FAI Sporting Code

Fédération Aéronautique Internationale

Section 4 – Aeromodelling

Volume S
Space Models

2024 Edition

Effective 1st January 2024

S1 - ALTITUDE
S2 & S2/P - PAYLOAD
S3 - PARACHUTE DURATION
S4 - BOOST GLIDER DURATION
S5 - SCALE ALTITUDE
S6 - STREAMER DURATION
S7 - SCALE
S8 & S8P - ROCKET GLIDER DURATION
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ANNEX 1 - SCALE SPACE MODELS JUDGES' GUIDE
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ANNEX 3 - SPACE MODEL RULES FOR WORLD CUPS
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ANNEX 6 - TRIANGULATION METHOD
S6A/P - STREAMER TARGET TIME DURATION (PROVISIONAL)
S12/P - TIME DURATION TRIATHLON (PROVISIONAL)

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1 FAI Statutes, ... Chapter 1, ... para. 1.6

2 FAI Sporting Code, Gen. Section, ... Chapter 4, ... para 4.1.2

3 FAI Statutes, ... Chapter 1, ... para 1.8.1

4 FAI Statutes, ... Chapter 2, ... para 2.1.1; 2.4.2; 2.5.2 and 2.7.2

5 FAI By-Laws, ... Chapter 1, ... para 1.2.1

6 FAI Statutes, ... Chapter 2, ... para 2.4.2.2.5

7 FAI By-Laws, ... Chapter 1, ... paras 1.2.2 to 1.2.5

8 FAI Statutes, ... Chapter 5, ... paras 5.1.1, 5.2, 5.2.3 and 5..2.3.3

9 FAI Sporting Code, Gen. Section, ... Chapter 4, ... para 4.1.5

10 FAI Sporting Code, Gen. Section, ... Chapter 2, ... para 2.2.

11 FAI Statutes, ... Chapter 5, ... para 5.2.3.3.7

12 FAI Statutes, ... Chapter 6, ... para 6.1.2.1.3

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THIS 2024 EDITION INCLUDES THE FOLLOWING AMENDMENTS MADE TO THE 2023 CODE

These amendments are marked by a double line in the right margin of this edition.

Paragraph	Plenary meeting approving change	Brief description of change	Change incorporated by
Annex 5 Par 11.	2024	Added new safety paragraph for minimal recovery device dimensions. Effective since 15th June.	Ron Miasnikov Technical Secretary & Zoran Pelagic, Space Models S/C Chairman

Four-Year Rolling Amendments for Reference			
Paragraph	Plenary meeting approving change	Brief description of change	**Change incorporated by**
2.1 and 2.2	2023	Delete these sections and reference CGR B.2.3.	Tyson Dodd Technical Secretary & Zoran Pelagic, Space Models S/C Chairman
2.4.3		Delete the word “heavy”, clarification of safety.	
2.4.4		Update definition table for minimal model dimensions in classes S1,S2, S3, S6 and S9 with the change of minimal dimensions for A/2 class.	
2.4.7.		Updated definition for no part separation in classes S3, S4, S6, S8 and S9.	
3.10.3		Update of rule for motor distribution at competitions.	
3.14.2		Update of rule for markings on motor exterior.	
4.4.3		Change of the “Builder of the model” rule.	
4.5.1		Update of rule by adding the definition what is an attempt and a misfire.	
5.4		Delete the final sentence.	
5.3, 6.1.7, 7.4, 8.4, 10.5, 11.6, 12.5 and 12.6.5		Delete the total impulse range in tables.	
6.2.5		Change score from 100 to 500 in S2/P.	
6.2.7		Add paragraph for replacement of model.	
10.2 and 10.3		Change number of rounds from three to two in class S5.	
11.4.4		Clarification and unification of landing zone for class S8.	
11.7.2		Update of total impulse for class S8P.	
12.1		Delete the separation wording from the paragraph.	
12.6.4		Add paragraph to use normalized scoring in S12/P	
12.6.6		Add paragraph for defining when a replacement model may be used.	
Annex 3 Par 4		Add a table with K factor for computing points depending how many countries compete in a class.	
Annex 3 Par 4		Delete final sentence and replace it with a definition how scores are rounded.	
Annex 4 Par 6		Update definition for number of competitions to be counted into SMIR.	
Annex 5 Par 4		Delete the whole paragraph.	
Annex 5 Par 5		Delete the whole paragraph.	
Annex 5 Par 8		Delete the whole paragraph.	

Paragraph	**Plenary meeting approving change**	**Brief description of change**	**Change incorporated by**
Part Thirteen	2021	Delete Class S10: Flex-Wing Duration Competition as this class is no longer performed.	Kevin Dodd Technical Secretary &
11.8.1-11.8.8.4		Delete Class S11/P: Rocket Powered Aircraft and	

		Spaceships Competition – never performed.	Zoran Pelagic, Space Models S/C Chairman
1.3		Delete this section and reference CGR: B.2.2 as the source of the definition	
3.9		Addition to the section related to modifications of space model motors to enhance safety.	
4.1 & 4.2		Delete these sections and reference CGR C.15.2.2 and C.10.2 as the source of this information.	
4.3.4		Change heading and clarify the rule for launch device operation while keeping the intent of the 2018 change.	
4.3.5		Addition to electrical launch system, and stand-off distances specified.	
4.3.7		Addition to hazard prevention requirements to mitigate known hazards.	
4.3.8		New paragraph to mandate the safety of a launch site.	
4.4.2		Delete this section and reference CGR C.11.2 as the source of the information.	
4.6.5		Change a parameter for determining basis for disqualification.	
4.8.1		Clarify when timing of the flight is to commence.	
4.8.3		Clarify the fly-off rule to clearly state the intention and the procedure.	
4.8.12		New paragraph allowing electronic altimeters to be used for timing.	
4.9.1 and Annex 6		Specified use for ‘Triangulation Method’ and new descriptive annex (#6).	
4.10.7		Prioritise the use of electronic altimeters.	
4.10.10 and Annex 2: Par 5.e		Require organisers to use approved software for documentation of contests. Annex 2: Par 5.e sets out the requirements of the software.	
7.1		Update definition for Parachute or Streamer Duration.	
7.5.1		Clarify definition. See Provisional Class section.	
9.1 (and others)		Added definitions for ‘prototype’ and ‘entry’. Changed ‘scale model’ to ‘entry’ throughout.	
9.6 and 9.8		Allow clear detachable fins for stabilising flight.	
9.7		Add 3D printed parts to clarify their level of use.	
9.11.1		Update what data are needed to be presented by the competitor.	
11.2		Reduce the size of the landing field.	
11.7		Change the name of the class S8E/P to S8P.	
11.7.3		Change the landing circles for the final.	
11.7.4.9 and 11.7.4.10		Change the number of rounds flown at Category One events, and specify the procedure for the final rounds.	
11.7.5.4		Addition of a safe procedure for movement around landing circles.	
Annex 1, Annex 2 and Par 9.11.2-9.11.5		Numerous changes to Scale Judging Guide (these changes have not been marked with double lines).	
Annex 2: c) and f)		Delete redundant mention of transmitter pound. Add a note regarding calibration control of electronic equipment for Motor Test Officials.	
Annex 2: 4.a		Delete the final sentence.	
Annex 2: 4.d.5		Clarify the definition of a scale model prototype.	
Annex 2: 5.d		Add a paragraph to define the role of a Landing Safety Officer (LSO).	
Annex 3: 1		Clarify the classes recognised for World Cup Competition.	
Annex 5		New Annex: FAI Space Model Safety Code	

Paragraph	Plenary meeting approving change	Brief description of change	Change incorporated by
There were no changes at the 2020 Plenary Meeting.			

