. See [Rule 6.6](#)



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## 6.2 Contest Year

### 6.2.1 The Contest Year

Begins the day after NARAM concludes and ends on the last day of NARAM of the following year.

### 6.2.2 SQS Year and Qualification Flying

Begins the day after NARAM concludes and ends on June 30 of the following year.

## 6.3 Sanctioned Competition

### 6.3.1 Spacemodeling Qualifier Series

**6.3.1.1** The Spacemodeling Qualifier Series (SQS) shall be a competition in which individuals and teams qualify to compete at the National Association of Rocketry Annual Meet (NARAM) for Event Specialist Award (ESA) and National and Reserve Champion awards.

**6.3.1.2** The SQS shall be six (6) events. All SQS events are flown at NARAM.

**6.3.1.3** A "SQS Launch" shall be a NAR member or section hosted competition, which is sanctioned by the Contest Board for the express purpose of qualifying individuals to compete at NARAM for a National Championship and/or Event Specialist Award.

**6.3.1.4** A Launch Director (LD) shall be the individual responsible for submitting SQS launch results.

### 6.3.2 National Meet

Only one National Meet (NARAM) shall be held each year. The National Meet will be held at such time and place and with such entry requirements as determined by the NAR Contest Board.

### 6.3.3 Record Trial

A Record Trial is conducted for the purpose of providing members an opportunity to establish or surpass official United States model rocket performance records. Events to be flown must be indicated on the application for sanction. Any number or combination of events may be flown. In a Record Trial, an NAR member duly entered in the meet may have as many opportunities as time and weather permit to make a record attempt.

## 6.4 Time

Other than the National Meet, all SQS launches and Record Trials must be scheduled on and completed within no more than three consecutive days, except as stated in [Rule 6.5](#)

## 6.5 Suspending Competition

An SQS Launch Director or NARAM Contest Director may suspend competition for reasons of safety (i.e., threatening weather/lightning.)

## 6.6 Sanction

Application for sanction of an SQS launch or record trial must be made to the NAR Regional Contest Board at least thirty days in advance of the date of the launch. Application for a launch sanction shall be made electronically on [NAR.org](#). The Senior Member of the NAR who will serve as the Launch Director must submit the application. All NAR sanctioned launches should be posted to the NAR Launch Calendar on [NAR.org](#) at least 21 days prior to the launch.

## 6.7 Results

The NAR Senior Member who serves as the Launch-Contest Director for a sanctioned launch must report the results to the NAR Contest Board within seven days following the completion of the launch. If an unusual question arises, the Launch-Contest Director may request a ruling on the matter from the NAR Contest Board. In this case, the Launch-Contest Director should make every effort to include complete and impartial details on the situation.

## 6.8 Rejection

The NAR Contest Board may refuse to accept the results if evidence is presented that the sanctioned launch was not conducted within the scope or intent of this United States Model Rocket Sporting Code.

## 6.9 Deadline

In all cases, SQS Launch results must be posted on [NAR.org](#) at least fourteen days prior to the opening day of the National Meet.

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## 6.10 Advisory Rulings

In cases where a contestant is uncertain of the application of a rule contained in the United States Model Rocket Sporting Code, he/she may ask for a ruling by the Regional Contest Board Chairman. The Regional Contest Board Chairman may rule or pass the request to the National Contest Board Chairman. This process should proceed in a timely manner so as to allow contestants time to react to the ruling.

## 7 CONTEST OFFICIALS

### 7.1 Launch-Contest Director

A Launch-Contest Director who is a Senior member of the NAR in good standing must: apply for contest sanction; receive and may be responsible for all contest material; ensure that the competition is properly arranged and functions within the intent and specifications of this United States Model Rocket Sporting Code; and report the results of the competition. The duties of the Launch-Contest Director and the Range Safety Officer may be combined. The Launch-Contest Director appoints the range crew.

### 7.2 Range Safety Officer

A Range Safety Officer (RSO) must preside over the conduct of the competition in accordance with **Rules 3 and 5**. In no case may the Launch-Contest Director or any other official override a safety ruling of the RSO.

### 7.3 Safety Check Officer

The Launch-Contest Director may appoint a Safety Check Officer(s). The Safety Check Officer must be qualified to rule in accordance with **Rule 5.3**. The duties of the Safety Check Officer and the RSO may be combined.

### 7.4 NARAM Judges

The Launch-Contest Director must appoint teams of judges for events requiring static judging (e.g., Scale, Plastic Model Conversion). At least half of the judges on each judging team must be members of the NAR, allowing for guest judges. At least one member of each team of judges must be a Senior or Leader member of the NAR.

### 7.5 Trackers and Timers

The Launch-Contest Director may appoint any capable person as a tracker or timer. Any glasses or aids necessary for that person to have normal vision must be worn. Any person not having correctable vision (e.g., cannot obtain a driver's license due to vision) is not eligible to time or track.

### 7.6 Conduct

A contest official considered by any member of the Contest Board, Board of Trustees, or other contest official to be impaired by alcohol or drugs, or demonstrating poor sportsmanship will be removed from his/her position and may be expelled from the meet.

### 7.7 Conflict

No competitor may serve as a contest official where he/she would rule on his/her own contest entry.

## 8 CONTESTANTS

### 8.1 Entering Competition

All contestants entering model rockets and competing in NAR sanctioned competition must be members of the NAR in good standing. They are required to sign an official entry blank. The countersignature of a parent or guardian is required on the entry blank for minors, except for persons serving in the Armed Forces of the United States or students enrolled at the time in a college, university, or other institution of higher learning. The Launch-Contest Director or his/her designee may ask contestants for verification of their NAR Sporting License. Newly joined NAR members who have not yet received their NAR Sporting License and wish to compete in sanctioned competition shall be recorded as pending.

A contestant may fly the same SQS event as often as he/she likes during the contest year per **Rule 10.1** (number of flights) of the U.S Model Rocket Sporting Code.

### 8.2 Conduct

The Launch-Contest Director may disqualify any contestant from an event or from the entire meet on the grounds of failure to practice or observe reasonable safety measures, published or otherwise; for poor sportsmanship; for failure to abide by the orders of the Range Safety Officer or contest officials; whose ability to safely fly model rockets is, in the opinion of the Launch-Contest Director or Range Safety Officer, impaired by alcohol or drugs.

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## 8.3 Competition Divisions

The Competition Divisions are as given in the following schedule:

A Division	Individuals and Teams, age 7 – 15
B Division	Individuals and Teams, age 16 – 22
C Division	Individuals 23 years old and older
D Division	Teams ages 23 years old and older

**8.3.1** Two or more NAR members may enter competition as a team. Teams must compete in the division of the oldest member. Teams must be registered with the NAR Contest Board. Membership of a team cannot be changed during the Contest Year. Such a change must be registered as a different team. One or more members of the team must prepare entries for flight, except if they are to be proxy-flown under the provisions of **Rule 8.4**. Entry blanks must contain the name and the number of the team. Any records established are credited to the team. No NAR member may enter a sanctioned launch as both an individual and as a team member, and no NAR member may enter a sanctioned launch as a member of more than one team. Neither of these restrictions applies at a Record Trial.

**8.3.2** The division in which an NAR member will compete during a Contest Year is determined by the member's age/status as of the start of the Contest Year.

## 8.4 Proxy

A contestant entered in sanctioned competition may have his/her entry proxy-flown by another NAR member except in the following:

- Radio Controlled Models
- Spot Landing
- Event Specialist Awards
- National Championship Awards
- United States Performance Records

Contestants having official duties at the contest may have their entry proxy-flown for them. An entry must not be proxy-flown by a member whose Competition Division is older than that of the contestant.

# 9 ENTRIES

## 9.1 Total Impulse Limit

No entry in sanctioned competition may be powered by a motor or combination of motors exceeding 125 grams of total propellant. The maximum total impulse, in accordance with the Model Rocket Safety Code, must not exceed 320.00 Newton-seconds.

## 9.2 Ejected Motors

If allowed by the rules of a specific event, an entry in sanctioned competition that during flight ejects a motor or motors which does not have an attached streamer or parachute is disqualified.

## 9.3 Flight Characteristics

During the powered phase of flight, spinning of the entry is permitted only around the roll axis. Entries that spin or loop around the pitch axis or yaw axis under power must be disqualified.

## 9.4 NAR Number

Each entry must carry, legibly displayed upon its exterior surface as the entry appears in flight readiness, the contestant's name or NAR license number. In the case of a team entry, the entry must carry the team name or number.

## 9.5 Safety Check

Each entry must pass a safety inspection given by the Safety Check Officer before each flight to ascertain that it meets the standards of this Sporting Code, and that it will be reasonably safe in its operation, in accordance with **Rule 5.3**. This inspection may include any launching device and auxiliary equipment provided by the contestant to assist the launch.

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### **9.5.1 Motors**

During safety check, the check-in official must record the make and complete designation of the motor on the contestant's flight card. (e.g. AeroTech G40-10W)

### **9.6 NARAM Minimum Entries**

At least two official entries in an event must be passed by the Safety Check Officer and must attempt to make official flights before points can be awarded in the event. This also applies where an event is flown in competition divisions; i.e., two entries for each division. If an event must be flown where competition divisions have been combined because of insufficient entries, competitors entered in adjacent divisions may have their flight records combined.

### **9.7 Substitution of Entries**

Substitution of entries between official flights of an event is allowed, unless disallowed by the rules for a specific event. When the rules for a specific event disallow substitution between official flights, only recovery devices and minor lost or damaged parts necessary to make the entry flight worthy may be changed for subsequent flights. In these circumstances, a replacement for a minor lost or damaged part must be identical to the part that it replaces.

### **9.8 Simultaneous Events**

Two or more competition events may not be flown simultaneously by the same entry on the same flight.

### **9.9 Construction**

The contestant must ensure that he/she has completely constructed the model rocket(s) he/she is using in competition. Entries not requiring construction must be permitted in competition. Materials and design may be obtained from any source, including kits.

### **9.10 Impound**

Contest officials have the authority to require that any entry having made an official flight be returned and impounded for a reasonable length of time for inspection if there is question regarding the adherence of the entry to the Sporting Code. This must be stated during or immediately after the flight in question. When the entry or part cannot be returned to the officials within a reasonable time, the officials may disqualify that flight.

### **9.11 Gross Launching Mass**

No entry in model rocket competition may exceed a maximum gross launch mass (GLM) of 1,500 grams.

### **9.12 Radio Control**

Frequency control regulations must be obeyed if implemented on the flying site. Radio control safety is part of the Range Safety Officer's responsibility. Radio control of an entry is not considered human intervention with regard to catching or cushioning of any model required to land naturally. Unless otherwise specified by the rules of that event, any entry may be radio controlled. The Launch-Contest Director can prohibit the use of Radio Control in any event or for the entire meet, by so stating in the sanction, and in all appropriate launch-competition printed and electronic postings. Entries that are to be radio controlled must be controlled or guided by the builder or a builder of the entry.

### **9.13 FAI Events**

Entries flown in the FAI class of an event, except for rocket glider, must comply with the following construction requirements of the FAI Sporting Code, Section 4, Volume SM- Space Models for that event. First, the minimum length of the enclosed airframe of the entry must be 500 millimeters and at least 50 percent of this airframe length must have a minimum diameter of 40 millimeters in the launch configuration. Second, in events where multi-staging is allowed the booster stage must deploy a recovery device, the upper stage must be at least 18 millimeters diameter over at least 75 percent of the upper stage length, and any boat tails on that stage must be at least 18 millimeters in diameter.

## **10 OFFICIAL FLIGHTS**

### **10.1 Number of Flights**

Unless otherwise specified in the rules for a specific event, time and weather permitting each contestant shall be given an opportunity to make two official flights in each event. A limitation shall not apply at Record Trials. Unless otherwise specified in the rules for a duration event, a contestant's official score is the sum of the durations achieved on all official flights.

When deciding on the number of flights that is to be allowed contestants in an event the Launch-Contest Director shall carefully consider whether time and/or weather may cause he/she to impose limitations on the event(s). The Launch-Contest Director must make every effort to announce how many flights will be allowed in the event(s) before the start of official flights.

However, if circumstances arise where it is necessary to enact a limitation after official flights have been made, all

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contestants must adhere to the new limits regardless of how many official flights they may have made.

To score contestant results after limitations have been placed on one or more events, the Launch-Contest Director must select for scoring only those qualified flights a contestant made under the new limitation. The Launch-Contest Director must then choose the contestant's best single qualified flight as his/her official flight in that event.

For example, if a Parachute Duration event must unexpectedly be limited to one flight per contestant, and a contestant has already made two flights, in order for the Launch-Contest Director to score the event, he/she must first select only the flights that the contestant(s) returned (since in a single-flight Parachute Duration event, the one flight must be returned.) If one or more contestant has returned two flights, the Launch-Contest Director must select the better of the two contestant's flights as his/her official flight for scoring purposes.

### 10.2 Record Attempts

At the discretion of the Launch-Contest Director, any NAR member or team may be allowed to attempt to set or surpass a United States Model Rocket Performance Record in any class of any event allowed in [Rule 17.2](#).

### 10.3 Official Flight Requirements

A flight is official if any part of the entry leaves the launcher under a motor's thrust phase; except in the case of a catastrophic failure according to the provisions of [Rule 11.5](#). All entries that do not leave the launcher subsequent to motor ignition must not be considered as having made an official flight unless they are disqualified by the RSO for safety reasons. If the power pod or motor of a Boost Glider entry disengages and proceeds into the air under power without the glider portion, the attempt must be considered a disqualified official flight. An entry that does not ignite enough motors to be in the proper total impulse class as per [Rule 4.6](#) must not be considered as having made an official flight unless its flight is disqualified for other reasons.

