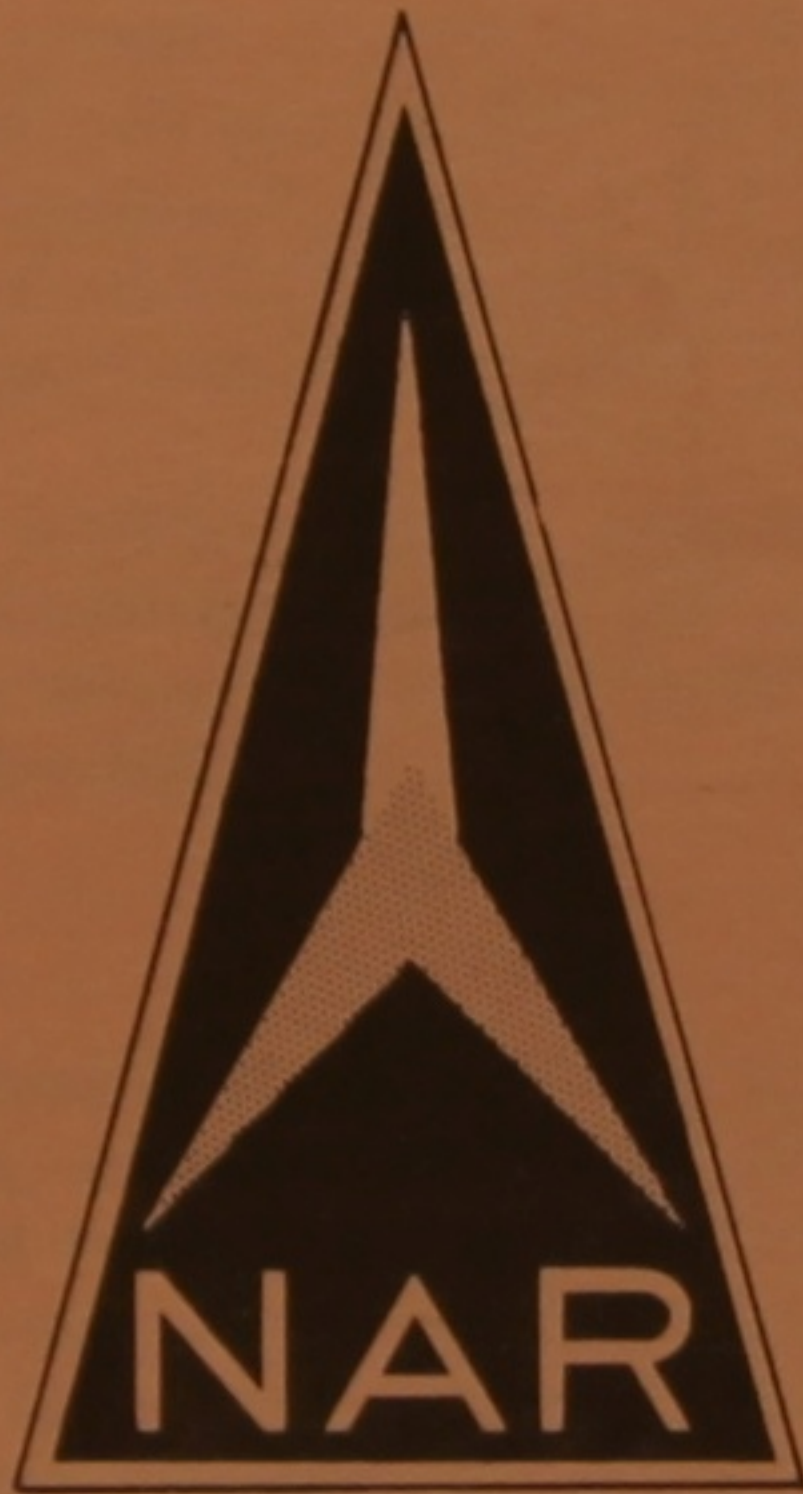


U. S. MODEL ROCKET
SPORTING CODE
1964 Edition



National Association of Rocketry

Headquarters — Stamford Museum and Nature Center — Stamford, Conn.

These standards, regulations and rules are subject to change by the NAR.
Changes will be effective immediately upon publication of such changes
to the membership.

NATIONAL ASSOCIATION OF ROCKETRY
UNITED STATES MODEL ROCKET SPORTING CODE

1. DEFINITIONS:

1.1. "Model rocket" means an aero-model that ascends into the air without use of aerodynamic lifting forces against gravity; that is propelled by means of a model rocket engine; that includes a device for returning it safely to the ground in a condition to fly again; and that is made of non-metallic parts.

1.2. "Model rocket engine" means a solid propellant rocket engine produced by a commercial manufacturer in which all chemical ingredients of a combustible nature are pre-mixed and ready for use.

2. SCOPE:

2.1. This United States Model Rocket Sporting Code shall govern the design, construction and operation of all model rockets and model rocket engines utilized by all members of the National Association of Rocketry during all competition sanctioned by the NAR and during all attempts to establish or surpass United States model rocket records.

3. SAFETY:

3.1. The Model Rocket Safety Code of the National Association of Rocketry shall be the general safety criteria to be followed in the interpretation and administration of this Model Rocket Sporting Code.

4. INTENT:

4.1. Because it is impractical to attempt to establish and operate under rules which will be applicable to every individual incident that may occur in sanctioned competition, the intent rather than the specific wording of a rule shall apply in such cases. It is the general intent of this Sporting Code to provide a standardized set of regulations written in such a manner that they may be readily understood by an average person in advance of the competition in order to give to each competitor a sporting chance to compete on the basis of skill, knowledge, and expertise with other competitors.