Paragraph	Plenary meeting approving change	Brief description of change	Change incorporated by
Throughout	n/a (2020)	The 2019 Volume contained grammatical errors and other ambiguous statements of a grammatical nature, which could lead to misunderstandings and wrong application of the rules. These have been corrected in this (2020) Volume (not marked). • The word 'engine' has been changed to 'motor' throughout (not marked). • Capital letters have been unified (not marked).	Kevin Dodd Technical Secretary & Zoran Pelagic, Space Models S/C Chairman

Paragraph	Plenary meeting approving change	Brief description of change	Change incorporated by
Annex 3 Par 4.	2019	Remove the exemption: 'Are not considered scores received by competitors in the final rounds in class S8E/P.' This clause has been deleted (not marked).	Kevin Dodd Technical Secretary & Zoran Pelagic, Space Models S/C Chairman

RULE FREEZE FOR THIS VOLUME

With reference to paragraph A.10.2 of *CIAM General Rules*:

In all classes, the two-year rule for no changes to model aircraft/space model specifications, manoeuvre schedules and competition rules will be strictly enforced. For Championship classes, changes may be proposed in the year of the World Championship of each category.

For official classes without Championship status, the two-year cycle begins in the year that the Plenary Meeting approved the official status of the class. For official classes, changes may be proposed in the second year of the two-year cycle.

This means that in Volume Space Models:

(a) changes can next be agreed at the Plenary meeting 2025 for application from January 2026;

(b) provisional classes are not subject to this restriction.

The only exceptions allowed to the two-year rule freeze are genuine and urgent safety matters, indispensable rule clarifications and noise rulings.

VOLUME S

GENERAL REGULATIONS AND SPECIAL RULES FOR SPACE MODEL CONTESTS, CHAMPIONSHIPS AND RECORDS

PART ONE – GENERAL DEFINITIONS

1.1 SPACE MODEL

Model rocket or rocket glider - a model that rises into the air without the use of aerodynamic lift forces to overcome the gravitational forces set in motion by a rocket motor (s) using a vertical or near vertical free-ballistic flight by the force of the thrust rocket motor a cone with an angle of 60°, oriented vertically on the launching device, comprising a device for safe return to the ground in a position that allows its reuse and constructed primarily of non-metallic materials.

1.2 SPACE MODEL MOTOR

“Space model motor” means a solid propellant reaction motor in which all chemical ingredients of a combustible nature are pre-mixed and ready for use.

1.3 CLASSIFICATION OF SPACE MODELS

See CIAM General Rules: B.2.2 Classification of space models.

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PART TWO – SPACE MODEL SPECIFICATIONS

A space model must comply with the following requirements prior to launch, and during flight.

2.1 WEIGHT

See CIAM General Rules B.2.3 Class S Space Models.

2.2 PROPELLANT

See CIAM General Rules B.2.3 Class S Space Models.

2.3 STAGES OF OPERATION

2.3.1 There shall be no more than three (3) operable stages. A stage is defined as a portion of the model airframe containing one or more space model motors that is designed to separate or which actually separates from the model while in flight. An un-powered part of the model is not considered to be a stage. The configuration of a model is considered to be that of the model at the instant of first motion on the launcher. Motors ignited simultaneously are considered one stage regardless of the number of separated parts; for example Soyuz.

2.3.2 Total impulse of motor(s) in a lower (booster) stage must, for safety reasons, be equal or greater than total impulse of motor(s) in (any) of upper stage(s). The thrust of the booster stage also must be equal or greater than the thrust of each of the upper stages. This does not relate the strapped-on boosters which are ignited simultaneously with the booster stage.

2.4 CONSTRUCTION REQUIREMENTS

2.4.1 A space model shall be so constructed to be capable of more than a single flight and shall contain 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 on the ground.

2.4.2 A space model must not eject its motor(s) in flight unless it/they is/are enclosed in an airframe that will descend in accordance with the provisions of paragraph 2.4.1. The motors(s) of the models cannot be fastened by glue and cannot be an integral part of model's construction.

2.4.3 Construction shall be of any modelling material without substantial metal parts. A substantial metal part is a nose cone, body tube, fins, any hard, sharp and external pointed part or any internal metal part that can cause injuries to persons or damages to property.

2.4.4 Minimum dimensions of subclasses of classes S1, S2, S3, S6 and S9 must not be less than:

Event Class	Minimum External Diameter (mm)		Minimum Overall Length (mm)
	Minimum Diameter (mm)	Minimum Length (mm)	
A/2, A & B	40	250	500
C	50	325	650
D	60	400	800
E	70	475	950
F	80	550	1100

The model length is the distance from the top of the model to the lowest part of the models body. In the case of Class S1 models, the smallest body diameter must be not less than 18 mm for at least 75% of the overall length of each stage. An S1 sustainer stage may not have a boat tail.

The minimum dimensions of Class S5 must not be less than:

Event Class	Minimum External Diameter (mm) of each Stage	Minimum Overall Length (mm)
A	20	400
B	25	500
C	30	600
D	40	800
E	50	1000
F	60	1500

Class S5 models shall have a minimum diameter of an enclosed airframe equal or larger than that in the table above for at least 50% of the overall length of each stage.

2.4.5 Design and construction shall include attached surfaces that will provide aerodynamic stabilising and restoring forces necessary to maintain a substantially true and predictable flight path. If required by the rules for a specific class, local rules for competition and/or safety officers or judges, the competitor entering the model must present data regarding the locations of the centre of gravity, centre of pressure, gross weight, burnout weight, and/or calculated or measured flight performance of the model. These data must be submitted with models S5 and S7 at model processing before a model is entered to competition.

2.4.6 A space model shall not contain any type of explosive or pyrotechnic payload. The prefabricated delay charge grain and ejection charge which deploys the recovery device, that are pre-assembled or affixed to the space model motor, shall not be considered an explosive or pyrotechnic payload.

2.4.7 Models in Classes S3, S4, S6, S8 and S9 must fly and, in case of S8 land, without separation of any part in flight. A part of a model is defined as any component in or on the model at the time of the launch.

PART THREE – SPACE MODEL MOTOR STANDARDS

A space model motor which shall supply the propulsive force for a space model must conform to the following standards:

3.1 DESCRIPTION

3.1.1 A space model motor shall be a solid propellant reaction motor, which has all propellant ingredients preloaded into the casing in such a manner that they cannot easily be removed. Delay grains and ejection charges may be pre-mixed and packaged separately if the auxiliary package is a single, pre-assembled unit containing all of the remaining combustible material.

3.1.2 All space modelling events shall be divided into sub-classes according to total impulse as follows:

Event Class	Total Impulse
A/2	0,00 to 1.25 Newton-seconds (Ns)
A	1,26 to 2.50 Ns
B	2.51 to 5.00 Ns
C	5.01 to 10.00 Ns
D	10.01 to 20.00 Ns
E	20.01 to 40.00 Ns
F	40.01 to 80.00 Ns

3.1.3 Total impulse of a single motor is equal to the upper limit of the total impulse for the motor class.

3.1.4 In space modelling competitions usage of space model motors of the following total impulse is allowed:

Motor Class	Total Impulse
A/2	1.25 Ns
A	2.50 Ns
B	5.00 Ns
C	10.00 Ns
D	20.00 Ns
E	40.00 Ns
F	80.00 Ns

3.2 CASING

A space model motor casing shall be made of non-metallic material of low thermal conductivity. The temperature of the external surface of the casing shall not exceed 200 degrees Centigrade during or after operation. Minimum casing diameter shall not be less than 10 millimetres.

3.3 INTERNAL OVERPRESSURE

A space model motor must be so designed and constructed that it will not rupture its casing in the case of internal overpressure. Any malfunction resulting in internal overpressure should dissipate its force along the longitudinal axis of the motor.