### 10.4 Return of Inaccessible Models

When the return of an entry is required, and the contestant cannot return his/her entry, but can point it out to an official visible in an inaccessible place where recovery would pose a personal hazard to the contestant. The official may score the entry as having been returned. The Launch-Contest Director must state prior to the start of competition what distance limits officials may travel. This rule may be superseded by the rules of a specific event.

### 10.5 Recording of Returns

It is the responsibility of the contestant to ensure that the officials have noted that the entry has been returned where it is so required.

## 11 DISQUALIFICATIONS

### 11.1 Officials

The Range Safety Officer may disqualify any entry that in their opinion did not comply with the competition rules or which in their opinion was not reasonably safe in operation. Contest officials may disqualify for non-safety reasons or compliance with this United States Model Rocket Sporting Code.

### 11.2 Scope

An entry may by reason of flight characteristics be disqualified for that flight, but it is not necessarily disqualified for the entire event.

### 11.3 Scoring

For the purposes of events in which a total score is computed from the sum of the performances of two or more flights, a disqualification must result in a score of zero for that flight. This rule may be superseded by the rules of a specific event. A disqualified flight may not be considered as a return in any event where a return is required.

#### 11.3.1 NARAM

If a contestant has one disqualified flight and another flight not returned in an event requiring one returned flight, a contestant at NARAM will only receive flight points.

### 11.4 Catastrophic Failure

A model rocket experiencing a catastrophic failure shall not be disqualified. The flight may or may not be considered as an official flight, if the Range Safety Officer rules the entry performed a safe and stable flight, and complied with the competition rules (e.g., a glider glided). The contestant will in this situation have the option of having such a flight ruled as either official or unofficial. If the entry did not meet these requirements, then it must be ruled an unofficial flight.

The contestant must inform the applicable contest official of his/her decision to accept or reject the flight as an official flight prior to any subsequent flight by the contestant in that event. The contestant must be permitted to

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substitute another entry. In the case of craftsmanship events; the substitute must be of the same prototype and scale as the original, and it is not required to exhibit the craftsmanship and detail of the original.

### 11.5 Recording Data

Performance data on an entry that has been disqualified during or after its flight must be recorded, even though the flight may not at that time be considered official, in case of later reversal of the disqualification ruling.

### 11.6 Correctable Conditions

Disqualifications for static conditions of an entry are not permitted and the contestant shall correct the condition prior to the official flight. If the contest officials do not discover a condition until during or after the flight is made, such as flying with the wrong motor type, the flight will not be considered official.

## 12 PROTESTS

### 12.1 SQS Disputes

SQS launches do not provide a contest jury. The contestant must present his/her disagreement to the Regional Contest Board Chairman for resolution and the Regional Contest Board Chairman must render a decision within 3 days.

### 12.2 NARAM Protests

Protests will be considered only when presented to a representative of the Contest Board in writing, accompanied by \$20.00 in cash, and no later than one hour after the end of the competition day.

With the exception of those RSO decisions related to safety in accordance with [Rule 7.2](#), decisions involving any interpretation of the Sporting Code as applied to settling disputes and protests shall be rendered by a minimum of three members of the Contest Board. At least one of the ruling Contest Board members shall be present at NARAM. No Contest Board member may rule or vote on any decision that could alter the award of contest points to his/her entry. All decisions of the Contest Board except for a safety ruling as stated in [Rule 11.1](#) are final as described in [Rule 12.2.2](#). The Contest Board may not override a safety ruling made by the RSO.

#### 12.2.1 Details

When filing a protest, the competitor must report in full the action or decision under protest; the names of the contestants and officials involved, and other substantiating details. All sides of a protest must have the right to be heard by members of the NAR Contest Board, see [Rule 7.4](#).

#### 12.2.2 Decision

The Contest Board must give to the Contest Director, and all parties involved in a protest, a written statement of their decision within 24 hours of filing of the protest or by the end of the final contest day. This statement must be included with the contest results. If the protest is upheld, the protest fee must be returned to the contestant. If the protest is denied, the protest fee must accompany the contest results and be forwarded to the NAR Contest Board Chairman. All protest rulings by the Contest Board are final.

## 13 COMPETITION AND CHAMPIONSHIPS

### 13.1 Spacemodeling Qualifier Series (SQS) Events

**13.1.1** The SQS must be made up of four (4) events selected from [Rule 13.1.3](#) by the Contest Board and two (2) events selected from 13.1.3 by the NARAM Contest Director. The SQS will be announced on NAR.org, on or before July 1 (prior to NARAM) by the National Events Chairman.

**13.1.2** If a NARAM CD is not yet selected by July 1, the Contest Board must select six (6) events from [Rule 13.1.3](#) to set the SQS.

**13.1.3** The only events that qualify a competitor to compete for the title of National Champion or for an Event Specialist Award are those selected for the SQS.

#### SQS Events List

- 1/4A-A Parachute Duration
- 1/4A-A Streamer Duration
- 1/4A-A Helicopter Duration
- 1/4A-A Boost Glider Duration
- B-C Egg Lofting Duration
- 1/2A-B Altitude-Altimeter
- A-B Payload-Altimeter

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- B-C Egg Lofting Altitude-Altimeter

13.1.4 SQS events must be flown under the specific event provisions of the U.S. Model Rocket Sporting Code.

### 13.2 Sanctions

- 13.2.1 All SQS flights must be conducted at launches sponsored by an individual member of the NAR or a chartered section of the NAR and sanctioned by the NAR.
- 13.2.2 There shall be no limit to the number of SQS sanctioned launches an individual or section may sanction in a contest year.
- 13.2.3 There shall be no limit to the number of SQS sanctioned launches a competitor may enter in a contest year.
- 13.2.4 Sanctions must be obtained from the Contest Board and listed on the NAR Contest Calendar.

### 13.3 Results

- 13.3.1 Results must be reported to the appropriate Regional Contest Board Chairman by the host individual or section for verification and must include data for pending performance records.
- 13.3.2 The SQS Launch Director shall post results to a cumulative, member accessible contest year results database. The results database shall reflect the highest score attained by a contestant. Posted results will be considered preliminary until verified by the Regional Contest Board.
- 13.3.3 Results must be posted to the database by the Launch Director within 7 days of the completion of the SQS sanctioned launch.
- 13.3.4 At the close of the contest year (June 30<sup>th</sup>), the final results of the SQS events determine the eligibility for a competitor to compete for and win an Event Specialist Award and National Championship.
- 13.3.4.1 Event Specialist Award (ESA) - To compete for an ESA at NARAM, competitors in each competition division must finish in the top 10 of a particular SQS event. There is no limit to the number of ESA's for which a competitor may qualify.
- 13.3.4.2 National Championship - To compete for a National Championship at NARAM, competitors in each competition division must:
- Achieve qualified flights in all of the SQS events and;
  - Finish in the top 10 of half or more of the SQS events, or
  - Using a combined score based on rank, finish in the top 10 or top 10%, whichever is greater, of the SQS events.

### 13.4 NATIONAL MEET (NARAM)

- 13.4.1 NARAM must present at a minimum the SQS events.
- 13.4.2 NARAM competition is open to all registered flyers.
- 13.4.3 Competitors that qualified through the SQS to compete for a National Championship shall declare their intent when registering for NARAM.
- 13.4.4 All competitors begin NARAM with zero points. Points will be awarded as follows for performance in each event as determined by place:
- 1<sup>st</sup> – 25 points
  - 2<sup>nd</sup> – 20 points
  - 3<sup>rd</sup> – 17 points
  - 4<sup>th</sup> – 14 points
  - 5<sup>th</sup> – 12 points
  - 6<sup>th</sup> – 10 points
  - 7<sup>th</sup> – 8 points
  - 8<sup>th</sup> – 6 points
  - 9<sup>th</sup> – 4 points
  - 10<sup>th</sup> – 2 points
  - Flight Points – 1 point

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## 13.5 NARAM Awards

### 13.5.1 Event Specialist Award (ESA)

- 13.5.1.1 Those who have qualified for an ESA per [Rule 13.3.4.1](#) above must compete at NARAM to receive the Event Specialist Award in a qualifying SQS event.
- 13.5.1.2 Each SQS event may award an ESA in each division.
- 13.5.1.3 An SQS qualified individual or team that is awarded first place in an SQS event at NARAM will receive the ESA for that event.
- 13.5.1.4 There is no limit to the number of Event Specialist Awards an individual or team competitor may qualify for, compete in, or be awarded at NARAM.
- 13.5.1.5 Event Specialist Award competitors may win both ESA's and meet awards.

### 13.5.2 Meet Awards

- 13.5.2.1 NARAM competitors who did not take part in an SQS event may compete for meet awards.
- 13.5.2.2 NARAM competitors who did take part in SQS events but failed to qualify per [Rule 13.3.4](#) for an Event Specialist Award or National Champion award may compete for meet awards.
- 13.5.2.3 For the purpose of determining the meet awards in each division, points will be awarded per [Rule 13.4.4](#).
- 13.5.2.4 Individual event awards will be presented for 1<sup>st</sup> through 3<sup>rd</sup> place in each competition division.
- 13.5.2.5 Meet champion awards shall be given for first and second place in each division.

### 13.5.3 National Champion Awards

- 13.5.3.1 National Champion awards shall be given for first and second place.
- 13.5.3.2 To be recognized as a National Champion in their competition division, competitors qualify per [Rule 13.3.4.2](#) above and must compete at NARAM.
- 13.5.3.3 For purposes of determining the National Champion awards in each competition division, points will be awarded per [Rule 13.4.4](#).
- 13.5.3.4 The qualified competitors accumulating the most points from the events they flew at NARAM shall receive the National Champion awards in their competition division.
- 13.5.3.5 Competitors who compete for National Champion awards may not win Meet Champion awards.
- 13.5.3.6 National Champions may win ESA awards if they qualified under [Rule 13.3.4.1](#).

### 13.5.4 SQS Awards

- 13.5.4.1 The top ten competitors in each division, at the close of the SQS on June 30<sup>th</sup>, will be recognized on the NAR.org website, in the E-Rocketeer, and in the official journal of the NAR for their performance.

## 13.6 REPORTING OF SCORES AT THE NATIONAL MEET (NARAM)

- 13.6.1 All points are awarded per [Rule 13.4.4](#).
- 13.6.2 At NARAM, results shall be posted in each of the following categories:
  - Events



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- Event Specialist Awards
- Meet Champions
- National Champions

## 14 ALTITUDE DATA

### 14.1 Scope

All entries in a given event, other than non-competition record attempts, are to be tracked using the same method. The sanction request form submitted by the Launch / Contest Director must, for each altitude event, designate whether “Altimeters (Rule 14.2)” or “Theodolites (Rule 14.3)” will be used for altitude tracking. In the case of record trials, the Launch / Contest Director may designate either or both types of tracking. The Launch / Contest Director must ensure that all announcements and publications for the sanctioned meet inform prospective entrants of the tracking method for each altitude event.

### 14.2 Electronic Altimeters

Electronic altimeters are the preferred method for altitude tracking. However, theodolites may also be used (per Rule 14.3).

Only commercially available altimeters approved by the NAR Contest Board and publicly announced as approved at least 60 days before any contest where they are used may be used in competition. These altimeters may not be altered or modified in any manner, including use of power sources that are outside the voltage range published by the altimeter manufacturer. To be approved by the Contest Board an altimeter must meet the following requirements:

- Uses barometric measurement techniques to record flight apogee altitude above launch pad altitude based on the formula for conversion of pressure to altitude in the International Civil Aviation Organization or US Standard Atmospheres.
- Uses a digital integrated pressure sensor with at least 16 bits of resolution in its digital conversion of pressure measurement.
- Recalculates launch pad pressure altitude by sampling local pressure at least once per minute after activation and before launch.
- Has resolution of 1 meter or better in readout.
- Has accuracy of 1 percent of recorded altitude or 2 meters, whichever is greater, across an operating range of no less than 4000 meters in flight altitude above sea level, 0 to 50 degrees Celsius in launch site temperature, and 750 to 1050 millibars in launch site ambient pressure.
- Has a sampling rate of 10 per second or greater.
- Employs processing functions to reject false short-duration launch or apogee altitude transients that may be created by wind gusts or the pressure transients of ejection events.
- Provides audio or visual readout of apogee from the most recent flight directly from the altimeter.
- Is capable of being placed in a preflight state of readiness to record new flight data and report this new data post-flight. This state must be audibly or visibly verifiable.

The altimeter must be fully enclosed within the rocket body through apogee. The part of the rocket containing the altimeter must be vented to the outside air by multiple vent holes that are placed at locations behind the curved forward surface of the rocket's nose. Any attempt to deliberately produce excessively high altitude readings, by use of devices such as venturis is prohibited.

NAR Contest Board approved altimeters are listed in Appendix E.

#### 14.2.1 Safety Check-In Procedure

The flight ready entry with the altimeter removed must be presented to the safety check official for inspection to verify the altimeter is unaltered and has been properly powered. The safety check officer may request the “owner's manual” for the altimeter if any questions arise concerning its operation or post flight readout. The make and model of the altimeter will be noted on the contestant's flight card under the “remarks” section. The altimeter's power source will be turned on in the presence of the safety check official, and readiness to record new flight data will be verified after boot-up. Alternately, the altimeter may be installed immediately after power-on and readiness verified after installation, provided the safety check official is satisfied the altimeter can be heard or seen for readiness verification per Appendix E. Installation of the altimeter in the rocket must be observed by the safety check official.

#### 14.2.2 Temperature Compensation

At the time of Safety Check-In, the ambient temperature at the launch site shall be recorded on the contestant's flight card in degrees centigrade rounded (Rule 1.5) to the nearest whole number.

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Subsequently, the contestant's recorded altitude must be corrected for the effect of ambient air temperature at the time of launch on the altimeter's altitude computation by multiplying the uncorrected altimeter reading by a factor of  $(273.15 + T)/288.15$  where T is the ambient temperature at the time of the rocket's launch in degrees Celsius.