5. MODEL ROCKET SPECIFICATIONS:

5.1. Design and Construction

5.1.1. The gross weight of a model rocket, including model rocket engine(s) shall in no event exceed sixteen (16) ounces.

5.1.2. No more than four (4) ounces of propellant materials shall be contained in the model rocket engine(s) of a model rocket at the moment of launch.

5.1.3. A model rocket shall be designed and constructed in compliance with accepted aerodynamic principles. If required, the builder must produce data on the locations of the center of gravity and the center of pressure, the gross weight, the burnout weight, and/or calculated or measured flight performance of the model.

5.1.4. A model rocket shall be capable of more than a single flight and shall contain a means for retarding its descent to the ground so that its structure will not be substantially damaged and so that no hazard is created to persons and property on the ground. If a model is to descend in more than one unattached part, each part must conform to the above specification.

5.1.5. A model rocket must not eject its engine(s) in flight in such a manner than the spent engine casing falls freely, apart from the model. If an engine or engines is/are ejected from a model as in a staged model, for example, they must be enclosed in an airframe that will descend in accordance with Rule 5.1.4.

5.1.6. Construction of a model rocket shall be of wood, plastic, paper, rubber or similar materials and without substantial metal parts.

5.1.7. Design and construction of a model rocket shall include attached surfaces which will provide aerodynamic stabilizing and restoring forces necessary to maintain a substantially true and predictable flight path.

5.1.8. A model rocket shall have no more than three (3) operable stages. A stage is defined as a portion of the model airframe containing one or more model rocket engines which is designed to separate or which actually separates from the model while in flight. A staged model is considered to be the configuration at the instant of first motion on the launcher. An unpowered part of a model is not considered to be a stage.

5.2. Launching

5.2.1. A device or mechanism must be used which shall restrict the horizontal motion of the model rocket until sufficient flight velocity shall have been attained for a reasonably safe, predictable flight.

5.2.2. A launching angle of more than 60 (sixty) degrees from the horizontal must be used.

5.2.3. Launching or ignition must be conducted by remote electrical means fully under the control of the person launching the model.

5.2.4. All persons in the vicinity of the launching must be advised that a launching is imminent before a model rocket may be ignited or launched.

5.2.5. A minimum five-second count-down must be given before the ignition and launching of a model rocket.

5.2.6. A model rocket may be launched only if wind are less than 20 miles per hour and visibility is greater than 2,000 feet.

5.2.7. A model rocket must not be flown in any manner which creates a hazard to aircraft.

5.2.8. A launcher must not impart to the model any velocity or change of momentum except that caused by the model rocket engines contained in the model. A launch assisted by mechanical devices built into the launcher shall not be allowed in competition.

6. MODEL ROCKET ENGINE SPECIFICATIONS:

6.1. Minimum Standards

6.1.1. A model rocket engine shall be a commercially manufactured device or combination of devices wherein all chemical ingredients of a combustible nature are pre-mixed and ready for use.

6.1.2. The propulsive force or motive power of a model rocket engine shall be created by the rearward discharge of gas generated by the combustion or other operation of materials contained solely within said device or combination of devices.

6.1.3. A model rocket engine constructed wholly or partly of metal must be equipped with an adequate blowout disc or other safety release as an integral part of the engine for the purpose of preventing rupture of the engine casing in the event of internal overpressure.

6.1.4. A model rocket engine shall be so designed and constructed as to be incapable of spontaneous ignition or combustion in air, water, under pneumatic or hydraulic pressure, as a result of motion or jarring, when subjected to a temperature of 170 degrees Fahrenheit or less, and/or in glycerine.

6.2. Testing and Certification

6.2.1. A model rocket engine used in a model rocket in sanctioned competition or for the purpose of establishing or surpassing United States model rocket records shall be of a type previously tested and certified for such use by the Testing Committee of the National Association of Rocketry.

6.2.2. The Testing Committee of the National Association of Rocketry shall carry out such testing and certification utilizing such established and recognized engineering techniques, such equipment, and such procedures as may be required to ascertain the compliance to specifications, safety, and the expected performance of an engine type.

6.3. Alteration of Engines.

6.3.1. A model rocket engine shall not be altered in any manner to change its performance characteristics or dimensions, but a non-metallic engine casing may be trimmed slightly around its extreme forward end in order to be made to fit properly into engine mountings.

6.4. Classification

6.4.1. A certified model rocket engine shall be placed in a type classification based upon its total impulse as determined by integrating the area under the average thrust-time curve obtained from static tests of engines of the same manufacture and type.

6.4.2. A certified model rocket engine shall be placed in one of the following type classifications:

Type 1/2A:	Total impulse	0. 01 - 0.35 lb-sec
Type A:	Total impulse	0. 36 - 0.70 lb-sec
Type B:	Total impulse	0.701 - 1.20 lb-sec
Type C:	Total impulse	1. 21 - 2.00 lb-sec
Type D:	Total impulse	2. 01 - 4.00 lb-sec
Type E:	Total impulse	4. 01 - 8.00 lb-sec
Type F:	Total impulse	8. 01 - 16.00 lb-sec

6.5. Nomenclature. An NAR-approved model rocket engine shall carry a code number to designate its NAR Type, its average thrust, and its time delay, if any. The coding system is as follows:

A. A letter indicating the NAR Type, as in Rule 6.4.2.
B. A number indicating the average thrust in pounds or, if the average thrust is less than a pound, in decimal fractions of a pound.
C. A dash followed by a number indicating the time in seconds to the nearest second of the delay charge duration.

7. FLIGHT AREAS:

7.1 Characteristics

7.1.1. A model rocket flight area shall contain a ground area of at least 5,000 square yards, having generally a rectangular shape with no side less than 50 yards in length.