3.4 SPONTANEOUS IGNITION

A space model motor must be so designed and constructed as to be incapable of spontaneous ignition in air, in water, as a result of physical shocks, jarring, impacts or motion under conditions that would reasonably be expected to occur during shipment, storage or use, or when subjected to a temperature of 80 degrees Centigrade or less.

3.5 LOADING, THRUST AND IMPULSE

A space model motor shall contain less than 125 grams of propellant material. It must not produce a total impulse of more than 100 Newton-seconds and must have a thrust duration longer than 0,050 seconds.

3.6 STORING AND SHIPPING

A space model motor shall be shipped and stored with no ignition element installed that may be actuated by an open flame, a temperature of less than 150 degrees Centigrade, or by incident radio-frequency radiation normally encountered during shipping, storage and use.

3.7 SEALING

A space model motor containing more than 20 grams of propellant materials shall be sealed at the factory with a non-metallic seal in the nozzle and in the forward end. These seals should be readily removable by the user unless the motor is designed to perform its function with the seals in place.

3.8 BURNING

A space model motor in operation shall expel from its nozzle no pieces of burning propellant and shall be incapable of igniting a piece of dry paper or grass at a distance of one metre or more from the nozzle of the motor.

3.9 MODIFICATIONS

A space model motor shall not be altered in any manner to change its published performance characteristics or dimensions and shall not be used for any purposes except those recommended by the manufacturer.

3.10 CERTIFICATION FOR FAI CONTESTS

A space model motor used in a space model in FAI competition or for the purpose of establishing or surpassing FAI space model performance records shall be of a type previously tested and certified for such use by a National Airsports Control.

3.10.1 Competitors or team managers must submit to the Competition Organiser in advance of the competition the National Airsports Control certification documents of all motor types to be used during the competition. These certification documents must include data on motor dimensions, loaded weight, propellant weight, total impulse, thrust time curve, and time delay. The certification documents must contain an affidavit stating that the space model motor type meets all FAI standards as set forth in these rules.

3.10.2 In World and Continental Championships the competition organisers must perform a static test on a random sample of each motor type to check the data submitted by a National Airsports Control. When motor testing is completed, motor testing officers shall produce a certificate that contains data specified in 3.10.1 and in addition to them: the date, venue, competition name, names of motor testing officials and type of motor tester. This certificate shall be signed and stamped by the motor test officers and the organiser's authority". This certificate may be a substitute for the National Airport Control certification documents defined in 3.10.1.

3.10.3 In Bulletin 1, the organizer lists at least two motor manufacturers whose motors will be used at the competition, as well as a list of motors with characteristics.

Competitors, by registering, request a motor for themselves or a team at the competition and make payment to the organizer along with the payment of fees for participating at the competition.

Motors for all teams or competitors are delivered by the organizer and placed in waterproof boxes that would be delivered to the timekeepers at the starting points of the competitors at the time of the starts, where the motors would be available to the competitors under the supervision of the timekeepers.

The motor manufacturer is obliged to provide the organizer with attestation lists with work diagrams for each type of motor submitted for the competition, two attestations for each type of motor with no greater deviations of 10% in relation to the given motor power and operating time tracker.

3.11 STATIC TESTING

Static testing by a National Airsports Control may be carried out by itself or by an organisation designated by the National Airsports Control. In all cases, the National Airsports Control shall be responsible for the accuracy and correctness of all test data.

Copies of the test results should, at their request, be given to the team managers of the competing countries.

Motors must be submitted in batches for testing. Batch is defined as the motors required for one motor class in an event regardless of delay length. Maximum three batches are allowed per motor class per an event. In case of failure of any motor in the batch or if the total impulse of the motor class is exceeded, the entire batch will be rejected.

3.12 STATIC TEST EQUIPMENT

Static test equipment utilised for FAI certification of space model motors shall meet the following specification:

3.12.1 Motor thrust will be measured with the motor in horizontal position. Thrust shall be measured and recorded to an accuracy of +/- 1% of the full scale for the particular measuring range.

Absolute measurement error shall not exceed +/- 0,05 N while testing motors up to 5 Ns during burning and delay time.

3.12.2 Thrust duration will be measured and recorded to an accuracy of +/- 0,01 sec.

3.12.3 Frequency response of the equipment shall be at least 100 Hertz, and the natural frequency of the equipment shall be at least 5 times this number, or 500 Hertz.

3.12.4 Time delay shall be measured and recorded to an accuracy of +/- 0,1 second.

3.13 SPACE MODELS MOTOR TESTING STANDARDS

A space model motor type may be certified by a National Airsports Control if the performance of a randomly selected sample meets the following standards:

3.13.1 The total impulse of any individual motor tested should not depart more than + 0% / - 20% from the established mean value for that motor type.

3.13.2 The time delay of any individual motor tested should not depart more that +/- 20% from the established mean value to the motor type, and this variation for any motor should not exceed +/- 3 seconds.

3.13.3 No motor tested should malfunction in any manner.

3.13.4 Static tests shall be conducted with the test motor at a temperature of 20 degrees Centigrade, +/- 5 degrees Centigrade.

3.14 TYPE IDENTIFICATION

3.14.1. All space model motors accepted for use in an FAI competition shall be plainly marked on their exterior by the manufacturer at the time of manufacture with markings or codings indicating the motor's type and/or performance. Colour coding of the nozzle end of the casting indication type is recommended.

3.14.2 Standard markings on the exterior of the casing of a space model motor shall consist of following marks: a) manufacturer's name or logo, b) motor class (and total impulse) marked by a capital letter in accordance with paragraph 3.1.4 of these rules, c) average thrust in Newtons (N) marked by a numeral and d) delay time in seconds (s) marked by a numeral, e) manufacturing date (day, month and year of production), f) model rocket motor . When the colour coding of the nozzle end is used, a manufacturer is obliged to provide an affidavit that explains this coding with every delivered quantity of the motors that shall be submitted to the Contest Organiser.

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PART FOUR – GENERAL RULES FOR INTERNATIONAL CONTESTS

See *CIAM General Rules* for details. Moreover the following additions apply:

4.1 WORLD CHAMPIONSHIP EVENTS for SPACE MODELS

See CIAM General Rules C.15.2.2 Class S Space Models

4.2 NUMBER OF MODELS

See CIAM General Rules C.10.2 Class S Space Models

4.3 LAUNCHING

4.3.1 Launch Authority

During all operations concerned with the launching and flight of space models, all authority for the safety and conduct of operations on the flying field shall be vested in a Range Safety Officer who must be a member of a National Airsports Control and who must be 18 years of age or more. Deputy Range Safety Officers who meet the above qualifications may have this authority delegated to them by appointment from the Range Safety Officer, but this delegation or partial authority does not relieve the Range Safety Officer of overall responsibility and authority on the flying field.

Adequate opportunity and facilities will be provided so that all competitors in each event at a competition may obtain motors and prepare their models simultaneously for flight under the observation of officials.

4.3.2 Flight Permission

All space models presented for operation on the flying field shall be permitted or denied flight by the Range Safety Officer or his duly authorised deputy on the basis of his considered judgement with respect to the possible safety of the model in flight.

4.3.3 Launching Device

A launching device or mechanism must be used that shall restrict the horizontal motion of the model until sufficient flight velocity shall have been attained for reasonably safe, predictable flight. A launching angle of more than 60 degrees from the horizontal must be used.

4.3.4 Assisted Launch

A launcher shall not impart any velocity change or change of momentum except for that caused by the space model engine(s) contained in the space model. A launcher shall not include any stored energy feature (pyrotechnic, chemical, mechanical, pneumatic, etc.) that imparts velocity change or change of momentum to the rocket. No part of the launcher shall lose contact with the launcher assembly.

Pressurization (piston) launchers that use the exhaust gas from the space model motor(s) contained in the space model to accelerate the space model may be used unless prohibited for an event. No other materials or devices may be added to or included in the launcher to augment the pressure produced by the space model motor(s) contained in the space model.