### 14.2.3 Returns Procedure

The entry and altimeter must be returned for data verification. If necessary (as in the case of visual readout), the contestant must open the altimeter compartment in the presence of the returns official to read the altimeter. The returns official and contestant both will concur on the reported altitude. Any other specific event rules may also apply.

If the altimeter cannot be returned, and the entry is not disqualified for any other safety or event rule violation, then that flight can be considered "No Data" and [Rule 14.3.3](#) can be applied.

If the altimeter fails to report an altitude, and the flight has not been disqualified for any safety or event rule reason, then that flight can be considered "No Data" and [Rule 14.3.3](#) can be applied.

### 14.2.4 Performance Records with Altimeters

Altitude records may only be set using a **recording** altimeter. After the flight, if a record is suspected the altimeter data will be downloaded by the contestant and reviewed by a contest official. If the data reveals that the peak altitude is attributable to an ejection event or other flight anomaly, that peak or anomaly will not be used to determine the recorded altitude. The maximum altitude excluding the anomalous peaks will be reported.

If the maximum altitude occurs more than five seconds after the ejection event (due to thermals or other anomaly), only the peak altitude prior to ejection (excluding sudden peaks or anomalies as described above) will be reported.

If the altimeter data is, in the opinion of the contest official, significantly inconsistent with the observed flight, the altimeter data will be disallowed. The decision by the contest official on the interpretation of the altimeter data is final.

The altitude must also be corrected for the effect of ambient air temperature at the time of launch per [Rule 14.2.2](#).

## 14.3 Theodolites Tracking

All entries in any event for which an achieved altitude figure is scored may be tracked in flight by theodolites of a design approved by the NAR Contest Board. Any tracking theodolite that:

- Is equipped with both azimuth and elevation axes at right angles to each other
- Can be leveled or adjusted to an otherwise proper plane before use
- Has an accuracy of 0.5 degrees in both azimuth and elevation
- Uses a rifle-sight or equivalent optical sight with or without lenses, or uses a pair of open sight mounted at least twenty centimeters apart
- Uses crosshairs in the optical or open sight
- Is mounted on a sturdy tripod or other solid base in a manner that does not permit the tracking head to wobble or otherwise lose its zero-reference under normal use
- Has a provision for securely holding the sights firmly in any desired position, so that the operator may accurately record the tracking data associated with a flight
- Is capable of tracking to an azimuth of  $\pm 180$  degrees and an elevation from 0 degrees to 90 degrees must be acceptable for NAR contest use.

The Contest Board must approve theodolites that do not meet all of the above requirements before they may be used in a sanctioned activity.

### 14.3.1 Baseline

Two or more tracking theodolites must be used on appropriate baselines. The baseline should be between 50% and 400% of the expected altitudes to be tracked. Thus a 300-meter baseline would be appropriate for 75-600 meter flights. While very low power events may require a baseline less than 300 meters, proper care and judgment should be used before this is done. Longer baselines are strongly encouraged for high-powered or high-performance entries. Proper baselines must be used to track any record setting flight.

### 14.3.2 Tracking

Entries must be tracked to apogee if practical. When apogee tracking is used, one person must be designated to give a mark to the theodolite operators at precisely the instant the entry appears to reach apogee, and the theodolites must be locked at the mark. At the discretion of the Contest Director, entries may be tracked to ejection instead of apogee. When ejection tracking is used, it is recommended that the entries to be tracked

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contain colored tracking powder to create a visible cloud at ejection, and that the theodolite operators lock their theodolites at the appearance of the tracking powder cloud. It is further recommended that all entries that are to be tracked be painted in colors or patterns that will aid tracking. All entries in an event must be tracked using the same tracking method (either apogee or ejection).

### 14.3.3 Untracked Flights

Track Lost or Track Not Closed, if it is not disqualified for any other reason, is considered an unofficial flight. In this case the contestant is entitled to an additional flight, to be made during the period allocated for tracked flights. At the option of the contestant, Track Lost or Track Not Closed may be considered an official flight if it is not disqualified for any other reason. In this case the flight cannot place but must receive flight points; except in an event where the score is the sum of several factors, in which case the flight must be scored as having an altitude of zero.

### 14.3.4 Communication System

A reliable voice communication system must be used to link both trackers and the launch control area, for the purpose of calling marks and for the transmission of tracking data.

### 14.3.5 Data Reduction

Angular data obtained from theodolite tracking must be reduced to an achieved altitude figure by means of a standard system of equations approved by the NAR Contest Board. Samples are included in Appendix E. All data must be recorded for all altitude events and flights, including those flights that may be disqualified; this permits the altitude data to be available in case the disqualification ruling is later reversed.

### 14.3.6 Error Check

The error figure as computed by the approved equations must be less than or equal to 10% to be considered valid and acceptable for competition and record flights. Flights whose reduced altitudes do not satisfy this constraint must be scored as Track Not Closed. Flights, whose data is incomplete, preventing calculation of their altitude, must be scored as Track Lost. All altitudes must be rounded off to the nearest meter per [Rule 1.5](#). The rounded altitude must be the official scored altitude. Any altimeter reading reporting by an entry that was optically tracked using theodolites will NOT be officially considered and [Rule 14.3.3](#) will NOT apply.

### 14.3.7 Multiple Stations

When more than two trackers are used, altitude and closure percentage shall be calculated for each combination of trackers. The official altitude score is the average of all closed tracks, rounded per [Rule 1.5](#). It is only necessary for one pair of trackers to close.

## 14.4 Novel Methods

The NAR Contest Board must approve novel altitude determination methods before the results are accepted for competition.

## 15 TIMING DATA

### 15.1 Timers

In all events for which a time-of-flight value is scored, one or more timers must be stationed in the launching area with stopwatches and may not leave the launching area in order to keep the entry in sight. Meet officials will provide the same number of timers to all contestants. At their option, the contestant may provide additional official timers. Timer(s) may not use optical aids other than sunglasses or eyeglasses to correct to normal vision. In FAI class events the timer(s) may be equipped with binoculars.

### 15.2 Separation

Unless specifically allowed by the rules of that event, no timed entry may separate into two or more unattached parts, or eject its motor.

### 15.3 Deployment

The recovery system of any duration entry need not deploy fully and correctly, as long as the entry descends in a safe manner and the recovery system action remains within the requirements of the particular event.

### 15.4 Conflict of Interest

A timer must not time his/her own entry.

### 15.5 Stopwatches

**15.5.1** Stopwatches used for timing must have a minimum resolution of 1/10<sup>th</sup> second; must have (at a minimum) start, stop, and reset capabilities. Stopwatches must be capable of being restarted from a stopped state without being reset.

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**15.5.2** A stopwatch with split-time or lap accumulate capabilities (i.e., one which continues to record time internally after being stopped; and which can display at any time, the total elapsed time) may be used for competition, provided that if it is used to time one entry, it must be available for use to time any other entry.

### 15.6 Timed Interval

All entries must be timed from the instant of first motion on the launcher until the part to be scored for time of flight touches the ground, is caught in a tree, power line, or otherwise stopped, or drifts out of sight of the timer(s). As specified in [Rule 1.1](#), motors, recovery system protectors, and wadding are not to be timed as portions of an entry.

### 15.7 Recording Data

Data must be recorded to the accuracy of the stopwatch for all timed flights, including those flights that may be disqualified. This permits the timing data to be available in case the disqualification ruling is later reversed.

### 15.8 Averaging

To arrive at an entry's official score:

- Compute the average of all recorded stopwatch timing data per [Rule 15.7](#). Do **not** round the data per Rule 1.5 **before** averaging.
- Round the resulting average data (time) to the nearest whole number of seconds.
- Fractions of a second **less** than 0.5 must be rounded **down** to the next lower second
- Fractions of a second **equal to or greater** than 0.5 must be rounded **up** to the next higher second

### 15.9 Disappearance

If the entry disappears behind an obstacle to vision in such a manner as to lead the timer(s) to believe that it touched the ground very shortly thereafter, stopwatches should be stopped when the entry disappears; however, they may be started again if the entry reappears. If the entry drifts out of sight in the sky, the timer(s) must stop their watches individually when they lose sight of it.

### 15.10 Return

#### 15.10.1 SQS

Unless otherwise specified by the rules of the event or for reason of safety ([Rule 9.10](#)), the contestant need not return an entry to a contest official.

#### 15.10.2 NARAM

Unless otherwise specified by the rules of the event, the contestant must return an entry to the officials after at least one of his/her qualified flights, except as specified by [Rule 10.4](#). Contestants failing to satisfy this requirement cannot place in an event, but will receive flight points, except in an event where the score is the sum of several factors, in which case the flight must be scored as having a duration of zero.

### 15.11 Malfunction

When a malfunction of a stopwatch or a timer occurs such that any elapsed time measurement is not available, the elapsed time(s) recorded by the remaining timer(s) must be used as the official time. When all stopwatches or timers malfunction, the flight will not be considered an official flight unless the flight is disqualified on other grounds. Alternately, at the option of the contestant, he/she may choose to consider the flight as an official flight with a time of zero; in which case the flight cannot place but is eligible for flight points at NARAM; except in an event where the score is the sum of several factors, in which case the flight must be scored as having a time of zero.

### 15.12 Multi-Round Events at NARAM

Any duration event listing a multi-round maximum may be flown as a multi-round event.

#### 15.12.1 Number of Flights

Each contestant is initially allowed three official flights in a multi-round event.

#### 15.12.2 Number of Models

A contestant may enter no more than two entries in a multi-round event for the purpose of making the first three rounds of flights, except as stated in [Rule 11.5](#). One (1) additional entry may be entered and flown in the event if a contestant is tied for first place at the end of the third round.

#### 15.12.3 Maximum Time

The official duration of each flight must be calculated as follows: if the duration achieved exceeds the maximum time limit defined for that flight, the entry must be awarded the maximum time limit; otherwise the entry must be awarded its achieved duration in seconds. Timers may stop timing the flight after it has achieved the maximum time. [See Rule 15.8](#)

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### 15.12.4 Scoring

Multi-round events must be scored as follows: the official durations achieved by the contestant on the initial three official flights in the event must be summed. If there is no tie for first place, then the contestant achieving the highest score is the winner. If there is a tie, competitors for first place must be given the opportunity to make an additional official flight (fly-off) to determine the winner. The fly-off round will have no maximum time limit. Second through tenth places must be distributed first among the other competitors in the fly-off, and then among any other competitors having made qualified flights, on the basis of total computed score.

### 15.12.5 Return

The entries in multi-round duration events need not be returned to the officials except as required by [Rules 9.10](#) and [15.12.2](#).

## 16 CRAFTSMANSHIP JUDGING

### 16.1 Judging

Craftsmanship events require static judging. The same team of one or more judges must judge all craftsmanship entries in an event that are in the same competition division.

### 16.2 Insufficient Data

If an entry is found to lack sufficient data the contestant will be allowed a reasonable amount of time to correct for the deficiency.

### 16.3 Conflict of Interest

A judge entered in an event shall not judge his/her own entry, or any entry in competition with it.

### 16.4 Viewing Period

It is recommended that the Contest Director set aside a period of time between judging and launching during which the entries can be viewed by the competitors and guests. The intent of this practice is to stimulate interest in craftsmanship events in contestants who may not otherwise enter such events, and improve the craftsmanship of those contestants who regularly do.

### 16.5 NAR Number

The contestant's name or NAR number is required to be on the model per [Rule 9.4](#)

### 16.6 Judging Condition

Entries must be judged in flight condition, with the exception that motor(s) and recovery system need not be present. Any clear plastic fins, launching lugs and fittings, and other exterior flight items must be attached to the entry during judging. Pop lugs are considered part of the launcher, not of the model. Nothing may be added to the entry, nor taken off the exterior of the entry, between judging and flight, except the motor(s) and recovery system(s). If unusual launching or recovery devices are to be used it should be so noted in the data presented.

### 16.7 Accidental Damage

Any damage to an entry while it is in the custody of the judges or meet officials must not be held against the contestant, and the contestant must have the opportunity to repair the entry without penalty.

### 16.8 Human Intervention

Craftsmanship entries are judged for flight damage; therefore no human intervention (e.g., catching the entry or cushioning its landing) will be allowed between launch and touchdown. Alternately contestants may choose to catch their entries. In this case, entries that are caught must be judged as if they had sustained maximum damage on landing, but will not be disqualified. If the intervention was accidental and/or inadvertent, in the opinion of the Range Safety Officer, the flight may be judged as having sustained maximum damage points or an unofficial flight at the option of the contestant. The contestant must inform the applicable contest official of his/her decision to accept or reject the flight as an official flight prior to any subsequent flight by the contestant in that event.

### 16.9 Lost Models

Craftsmanship entries that cannot be returned to the judges must be judged as if it had sustained maximum damage on landing, but will not be disqualified, except as per [Rule 9.10](#). [Rule 10.4](#) will not apply.

## 17 UNITED STATES MODEL ROCKET PERFORMANCE RECORDS

### 17.1 Eligibility

Performance records may be set in any event and motor class, unless judging is required, or a limited score is the goal. For example, performance records may be set in Altitude or Parachute Duration, but not in Scale Altitude,

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Spot Landing, or Precision Payload. Entries must be made during a sanctioned launch per [Rule 6](#). Proxy entries are not eligible for performance records per [Rule 8.4](#).

### 17.2 Categories

Performance records must be awarded separately for each competition division. Within each competition division, separate performance records must be awarded for:

#### 17.2.1 Free Flight

All entries that are not radio-controlled or use altimeter for altitude measurement.

#### 17.2.2 Radio Control

Entries using radio control to provide active guidance per [Rule 9.12](#).