7.1.2. A model rocket flight area shall be located in such a place so as to not create a hazard to persons and property in the vicinity of the area.

7.1.3. Flight areas shall not contain high-voltage power lines, major highways, multi-story buildings, or other obstacles.

7.2. Markings. A model rocket flight area, when in use, shall be plainly marked as being the site of model rocket flight operations by the flying of the national colors or a brightly-colored flag at least 12 inches square at a height no less than 7 feet above the ground in the immediate vicinity of the launching site.

7.3. Command and Control

7.3.1. During all operations of a model rocket flight area, all authority for the safety and conduct of operations in the area shall be vested in a single individual, the Range Safety Officer, who shall be a Senior Member in good standing of the National Association of Rocketry.

7.3.2. During operations, the Range Safety Officer may delegate part of his operational authority to any Senior or Leader Member of the National Association of Rocketry who, in his own judgement, is capable of carrying out such assigned duties. This delegation of partial authority does not relieve the Range Safety Officer of overall responsibility and authority in the flight area.

7.3.3. All model rockets presented for operation in the flight area shall be allowed to fly or prohibited from flying by the Range Safety Officer or his duly authorized deputy on the basis of his judgement alone.

7.3.4. All persons in the flight area shall be under the

control of the Range Safety Officer, and complete discretion as to their positions, locations, and actions shall be left to him. The Range Safety Officer shall have the authority to remove any person from the flight area for violation of rules or orders.

8. SANCTIONED COMPETITION:

8.1. The National Association of Rocketry will sanction model rocket competition which is conducted by Senior and Leader members of the NAR according to these official regulations.

8.2. Competitions sanctioned by the NAR shall be classified as follows:

8.2.1. Section Meets: Competition in which entry is restricted to members of a chartered Section of the NAR. A Section will not be permitted to conduct more than four (4) sanctioned Section Meets during each contest year.

8.2.2. Area Meets: Competition in which entry is restricted to members residing in a particular locale or competition in which two or more chartered NAR Sections compete against one another. A Section or NAR member may not compete in more than four (4) Area Meets during each contest year.

8.2.3. Regional Meets: Competition in which entry is restricted to members from no less than two states and not more than six states and at least three Sections. A Section may not compete in more than four (4) Regional Meets during each contest year.

8.2.4. National Meets: Only one National Meet shall be held each year at such a time and place and with such entry requirements as shall be designated by the NAR Contest Board.

8.2.5. Record Trials: Competition conducted for the sole purpose of providing an opportunity and facilities for attempts to establish or surpass official United States model rocket records with no special awards or competition points offered to winners.

8.3. In Area and Regional Meets, a Section must have at least four members entered and flying before such Section will be awarded the points earned by its members toward the National Championship Section Pennant.

8.4. Application for sanction of a model rocket competition shall be made at least 30 days in advance of the date

of the competition by the Senior Member of the NAR who will serve as local contest director. Application shall be on the standard form, "Application for Contest Sanction," which is available from NAR Headquarters.

8.5. The Senior and/or Leader members who served as judges in a sanctioned competition must report the results of the competition to the NAR Contest Board using the standard form. The report shall be postmarked within seven (7) days following the completion of the competition and shall include all entry blanks and contest flight cards. Failure to report contest results within the specified time limit or failure to report on the standard form may result in refusal of the NAR Contest Board to honor said results.

9. CONTESTANTS:

9.1. All persons entering model rockets in NAR-sanctioned competition shall be NAR members in good standing. The determination of such standing is the responsibility of the local contest director.

9.2. A model rocket properly entered in sanctioned competition may be prepared for flight by another NAR member, provided the builder of the model furnishes evidence satisfactory to the judges of his inability to be present. Contestants having range duties may have their model prepared and processed for them by another NAR member with the approval of the judges.

9.3. Where two or more NAR members enter competition as a team, all shall have taken active part in the design and construction of the model. One or more of the members of the team shall prepare the model for flight, unless the team presents evidence satisfactory to the judges that its members are unable to do so, in which case another NAR member may prepare the model. Entry shall be made in the name of the team with the individual members listed, and all awards given, points earned, or records established shall be in the name of the team. No NAR member may enter an event both as an individual and as a team member, and no NAR member may enter a competition as a member of more than one team. An individual entering an event as a member of a team may enter other events as an individual. However, points earned in team competition may be used only to qualify for National Champion Team awards and for the Championship Section Pennant. Team entries may be flown by proxy for one or all members of the team in the same manner as individual entries.

10. JUDGES:

10.1. There shall be three (3) judges for each event. At

least one judge shall be a Senior Member of the NAR in good standing. The other two judges may be either Senior Members or Leader Members of the NAR in good standing.

10.2. No judge shall carry out the duties of a judge during the flight of his own entry, and no judge shall be allowed to rule or make decisions on his own entry.

10.3. In case of dispute, the ruling of two of the judges present and acting shall be final.

11. ENTRIES:

11.1. Each contestant may enter only one entry in each event. The model that is entered, judged, and makes the first official flight shall be the same model that makes the second flight, and there shall be no substitution of models. Two or more competition events may not be flown simultaneously by the same model.

11.2. Each entry shall carry, prominently displayed upon its body, fins, or other exterior part the contestant's NAR number in legible letters and numbers at least 1/8" high.

11.3. Each entry shall pass a safety inspection given by the judges or their authorized deputies before each flight to ascertain that it meets NAR standards and will be reasonably safe in operation.