For the S1, S2, and S5 events, pressurization (piston) launchers shall not be used. For these events, the nozzle(s) of the space model motors(s) contained in the model must be exposed to the atmosphere.

4.3.5 Launching Procedure

Launching or ignition must be conducted by remote electrical means with a launch system that has a safety interlock in series with the launch switch and a launch switch that returns to the “off” position when released. When launching all persons shall be at a safe distance that depends on the space model class, weather conditions and number of spectators. This distance shall be no less than 4 metres; for rockets containing clusters of multiple motors shall be at least 8 metres; and for rockets where safety or stability is in question shall be a distance and direction as determined by the Range Safety Officer.

All persons in the vicinity of the launching must be advised that a launching is imminent before a space model may be ignited and launched, and a minimum five (5) second “count down” must be given before ignition and launching of a space model.

If a space model does not launch when the button of the electrical launch system is pressed, the launch system’s safety interlock shall be removed or the system shall be disconnected from the battery, and 20 seconds must pass after the last launch attempt before anyone approaches the space model.

4.3.6 Weather Conditions

See *CIAM General Rules*, Para C.17, except that if wind is stronger than 9 m/s measured at two (2) metres above the ground at the starting line (flight line), for at least one minute, the contest should be interrupted or the start delayed.

4.3.7 Hazard

A space model shall not be launched into clouds or create a hazard to aircraft and shall not be used as a weapon against ground or air targets. Space models shall not eject any materials such as recovery device protection that are not flameproof and shall use containment tubes for fuse-type dethermalizers, so that the space models do not present a fire hazard upon landing. Launch devices shall have a means to prevent the motor's exhaust from directly hitting the ground, and any dry grass close to the launch pad shall be cleared before launch. No attempt shall be made to recover space models from power lines, tall trees, or other dangerous places.

4.3.8 Launch Site

Space models shall be launched outdoors, in an open area free of hazards to the safety of fliers or spectators and whose size is appropriate to the power of the models and to the weather conditions, as determined by the RSO.

4.3.9 Thermal Creation and Detection

No mechanical or passive methods of thermal creation are permitted (waving jackets, spreading reflective sheets, hot air blowers, motorcycles, etc.)

Ground or tethered thermal detection is permitted as long as it does not interfere with the conduct of the competition as determined by the FAI Jury.

4.4 OFFICIAL ENTRIES

4.4.1 Entry

Before the first flight in any competition event, at least one model must be inspected and marked by the judges. If a second model is allowed in an event, the second space model may be inspected and marked during the competition event. Two or more competition events may not be flown simultaneously by the same model.

4.4.2 Model Marking and Identification

See CIAM General Rules C.11.2 Class S Space Models.

Note: CIAM General Rules: C.11.1 a) introduced the mandatory carrying of the FAI ID number from 2022.

4.4.3 Builder of the Model

The judges shall make every reasonable effort to ensure that each competitor has completely constructed the model entered in the 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. The space model must be prepared for flight by the competitor and optionally assisted for flight by one helper. The helper may be a competitor within the same event. For junior competitors, the Team Manager must provide supervision.

4.5 OFFICIAL FLIGHTS

4.5.1 Definition of an Official Flight

A flight is considered official if the model or any part of the model leaves the launching device, loses contact with the launching device after ignition, or becomes airborne, except in the case of a catastrophic failure according to the provisions of Rule 4.6.3., in which case the flight is not considered official. An attempt is defined at the point where the RSO starts the countdown. A misfire (failed motor ignition) is not considered as an attempt.

4.5.2 Number of flights

In each event, except otherwise stated, each competitor shall be given an opportunity to make three (3) official flights, time and weather permitting. In Scale (S7) two (2) opportunities will be given, time and weather permitting.

4.5.3 Definition of an Unsuccessful Attempt

An attempt is classed as unsuccessful if the model or any part of the model leaves the launching device and at least one of the following cases occur:

a) model collides with another model during the flight,
b) proven frequency interference for radio controlled models,
c) catastrophic failure according to the provisions of the rule 4.6.3,
d) “no close” or “track lost” for altitude models.

If this happens on the first attempt in a round, the competitor is entitled to a second attempt in the same round.

4.5.4. Definition of a Re-flight

A competitor shall be allowed a re-flight when he is prevented from making an official flight through no fault of his own. In such cases he or his team manager should notify the RSO immediately. Permission for a re-flight shall be given by the RSO, or in case of a protest, by the FAI Jury. A re-flight shall be made under flight conditions similar to those under which the other official flights for that class were made, but before the official results are announced. If a re-flight is allowed, the competitor shall not be penalised by the loss of a round.

4.6 DISQUALIFICATION

4.6.1 Judges may disqualify any model at any time which, in their opinion, does not comply with the competition rules or which the Range Safety Officer or his authorised deputy feels may not be reasonably safe in operation.

4.6.2 Judges may disqualify any competitor on the grounds of failure to practise or observe reasonable safety measures, published or otherwise, for poor sportsmanship, for failure to abide by the orders of the Range Safety Officer or his authorised deputy or for misconduct in general.

4.6.3 A model experiencing a catastrophic failure which, in the opinion of the judges, was not due to or caused by improper design, construction, or pre-flight preparations of the model, shall not be disqualified from competition. A model suffering such a catastrophic failure and thereby rendered incapable of additional flights may be replaced by another model. For Scale models S5 and S7, experiencing a catastrophic failure, see rule 9.12.

4.6.4. By reason of flight characteristics, a model may be disqualified for a flight but is not necessarily disqualified for the entire event.

4.6.5 In the S4 classes, the model must reach a stable flight within 30 s from the moment the model or any part of the model leaves the launching device, otherwise the flight is disqualified.

In S3, S6 and S9 classes, the recovery system must deploy correctly within 30 s from the moment the model or any part of the model leaves the launching device, otherwise the flight is disqualified.

4.7 RADIO CONTROLLED SPACE MODELS

4.7.1. For transmitter and frequency control see *CIAM General Rules*, paragraph C.16.2.

4.7.2. Competitors must be called at least five minutes before they are required to occupy the starting area.

4.7.3. Once the competitor has been given permission to start, he may delay no longer than one minute before attempting launching.

4.7.4. If using an am/fm transmitter, the competitor must have ability to fly on at least two frequencies.

4.7.5 In World and Continental Championships because of increased safety, reduced harmful radio-interferences and simplified organisation of the RC events, spread spectrum 2.4 GHz radio devices are strongly recommended. When all the RC radio devices are spread spectrum 2.4 GHz, they must not be impounded.

4.8. TIMING AND CLASSIFICATION

4.8.1. The timing of flights is limited to a maximum determined by the individual class and size of motor used. The total flight time is taken from the time at which the model or any part of the model leaves the launching device to the end of the flight.

4.8.2. The total time of the three flights of each competitor is taken for the final classification unless otherwise defined by the rules of a particular class.

4.8.3. In order to decide the winner when there is a tie, additional deciding flights shall be made immediately after the last flight of the event has been completed. There shall be no more than two fly-off rounds to determine the winner. The maximum time of flight in the first fly-off round shall be

increased by two (2) minutes on the maximum time of flight of the previous round. The second fly-off round will be timed to the completion of the flight for final results. There shall be only one attempt for each additional flight. The times of the additional flights shall not be included in the final figures of classification for teams, they are for the purpose of determining the winner and for awarding the prizes attached to the title. The organiser will decide the time during which all competitors must launch their models. In the case of a tie in the team classification, the best individual score (classification) will be used.

4.8.4. For World and Continental Championships a round is defined as the amount of time allocated by the organiser for a national team to prepare and launch their models for one official flight per team member (one hour is recommended).