#### 17.2.3 Altimeter

Entries using an altimeter for altitude measurement per [Rule 14.2](#)

### 17.3 Return

The entry must be returned to ensure compliance with all rules for the event and to record motor manufacturer and designation. [Rule 10.4](#) for inaccessible models does not apply.

### 17.4 Surpassing

Attempts to surpass an existing performance record must exceed the current value by at least 1%.

### 17.5 Submission

The Launch/Contest Director must review all flight results to determine if any new performance records were set. If so, the flight card and contestant entry form must be sent to the NAR Records Subcommittee for review.

Individual contestants may also submit copies of their flight card(s) and entry form, provided the Launch/Contest Director signs the forms.

The submitted data must include the following items:

- Contestant name
- Division
- Event and motor class
- Date
- New record value
- Altimeter make & model (if used)
- Motor manufacturer and designation

### 17.6 Certification

The NAR Records Subcommittee may request any additional substantiating data it deems necessary to certify a new record. The NAR Records Subcommittee has the right to disallow any record claim, regardless of the data submitted, if the record attempt is found to have been made unfairly or falsely reported.

## 18 PROVISIONAL COMPETITION

### 18.1 Author

Any NAR member or section may author a new event concept.

### 18.2 Standards

New event concepts submitted for the consideration of the NAR Contest Board must meet safety standards. In addition, they should be designed so that they can be flown at any or all sanctioned launches.

### 18.3 Form

Rules for new event concepts must be formatted as for any established event.

### 18.4 Postal Competition

New event concepts must be tested for merit using a postal competition format. Postal competition requires the following:

- Event rules are distributed electronically at NAR.org.
- There must be no less than a 60-day competition window for flying any new event concept and it must start no less than 30 days from rule distribution or announcement.
- Upon close of the competition window, results must be published electronically on NAR.org no more than 14 days after close of the competition window.
- There will be no less than two competition windows for a new event concept.

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### **18.5 Improvement**

During postal competition, NAR members and sections are encouraged to suggest rule changes for the purpose of testing the event for suitability before submission. Competitors are encouraged to suggest changes that may eliminate loopholes or make the event more interesting.

### **18.6 Submission**

New event concepts must be submitted to the NAR Contest Board Chair in electronic form; including rules and all postal results.

### **18.7 Adoption**

For a new event concept to be adopted, it must meet the requirements of **Rules 18.2 and 18.3**. The Contest Board must vote to accept or reject the submission for inclusion in the next sporting code revision. Results of the vote must appear in both the E-Rocketeer and NAR.org no more than 90 days after date of submission.

### **18.8 National Meet**

A new event concept may not be included in a NARAM until it has qualified under **Rule 18.7**; or except by a special resolution of the NAR Contest Board.

## **19 Reserved for future rules**

## ALTITUDE EVENTS

### 20 ALTITUDE

#### 20.1 Scope

Altitude comprises twelve events open to any model rocket. The purpose of this event is to achieve the highest altitude.

#### 20.2 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Altitude are established:

Motor Class
1/8A
1/4A
1/2A
A
FAI A
B
FAI B
C
D
E
F
G

### 21 SUPERROC ALTITUDE

#### 21.1 Scope

Superroc Altitude comprises ten events open to single-stage model rockets whose body length is no less than the minimum allowed for the classes of the event. The purpose of this event is to achieve the greatest altitude possible with the longest rocket possible without compromising the structural integrity of the rocket.

#### 21.2 Structural Failure

An entry that separates, folds, or has a structural failure prior to ejection must be disqualified.

#### 21.3 Separation

An entry is allowed to separate into two or more unattached parts after ejection, provided that each part satisfies the provisions of [Rule 3.5](#).

#### 21.4 Safety

Entries must satisfy the provisions of [Rule 1.1](#).

#### 21.5 Scoring

Superroc Altitude must be scored as follows: the length of an entry to the nearest centimeter, as measured from the tip of the nose cone to the end of the motor nozzle, up to the maximum length for that category, must be awarded as static points. If an entry has more than one motor, the length must be measured to the motor nozzle closest to the tip of the nose cone. No additional points are awarded for any length beyond the maximum. The altitude of the model measured in meters, must be awarded as flight points. The static points and flight points obtained must be multiplied to determine the score. The contestant achieving the highest score must be declared the winner. When posting, printing, or maintaining contest results or performance records, an entries altitude in meters must be shown with its composite score.



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## 21.6 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Superroc Altitude are established:

Motor Class	Minimum Length (centimeters)	Maximum Length (centimeters)
1/8A	12	25
1/4A	25	50
1/2A	50	100
A	75	150
B	100	200
C	125	250
D	150	300
E	175	350
F	200	400
G	225	450

## 22 PRECISION ALTITUDE

### 22.1 Scope

Precision Altitude comprises three events open to any model rocket. The purpose of this event is to accurately predict the altitude that an entry will attain.

### 22.2 Classes

The three classes of Precision Altitude are:

#### 22.2.1 Predicted Altitude

The minimum altitude prediction allowable is 100 meters. The contestant must predict in meters the altitude to which their entry will be flown. A contestant at a meet must record their altitude prediction on the flight card prior to any official flight.

#### 22.2.2 Set Altitude

The Launch-Contest Director must set the target altitude when the meet is sanctioned. This value must appear in the sanction form and all appropriate contest information. The target altitude must be a multiple of 5 meters between 100 and 300 meters.

#### 22.2.3 Random Altitude

The Launch-Contest Director must randomly select the target altitude just prior to when the event is flown, by random selection. The target altitude must be a multiple of 5 meters between 100 and 300 meters.

### 22.3 Practice

Practice flights are not allowed on the day the event is flown.

### 22.4 Number of Flights

Entries must be allowed only one official flight in Precision Altitude. If no altitude data is available, any flight allowed under [Rule 14.3.3](#) must be made by the same entry, and no changes in configuration, motor type, or prediction must be allowed.

### 22.5 Control

The entry must not be radio controlled or contain any device whose purpose is to control the altitude of the entry.

### 22.6 Scoring

Precision Altitude Competition must be scored as follows: the entry's achieved altitude must be divided by its target altitude, and the result multiplied by 100. This figure must then be rounded (according to what rounding process) to the nearest 0.1%. If the result is greater than or equal to 100, subtract 100 from it; otherwise, subtract it from 100. The contestant whose score comes closest to zero must be declared the winner.

## 23 CLUSTER ALTITUDE

### 23.1 Scope

Cluster Altitude is comprised of six events open to single-stage model rockets.

### 23.2 Purpose

The purpose of the event is to achieve the highest altitude.

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## 23.3 Retained Motors

All motor cases are to be retained in the entry. Following an official flight, a contestant must present his/her entry as recovered to a contest official for verification of motor casing retention or the flight must be disqualified.

## 23.4 Ignition

Air starts are prohibited.

## 23.5 Partial Ignition

Partial cluster ignition must be deemed an official flight unless disqualified for other safety reasons by the RSO.

## 23.6 Classes

The following five classes of Cluster Altitude are established:

Class Name
1/8A x 2 Motor
1/4A x 2 Motor
1/2A x 3 Motor
A x 4 Motor
B x 5 Motor
C x 6 Motor

## 24 PAYLOAD

### 24.1 Scope

Payload comprises seven events open to model rockets that carry one or more standard NAR payloads of given mass and dimensions to as high an altitude as possible and to recover the payload. The standard NAR payload is intended to represent an instrument package whose dimensions and mass cannot be modified, but must be accepted as a design constraint.

### 24.2 Staging

If the entry is staged, the payload(s) must be totally enclosed in the uppermost stage of the entry.

### 24.3 Payload Specifications

The standard NAR payload is a sealed non-metallic cylinder containing fine sand, with a mass of no less than 28.0 grams. This cylinder must be a minimum of 17.0 millimeters in diameter, and a minimum of 60.0 millimeters in length. No holes may be drilled into it, no changes made in its shape, and no material may be affixed to it.

### 24.4 Enclosed Payloads

The standard NAR payload(s) carried in an entry –

- must be totally enclosed and contained within the entry,
- must not separate from the entry in flight
- and must be removable from the entry

### 24.5 Return

Following the flight, the contestant must present his/her entry as recovered and, in the presence of an official, must remove the payload(s). If the official cannot examine the payload(s), the entry must be disqualified. **Rule 10.4** does not apply. If the contestant removes the payload(s) in the absence of officials, the entry must be disqualified. The official may require that the payload(s) be rechecked and must disqualify the entry if it no longer complies with **Rule 25.3**.

### 24.6 Classes

This event is divided into classes based upon the permissible total impulse of the motor(s). The following classes of Payload are established:

Motor Class	Payloads Carried
A	1
B	1
C	1
D	1
E	2
F	3
G	4

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## 25 EGG LOFTING ALTITUDE

### 25.1 Scope

Egg Lofting Altitude comprises six events open to model rockets that carry, as a totally enclosed payload, one raw large egg intended to simulate carrying an astronaut to as high of an altitude as possible and to recover the payload without damage.

### 25.2 Stages

If the entry is staged, the egg must be totally enclosed in the uppermost stage of the entry.

### 25.3 Eggs

Eggs must have a mass of not less than 57 grams and not more than 63 grams, and no more than 45 millimeters in diameter. Prior to flight each egg must be uniquely marked, and the mark must be recorded on the contestant's flight card. A contestant must not be required to use an egg that has been previously lofted by another contestant. No material may be affixed to the egg (e.g., glue or tape).

### 25.4 Return

Following the flight, the contestant must present his/her entry as recovered and, in the presence of an official, must remove the egg. If the shell of the egg is broken or cracked, the entry must be disqualified. If the official cannot examine the egg, or the contestant removes the egg in the absence of officials, or breaks the egg in the process of removing it, the entry must be disqualified. Any entry that is caught or cushioned prior to landing must be disqualified. **Rule 10.4** does not apply.

### 25.5 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Egg Lofting Altitude are established:

Motor Class
B
C
D
E
F
G

## 26 DUAL EGG LOFTING ALTITUDE

### 26.1 Scope

Dual Egg Lofting Altitude comprises five events open to model rockets that carry, as a totally enclosed payload, two raw large eggs intended to simulate carrying two astronauts to as high of an altitude as possible and to recover the payload without damage.

### 26.2 Stages

If the entry is staged, the eggs must be totally enclosed in the uppermost stage of the entry.

### 26.2 Eggs

Eggs must have a mass of not less than 57 grams and not more than 63 grams, and no more than 45 millimeters in diameter. Prior to flight each egg must be uniquely marked, and the mark must be recorded on the contestant's flight card. A contestant must not be required to use an egg(s) that has been previously lofted by another contestant. No material may be affixed to the egg(s) (e.g., glue or tape).

### 26.3 Return

Following the flight, the contestant must present his/her entry as recovered and, in the presence of an official, must remove the eggs. If the shell of the egg(s) is broken or cracked, the entry must be disqualified. If the official cannot examine the eggs, or the contestant removes the eggs in the absence of officials, or breaks the eggs in the process of removing them, the entry must be disqualified. Any entry that is caught or cushioned prior to landing must be disqualified. Rule 10.4 does not apply.

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### 26.4 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Dual Egg Lofting Altitude are established:

Motor Class
C
D
E
F
G

**27-29 Reserved for future events**

## DURATION EVENTS

### 30 PARACHUTE DURATION

#### 30.1 Scope

Parachute Duration comprises seven events open to single-stage entries containing one or more parachutes for recovery purposes. The purpose of this event is to achieve the longest flight duration time.

#### 30.2 Qualification

Some portion of the parachute must protrude out of the entry and into the airflow to aid in recovery for the flight to be considered qualified.

#### 30.3 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Parachute Duration are established:

Motor Class	Multi-Round Maximum
1/8A	40 sec
1/4A	60 sec
1/2A	120 sec
A	180 sec
FAI A	300 sec
B	240 sec
C	300 sec

### 31 STREAMER DURATION

#### 31.1 Scope

Streamer Duration comprises eleven events open to single-stage entries that contain a single streamer as the only recovery device. The purpose of this event is to achieve the longest flight duration time.

#### 31.2 Streamer Specifications

A streamer is a continuous plane of identical cloth, plastic film, or paper; has a length-to-width ratio of 5:1 or greater; may be folded and/or creased; it may not be cut, slit, punched, and or perforated. The streamer and model must be connected by only a single line or cord, attached at the narrow end of the streamer. The cord may not be connected to either the streamer or the model at more than one point (e.g., no yokes are permitted).

##### 31.2.1 FAI Streamers

For FAI class streamer duration, the streamer must have a length-to-width ratio of 10:1 or greater. The cord attaching the streamer to the model may be attached to a loop of thread that is attached to each corner of the narrow end of the streamer.

#### 31.3 Assembly

Several pieces of material may be joined into a single streamer. All such joints must be parallel to the narrow axis of the streamer. All pieces of the streamer must consist of identical material.

#### 31.4 Qualification

Some portion of the streamer must protrude out of the entry and into the airflow to aid in recovery for the flight to be considered qualified.

#### 31.5 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Streamer Duration are established.

Motor Class	Multi-Round Maximum
1/8A	20 sec
1/4A	30 sec
1/2A	60 sec
A	120 sec
FAI A	180 sec
B	180 sec
C	240 sec
D	300 sec
E	300 sec
F	300 sec
G	300 sec

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## 32 HELICOPTER DURATION

### 32.1 Scope

Helicopter Duration comprises eleven events open to any single-stage model rocket that uses the principle of autorotation as the sole means of recovery. The purpose of this event is to achieve the longest flight duration using an auto-rotating recovery system.

### 32.2 Autorotation

Each entry must be decelerated during descent by its auto-rotating recovery device. The resulting autorotation must be around the vertical axis. An entry that descends nose first, or flips over during descent is permitted.