11.4. There must be two entries officially entered and passed by the safety inspectors before an event can be held.

11.5. The judges shall make every reasonable effort to insure that each contestant has completely "constructed" the model(s) he uses in competition with "construction" to be interpreted as the action required to complete a model starting with no more prefabrication than the amount used in the average kit. Models that are completely prefabricated or require only a few minutes of unskilled effort for their completion shall be excluded from competition. Materials and design may be obtained from any source, including kits.

11.6. The judges have the authority to require that any model having made an official flight be returned to them and impounded by them for a reasonable length of time for their inspection.

12. OFFICIAL FLIGHTS:

12.1. Time and weather permitting, each contestant shall be given an opportunity to make two official flights with each entry, providing the event rules do not eliminate a second

flight privilege.

12.2. A flight is considered official if the entry leaves the launching device, loses contact with the launching device, or becomes airborne.

13. DISQUALIFICATION:

13.1. Judges may disqualify any entry which, in their opinion, does not comply with the competition rules or which they feel may not be reasonably safe in operation.

13.2. Judges may disqualify any contestant on the grounds of failure to practice or observe reasonable safety measures, for poor sportsmanship, for failure to abide by the orders of the presiding range safety officer, or for misconduct in general.

13.3. An entry experiencing a catastrophic failure which, in the opinion of the judges, was not due to or caused by improper design or construction of the model shall not be disqualified from competition.

13.4. Ejection of an engine casing during any portion of the flight shall disqualify the model for that flight, unless the ejection of the engine meets the specifications as set forth in Rule 5.1.5.

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

14. PROTESTS AND APPEAL:

14.1. Protests will be considered only when presented in writing to the judges within one hour after the close of the competition. The protestant must report in full the action or decision, the names of the contestants and officials involved, and other substantiating details.

14.2. Appeal may be made to the NAR Contest Board on action taken on a protest. Such appeals must be made in writing within a three-day period following the action of the local judges on the original protest.

15. ALTITUDE DATA:

15.1. All entries in any event for which an achieved altitude figure is scored shall be tracked in flight by optical theodolites of an approved design which are situated on a measured baseline of at least 1000 feet.

15.2. Optical theodolites must be equipped with both azimuth and elevation axes at right angles to each other, must be levelled before use, and shall have an accuracy of ± 0.5 degrees in both azimuth and elevation.

15.3. Angular data recovered from theodolite tracking will be reduced to altitude data by means of an approved data reduction system such as is set forth in NAR Technical Reports.

15.4. All entries which are to be tracked for altitude shall be painted in such colors and in such patterns so as to aid optical tracking.

15.5. Loss of track by theodolite operators will be considered due to inadequate coloring or painting of the entry.

15.6. All altitude readings will be rounded off to the nearest 10-foot interval. If the last digit is 1 to 4, it will be dropped to zero. If the last digit is 5 to 9, it will be raised to the next 10-foot interval. In the case of the last digit being 5, the figure will be raised to the next 10-foot interval if the preceding digit is odd or dropped if the preceding digit is even.

15.7. The computed altitude from each station's elevation angle must be within 10% of the average altitude computed to be considered valid and acceptable for competition and record flights. Computed station altitudes not falling within 10% of the average computed altitude will result in a "track lost" flight for the entry. All altitudes will be rounded off in accordance with Rule 15.6 before reapplying the 10% rule.

15.8. Any tracking system which differs from the approved all-azimuth optical theodolite system must be approved by the NAR Contest Board before the results are accepted from any competition in which such a novel system is used.

16. COMPETITION POINTS AND CHAMPIONSHIPS:

16.1. Competition points shall be awarded to each contestant on the basis of the following schedule:

- 1 point for an entry that makes one qualified official flight.
- 2 points for third place in an event.
- 3 points for second place in an event.
- 5 points for first place in an event.

16.2. In case of a tie in any of the first three places, duplicate points and/or awards will be made.

16.3. Each competition event will be assigned a weighting

factor based upon the difficulty of the event. The competition points won in an event will be multiplied by the weighting factor to arrive at the final score for the event.

16.4. At the option of the judges, any event having a weighting factor of 3 or more may be flown in age divisions based on grade of NAR membership of the contestants provided Rule 11.8 is met. An event flown in age divisions will be scored and points will be awarded as if separate events were flown. Age divisions, if flown, may not be combined.

16.5. Each type of competition detailed in Rule 8.2 is assigned a Competition Factor based on the difficulty of competition encountered. The competition points won in any sanctioned competition will be multiplied by the Competition Factor to arrive at the final point scores for the competition. The schedule of Competition Factors is as follows:

Record Trials:	0
Section Meets:	1
Area Meets:	2
Regional Meets:	3
National Meet:	5

16.6. Competition points shall be official only when the results of the competition are accepted by the NAR Contest Board.

16.7. Competition points shall be accumulated by each NAR member or team who enters a contest or contests during each contest year. The contest year begins on the day following the close of each National Meet and ends on the final day of the following National Meet.

16.8. A National Championship Award for a contest year will be given to that individual NAR member who has compiled the largest number of competition points during the contest year. To be eligible for a National Championship Award, the contestant must have entered and flown in the National Meet at the close of the contest year. The National Championship Award shall be given in three age divisions based on grade of NAR membership.

16.9. A National Championship Team Award for a contest year will be given to that team which has amassed the largest number of competition points during the contest year. To be eligible for the National Championship Team Award, the team must have entered and flown in the National Meet at the close of the contest year.

16.10. A National Championship Section Pennant for the

contest year will be given to that chartered NAR Section that has amassed among its members the largest number of competition points during the contest year. To be eligible for this award, the chartered NAR Section must have at least one member who enters and flies in the National Meet for that contest year.

17. ALTITUDE COMPETITION:

17.1. In any altitude competition event, the entry achieving the highest maximum altitude as tracked and reduced shall be declared the winner.