4.8.5. a) Each team shall have the right to provide a timekeeper for the following classes of World and Continental Championships: S3, S4, S6, S8, S9; with the organiser to be responsible for providing lodging and food only. Teams must nominate only skilled timekeepers and the timekeepers must bring binoculars, binocular tripods and watches for their own use. The organiser must use these timekeepers as a priority, before allocating duties to the timekeepers of the host nation or other timekeepers.

b) Competitors may act as timekeepers.

4.8.6. The timekeepers must familiarise themselves with the colour and shape of the model in order to recognise it during the flight.

4.8.7. The flight is considered ended when the model touches the surface of the earth, encounters an obstacle which definitely terminates its flight or when it definitely disappears from the timekeeper's sight. If the model disappears behind some obstacles or in clouds, the timekeepers are to wait for ten seconds; should the model not reappear, timing will cease and the ten seconds will be subtracted from the flight time.

4.8.8. a) The flights must be timed by two timekeepers during the first competition rounds and, in the fly-off, each flight must be timed by at least three timekeepers – the additional timekeepers preferably to be picked from among the competitors – with quartz controlled electronic stopwatches with digital readout recording to at least 1/100th of a second.

b) All timekeepers must be equipped with binoculars.

4.8.9. The timekeepers must remain within a circle of 10 metres radius centred on the competitor's launching device during the flights and time the flights independently of each other.

4.8.10. The time recorded is the mean of the times registered by the timekeepers, rounded to the nearest whole number of seconds to the resulting mean time (0.5 second rounded up to the second above) unless the difference between the times registered shows evidence of an error in the timing, in which case the organiser will determine, with the FAI Jury, which time will be registered as the official time or what action should be taken.

4.8.11. Instructions for using binoculars:

a) The binoculars must have a magnification of at least 7. At World and Continental Championships, at least one of the binoculars at the competitor's launch pad must be mounted on a tripod.

b) The timekeeper will adjust the binoculars before timing, so as to suit his eyesight. To do this the focus will first be adjusted with the centre knob, and then by separate adjustment of the adjustable eyepiece. The distance between the eyepieces will be adjusted so as to give a circular field of view.

Note: Binoculars with no central focusing device will be adjusted by altering each eyepiece in turn.

c) After adjustment and scale, readings will be noted. This should simplify readjustment if needed.

d) The timekeepers must not use the binoculars whilst the model is being launched. Use of the binoculars is suggested after about one minute of flight.

e) Use of the binoculars must not be left until too late in the flight, when there is a risk of not finding the model with the binoculars.

4.8.12 Electronic altimeters produced and approved in accordance with the provisions of the Sporting Code Volume EDIC – Electronic Devices in Competition – Section 2 - Technical Guidance Notes and Technical Specification for Altimeters Used in Space Modelling Competition V.1.0, which register the whole space model's flight trajectory and have time scale recording to at least 1/100th of a second, which is equivalent to quartz controlled electronic stopwatches with digital readout required for timing in paragraph 4.8.8 of these rules, can be used for timing in space models

contests. Qualified personnel and procedure of calibration, preparation for flight and readout of data is the same as for altitude measurements.

4.9. ALTITUDE DATA

For measuring and calculating altitudes, the methods that may be used are based on the principles of triangulation, or electronic or radar tracking.

4.9.1. Triangulation Method

Triangulation Method is described in Annex 6 of these rules. It is the oldest method for space models altitude measurements, is simple and cheap and is acceptable for lower levels of contests, but because of its slow procedure of tracking and results calculation as well as its limited accuracy, may be used only in Category 2 contests when and where electronic altimeters are not available. It is suitable for contests with smaller number of competitors and shall not be used for record attempts. It is also suitable as an educational tool for juniors.

For the description and parameters of Triangulation Method, refer to Annex 6.

4.9.2. Electronic or Radar Tracking

Altitude data derived from electronic or radar devices is valid only if evidence is presented regarding proper calibration and correction.

4.9.2.1. Electronic altitude measurements with an electronic altimeter shall use the new Sporting Code Volume EDIC – Electronic Devices in Competition – Section 2 - Technical Guidance Notes and Technical Specification for Altimeters Used in Space Modelling Competition V.1.0 for the documentation regarding specifications and guidance.

4.9.2.2. Radar Altitude Measurements

Subject to the radar equipment to be used for radar altitude measurements, the organiser of the event shall announce a special request for the type of reflective surface or responders to be used in a particular event.

4.10. SPECIAL CONTEST ORGANISATION REQUIREMENTS

The organiser must:

4.10.1. Provide a contest area divided in two sectors for seniors and juniors (if both classifications exist in a contest). Each sector shall be composed of the launch boxes 5 x 7 metres marked by plastic, marking ribbon. The whole launching area shall be protected by marking ribbons from the access of non-authorised persons.

4.10.2. Provide for class S8:

a) for S8A - S8F a landing area in accordance with Volume S paragraph 11.2. and 11.5.c);

b) for S8P a landing line with landing circles in accordance with Volume S paragraph 11.7.5 and relevant subparagraphs.

Refer also to *CIAM General Rules* C.16.2 Radio Control.

4.10.3. Provide an official clock (digital with big ciphers if possible) posted next to the score board for timing of the rounds.

4.10.4. Provide a public-address system (which may be a megaphone at the events with smaller participation) for countdown and to inform competitors.

4.10.5. Provide tent(s) for model preparation for flights by competitors and/or model repair in case of bad weather. A separate tent shall be provided for the computer centre with a printer for result calculations and for the FAI Jury.

4.10.6. Provide a light, dry and warm room large enough for static judging of scale models in classes S5 and S7 with necessary measuring equipment (for measurement of length, diameters, thickness and weight) and static judging forms according to Volume S Annex 1.

4.10.7. Provide the necessary number of CIAM approved electronic altimeters with software for altitude classes S1, S2 and S5 with proven qualified personnel. All electronic altimeters shall be impounded prior to the beginning of the competition and supervised by a special official, qualified and equipped with the relevant devices, to check and calibrate impounded equipment when necessary. If electronic altimeters are not available, Triangulation Method (Annex 6) can be used in Category 2 contests if the organiser provides at least two altitude measuring devices (theodolites) for altitude classes S1, S2 and S5 with proven qualified personnel and an appropriate radio communication system for data transfer from the tracking stations to the computer centre.

4.10.8. a) Organisers of World and Continental Championships must provide a relevant protected area

and calibrated motor tester(s) of a level of accuracy according to the Volume S paragraphs 3.12 and 3.13 to recheck samples of motors submitted for competition. A motor testing time-table shall be posted prior to the beginning of the testing and also distributed to the FAI Jury, motor testing officials and participating team managers.

b) Only Jury members, persons authorised by the Organiser, motor-testing officials and the Team Manager or Assistant Team Manager with one competitor or helper ie two persons from the team whose motors are being tested may attend motor testing. A report of by the organiser after the completed motor testing shall confirm which motors shall be used in competitions.

c) The organiser also may issue a certificate with measurements and thrust-time curve upon a request from the relevant participating team.

d) NAC certificates issued in accordance with the Volume S paragraph 3.10 shall be accepted for Open International space modelling events on the CIAM Contest Calendar.

4.10.9. Organisers of World and Continental Championships must provide lockable plastic boxes with the names of the participating countries. After all the motors have been submitted for testing and samples tested, all the motor boxes shall be impounded in a separate, secure room. The boxes shall be guarded during transportation to the field by special official(s) and delivered to the time-keepers at the relevant launching box that shall control delivery of the motors to competitors.

4.10.10 The organiser of a space models international contest listed in the FAI Contest Calendar shall provide and use a software approved by CIAM to produce uniform documentation of the contest. This relates to bulletins, results lists, jury reports and other accompanying documentation required by CIAM. Requirements for this software are given in Annex 2 Chapter 5.e.