### 32.3 Recovery

Recovery devices employing flexible (e.g., plastic film or cloth) surfaces are prohibited. Entries using a recovery system that is designed to act (or that actually acts) in a manner similar to a parachute, a rigid inverted bowl, or similar techniques are specifically excluded from this competition.

### 32.4 Qualification

The entry must make a minimum of one complete rotation around its vertical axis during the recovery portion of the flight to be considered qualified.

### 32.5 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Helicopter Duration are established:

Motor Class	Multi-Round Maximum
1/8A	20 sec
1/4A	30 sec
1/2A	60 sec
A	120 sec
FAI A	180 sec
B	180 sec
C	240 sec
D	300 sec
E	300 sec
F	300 sec
G	300 sec

## 33 SUPERROC DURATION

### 33.1 Scope

Superroc Duration comprises ten events open to single-stage model rockets whose body length is no less than the minimum allowed for the classes of the event. The purpose of this event is to achieve the greatest duration possible with the longest entry possible without impairing the structural integrity of the entry.

### 33.2 Structural Failure

An entry that separates, folds, or has structural failure prior to ejection must be disqualified.

### 33.3 Safety

Entries must comply with the provisions of [Rule 1.1](#).

### 33.4 Scoring

Superroc Duration must be scored as follows: the length of the entry to the nearest centimeter as measured from the tip of the nose cone to the end of the motor nozzle, up to the maximum length for that category, must be awarded as static points. If the entry has more than one motor, the length must be measured to the motor nozzle closest to the tip of the nose cone. No additional points are awarded for any length beyond the maximum. The achieved duration of the entry in seconds must be awarded as flight points. The static points and flight points ~~the~~ obtained must be multiplied to determine the score. The contestant achieving the highest score must be declared the winner. When posting, printing, or maintaining contest results or performance records, the model's time in seconds must be shown with its composite score.

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## 33.5 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Superroc Duration are established:

Motor Class	Minimum Length (centimeters)	Maximum Length (centimeters)
1/8A	12.5	25
1/4A	25	50
1/2A	50	100
A	75	150
B	100	200
C	125	250
D	150	300
E	175	359
F	200	400
G	225	450

## 34 EGG LOFTING DURATION

### 34.1 Scope

Egg Lofting Duration comprises six events open to single-stage model rockets that carry, as a totally enclosed payload, one raw large egg intended to simulate carrying an astronaut and achieving the greatest duration possible.

### 34.2 Eggs

Eggs must have a mass of not less than 57 grams and not more than 63 grams; and measuring no more than 45 millimeters in diameter. Prior to flight each egg must be uniquely marked and the mark must be recorded on the contestant's flight card. A contestant must not be required to use an egg that has been previously flown lofted by another contestant. No material may be affixed to the egg (e.g., glue or tape).

### 34.3 Return

Following the flight, the contestant must present his/her entry as recovered and, in the presence of an official, must remove the egg. If the shell of the egg is broken or cracked, the entry must be disqualified. If an official cannot examine the egg, or the contestant removes the egg in the absence of officials, or breaks the egg in the process of removing it, the entry must be disqualified. If an official cannot examine the egg, the entry will be disqualified. Any entry that is caught or cushioned prior to landing must be disqualified. Rule 10.4 does not apply.

### 34.4 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Egg Lofting Duration are established:

Motor Class
B
C
D
E
F
G

### 34.5 Scoring

Egg Lofting Duration must be scored as follows: The contestant whose model achieves the longest duration for a single flight is the winner.

## 35 DUAL EGG LOFTING DURATION

### 35.1 Scope

Dual Egg Lofting Duration comprises five events open to single-stage model rockets that carry as a totally enclosed payload, two raw large eggs intended to simulate carrying two astronauts and achieving the greatest duration possible.

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### 35.2 Eggs

Eggs must have a mass of not less than 57 grams and not more than 63 grams; and measuring no more than 45 millimeters in diameter. Prior to flight each egg must be uniquely marked and the marks must be recorded on the contestant's flight card. A contestant must not be required to use one or more eggs that have been previously lofted by another contestant. No material may be affixed to the egg(s) (e.g., glue or tape).

### 35.3 Return

Following the flight, the contestant must present his/her entry as recovered and, in the presence of an official, must remove the eggs. If the shell of the egg(s) is broken or cracked, the entry must be disqualified. If the official cannot examine the eggs, or the contestant removes the eggs in the absence of officials, or breaks the eggs in the process of removing them, the entry must be disqualified. Any entry that is caught or cushioned prior to landing must be disqualified. **Rule 10.4** does not apply.

### 35.4 Classes

This event is divided into five classes based on the permissible total impulse of the motor(s). The following classes of Dual Egg Lofting Duration are established.

Motor Class
C
D
E
F
G

### 35.5 Scoring

Dual Egg Lofting Duration must be scored as follows: The contestant whose model achieves the longest duration on a single flight is the winner.

## 36 BOOST GLIDER DURATION

### 36.1 Scope

Boost Glider Duration comprises ten events open to any model rocket, one portion of which returns to the ground in stable, gliding flight supported by aerodynamic lifting surfaces that sustain that portion against gravity. If the entry is staged, the gliding portion must be part of the uppermost stage. The entry may separate into multiple pieces; only the gliding portion is timed and needs to be returned per **Rule 15.10**. Entries whose gliding surfaces are made of flexible materials (e.g., plastic film or cloth) are prohibited from this event. The purpose of this event is to achieve the longest flight duration time.

### 36.2 Qualification

During the recovery portion of the flight, the entry's gliding portion must achieve a minimum of a 1:1 glide ratio at some point to be considered qualified.

### 36.3 Disqualification

The glider must not be deployed during the motor's thrust phase- otherwise the entry must be disqualified for pod separation. Non-gliding portions of the entry may deploy parachutes and/or streamers for recovery purposes. However, any gliding portion of the entry that descends with parachute and/or streamer recovery device(s) intentionally attached must be disqualified.

### 36.4 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Boost Glider Duration are established:

Motor Class	Multi-Round Maximum
1/8A	30 sec
1/4A	45 sec
1/2A	90 sec
A	120 sec
B	240 sec
C	270 sec
D	270 sec
E	300 sec
F	300 sec
G	300 sec



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## 37 ROCKET GLIDER DURATION

### 37.1 Scope

Rocket Glider Duration comprises eleven events open to any single-staged model rocket that returns to the ground in stable, gliding flight supported by aerodynamic lifting surfaces which sustain it against gravity. Entries whose gliding surfaces are made of flexible materials (e.g., plastic film or cloth) are prohibited from this event. The purpose of this event is to achieve the longest flight duration time.

### 37.2 Qualification

During the recovery portion of the flight, the entry must achieve a minimum of a 1:1 glide ratio at some point to be considered qualified.

### 37.3 Disqualification

Any entry that descends with parachute and/or streamer recovery device(s) attached must be disqualified. Any entry that separates into two or more unattached parts, or ejects its motor must be disqualified.

### 37.4 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Rocket Glider Duration are established:

Motor Class	Multi-Round Maximum
1/8A	30 sec
1/4A	45 sec
1/2A	90 sec
A	120 sec
FAI A	180 sec
B	180 sec
C	240 sec
D	270 sec
E	300 sec
F	300 sec
G	300 sec

## 38 FLEX WING BOOST GLIDER DURATION

### 38.1 Scope

Flex Wing Boost Glider Duration comprises ten events open to any model rocket, one portion of which returns to the ground in stable, gliding flight supported by flexible aerodynamic lifting surfaces which sustain that portion against gravity. If the entry is staged, the gliding portion must be part of the uppermost stage. The entry may separate into multiple pieces; only the gliding portion is timed and needs to be returned per [Rule 15.10](#). The purpose of this event is to achieve the longest flight duration time.

### 38.2 Qualification

During the recovery portion of the flight, the entry's gliding portion must achieve a minimum of a 1:1 glide ratio at some point to be considered qualified.

### 38.3 Disqualification

Non-gliding portions of the entry may deploy parachutes and/or streamers for recovery purposes. However, any gliding portion of the entry that descends with parachute and/or streamer recovery device(s) intentionally attached must be disqualified.

### 38.4 Classes

This event is divided into classes based on the permissible total impulse of the motor(s). The following classes of Flex Wing Boost Glider Duration are established:

Motor Class	Multi-Round Maximum
1/8A	30 sec
1/4A	45 sec
1/2A	90 sec
A	120 sec
B	180 sec
C	240 sec
D	270 sec
E	300 sec
F	300 sec
G	300 sec

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## 39 PRECISION DURATION

### 39.1 Scope

Precision Duration comprises three events open to any single-staged model rocket. The purpose of this event is to accurately predict the duration that an entry will achieve.

### 39.2 Classes

The three classes of Precision Duration are:

#### 39.2.1 Predicted Duration

The contestant must predict the duration in seconds that the entry will achieve. The contestant's prediction must be recorded on the flight card and given to the official(s) prior to any official flight by the contestant at the meet. The minimum duration prediction is 30 seconds.

#### 39.2.2 Set Duration

The Launch-Contest Director must set the target duration when the meet is sanctioned. This target duration must appear on the sanction form and all appropriate meet information. The target duration must be no less than 30 and no more than 120 seconds in increments of 5 seconds.

#### 39.2.3 Random Duration

The Launch-Contest Director must select the target duration just prior to when the event is flown, by random selection. The target duration must be no less than 30 and no more than 120 seconds in increments of 5 seconds.

### 39.3 Practice

Practice flights are not allowed on the day the event is flown.

### 39.4 Number of Flights

Entries must be allowed only one official flight in Precision Duration. In the case of a timer malfunction, any flight allowed under Rule 15.11 must be made by the same entry, and no changes in configuration, motor type, or prediction must be allowed.

### 39.5 Control

The entry may not be radio controlled. The entry must not contain a dethermalizer or other device whose purpose is to cause the entry to land after a predetermined amount of elapsed time. Any entry that is caught or interfered with prior to landing must be disqualified. Any entry that drifts out of sight of the timers while still in flight must earn only flight points.

### 39.6 Scoring

Precision Duration must be scored as follows: the achieved duration of the entry must be divided by the target duration, and the result multiplied by 100. This figure must then be rounded to the nearest 0.1%. If the result is greater than or equal to 100, subtract 100 from it; otherwise, subtract it from 100. The contestant whose score comes closest to zero must be declared the winner.

### 39.7 Return

Return of the entry to the officials is not required except as stated in Rule 9.10.

## 40 – 49 Reserved for future events

## CRAFTSMANSHIP EVENTS

### 50 SPORT SCALE

#### 50.1 Scope

Sport Scale comprises three events open to any entry that closely resembles an existing or historical guided missile, rocket vehicle, or space vehicle, that has flown under rocket power. The purpose of this event is to produce an accurate, flying replica of a real rocket powered vehicle that is judged for craftsmanship in construction, finish, and flight performance. Sport Scale differs from Scale in that the dimensions of the entry are not measured per [Rule 51](#).

#### 50.2 Classes

The following classes of Sport Scale exist:

##### 50.2.1 Sport Scale

Entries may be any size.

##### 50.2.2 Giant Sport Scale

The entry must be a minimum of 100 centimeters in overall length or a minimum of 10 centimeters in body diameter. Vehicles with significant outer assemblies or winged vehicles qualify if their length plus wingspan totals at least 100 centimeters or if their girth (as measured around in a plane perpendicular to the centerline of the model by a length of string around the components not including the fins or wings) totals at least 31.4 centimeters.

##### 50.2.3 Peanut Sport Scale

The entry may be a maximum of 30 centimeters in overall length or a maximum of 2 centimeters in body diameter. When judging this class, the increased difficulty of building a very small model should be considered.

#### 50.3 Exclusions

Sport Scale entries of amateur rockets or missiles are specifically excluded from this event, except when the prototype is of obvious historical significance.

#### 50.4 Non-Flying Prototypes

Entries in Sport Scale may model a non-flying or inert vehicle if its configuration is representative of a historical vehicle configuration.

#### 50.5 Plastic Models

Entries that qualify for Plastic Model Conversion per [Rule 55](#) are specifically excluded from this event. Parts from commercial plastic kits may be used on scale entries provided this is pointed out in the data presented with the entry for judging.

#### 50.6 Kits

Commercially available scale model rocket kits are acceptable for entry.

#### 50.7 Data

The contestant must supply data to substantiate his/her entry's adherence to scale in shape, color, and paint pattern.

#### 50.8 Stages

If the prototype is a multi-stage vehicle, the entry may be designed so that some or all of the upper stages are inoperable dummies. However, an entry of one or more of the upper stages of a multi-stage vehicle may not be entered without the operable lower stage(s) unless specific data is furnished to prove to the judges that the upper stage(s) have flown.

#### 50.9 Transparent Fins

Transparent fins are allowed for the purpose of stabilizing an entry. The transparent fins and their attachment must be judged for craftsmanship along with the entry.

#### 50.10 Judging

Entries must be judged for static points in the following manner: Scale-like qualities are to be judged from a distance of at least one meter from the model. Judges may then closely examine the model to judge it for craftsmanship.

#### 50.12 Flight

If the entry does not make a safe, stable flight, it must be disqualified.

## **DRAFT**

### **50.13 Static Judging**

#### **50.13.1 Similarity of Outline: 200 points**

The contestant is required to submit data to substantiate his/her entry's visual resemblance to the prototype. Minimum allowable data consists of:

- A line, tone, or color drawing; or
- One or more clear photographs, halftones, or photo-reproductions of the prototype, sufficient to show the outline and general configuration of the prototype modeled.