17.2. Altitude competition shall be divided into classes based upon maximum gross launching weight of the entry and maximum allowable total impulse of the engine or engines powering the entry. Any number of engines may be used in any arrangement so long as the sum of the total impulses of the individual engines does not exceed the allowable maximum of the class.

17.3. The following event classes are in effect for altitude competition:

Class	Total Impulse (lb-sec)	Max. Wt. (oz.)	Weighting factor
1	0.01- 1.00	2	1
2	1.01- 2.00	4	2
3	2.01- 8.00	8	3
4	8.01-16.00	16	4

18. SCALE ALTITUDE COMPETITION:

18.1. This event is open to models that are scale models and is a combination of the Scale Competition (paragraph 19) and the Altitude Competition (paragraph 17).

18.2. All entries must comply with the rules of the Scale Competition (paragraph 19) and will receive the same maximum number of scale points as authorized for the Scale Competition.

18.3. The total number of scale points awarded to each entry will be added to the highest official altitude in feet achieved by the entry. If track is lost, no such altitude can be added. The entry with the highest number of total points thus achieved will be declared the winner.

18.4. The judges may disqualify from Scale Altitude Competition any model which, in their opinion, does not show

sufficient scale substantiation or evidence of the normal level of workmanship required for a scale model under the provisions of the Scale Competition (paragraph 19). The intent of this rule is to eliminate from Scale Altitude Competition any entry for which, in their opinion, scale qualities have been grossly subordinated in favor of altitude performance characteristics.

18.5. The following event classes are in effect for Scale Altitude Competition:

Class	Total Impulse (lb-sec)	Max. Wt. (oz)	Weighting factor
1	0.01- 1.00	2	2
2	1.01- 2.00	4	3
3	2.01- 8.00	8	4
4	8.01-16.00	16	5

19. SCALE COMPETITION:

19.1. The Scale Competition comprises a single event and is limited to flying model rockets that are true scale models in shape and color of existing or historical guided missiles, rocket vehicles or space vehicles.

19.2. If the entry is a scale model of a multi-staged vehicle, it may be designed so that one or more of the upper stages are inoperable dummies. However, the upper stage of a multi-staged vehicle may not be entered without its operable lower stage or stages unless specific data is furnished to prove to the judges that the upper stage configuration was designed to or has flown separately, alone, and as a vehicle itself.

19.3. The contestant must supply data and other information in the form of drawings, actual measurements of prototype, manufacturer's specifications and data sheets, or other material to substantiate completely claims to scale. The contestant must also furnish information indicating the scale of the model, how the scale proportions were arrived at, how scaling was accomplished, and where information on color, paint pattern, and other details was obtained.

19.4. The entry must be painted in the color or colors and in the paint pattern of the prototype. Scale substantiation data in the form of color photographs, color-coded drawings, etc. must be furnished to substantiate color scheme.

19.5. NAR Plans may be used as part of the scale substantiation data, but may not be used as the only such data.

19.6. Commercially-available flying scale model rocket kits shall be acceptable for entry only if accompanied by substantiating data other than that contained in the kit or available from the kit manufacturer. Contestant shall be responsible for ascertaining the correct scale qualities of the kit model and must present satisfactory evidence that the model is to correct scale.

19.7. Scale models of rockets, missiles or space vehicles that are not fin-stabilized may be fitted with transparent plastic fins so as to make the model stable in flight while detracting the least from the scale qualities of the model.

19.8. Scale models of rockets, missiles or space vehicles incorporating scale spin rockets affixed by circumferential bands about their bodies may have these scale details removed after judging and before flight for purposes of streamlining or proper fit into launchers.

19.9. Commercially-available plastic model kits which have been modified for flight shall not be acceptable for entry.

19.10. The contestant must have modeled one particular serial-numbered prototype, except in the case where the prototype is in such high mass production that there is no particular individual vehicle that can be singled out for scaling. However, the contestant shall make every reasonable attempt to model a specific prototype.

19.11. Each entry must be capable of stable flight, and two opportunities will be available for this purpose, time and weather permitting.

19.12. Entries will be judged as follows:

19.12.1. Adherence to scale, 500 points maximum, to be awarded as all or part of the following schedule:

Authenticity of scale data - 50 points max.

Completeness of scale data - 50 points max.

Adherence of major model dimensions to scale - 100 points max.

Adherence of model component shapes to scale - 100 points max.

Amount and completeness of scale detail - 100 points max.

Adherence of model to scale color and paint pattern - 100 points max.

19.12.2. Workmanship, 200 points maximum, to be awarded as all or part of the following schedule:

General workmanship evidenced in model - 100 points max.

Matching of separating parts - 50 points max.

Smoothness and beauty of finish - 50 points max.

19.12.3. Degree of difficulty, 200 points maximum, to be awarded as all or part of the following schedule:

Difficulty in obtaining scale data - 50 points max.

Difficulty in adapting design for flight - 50 points max.

Difficulty of construction of model - 50 points max.

Degree of difficulty in detailing - 25 points max.

Degree of difficulty in finishing - 25 points max.

19.12.4. Flight characteristics, 100 points maximum, to be awarded as all or part of the following schedule:

Launch with no tip-off or weathercocking - 10 points max.

Deviation of flight path from that intended - 20 points max.

Degree of spin present or not present in prototype - 10 points max.

Clean and successful separation of stages, if any - 10 points max.

Stability of model in flight - 20 points max.

Proper and complete ejection of recovery device - 10 points max.

Correct operation of recovery device during descent - 10 points max.

Lack of damage on landing - 10 points max.