PART FIVE - ALTITUDE COMPETITION (CLASS S1)

5.1. DEFINITION

In any altitude competition event, the model achieving the maximum altitude as measured and/or calculated shall be declared the winner.

5.2. ALTITUDE DATA

ALTITUDE DATA rules 4.9 will be used for this competition.

5.3. SUB-CLASSES

Altitude competition shall be divided into classes based upon the maximum allowable gross launching weight of the model and the maximum permissible total impulse of the motor or motors powering the model. Any number of motors may be used in any arrangement, provided that the sum of the total impulses of the individual motors does not exceed the allowable total impulse maximum for the competition class.

The following event classes are in effect for altitude competition:

Class	Maximum Weight (g)
S1A	60
S1B	90
S1C	120
S1D	240
S1E	300
S1F	500

5.4. CLASSIFICATION

Every competitor shall be given three opportunities to make official flights. The best out of three flights shall be taken for classification. In case of a tie, the second or even the third flight shall be decisive. If the tie remains, competitors shall be allowed to make an additional flight.

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PART SIX - PAYLOAD COMPETITIONS (CLASSES S2 & S2/P)

6.1. CLASS S2 (PAYLOAD ALTITUDE COMPETITION)

6.1.1 DEFINITION

This event is open to models that carry one or more standard FAI space model payloads to the highest altitude as tracked and reduced or to a target altitude in a specified time.

6.1.2. STANDARD FAI PAYLOAD SPECIFICATION

The Standard FAI space model payload is a cylindrical container made of any non-metallic modelling materials according to paragraph 2.4.3. The Standard FAI space model payload has the diameter of maximum 40 mm and weighs 28 grams (+/- 0,1 g). The organisers of these events must provide a sufficient amount of equal payloads for all competitors. The organisers may define, by local rules, the sophistication of the payload (photo, movie camera or electronic equipment) and add optional tasks.

6.1.3. PAYLOAD CARRYING REQUIREMENTS

The standard FAI space model payload or payloads carried in a model shall be completely enclosed and contained within the model, shall be removable from the model for technical control purposes, and shall not be capable of separating from the model in flight.

6.1.4. MODEL RECOVERY REQUIREMENTS

Models in this event must contain for recovery purposes parachutes of sufficient size to allow a safe landing under the provisions of Paragraph 2.4.1.

6.1.5. DISQUALIFICATION

A model's official flight will be disqualified if the payload separates during flight or landing and thereby becomes separated from the model.

6.1.6. ALTITUDE DATA

ALTITUDE DATA rules 4.9 will be used for this competition.

6.1.7. SUB-CLASSES

This competition will be divided into classes based upon maximum allowable gross launching weight, number of standard FAI space model payloads carried, and maximum permissible total impulse of the motor or motors. The following classes of FAI space model payload competition are established:

Class	Maximum Weight (g)	Number of Payloads Carried
S2C Single	90	1
S2E Dual	180	2
S2F Open	500	4

6.2. CLASS S2/P PRECISION FRAGILE PAYLOAD COMPETITION

6.2.1 Definition/Description

This event provides a precision performance challenge in both altitude and duration for single-stage space models that are carrying a fragile payload (as a raw egg or a small fragile plastic/glass container filled with liquid). The objective is to come as close as possible to the target altitude of 300 meters and a flight duration of 60 seconds in each of three flights with one model without breaking the payload.

6.2.2. Model Requirements

Each contestant may enter only one model. The model shall have one stage but may have any weight that is in compliance with the FAI SC4 Volume S paragraph 2.1 and any combination of motors that is in compliance with paragraph 2.2. It must contain and wholly enclose a fragile payload throughout the flight. It must use one or more parachutes as its sole recovery device. No form of external control may be used to regulate duration. During the flight no part of the model other than parachute protectors or wadding may be detached or jettisoned.

6.2.3. Payload Requirements

The fragile payload shall be in diameter than 45 +/- 5 millimetres and shall be between 60 +/- 3 grams in weight. One fragile payload shall be provided to the contestant before the first flight, flown on each flight, and inspected after the final flight.

6.2.4. Disqualification

If there is any external damage to the fragile payload when it is inspected after the contestant's final flight, the contestant shall be disqualified from the event.

6.2.5. Scoring

The score for each flight shall be the absolute difference between the recorded altitude and 300 metres (always a positive number) plus 3 times the absolute difference between the recorded duration and 60 seconds (always a positive number). Any flight which is disqualified for a reason other than a broken fragile payload, or which receives no altitude score, shall receive a score of 500 for that flight. The score for the event shall be the sum of the scores from each of the three flights. The lowest score is the winner. In the case of tie the best (the lowest score) in a round is decisive.

The following scoring formula shall be used for point allocation:

B = ABS(H-300) + 3 * ABS(T-60),

where B = points awarded to the competitor,
H = flight altitude of the model (meters),
T = flight time of the model (seconds).
ABS = Absolute value function

6.2.6. Model Processing and Precautions

Every model entered into this competition shall be inspected and marked before the first flight by the judges according to the SC4 Volume S paragraph 4.4.1. For safety reasons, at the request of the judges, the contestant must present data regarding the locations of the centre of gravity, centre of pressure, gross weight, burnout weight and/or calculated or measured flight performances of the model in accordance with the SC4 Volume S paragraph 2.4.5.

6.2.7. Replacement of Model

If a model is damaged by a catastrophic failure (cato) of the motor, a competitor may replace the model and may use a new fragile payload.

PART SEVEN - PARACHUTE/STREAMER DURATION COMPETITION (CLASSES S3 AND S6)

7.1. GENERAL

The Parachute or Streamer Duration Competition is divided into classes according to the total impulse of the motor used.

7.2. SPECIFICATIONS

7.2.1. Parachute Duration Models

The Parachute Duration Competition is open to models that are single-staged, powered by a single space model motor, containing one or more parachutes for recovery purposes. The parachute(s) must be provided with a minimum of three (3) shroud lines. A competitor may change the recovery parachute(s) in a model at any time during the competition.

7.2.2. Streamer Duration Models

The Streamer Duration Competition is open to models that are single-staged, powered by a single space model motor, containing one streamer for recovery purposes. The streamer must be a single homogenous unperforated rectangle of flexible material i.e. fabric, tissue or plastic foil with a length to width ratio of 10:1 minimum. At the narrow end of it a rigid support of 2 mm x 2 mm maximum cross-section together with a loop of thread attached at each end of the support may be used to attach the streamer to the model's single shroud line. The streamer must completely unfurl during the flight. A competitor may change the streamer in a model with an inspected and valid streamer at any time during the competition.

7.3. TIMING AND CLASSIFICATION

Timing and Classification Rules 4.8 will be used for this competition.

7.4. SUB-CLASSES

For Parachute and Streamer Duration Competitions the classes and their respective maximum flight tines are:

Class	Maximum Weight (g)	Maximum Flight Time (sec)	
		Parachute	Streamer
S3A / S6A	60	300	180
S3B / S6B	90	420	240
S3C / S6C	150	540	300
S3D / S6D	200	660	360

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PART EIGHT – BOOST GLIDER DURATION COMPETITION (CLASS S4)

8.1. DEFINITION/DESCRIPTION

This competition comprises a series of events open to any space model that ascends into the air without use of lifting surfaces which sustain the entry against gravity during that portion of flight when it is being subjected to or accelerated by thrust from its space model motor; and that returns to the ground in stable gliding flight supported by aerodynamic lifting surfaces which sustain the model against gravity. The intent of this competition is to provide a sporting competition for space models with gliding recovery. Space models that ascend into the air in a spiralling climb under rocket power in such a manner that they are supported during their rise by wings shall not be eligible for entry in this competition.