#### **50.13.2 Finish, Color, and Markings: 200 points**

The contestant should submit data to substantiate his/her model's fidelity to the prototype. Such as:

- One or more clear photographs, halftones, or photo-reproductions, including at least one in color. The number of these submitted should be sufficient to substantiate additional views of the model on which the color pattern and markings differ significantly.
- Other published pictorial representations, such as a color painting, or a drawing from a magazine.
- A detailed written description and/or drawing (which may be created by the contestant), from verifiable source, of the color scheme and markings, accompanied by a drawing of the prototype on which the color scheme and markings described have been included.

Any entry not accompanied by data substantiating the finish, color, and markings of the prototype must be given zero points for Finish, Color and Markings.

#### **50.13.3 Degree of Difficulty: 100 points**

Points must be awarded according to the difficulty experienced by the contestant in building the model and adapting it for flight. Consideration should be given to whether the entry was built from a kit. Points should be awarded for parts and details that were individually constructed by the contestant. To facilitate judging, the contestant should point out difficult assemblies or construction problems in his/her data.

#### **50.13.4 Craftsmanship: 300 points**

Points will be awarded for neatness, care in construction, craftsmanship of details, and quality of finish. Consideration should be given to the invisibility of body seams and wood grain, and the accurate reproduction of curved lines and edges. The finish should be free of fingerprints, brush strokes, runs, or other unintentional blemishes, and the paint pattern should be well defined.

### **50.14 Flight Characteristics: 300 points**

#### **50.14.1 Mission: 200 points**

Mission points are awarded for the entry's appropriate and scale-like operation of the prototype during flight. Examples of such operations are staging, simulated cloud seeding, operation of electronic payload, and smoke ejection. Any such operation that does not comply with the safety standards set forth in this Sporting Code must be disqualified. The RSO is the only official who may rule on the safety of the entry's operation.

#### **50.14.2 General Flight: 100 points**

General flight points are awarded for proper operation of the entry during flight, including launch, lack of misfires, stability, recovery, and lack of damage on landing. No consideration should be given to staging or scale-like flight characteristics, as they are covered under mission points. However, if the general flight performance of the entry is adversely affected by the failure of one or more of these aspects, general flight points may be deducted.

### **50.15 Damage**

Damage must be judged cumulatively with each flight, assessed from the judged condition of the entry to the condition presented to the judge post-flight. Damage caused by catastrophic failure must not be counted against the entry's flight points.

### **50.16 Scoring**

Sport Scale must be scored as follows: the entry's static points are added to its flight points. The contestant receiving the highest score is the winner.

## DRAFT

### 51 SCALE

#### 51.1 Scope

Scale comprises a single event open to any model rocket that is a true scale model of an existing or historical guided missile, rocket vehicle, or space vehicle, that has flown under rocket power. The purpose of this event is to produce an accurate, flying replica of a real rocket powered vehicle that is judged for craftsmanship in construction, finish, and flight performance.

#### 51.2 Exclusions

Prototypes of amateur rockets or missiles are specifically excluded from this competition, except when the prototype is of obvious historical significance.

#### 51.3 Non-Flying Prototypes

Entries in Scale may model a non-flying or inert prototype if its configuration is representative of a historical vehicle configuration.

#### 51.4 Plastic Models

Entries that qualify for Plastic Model Conversion per **Rule 55** are specifically excluded from this event. Parts from commercial plastic kits may be used provided this is pointed out in the data presented with the entry for judging.

#### 51.5 Kits

Commercially available flying scale model rocket kits are acceptable for entry only if accompanied by additional substantiating data other than that contained in the kit. The contestant must be responsible for ascertaining the correct scale qualities of the kit, and must present satisfactory evidence that the entry is to the correct scale.

#### 51.6 Serial-Numbered Prototype

The contestant should model one particular serial-numbered prototype (or round), except in the case where the prototype is in such extensive mass production that no single individual vehicle can be singled out for ~~scaling~~ entry. However, the contestant must make every reasonable attempt to model a specific prototype, since any generalization may detract from his/her score.

#### 51.7 Data

The contestant must supply data to substantiate his/her entry's adherence to scale in dimension, shape, color, and paint pattern.

#### 51.8 Stages

If the prototype is a multi-stage vehicle, the entry may be designed so that some or all of the upper stages are inoperable dummies. However, an entry of one or more of the upper stages of a multi-stage vehicle may not be entered without the operable lower stage(s) unless specific data is furnished to prove to the judges that the upper stage(s) has been flown.

#### 51.9 Transparent Fins

Transparent fins are allowed for the purpose of stabilizing an entry. The transparent fins and their attachment must be judged for craftsmanship along with the entry.

#### 51.10 Flight

If the entry does not make a safe, stable flight, it must be disqualified.

#### 51.11 Static Judging

##### 51.11.1 Scale Data: 50 points

Points must be awarded for data that exceeds the minimum requirements; however, data will be judged on quality, not quantity. All data presented should apply to the particular prototype that is being modeled. Minimum allowable data consists of:

- Scale factor
- Overall length
- Significant body diameter(s)
- Nose cone length
- Fin length and width (if applicable to the prototype)
- Length of transition pieces (if applicable)
- Color pattern (documented either in writing or by photographs)
- One clear photograph, halftone, or photo-reproduction
- For at least all required dimensions listed above, both the actual (prototype) dimensions and the scaled (model) dimensions presented in a table or on a drawing

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Dimensional data must be from an accurate source, such as magazines, books, the prototype manufacturer's specifications or data sheets, and so on. Dimensions for which explicit data cannot be found may be calculated by proportioning drawings or photos; dimensions obtained in this manner must be so identified in the data. Drawings prepared by the contestant to facilitate judging must be accompanied by substantiating data or drawings. Photographs from any source are acceptable. The photograph requirement may be satisfied by reproductions of pictures from books and other printed material. In addition, the contestant should make an effort to include in a table or drawing, any additional dimensions (both prototype and scaled) that he/she has tried to scale. Points may be deducted if the scale data is not pertinent to the prototype. An entry must be judged against the data presented.

### **51.11.2 Accuracy of Major Dimensions: 200 points**

Major dimensions include those required per **Rule 50.11.1**, as well as dimensions of sub-assemblies, location of details, location of paint pattern, and so on. At least five dimensions must be checked for accuracy. The judges must measure the model dimensions to a tolerance of  $\pm 0.5$  millimeters. Points must be deducted according to the percentage of deviation from the scale dimensions. Model features so small that they cannot be measured should appear scale-like.

### **51.11.3 Accuracy of Color and Markings: 100 points**

The color, surface finish, and texture of the entry should conform to the data and photographs. Lettering and insignia, if applicable, should be scaled and properly reproduced. Paint patterns should be properly proportioned.

### **51.11.4 Appearance of Details: 50 points**

Details such as antennas, rivets, cover plates, bolts, prototype imperfections, and so on that appear in the data should be present and accurately scaled.

### **51.11.5 Craftsmanship: 300 points**

Points will be awarded for neatness, care in construction, craftsmanship of details, and quality of finish. Consideration should be given to the invisibility of body seams and wood grain, and the accurate reproduction of curved lines and edges. The finish should be free of fingerprints, brush strokes, runs, or other unintentional blemishes, and the paint pattern should be well defined.

### **51.11.6 Degree of Difficulty: 200 points**

Points must be awarded according to the difficulty experienced by the contestant in building the model and adapting it for flight. Consideration should be given to whether the entry was built from a kit. Points should be awarded for parts and details that were individually constructed by the contestant. To facilitate judging, the contestant should point out difficult assemblies or construction problems in his/her data.

## **51.12 Flight Characteristics: 300 points**

### **51.12.1 Mission: 200 points**

Mission points are awarded for the entry's appropriate and scale-like operation of the prototype during flight. Examples of such operations are staging, simulated cloud seeding, operation of electronic payload, and smoke ejection. Any such operation that does not comply with the safety standards set forth in this Sporting Code must be disqualified. The RSO is the only official who may rule on the safety of the entry's operation.

### **51.12.2 General Flight: 100 points**

General flight points are awarded for proper operation of the entry during flight, including launch, lack of misfires, stability, recovery, and lack of damage on landing. No consideration should be given to staging or scale-like flight characteristics, as they are covered under mission points. However, if the general flight performance of the entry is adversely affected by the failure of one or more of these aspects, general flight points may be deducted.

## **51.13 Damage**

Damage must be judged cumulatively with each flight, assessed from the judged condition of the entry to the condition presented to the judge post-flight. Damage caused by catastrophic failure must not be counted against the entry's flight points.

## **51.14 Scoring**

Scale must be scored as follows: the entry's static points added to its flight points. The contestant receiving the highest score is the winner.

# DRAFT

## 52 SCALE ALTITUDE

### 52.1 Scope

Scale Altitude comprises six events open to any model rocket that is a true scale model of an existing or historical guided missile, rocket vehicle, or space vehicle, that has flown under rocket power. The purpose of this event is to produce an accurate, flying replica of a real rocket powered vehicle that is judged for craftsmanship in construction, finish, flight performance, and achieving the greatest possible altitude

### 52.2 Judging

An entry must comply with the rules of Scale per **Rule 51**.

### 52.3 Scoring

Scale Altitude must be scored as follows: the entry's static points must be combined with its flight points and added to the entry's altitude in meters. The contestant achieving the highest score must be declared the winner.

### 52.4 Classes

This event is divided into classes based on the maximum permissible total impulse of the motor(s). The following classes of Scale Altitude are established:

Motor Class
1/8A
1/4A
1/2A
A
B
C

## 53 CONCEPT SPORT SCALE

### 53.1 Scope

Concept Sport Scale comprises a single event that is a variation of Sport Scale. The purpose of this event is to produce a flying replica of either a fictional or a proposed, but un-flown rocket vehicle. Entries that qualify for Sport Scale per **Rule 50** are excluded from this event.

### 53.2 Exclusions

Subjects excluded from this event:

- Vehicles from unpublished fiction and amateur films
- Science fiction or futuristic designs published by model rocketry manufacturers, publications, or organizations specifically for flying model construction
- Science fiction themed rocket kits that do not appear in actual works of science fiction or rockets in generic science fiction illustrations
- Generic illustrations of a class of proposed vehicle rather than a specific program
- Real prototypes that appeared in science fiction, unless so modified that they could not be flown in Sport Scale
- Amateur rockets and missiles, except when the prototype is of obvious historical significance

### 53.3 Plastic Models

Entries that qualify for Plastic Model Conversion per **Rule 55** are excluded from this event.

### 53.4 Data

The contestant must supply data to substantiate the model's adherence in shape, color, and paint pattern. Data must derive from the work of science fiction or from an established aerospace professional, institution or company proposal.

For fictional prototypes, photos and art extracted from the work of science fiction, or from advertising or publicity for the work are acceptable. Photos and drawings of props used in filming of works of science fiction are acceptable. If the original work did not depict the vehicle in color, colors of contemporary vehicles may be used to suggest a scheme consistent with the original work.

For proposed prototypes, photos and drawings of models produced by an established aerospace professional, institution, or company is acceptable. If color or marking data is not available, the contestant may use document markings of a similarly proposed or flown design from the same era. Drawings or photographs depicting flying model kits are not acceptable.

## **DRAFT**

### **53.5 Flight**

If the entry does not make a safe, stable flight, it must be disqualified.

### **53.6 Static Judging**

#### **53.6.1 Similarity of Outline: 200 points**

The contestant is required to submit data to substantiate his/her entry's visual resemblance to the prototype.

#### **53.6.2 Finish, Color, and Markings: 200 points**

The contestant should submit data to substantiate his/her model's fidelity to the prototype. Any entry not accompanied by data substantiating the finish, color, and markings of the prototype must be given zero points for Finish, Color and Markings.

#### **53.6.3 Degree of Difficulty: 100 points**

Points must be awarded according to the difficulty experienced by the contestant in building the model and adapting it for flight. Consideration should be given to whether the entry was built from a kit. Points should be awarded for parts and details that were individually constructed by the contestant. To facilitate judging, the contestant should point out difficult assemblies or construction problems in his/her data

#### **53.6.4 Craftsmanship: 300 points**

Points will be awarded for neatness, care in construction, craftsmanship of details, and quality of finish. Consideration should be given to the invisibility of body seams and wood grain, and the accurate reproduction of curved lines and edges. The finish should be free of fingerprints, brush strokes, runs, or other unintentional blemishes, and the paint pattern should be well defined.

### **53.7 Flight Characteristics: 300 points**

#### **53.7.1 Mission: 200 points**

Mission points are awarded for the entry's appropriate and scale-like operation of the prototype during flight. Any such operation that does not comply with the safety standards set forth in this Sporting Code must be disqualified. The RSO is the only official who may rule on the safety of the entry's operation.

#### **53.7.2 General Flight: 100 points**

General flight points are awarded for proper operation of the entry during flight, including launch, lack of misfires, stability, recovery, and lack of damage on landing. No consideration should be given to staging or scale-like flight characteristics, as they are covered under mission points. However, if the general flight performance of the entry is adversely affected by the failure of one or more of these aspects, general flight points may be deducted.

### **53.8 Damage**

Damage must be judged cumulatively with each flight, assessed from the judged condition of the entry to the condition presented to the judge post-flight. Damage caused by catastrophic failure must not be counted against the entry's flight points.

### **53.9 Scoring**

Concept Sport Scale must be scored as follows: the entry's static points are added to its flight points. The contestant receiving the highest score is the winner.

## **54 CLASSIC MODEL**

### **54.1 Scope**

Classic Model comprises a single event that emphasizes craftsmanship while remembering the historic legacy of model rocketry. The purpose of this event is to produce a flying replica of a classic model rocket kit. The model must have been available for sale in kit form prior to 1990 and the builder must provide documentation to support this. Models that are still in production can be entered in this event, including models that are reproductions of classic kits. However, entries must be built and finished to represent a version of the model available for sale as a kit prior to 1990. The entry may be an up or down sized version of the original model.