19.13. The weighting factor for the Scale Competition is 5.

20. PLASTIC SCALE COMPETITION:

20.1. The Plastic Scale Competition comprises a single event and entry is limited to scale models assembled from commercially-available plastic model kits that have been modified by the contestant for flight.

20.2. The requirements, judging procedure, points awarded, and rules for this event are the same as for the Scale Competition (paragraph 19) and the entries will be judged and flown on the same basis.

20.3. The weighting factor for the Plastic Scale Competition is 5.

21. PAYLOAD COMPETITION:

21.1. This event is open to models which carry one or more standard NAR Payloads.

21.2. The standard NAR Payload consists of a solid cylinder of lead 3/4" in diameter weighing not less than one (1) ounce. Tolerances in dimension shall not exceed $\pm 1/32$ ".

21.3. The NAR Payload or Payloads carried shall be completely enclosed and contained within the entry, shall be removable from the entry, and shall not be capable of separating from the entry while in flight.

21.4. Entries in this event will be divided into classes based on maximum total weight, number of NAR Payloads carried, and maximum total impulse of engine or engines.

21.5. The contestant must present evidence satisfactory to the judges to prove that the model will be stable during launch and has a thrust-to-weight ratio at launch of at least 4.

21.6. The entry must contain, for recovery purposes, a parachute of sufficient size to allow the safe landing of the entry in accordance with paragraph 5.1.4.

21.7. The following classes of NAR Payload Competition have been established:

Class	Total Impulse (lb-sec)	Max. Wt. (oz)	# of Payloads Carried	Weighting factor
PeeWee	0.01- 2.00	4	1	2
Dual	2.01- 8.00	8	2	3
Open	8.01-16.00	16	4	4

22. SPOT LANDING COMPETITION:

22.1. The Spot Landing Competition comprises a single event open to entries that are single-staged, powered by a single engine of not more than 2.00 pound-seconds of total impulse, and that weigh less than 3 ounces. The competition is judged on the basis of which entry lands with its nose cone closest to a predetermined spot on the ground.

22.2. Each entry must deploy its recovery device fully and completely before touching the ground to allow safe landing of the entry in accordance with paragraph 5.1.4. No part of any entry may freely fall to the ground without a substantial reduction in its velocity caused by a device with high aerodynamic drag.

22.3. The entry must not separate into more than two (2) unattached pieces. Parachute protectors or wadding shall not be considered to be part of the entry.

22.4. Entries will be allowed only one official flight in this competition.

22.5. The weighting factor for the Spot Landing Competition is 2.

23. DRAG RACE COMPETITION:

23.1. The Drag Race Competition comprises a single event and is open to single-staged models powered by a single engine of not more than 2.00 pound-seconds of total impulse and which weight not more than 3 ounces.

23.2. The event is a series of flyoffs between two entries, the winner of the heat proceeding to fly against the winner of another heat in regular competition playoff.

23.3. The competition flyoffs will be paired by the judges in the standard manner by drawings of paired heats by lot.

23.4. In paired heats, the models will be launched simultaneously through a common firing switch operated by the judges or their appointed deputy.

23.5. In a paired heat, an entry must fly successfully to win the heat.

23.6. Any type of electrically-initiated ignition system may be used.

23.7. The event will be judged as follows with the winner of the heat being that entry which receives the largest number of points according to this schedule:

First entry to achieve first motion - 1 point

Entry achieving the lowest maximum altitude of the two - 1 point.

Entry which touches the ground last (if entry separates into two or more pieces, first piece touching ground is counted) - 1 point.

23.8. The weighting factor for the Drag Race Competition is 2.

24. PARACHUTE DURATION COMPETITION:

24.1. The Parachute Duration Competition comprises a single event open to entries that are single-staged, powered by a single engine with no more than 1.50 pound-seconds of total impulse, weighing not more than three (3) ounces, and containing a parachute for recovery purposes.

24.2. The purpose of the event is to determine which entry achieves the longest flight duration time. The entry will be timed from the instant of first motion until the instant any part of the entry, excepting parachute protectors or wadding, touches the ground.

24.3. An entry which is lost from sight or which cannot be recovered and returned to the judges in a reasonable time will be disqualified.

24.4. Optical aids other than sunglasses or eyeglasses to correct to normal vision may not be used by the judges.

24.5. Two judges will be stationed in the launching area with stop watches and may not leave the launching area in order to keep the model in sight. The official time will be computed by averaging the elapsed time of flight recorded by each judge to the nearest whole number of seconds below the resulting mean time of flight.

24.6. Rule 24.3 shall not be applied if the model disappears behind a building, tree or terrain in such a manner to lead the judges to believe that it touched the ground very shortly thereafter. However, the entry must be recovered and returned to the judges. Watches shall be stopped when the entry disappears from sight under these conditions.

24.7. The weighting factor for the Parachute Duration Competition is 2.

25. BOOST/GLIDE DURATION COMPETITION:

25.1. This competition comprises a series of events open to any entry which ascends into the air without use of lifting surfaces which sustain the entry against gravity and which returns its glider portion to the ground supported by aerodynamic lifting surfaces which sustain the part against gravity in a stable glide. The intent of this is to provide a sporting competition to model rockets with gliding recovery. Model aircraft which ascend into the air in a spiraling climb under rocket power in such a manner that they are supported during rise by their wings shall not be eligible for entry in this competition. In this competition, a parachute recovery device on the top portion of the model shall not be considered to be a supporting aerodynamic surface, but parachutes may be used to effect recovery of other portions of the entry, if used.

25.2. The purpose of this competition is to determine which entry achieves the longest time of flight utilizing a vertical or near-vertical free-ballistic takeoff and a stable

aerodynamic glide recovery. Each entry will be timed from the instant of first motion until the instant the gliding top portion touches the ground.