The model may use one channel of radio control to control a single function for a dethermaliser (a device that alters the aerodynamics of the Boost Glider, allowing it to descend quickly but safely, especially when caught in a thermal). All models shall use spread spectrum 2.4 GHz radio systems to eliminate the need for transmitter impound.

Any model that qualifies as a flex-wing (Rogallo) is not eligible for this event.

8.2 PURPOSE OF COMPETITION

The purpose of the competition is to determine which model achieves the longest time of flight utilising a vertical or near vertical free-ballistic flight pattern under power within a 60 degree cone centred vertically on the launcher and a stable aerodynamic glide recovery. Each model will be timed from the instant of first vertical motion on the launcher until the instant the model touches the ground.

8.3. TIMING AND CLASSIFICATION

Timing and Classification Rules 4.8 will be used for this competition.

8.4. SUB-CLASSES

For Boost Glider Duration Competitions, the classes and their respective maximum flight times are:

Class	Maximum Weight (g)	Maximum Flight Time (sec.)
S4A	60	180
S4B	90	240
S4C	120	300
S4D	240	360
S4E	300	360
S4F	500	360

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PART NINE - SCALE COMPETITION (CLASS S7)

9.1. DEFINITION

Scale competition is a single event and is limited to flying space models that are true scale models of existing or historical guided missiles, rocket vehicles, or space vehicles.

Note: To indicate the subject full-size rocket being scale modelled, the word "prototype" may be used. To indicate the scale model itself, the word “entry” may be used.

9.2. MULTI-STAGE PROTOTYPE

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 and flown without its operable lower stages unless specific data is furnished to the judges to prove that the upper stage configuration was designed to be or has flown separately, alone, and as a vehicle itself. For example, all Aerobee rockets must have operable boosters.

9.3. SELECTION OF PROTOTYPE

The competitor must have modelled one particular serial-numbered prototype, except in the case where the prototype is in such large mass production that there is no single individual vehicle that can be singled out for scale modelling purposes. However, the competitor shall make every reasonable attempt to model a specific prototype.

9.4. PROOF OF SCALE

The competitor must supply scale data to substantiate his entry’s adherence to scale in dimension, shape, colour, and paint pattern. Minimum allowable data consists of length and diameter of the prototype, one photograph and data required in rule 2.4.5. Further data is certainly encouraged. Dimensional data must be from an accurate source such as magazines, books, manufacturer’s specifications or data sheets, etc. Photographs from any sources are acceptable. All data presented should apply to the particular prototype that is modelled and entered. Judges may deduct points for incorrect data.

9.5. KITS AND KIT PARTS

Flying scale space model kits may be used as a source of design, materials, etc. and acceptable for entry only if accompanied by scale substantiation data other than that contained in the kit or available from the kit manufacturer. The competitor shall be responsible for ascertaining the correct scale qualities of the kit and must present satisfactory evidence that the kit model is correct to scale.

9.6. STABILISING FINS

Scale models of rockets, missiles or space vehicles that are, in the opinion of the competitor, insufficiently fin-stabilised 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. The clear stabilising fins may be detached from the entry for static judging, but must be presented with the entry (best near it).

9.7. PLASTIC MODEL KIT PARTS

Parts from plastic model kits and 3D printed parts may be used on scale space models provided that this use is pointed out in the data presented with the model at the time of judging for scale qualities.

9.8. CONDITIONS OF MODEL FOR JUDGING

Entries will be judged for scale qualities in flight condition minus space model motors. All launching lugs, fittings and other flight items must be attached to the model for scale judging. Nothing may be added to or taken off the model between the scale judging and the flight except space model motors, detachable plastic fins and recovery device packing.

9.9. MAXIMUM WEIGHT AND IMPULSE

Maximum allowable gross launching weight is listed in Rule 2.1.

Maximum allowable total impulse is listed in Rule 2.2.

9.10. NUMBER OF FLIGHTS

Each entry must make a stable flight, and two (2) opportunities will be available to the competitor for this purpose, time and weather permitting.

9.11. SCALE JUDGING

Scale quality points will be awarded to each entry according to the following schedule:

9.11.1. A competitor who presents the following proper technical data may be awarded with points defined in the paragraphs below only for items documented in these technical data:

- authentic, authorised drawing(s) of the prototype with cross sections, i.e. data which define colour and markings on it;
- workshop drawing of the entry that shows prototype and model dimensions;
- photographs of the whole prototype with clearly visible details of colour and markings;
- photographs of details and assemblies;
- flight profile - taken from official sources: official publications, magazines, books, specifications of the design bureau or developer of space rocket systems;
- drawing that indicates powered parts and separation joints
- file containing all necessary technical data including data regarding the locations of the centre of gravity, centre of pressure, gross weight, burnout weight and/or calculated or measures flight performance of the model necessary for safety reasons.

9.11.2. **Adherence to scale:** 130 points maximum. To be considered as a scale model the dimensions of the body diameter and overall length should not depart from scale by more than 10% or else the entry is disqualified. This rule shall not be applied to dimensions less than 10 mm. The judging category should be judged in two areas: 1) model dimensions - 110 points maximum; 2) colour and markings - 20 points maximum.

9.11.3. **Workmanship:** 170 points maximum. To be judged on neatness, care of construction, and degree of finish. The judging category will be judged in two areas: 1) workmanship of body, fins and details - 130 points maximum; 2) finish of body and fins - 40 points maximum. Deviations from scale finish such as a high gloss finish on an entry that should have a flat or dull finish will detract from maximum points.

9.11.4. **Degree of difficulty:** 150 points maximum. To be judged on the degree of difficulty involved in constructing the model up to 110 points. Factors to be considered include symmetry of model; number of external components; intricacy of paint pattern; degree of detailing. A bonus of 40 points for “originality” shall be awarded to a prototype that is the only one in the competition and a bonus of 20 points shall be awarded if two prototypes of the same kind enter the competition. No bonus points shall be awarded if there are three or more models of the same kind. For originality points, prototypes with the same external appearance except for flight serial number/markings and colours/paint pattern shall not be considered unique vehicles (e.g., Saturn IB/Skylab flights, Soyuz-FG/TMA flights, etc.).

9.11.5. **Flight, characteristics:** 300 points maximum. To be judged on launch, stability of flight, motors and descent. A competitor has to designate which operations his models are to perform in flight (eg separation of powered portions; radio controlled trajectory; ejection of payload, etc).

If the entry has been disqualified in both official flights, the competitor will not be eligible for final classification.

9.11.6. In the case of World and Continental Space Modelling Championships, dimension deviations from the Scale shall be measured by a separate qualified measuring team approved by the FAI Jury. The measured dimensions will be presented to the Scale Judges for verification and included with the Scale Judging Data.

9.11.7. Results for static points and flight characteristics shall be published for the categories defined in Rules 9.11.2 through 9.11.4:

- Adherence to Scale
- Workmanship
- Degree of Difficulty
- Flight Characteristics

For World and Continental Space Modelling Championships, the results for static points and flight characteristics from each judge shall be anonymously published after the competition.

9.12. Should the entry experience a catastrophic failure, be incapable of additional flights (4.6.3.) and have scored no Flight Characteristic points, the competitor’s score shall be zero.

PART TEN - SCALE ALTITUDE COMPETITION (CLASS S5)

10.1. DEFINITION

This series of events involves altitude competition with scale space models and is a combination of the altitude competition (Part 5) and the scale competition (Part 9). The objective of the competition is to achieve the highest altitude with a scale space model.

10.2. RULES

All entries must comply with the rules of Scale competition (Part 9) and will be judged under the same rules and receive the same number of maximum scale quality points except that two flights will be allowed and no flight characteristics points will be given.

ALTITUDE DATA rules 4.9 will be used for this competition.