### **54.2 Exclusions**

Models that are reproductions of scale model rocket kits that would be eligible for competition in Sport Scale, Scale, Concept Sport Scale, and Plastic Model Conversion are excluded from this event per **Rules 50, 51, 53, and 55**.

### **54.3 Data**

The contestant must supply data to substantiate the model's adherence to shape, color, and paint pattern. Data must be derived from a catalog, package insert and/or the kit's instruction sheet.



## DRAFT

### 54.4 Judging

Entries must be judged for static points in the following manner: Reproduction qualities are to be judged from a distance of at least one meter from the model. Judges may then closely examine the model to judge it for craftsmanship.

### 54.5 Flight.

If the entry does not make a safe, stable flight, the entry must be disqualified.

### 54.6 Static Judging

#### 54.6.1 Similarity of Outline: 200 points

The contestant is required to submit data to substantiate his/her entry's visual resemblance to the prototype.

#### 54.6.2 Finish, Color, and Markings: 200 points

The contestant should submit data to substantiate his/her model's fidelity to the prototype. Any entry not accompanied by data substantiating the finish, color, and markings of the prototype must be given zero points for Finish, Color and Markings.

#### 54.6.3 Degree of Difficulty: 100 points

Points must be awarded according to the difficulty experienced by the contestant in building the model and adapting it for flight. Consideration should be given to whether the entry was built from a kit. Points should be awarded for parts and details that were individually constructed by the contestant. To facilitate judging, the contestant should point out difficult assemblies or construction problems in his/her data

#### 54.6.4 Craftsmanship: 300 points

Points will be awarded for neatness, care in construction, craftsmanship of details, and quality of finish. Consideration should be given to the invisibility of body seams and wood grain, and the accurate reproduction of curved lines and edges. The finish should be free of fingerprints, brush strokes, runs, or other unintentional blemishes, and the paint pattern should be well defined.

### 54.7 Flight Characteristics: 300 points

Points are awarded for proper operation of the model during flight, including launch, lack of misfires, stability, recovery, and lack of damage on landing. Consideration should be given to clustering, staging, glide recovery, or flight characteristics that mimic the operation of the classic rocket kit prototype. However, if the general flight performance of the model is adversely affected by the failure of one or more of these aspects, points may be deducted from Flight Characteristics.

### 54.8 Damage

Damage must be judged cumulatively with each flight, assessed from the judged condition of the entry to the condition presented to the judge post-flight. Damage caused by catastrophic failure must not be counted against the entry's flight points.

### 54.9 Scoring

Classic Model must be scored as follows: the entry's static points are added to its flight points. The contestant receiving the highest score is the winner

## 55 PLASTIC MODEL CONVERSION

### 55.1 Scope

Plastic Model Conversion comprises a single event open to entries that have been assembled from plastic or resin model kits of guided missiles, rocket vehicles, space vehicles, or jets whose engines are in or spaced apart to the rear of the fuselage. The entry must be one that the manufacturer did not produce as a model to be flown; and it must be modified for flight by the contestant. The purpose of this event is to produce a flying model from a kit originally intended as a static model and that shows craftsmanship in construction, finish, and flight performance. The entry must be representative of the kit chosen, as designed by the manufacturer.

### 55.2 Construction

Modifications necessary to convert the model for flight are allowed. However, the basic structure and configuration of the entry must be as designed by the manufacturer of the kit. Details may be obtained from other plastic kits, or constructed by the contestant. Components necessary to convert the model for flight may be made of any safe material and obtained from any source.

### 55.3 Transparent Fins

Transparent fins are allowed for the purpose of stabilizing an entry. The transparent fins and their attachment must be judged for craftsmanship along with the entry.

## **DRAFT**

### **55.4 Flight**

If the entry does not make a safe, stable flight, it must be disqualified.

### **55.5 Static Judging**

#### **55.5.1 Craftsmanship: 500 points**

Points are awarded in the following categories:

- Neatness and care in construction: 150 points
- Craftsmanship of details: 100 points
- Degree and quality of finish: 100 points
- General appearance: 150 points

#### **55.5.2 Degree of Difficulty: 300 points**

Points are awarded according to the difficulty experienced by the contestant in building the model, according to the following schedule:

- Asymmetries inherent in the model: 40 points
- Intricacy of paint pattern: 80 points
- Degree of detailing required: 80 points. This category includes such items as the number of external or visible internal components and details that had to be added or reconstructed individually by the contestant.
- Difficulty of stabilizing model: 50 points
- Difficulty of adapting the model for flight: 50 points

The judges should consider that entries exhibiting an equal degree of craftsmanship might have required unequal amounts of time and effort because of the uniqueness of the kit. To facilitate judging, the contestant should point out difficult assemblies or construction problems in a note to the judges.

### **55.6 Flight Characteristics: 300 points**

#### **55.6.1 Mission: 200 points**

Mission points are awarded for the entry's appropriate and scale-like operation of the prototype during flight. Examples of such operations are staging, simulated cloud seeding, operation of electronic payload, and smoke ejection. Any such operation that does not comply with the safety standards set forth in this Sporting Code must be disqualified. The RSO is the only official who may rule on the safety of the entry's operation.

#### **55.6.2 General Flight: 100 points**

General flight points are awarded for proper operation of the entry during flight, including launch, lack of misfires, stability, recovery, and lack of damage on landing. No consideration should be given to staging or scale-like flight characteristics, as they are covered under mission points. However, if the general flight performance of the entry is adversely affected by the failure of one or more of these aspects, general flight points may be deducted.

### **55.7 Damage**

Damage must be judged cumulatively with each flight, assessed from the judged condition of the entry to the condition presented to the judge post-flight. Damage caused by catastrophic failure must not be counted against the entry's flight points.

### **55.8 Scoring**

Plastic Model Conversion must be scored as follows: the entry's static points are added to its flight points. The contestant receiving the highest score is the winner.

## **56 – 59 Reserved for future events**

## MISCELLANEOUS EVENTS

### 60 SPOT LANDING

#### 60.1 Scope

Spot Landing comprises three events open to single-staged entries. The purpose of this event is to land the entry so that the tip of its nose cone is closest to a predetermined spot on the ground.

#### 60.2 Control

The entry may not be remotely controlled or remotely guided.

#### 60.3 Recovery

Each entry must fully comply with [Rule 3.5](#).

#### 60.4 Separation

An entry must not separate into two or more unattached pieces.

#### 60.5 Number of Flights

Each entry must be allowed only one official flight.

#### 60.6 Practice

Practice flights are not allowed on the day the event is flown.

#### 60.7 Scoring

Spot Landing must be scored as follows: the distance between the tip of the entry's nose cone (or motor nozzle if there is no nose cone) and the target spot must be measured by the officials in meters to the nearest centimeter.

If the tip of the nose cone lands more than 50 meters from the spot, the entry must not place, but may receive flight points, otherwise, the entry must be given a score equal to its distance in meters, measured to the nearest centimeter. The contestant achieving the smallest score must be the winner.

#### 60.8 Classes

The three classes of Spot Landing are:

##### 60.8.1 Open Spot Landing

Any type of recovery allowed.

##### 60.8.2 Parachute Spot Landing

Each entry must fully and completely deploy a parachute, with dimensions no less than 15 centimeters square or 15 centimeters in diameter for recovery purposes.

##### 60.8.3 Streamer Spot Landing

Each entry must fully and completely deploy a streamer with dimensions not less than 25 millimeters by 300 millimeters.

#### 60.9 Flight Points

Any entry that lands such that it cannot be measured or found may only be awarded flight points.

### 61 PRECISION PAYLOAD

#### 61.1 Scope

Precision Payload comprises three events open to single-stage model rockets that totally enclose the specified payload(s) for each class. The purpose of this event is to accurately predict both the altitude and duration that a model will attain while carrying a payload of given mass and dimensions and recovering the payload without damage.

#### 61.2 Payload Types

Precision Payload specifies two payload types:

- Standard NAR Payload, a non-metallic cylinder as described in [Rule 24.3](#)
- Fragile Payload, a raw large egg as described in [Rule 25.3](#)

#### 61.3 Entry Requirements

The entry must not separate into multiple parts per [Rule 15.2](#). No controlling device may be used to regulate flight altitude or duration. A contestant may submit only one entry. In case of catastrophic failure the contestant may enter a replacement entry per [Rule 11.4](#).

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## 61.4 Classes

### 61.4.1 Precision Standard Payload

The entry must carry one totally enclosed standard NAR Payload to a target altitude of 150 meters and target duration of 40 seconds.

### 61.4.2 Precision Fragile Payload

The entry must carry one totally enclosed raw large egg to a target altitude of 300 meters and target duration of 60 seconds.

### 61.4.3 Precision Dual Fragile Payload

The entry must carry two totally enclosed raw large eggs to a target altitude of 500 meters and target duration of 90 seconds.

## 61.5 Scoring

Unless otherwise noted, altitude data per [Rule 14](#) and timing data provisions of [Rule 15](#) apply. The score for each qualified flight must be 1,000 points minus the altitude and duration errors. The altitude error is the absolute difference between the recorded altitude and the target altitude in meters. The duration error is three times the absolute difference between the recorded duration and the target duration in seconds. The formula for computing a flight score is:

$$S = 1000 - \text{ABS}(TA - A) - 3 * \text{ABS}(TD - D)$$

Where:

S is the score for the flight

A is the flight altitude in meters

TA is the target altitude in meters

D is the flight duration in seconds

TD is the target duration in seconds

ABS(...) is the absolute-value function

The score for the event must be the sum of the scores for up to two official flights. The highest event score is the winner.

## 61.6 Return

The entry must be returned after each final flight to verify that the payload(s) were retained within the entry.

## 61.7 Disqualification

A contest official must inspect the payload(s) after each flight. If the official cannot examine the payload(s), the flight is disqualified. If the contestant removes the payload(s) in the absence of an official, the flight is disqualified. The official may require that the standard NAR payload(s) be rechecked and must disqualify the flight if it no longer complies with [Rule 24.3](#). If the fragile payload(s) are broken or cracked, the flight is disqualified. Any entry that is caught or cushioned prior to landing must be disqualified.

## 62 – 70 Reserved for future events

**Catastrophic Failure:** A failure that, in the opinion of the judges, is not due to or caused by improper design, construction, or preflight preparations of the model. This can include a malfunction of the model rocket motor, a model being run over by a car or stolen, an irreversible error by a meet official such as a lost flight card, or a similar occurrence beyond the control of a contestant. This does not include improper assembly of a reloadable motor. A flight experiencing a catastrophic failure may or may not be declared an official flight. See [Rule 11.4](#)

**Contestant:** A NAR member or a team composed of NAR members entered in a sanctioned competition.

**Entry:** A model rocket entered in sanctioned competition. A scale entry must also include its scale data.

**First Motion:** The instant at which a model begins to move upward under the thrust provided by a model rocket motor.

**Gross Launching Mass:** The mass of a model rocket in flight condition, including fully loaded motor(s), but not including launching devices or auxiliary equipment which does not become airborne with the model.

**Misfire:** Failure of a model to make an official flight when its launch is attempted. Failure to launch caused by a malfunction of a meet-provided launch system must not be considered a misfire.

**NAR Contest Board:** Refers to the National Contest Board of the National Association of Rocketry.

**Pitch Axis:** An imaginary reference line through a model about which the model might rotate. On a typical model rocket, this axis runs side-ways through the body at the center of gravity. Since a model rocket is usually symmetrical around the roll axis, the pitch and yaw axes are usually indistinguishable. On a typical glider, the pitch axis runs side-ways through the fuselage or boom in such a manner that if the model, during gliding flight, were to rotate about the pitch axis, its nose would move up or down.

**Pop/Fly-away Lug:** A launch lug or other fitting that guides the rocket during launch, but remains connected to the launcher, or falls from the model immediately after leaving the launcher.

**Roll Axis:** An imaginary reference line through a model about which the model may rotate without changing its direction of travel. On a typical model rocket this axis runs down the length of the model, from the center of the nose cone through the center of the motor nozzle. On a typical glider, it runs down the fuselage or boom, from the nose to the tail, in such a manner that if the model, during gliding flight, were to rotate about its roll axis, one wing tip would rise while the other fell, and the model would bank to one side.

**Safety Ruling:** A ruling by a contest official denying an entry the opportunity to fly due to considered judgment that the model would be unsafe in flight. It is also a ruling that disqualifies a model which flies in an unsafe manner.

**Stage:** Any portion or portions of the model airframe containing one or more model rocket motors. An unpowered portion of the model is not considered a stage. Clustered motors that ignite at the same time, but may be contained in multiple airframe portions such as strap-on boosters that separate in flight (i.e., Delta, Soyuz), are considered to be one stage. Upper stages must involve ignition and separation from the airframe in order to count as an additional stage. Air-starting of one or more additional motors, which do not involve separation from the model, is not considered to be an additional stage.

**Yaw Axis:** An imaginary reference line through a model about which the model might rotate. On a typical model rocket, this axis runs sideways through the body at the center of gravity (see pitch axis). On a typical glider, the yaw axis runs vertically through the fuselage or boom in such a manner that if the model, during gliding flight, were to rotate about the yaw axis, its nose would move left or right.