25.3. Any entry which is lost from sight or which cannot be recovered and returned to the judges in a reasonable time will be disqualified.

25.4. Optical aids other than sunglasses or eyeglasses to correct to normal vision may not be used by the judges.

25.5. Two judges will be stationed in the launching area with stop watches and may not leave the launching area in order to keep the model in sight. The official time will be computed by averaging the elapsed time of flight recorded by each judge to the nearest whole number of seconds below the resulting mean time of flight.

25.6. Rule 25.3 shall not be applied if the model disappears behind a building, tree or terrain in such a manner to lead the judges to believe that it touched the ground shortly thereafter. Watches shall be stopped when the entry disappears from sight under these conditions. However, the entry must be recovered and returned to the judges.

25.7. The following classes of events are authorized for the Boost/Glide Duration Competition:

Class	Total Impulse (lb-sec)	Max. Wt. (oz)	Weighting factor
Swift	0.01- 1.00	2	2
Hawk	1.01- 2.00	4	3
Eagle	2.01- 8.00	8	4
Condor	8.01-16.00	16	5

25.8. The gliding portion of the entry may be radio-controlled to maintain its flight path in the vicinity of the launching area.

26. AEROSPACE SYSTEMS COMPETITION:

26.1. This competition comprises a single event and is open to entries that are scale models of any historic, developmental, operational or programmed rocket vehicle, guided missile or space vehicle of the United States Air Force. Criterion for establishment of the prototype's eligibility as a USAF vehicle shall be proof, where necessary, that the vehicle was funded by the USAF.

26.2. An entry in this competition must also carry a standard NAR Payload under the rules of paragraph 21.

26.3. An entry in this competition must also be accompanied by its own launcher which shall resemble as closely as possible the launcher of the prototype and which shall be judged along with the entry for scale points.

26.4. An entry in this competition must also be accompanied by its own electrical firing system that has been constructed by the contestant and shall include its own individual battery which may not be shared with another entry at any time during the competition.

26.5. All entries and their launchers shall be judged before flight for scale qualities in accordance with the rules of the Scale Competition (paragraph 19), and scale points according to that schedule will be awarded each entry.

26.6. Each contestant will be given a "prepare to launch" signal, following which he will be allowed a maximum time of fifteen (15) minutes in which to complete the launching of his entry. Such a signal will be given only if the entry has been judged for scale qualities in accordance with Rule 26.5. All pre-launch operation must be completed after the starting signal, and these shall include insertion of igniter, safety-check of entry, and loading of entry on launcher. Entries may have their recovery devices prepared for flight and engine or engines installed before the starting signal is given.

26.7. The entry must be flown from its launcher only after range safety clearance has been given. In the event that there is a "hold" for safety reasons or for range readiness officially given by range officers, the elapsed launching time clock shall be stopped during such a hold and started again when the hold is lifted so as not to penalize the contestant for safety or operational delays beyond his control.

26.8. During flight, the entry will be tracked and the maximum altitude achieved by the entry thus determined. In the case of track lost, a zero altitude figure will be scored for the entry.

26.9. The entry must deploy, completely and fully, its recovery system before touching the ground and must land its nose cone as near as possible to a predetermined point on the ground located not more than 500 feet from the launcher. The judges may use as many target points as they desire and all targets must be plainly marked so that their designation may be read from the launching area. At the "prepare to launch" signal, the contestant will be notified of the target pole toward which he must fly his entry.

26.10. Scale points earned by the entry will be added to the achieved altitude in feet. The distance in feet to the nearest foot from the target pole to the tip of the nose cone of the landed entry will be subtracted from the above mark. The entry with the highest number of points thus achieved will be declared the winner.

26.11. The weighting factor for the Aerospace Systems Competition is 10.

27. RESEARCH AND DEVELOPMENT COMPETITION:

27.1. This competition is open to new designs, developments or research in model rocketry of any type. It is the purpose of this competition to stimulate new concepts, new approaches and new ideas in model rocketry.

27.2. Each entry must be accompanied by a written report stating in detail the objectives of the work, the approach taken, the equipment used, the data collected, the results obtained and the conclusions drawn from the results.

27.3. The contestant should be prepared, if called upon by the judges, to make an oral presentation on his project not over 15 minutes in length. He should speak without notes and cover briefly the material of his written report. He may be required to answer questions from the judges concerning his project.

27.4. If required, the contestant must demonstrate his project in operation. Success or failure are not judging criteria provided the contestant gives a reasonable oral explanation of deviation of operation from expected performance.

27.5. Entries will be judged on the basis of originality of concept, method of problem approach, extent and completeness of documentation, contestant's understanding of problems encountered and results achieved, practicality of project, development of new theory (if any), and quality of research or development work in evidence.

27.6. This event may not be flown in a Section Meet.

27.7. The weighting factor for the Research and Development Competition is 10.

28. UNITED STATES MODEL ROCKET RECORDS:

28.1. All United States model rocket records must be attempted, established or surpassed during NAR-sanctioned competition under this sporting code.

28.2. U. S. model rocket records which may be held or attempted by NAR members are as follows:

- | | |
|------------------------|-----------------------------|
| Class 1 Altitude | Parachute Duration |
| Class 2 Altitude | Swift Boost/Glide Duration |
| Class 3 Altitude | Hawk Boost/Glide Duration |
| Class 4 Altitude | Eagle Boost/Glide Duration |
| Class 1 Scale Altitude | Condor Boost/Glide Duration |
| Class 2 Scale Altitude | PeeWee Payload |
| Class 3 Scale Altitude | Dual Payload |
| Class 4 Scale Altitude | Open Payload |

28.3. Any event carrying a weighting factor of 3 or more may have national records in three age divisions based upon the grade of membership held by the record aspirant at the time the record was established.

28.4. U. S. model rocket records will be awarded to those NAR members who hold the highest official and homologated performance achieved in the above events. Any NAR member in good standing may attempt to establish or surpass a record.

28.5. Attempts to surpass an established record must exceed by 1% the value of the established record performance.

28.6. Homologation and certification of U. S. model rocket records will be carried out by the NAR Contest Board. The following data must be submitted for homologation purposes:

28.6.1. The contest flight card of the record attempt must be marked "Record Attempt" before its return to the NAR Contest Board with the contest results. Tracking station angular data must be filled in with ink. The name, signature and NAR number of the record aspirant must appear, written in ink, on the contest flight card. The following data, written in ink, must also appear on the contest flight card: competition, event and class in which record attempt was flown; date of record attempt; location of record attempt; certifying signatures of the three witnessing judges; a signed statement certifying the calibration and accuracy of the tracking system used, where applicable, said statement signed by the three witnessing judges.

28.6.2. The witnessing judges must submit a statement giving the make and NAR type of the engine or engines used in the record attempt.

28.6.3. The witnessing judges must submit, in the case of parachute duration records, a statement giving size, material and design of the parachute used.

28.6.4. The record aspirant must submit an accurate drawing to scale of the model used in the record attempt, said drawing to include all principal dimensions, gross weight, and no-engine weight.

28.6.5. The record aspirant must submit a clear, glossy 5" x 7" enlargement of a photograph of the model used in the record attempt. A ruler, hand or other object of known size must appear in the photograph to indicate size of model.

28.6.6. For scale model records, the contestant must submit all substantiating scale data which will be returned to the aspirant upon completion of homologation procedures.

28.7. It is the purpose of these homologation procedures and requirements to ascertain as well as possible that a given model did indeed attain the flight performance claimed and that the flight was made completely within the requirements of this sporting code. The NAR Contest Board has the right to request any additional record substantiating data it feels may be necessary in the circumstances to achieve this purpose and further has the right to disallow any record claim, regardless of homologation data submitted, if, in the opinion of the Board, the record attempt was unfairly made or untruthfully reported.

SUMMARY TABLE - NAR COMPETITION EVENTS

COMPETITION	Para.	EVENT	Max. Wt. (oz)	Total Impulse (lb-sec)	WEIGHTING FACTOR	OTHER
ALTITUDE	17	Class 1 Altitude	2	0.01 - 1.00	1	
		Class 2 Altitude	4	1.10 - 2.00	2	
		Class 3 Altitude	8	2.01 - 8.00	3	
		Class 4 Altitude	16	8.01 - 16.00	4	
SCALE ALTITUDE	18	Class 1 Scale Altitude	2	0.01 - 1.00	2	
		Class 2 Scale Altitude	4	1.01 - 2.00	3	
		Class 3 Scale Altitude	8	2.01 - 8.00	4	
		Class 4 Scale Altitude	16	8.01 - 16.00	5	
SCALE	19	Scale	16	0.01 - 16.00	5	
PLASTIC SCALE	20	Plastic Scale	16	0.01 - 16.00	5	
PAYLOAD	21	PeeWee Payload	4	0.01 - 2.00	2	1 Payload
		Dual Payload	10	2.01 - 8.00	3	2 Payloads
		Open Payload	16	8.00 - 16.00	4	4 Payloads
SPOT LANDING	22	Spot Landing	3	0.01 - 2.00	2	1 stage
DRAQ RACE	23	Drag Race	3	0.01 - 2.00	2	1 stage
PARACHUTE DURATION	24	Parachute Duration	3	0.01 - 1.00	2	1 stage
BOOST/GLIDE DURATION	25	Swift Boost/Glide	2	0.01 - 1.00	2	
		Hawk Boost/Glide	4	1.01 - 2.00	3	
		Eagle Boost/Glide	8	2.01 - 8.00	4	
		Condor Boost/Glide	16	8.01 - 16.00	5	
AEROSPACE SYSTEMS	26	Aerospace Systems	16	0.01 - 16.00	10	1 payload
R&D	27	Research and Development	16	0.01 - 16.00	10	

(Maximums: 3 stages, 4oz. propellant)

Model Rocketry

SAFETY CODE

As a member of THE NATIONAL ASSOCIATION OF ROCKETRY, I will do my best to maintain the safety record of the hobby of model rocketry, and I will obey this NAR Model Rocket Safety Code:

1. I will obey the laws regarding rockets.
2. I will not mix my own rocket propellants or delay trains, etc.
3. I will not make my own rocket engines. I will use pre-loaded, factory-made commercial model rocket engines that do not require mixing the propellant.
4. I will treat all rocket engines with care, keeping them from heat and not dropping them.
5. My model rockets will contain no substantial metal parts.
6. My model rockets will contain a recovery device to return them safely to the ground so that they may be flown again.
7. My model rockets will not contain explosive warheads.
8. I will fly model rockets with adult supervision in open areas away from houses, buildings, trees and power lines.
9. I will use a remotely-operated electrical firing system to ignite model rocket engines, and I will not install the electrical ignition element in a rocket engine until shortly before launching.
10. I will always use a launching device that is pointed within 30 degrees of the vertical.
11. I will not fly model rockets against targets in the air or on the ground.
12. I will not fly model rockets in windy weather or in conditions of low visibility.
13. I will not fly model rockets where they may endanger aircraft in flight.
14. I will always act in a mature manner with safety uppermost in mind.
15. I will not engage in any operation that may endanger myself or others.