**APPENDIX B: ABBREVIATIONS****B.1 OFFICIALS and ORGANIZATIONS**

CD	Contest Director
FAI	Federation Aeronautique Internationale
LCO	Launch Control Officer
LD	Launch Director
SCO	Safety Check Officer
NAR	National Association of Rocketry
NARAM	National Association of Rocketry Annual Meet
NFPA	National Fire Protection Agency
RSO	Range Safety Officer

**B.2 EVENTS**

ALT	Altitude	PRA	Predicted Altitude
BG	Boost Glider Duration	PRD	Predicted Duration
CA	Cluster Altitude	PSL	Parachute Spot Landing
CM	Classic Model	RDA	Random Altitude
CSC	Concept Sport Scale	RDD	Random Duration
DEA	Dual Egg Lofting Altitude	RG	Rocket Glider Duration
DED	Dual Egg Lofting Duration	SC	Scale
DFP	Dual Fragile Precision Payload	SCA	Scale Altitude
ELA	Egg Lofting Altitude	SD	Streamer Duration
ELD	Egg Lofting Duration	SPP	Standard Precision Payload
FPP	Fragile Precision Payload	SPSC	Sport Scale
FW	Flex Wing Boost Glider Duration	SRA	Superroc Altitude
HD	Helicopter Duration	SRD	Superroc Duration
OSL	Open Spot Landing	SSL	Streamer Spot Landing
PAY	Payload	STA	Set Altitude
PD	Parachute Duration	STD	Set Duration
PMC	Plastic Model Conversion		

**B.3 SCORING and DISQUALIFICATIONS**

CAT	Catastrophic Failure (CATO)
DNF	Did Not Fly
DQ	Disqualified
EGG	Egg Broken
EJ	Ejected Motor
FP	Flight Points
IMP	Impound
LUB*	Loop Under Boost
LST	Lost by Timers
MAX	Maximum Time
NR	No Return
ND	No Data (when altimeter data is not available)
NC	Track Not Closed
NG	No Glide
NDP	No Deployment
NVB*	Non-Vertical Boost
PS*	Pod Separation (from glider while under power)
ROT	No Rotation
SEP	Separation
SHR*	Shred
SF	Structural Failure
TL	Track Lost
UNS*	Unsafe
UST*	Unstable

\* Indicates that this is considered a disqualification for safety reasons

## APPENDIX C: RETURN/SCORING GUIDE

Event	Applicable Section #	Return Required SQS*	Return Required NARAM*	Rule 10.4 Applies?	Scoring Method
Altitude	20	No	No	N/A	Best single qualified flight
Boost Glider Duration	36	No	Yes	Yes	Sum of qualified flights**
Classic Model	54	N/A	No	N/A	See 54.9
Cluster Altitude	23	N/A	Yes	No	Best single qualified flight
Concept Sport Scale	53	N/A	No	N/A	See 53.9
Dual Egg Lofting Altitude	26	N/A	Yes	No	Best single qualified flight
Dual Egg Lofting Duration	35	N/A	Yes	No	Best single qualified flight
Dual Fragile Precision Payload	61	N/A	Yes	No	See 61.5
Egg Lofting Altitude	25	Yes	Yes	No	Best single qualified flight
Egg Lofting Duration	34	Yes	Yes	No	Best single qualified flight
Flex Wing Glider Duration	38	N/A	Yes	Yes	Sum of qualified flights**
Fragile Precision Payload	61	N/A	Yes	No	See 61.5
Helicopter Duration	32	No	Yes	Yes	Sum of qualified flights**
Parachute Duration	30	No	Yes	Yes	Sum of qualified flights**
Payload	25	Yes	Yes	No	Best single qualified flight
Plastic Model Conversion	55	N/A	No	N/A	See 55.8
Precision Altitude	22	N/A	No	N/A	Only one official flight permitted
Precision Duration	39	N/A	No	N/A	Only one official flight permitted
Random Altitude	22	N/A	No	N/A	Only one official flight permitted
Random Duration	39	N/A	No	N/A	Only one official flight permitted
Scale	51	N/A	No	N/A	See 51.15
Scale Altitude	52	N/A	No	N/A	See 52.3
Sport Scale	50	N/A	No	N/A	See 50.16
Spot Landing	60	N/A	No	N/A	Only one official flight permitted
Standard Precision Payload	61	N/A	Yes	No	See 61.5
Streamer Duration	31	No	Yes	Yes	Sum of qualified flights**
Superroc Altitude	21	No	No	N/A	Best single qualified flight
Superroc Duration	33	N/A	Yes	Yes	Sum of qualified flights**
Multi-Round Duration	All MR Events	N/A	No	N/A	Sum of 3 (or more) flights

\* Any entry may require return if a safety or rule adherence question exists [Refer to Rule 9.10](#)

\*\* Refer to [Rule 10.1](#)

N/A Not Applicable

## APPENDIX D: Notice of Rulemaking Procedures

It should be noted section "D" of the 2017 sporting code can only be changed by the BOT.

Model rocketry contests in the United States are governed by the U.S. Model Rocket Sporting Code, a booklet known as The Pink Book. The rules in the Pink Book are revised every year. The procedures published here explain how the rules are rewritten, and how you can have a voice in the process. The NAR Contest Board oversees the project. If you have questions about the Pink Book revision process, contact the NAR Rules Revision Chairman.

### D.1 Purpose

The purpose of the Rules Proposal (RP) Procedures is to assist the NAR Contest Board in monitoring and accomplishing rules revisions through an open process that encourages member participation and feedback. The responsibility of the Contest Board is to provide the U.S. Model Rocket Sporting Code standards and policy that will promote the healthy development of the competitive hobby of model rocketry.

### D.2 General Considerations for Rules Proposals

Proposals submitted in the RP process should be reviewed by all interested members for ambiguities in scoring, judging, and interpretation. Contest Board members should openly discuss rule change proposals with as many members as possible to obtain input on the merits or faults in the proposed new rules. Care should be taken by members proposing and reviewing rule change proposals to avoid generating rules that overlap or conflict with general rules covering all contest events.

### D.3 Analysis of Proposals

The following are example criteria the Contest Board may use in analyzing each new rules proposal:

- Manufacturing - Will current models or equipment tend to become obsolete or no longer useful?
- Protests - Will the change tend to eliminate a source of protests or are protests more likely?
- Model Processing Time - Will the change tend to increase or decrease time required to process models at a meet?
- Designs - Will the builder be given more or less freedom in design?
- Contests - Will the time and effort required to conduct a contest be increased or decreased?
- Present models - Will a contestant be able to effectively compete with current models, or will the contestant have to build new ones?
- Effect on Competition - Will the net effect of the proposed change be to encourage or discourage contest participation?
- Effect on Skill Level - Will the contestant be encouraged to develop new skills and construction techniques?

### D.4 Schedule

These procedures provide for a one-year schedule, which begins on September 1 of each year, for the review and adoption of Rules Proposals.

### D.5 Advisory Committees to the Contest Board

The National Contest Board Chairman may appoint advisory committee(s) and a chair to assist the Contest Board in the development of a RP. These committees will operate in accordance with the Contest Board Procedures.

The Contest Board Chair will strive to achieve maximum utilization of existing special interest groups or individuals when selecting advisory committee members. The Contest Board Chair will determine the tenure of advisory committees. The National Contest Board Chair will appoint a Rules Revision Chair to oversee the RP process.

### D.6 Proposal Preparation and Submittal

Any NAR member may submit an RP by filing a completed Rules Change Proposal Form with the Rules Revision Chairman (RRC). Upon receipt of the proposal it will be reviewed by the RRC to assure that it has been properly submitted (clearly stated proposal; name, address, and signature of proposer). If the proposal, as submitted, does not pass the review, then it will be returned to the author along with a checklist explaining deficiencies and proper filing procedures. The RRC will process the submittal in a timely manner and will send the author an acknowledgment of receipt within 30 days.

### D.7 Types of Proposals

There are two basic types of proposals:

- REGULAR RULES REVISION PROPOSAL - May be filed by any NAR member. If adopted, the new rules go into effect with the next edition of the Pink Book.
- SAFETY, EMERGENCY, URGENT OR INTERPRETATION PROPOSALS - May be filed by any NAR member, but because of the relatively longer time required to get a rule change through the normal process, there are alternate paths for revision, which may be enacted quickly if the situation dictates.



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The RRC will determine which of these two categories a proposal should fall into, based on the content of the proposal and the perceived dangers of delaying action on the proposal. Proposals addressing problems that might result in the loss of life, injury, or property damage will be given SAFETY status. The intent of SAFETY proposals is to quickly modify a rule to create a safer flying environment.

Proposals addressing problems that might affect the integrity of the national competition structure will be given EMERGENCY status. The intent of an EMERGENCY proposal is to quickly modify an existing or proposed rule to prevent a significant disruption to the Contest Year, National Championships, or to otherwise ensure all competitors can compete in a fair manner. EMERGENCY proposals may only be used when the time-sensitive nature of the issue does not allow the proposal to be processed under URGENT or REGULAR rules change proposals.

An URGENT proposal is one that is neither an interpretation nor is it necessarily related to safety. It will constitute an actual change in the rules and therefore the justification behind this type of proposal must be scrutinized, as always, to prevent abuse.

An INTERPRETATION proposal will not alter an existing rule but would provide information designed to clarify it. It deals with interpretations of the rules, or ways in which the rules are applied in the field. URGENT and INTERPRETATION proposals will be dealt with as described in F.8.B below.

### D.8 General Procedure or Safety, Emergency, Urgent and Interpretation Proposals

#### A. SAFETY or EMERGENCY PROPOSALS

Proposals may be put in force immediately if the National Contest Board Chairman, Rules Revision Chairman and the President concur that the action is necessary. Notice of the action and its rationale behind will be communicated to NAR members. Any SAFETY or EMERGENCY proposal enacted as set forth above will remain in effect under temporary status until acted upon by the Board of Trustees.

#### B. URGENT or INTERPRETATION PROPOSALS

Proposals may be put in force immediately if the National Contest Board Chairman, Regional Contest Board Chairman, and the Rules Revision Chairman concur that the action is necessary. Notice of the action and its rationale behind will be communicated to NAR members.

Situations judged by the RRC as cases where rules do not seem to cover areas they should, may be applied to more than would be intended, or seem to lack the logic and/or intent, and do not qualify under part (A), and require immediate action may be enacted immediately based upon a 2/3 vote in favor of the Contest Board listed above. When an RP illustrates an issue that requires immediate action and is not sufficient as written (e.g., it does not cover the areas it should, may be applied to more than one section of the Pink Book, or lack complete logic to fully implement as written), the RRC can submit it to the Contest Board for review, changes and ratification by a 2/3 vote of the group consisting of the Contest Board Chair, the RRC, and the NAR President.

If the proposal does not receive a majority approval for immediate action, it will be retained and is eligible for consideration as a Regular Rules revision in the normal one-year cycle. All requests for SAFETY, EMERGENCY, INTERPRETATION or URGENT rules must be submitted on the standard proposal form or a facsimile that contains all of the required information. All SAFETY, EMERGENCY, INTERPRETATION or URGENT rules adopted by the National Contest Board will be included in the next printing of the Pink Book.

### D.9 General Procedure or Regular Rules Revision Proposals

Upon receipt of a completed Rules Change Proposal Form, the RRC must review the proposal for acceptability. The RRC will ensure that the intent is clearly stated and that the language and format is suitable for inclusion in the Pink Book. The proposed rule revision must not result in a rules revision that violates the Safety Code or general safety guidelines. If the new proposal affects more than one rule or event, then the author must clearly address each of the changes necessary to implement the proposal. If the proposal is deficient in any of these areas, then the RRC may return it to the author with comments or suggestions for presenting it properly. The RRC will process the submittal in a timely manner and will send the author an acknowledgment of receipt within 30 days.

### D.10 Voting and Vote Tabulation for Regular Rules Revisions

The reviewed proposals will be communicated to NAR members and will be placed in the normal cycle for Regular Rules revisions. The Final Vote will be conducted by the RRC through an electronic survey (E-Survey) ballot sent to the membership. The E-Survey will contain a listing of the proposals having passed the Initial Vote. It must contain web links to the full original RCP submission and to any public comments about the RCP. It must state the deadline for voting. The deadline must be set so that it is no less than 30 days after the E-Survey has been sent to the membership.

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The communication of a regular rules revision for comment will occur no less than three (3) months prior to the Final E-Survey so that there is ample time for the membership to discuss the merits of each proposal.

Every NAR member is entitled to one vote. Only votes cast on the official E-Survey will be tabulated. Each survey vote may be submitted only by voting members and the member will have to enter his/her NAR license number. E-Survey votes can not be submitted after the deadline. The RRC will review the votes cast for and against each individual proposal. Each proposal that receives two-thirds (66.7%) or greater "Yes" votes will be deemed to have been approved and will be included in the upcoming Pink Book revision.

### **D.11 Proposal Editing**

To encourage member participation and discussion, the RRC or designee must present the proposals received prior to the June 30<sup>th</sup> deadline in a Contest Forum Meeting at NARAM following the close of that proposal cycle. Rule change proposals will be communicated to NAR members prior to NARAM. Members will be encouraged to participate in the NARAM Contest Forum Meeting or, if unable to attend, to submit comments to the RRC. The purpose of all of the member participation efforts is to allow for maximum input and suggestions for changes that increase the quality of the proposed revision.

The RRC may, at any time prior to a vote, edit proposal wording for purposes of clarity or to minimize misunderstandings and ambiguities, where the RRC deems it necessary. Whenever possible, editing should be done early in the rulemaking process. The RRC must not edit the proposal in such a manner that its intent is altered. The RRC will inform the author in writing of the revised wording in a timely manner so that any potential conflicts will be resolved prior to publication deadlines. Should the member who submitted the proposed rule change deem that the intent has of the proposed rule has changed, and editing revisions cannot be resolved with the RRC, then the proposed rule change as written by the submitting member will be offered to the members for a vote.

### **D.12 Proposal Withdrawal**

The author of a proposal may request for withdrawal of the proposal with the RRC.

### **D.13 Revisions to Rules Proposal Procedure**

Revisions to the Rules Proposal procedures must require approval by the NAR Board of Trustees.

The suggested text of any proposed revision(s) must be submitted to the RRC for communication to NAR members at least two (2) months prior to a NAR Board Meeting so that the Board might consider relevant input from the NAR membership.

## **APPENDIX E: Altimeters Approved for Contest Use**

TBD