10.3. SCORING

The total number of scale quality points awarded to an entry will be added to the highest official altitude achieved by the entry. Only in the case of “no close” or “track lost”, no altitude points are added but the flight is considered qualified and the competitor’s static points will be taken to decide the final classification. Otherwise, if the model does not make a qualified flight after two attempts, the final classification will be zero.

The entry having the largest number of total points resulting from adding the static scale quality points to the altitude in metres achieved from the same flight, will be declared the winner. In the event of a tie, the points gained for scale quality will be decisive.

10.4. DISQUALIFICATION

The judges must disqualify from scale altitude competition any entry which, in their opinion, does not show sufficient scale qualities or evidence of normal level of workmanship required for a scale model under the provisions of the scale competition (Part 9). The intent of this rule is to eliminate from scale altitude competition any entry which has scale qualities grossly subordinated in favour of altitude performance qualities.

10.5. SUB-CLASSES

Scale Altitude Competition may be flown in the following classes:

Class	Maximum Weight (g)
S5A	60
S5B	90
S5C	120
S5D	240
S5E	300
S5F	500

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PART ELEVEN - ROCKET GLIDER DURATION COMPETITION (CLASS S8)

11.1 GENERAL

11.1.1. Rocket Glider Duration Competition comprises a series of events open to any single-staged rigid-winged, radio-controlled space model which returns to the ground in stable, gliding flight supported by aerodynamic lifting surfaces which sustain it against gravity. The model must utilise a vertical or near-vertical ballistic take-off and a stable aerodynamic glide recovery without any separation or discarding of motor casing(s).

11.1.2. Radius of the nose must be a minimum of 5 mm in all orientations for S8D, S8E, S8P and S8F.

11.2. PURPOSE

The purpose of this competition is to achieve the longest flight duration time in combination with a landing of any part of the model within a given one or more landing area(s) of 15 by 15 metres.

11.3. DISQUALIFICATIONS:

11.3.1. Any entry which, under any circumstances or in any manner, separates into two or more unattached pieces, or discards its motor casing(s) shall be disqualified.

11.3.2. Any entry that is supported by aerodynamic lifting forces in such a manner that it ascends in a climb not substantially vertical, within a 60 degree cone centred vertically on the launcher while under rocket power shall be disqualified from this competition.

11.3.3. Any entry that descends with parachute and/or streamer recovery device(s) attached shall be disqualified.

11.3.4. During the powered phase of flight, spinning or looping of the entry is permitted only around the roll axis or a parallel axis. Entries which spin or loop around the pitch or yaw axis shall be disqualified.

11.4. TIMING AND CLASSIFICATION

11.4.1 Timing and Classification Rules 4.8 will be used for this competition.

11.4.2 The model shall be timed from the instant of first vertical motion on the launcher until the instant it touches the ground.

11.4.3 One point will be awarded for each full second of flight time up to the class maximum listed in rule 11.6.

11.4.4 60 additional points will be awarded if any part of the model lands within the metres Target Landing Zone specified in par. 11.2. During landing, if the model hits the pilot or their helper, or the pilot lands the model outside the Target Landing Zone, no additional points will be awarded for landing.

For each flight, the total score is compiled by adding points from flight time and additional points for landing.

11.4.5 For the fly-off in classes S8E and S8F the jury shall determine the maximum time of flight (but not exceeding 30 minutes) for a round according to the meteorological conditions and the character of the flying site. The maximum must be announced before the start of the round.

11.5. RADIO CONTROLLED FLIGHT

a) The models in Class S8 subclasses S8A to S8F must be radio controlled. Rule 4.7 applies.

b) The pilot shall be disqualified from the flight if he moves away from the area marked by the organiser.

c) The Contest Director is responsible for determining the location and orientation of the Target Landing Area(s). Any changes of the indicated landing area are forbidden during the round. The landing area must be located at a place on the field where there is no danger of collision with any person during the landing of the models.

11.6. SUB-CLASSES

Class	Maximum Weight (g)	Minimum Wing Span (mm)	Maximum Flight Time (sec.)
S8A	60	500	180
S8B	90	650	240
S8C	120	800	300
S8D	300	950	360
S8E & S8P	300	1100	360
S8F	500	1250	360

11.7. CLASS S8P RADIO CONTROLLED ROCKET GLIDER TIME DURATION AND PRECISION LANDING COMPETITION

11.7.1. PURPOSE

The purpose of the competition is for the competitor to remotely control his/her model from the ground to achieve a model flight of 360 seconds and precisely land the model on the target, centred within his/her designated landing area of 10 metres radius.

11.7.2. SPECIFICATIONS

The competition has only one subclass determined for models which comply in size with subclass S8E. Total impulse of motor(s) 10,01 to 20,00Ns is allowed.

The radio shall be able to operate at 2.4 GHz. Where the radio does not meet this requirement, the working bandwidth (Maximum 50 kHz) shall be specified by the competitor.

11.7.3. LANDING AREA

Before the start of each round the organiser must provide:

a) An appropriate number of non-extensible measuring tapes marked every one metre. The number will be determined by the maximum number of flyers in a group.

b) A landing area consisting of the appropriate number of 10 metre landing circles; for the final, 3 metre circles; laid out square to the wind direction and with the marked landing tapes pinned down at the centre of each circle. The contest director is responsible for determining the direction and layout of the circles. Any changes of indicated landing area are forbidden during the round. The landing area must be located at a place on the field where there is no danger of collision with any person during the landing of the models.

c) The location of the timekeepers and pilots during landing near their landing circles is the responsibility of a specially appointed landing officer.

11.7.4. TIMING AND CLASSIFICATION

11.7.4.1. Timing and Classification Rules 4.8 will be used for this competition.

11.7.4.2. The model shall be timed from the instant of first motion on the launcher until the instant it touches the ground.

11.7.4.3. The timekeepers must remain within a radius of approximately 10 metres from competitors during the flights and time the flights independently of each other. After the landing, the timekeepers must determine the point at which the nose of the model came to rest and award additional points for landing in accordance with 11.7.4.6 provided the claim is justified.

11.7.4.4. One point will be awarded for each full second of flight time up to a maximum of 360 points (that is, 360 seconds maximum).

11.7.4.5. One point will be deducted for each full second flown in excess of 360 seconds.

11.7.4.6. Additional points will be awarded for landing:

When the nose of the rocket-glider comes to rest, the distance from the nose to the centre of the circle is measured. One (1) point is deducted from a maximum of 100 points for every 10 centimetres from the centre.

No additional points will be awarded if the landing occurs 390 seconds after the start or if the model lands outside of the designated landing circle. If, on landing, the model hits the pilot or his helper, or the pilot stops the model, no additional points will be awarded for landing.

11.7.4.7. For each flight, the total score is compiled by adding points for flight time and additional points for landing.

11.7.4.8. The winner of a particular flight round in the relating group receives a score of 1000 points. Other competitors receive points as follows:

$$P_c = 1000 \times \frac{R_C}{R_W}$$

where P_c = points of the competitor
R_w = result of the winner in the relating group
R_c = result of the competitor

The corrected score shall be recorded (rounded) to one place after the decimal point.

11.7.4.9. There shall be four rounds, except for Category One events, which shall have four initial rounds and two final rounds. At Category One events the five competitors with the highest score after the initial rounds qualify for the final rounds, and shall fly as a group.

11.7.4.10. The final classification will be determined by the sum of all flight scores of each competitor.

When there is a tie, the best score of one round shall be used to determine the individual winner. If a further tie occurs, the second best score of one round shall decide the winner.

11.7.5. ORGANISATION OF STARTS

11.7.5.1. Competitors shall be combined in groups by draw in accordance with radio frequencies used to permit as many flights simultaneously as possible. For this competition, there must be a minimum of three competitors in a group. The draw is organised in such a way that, as far as possible, there are no competitors of the same nation in the same group. The flying order of the different groups is also established with a draw. A different composition of groups shall be used for each round.

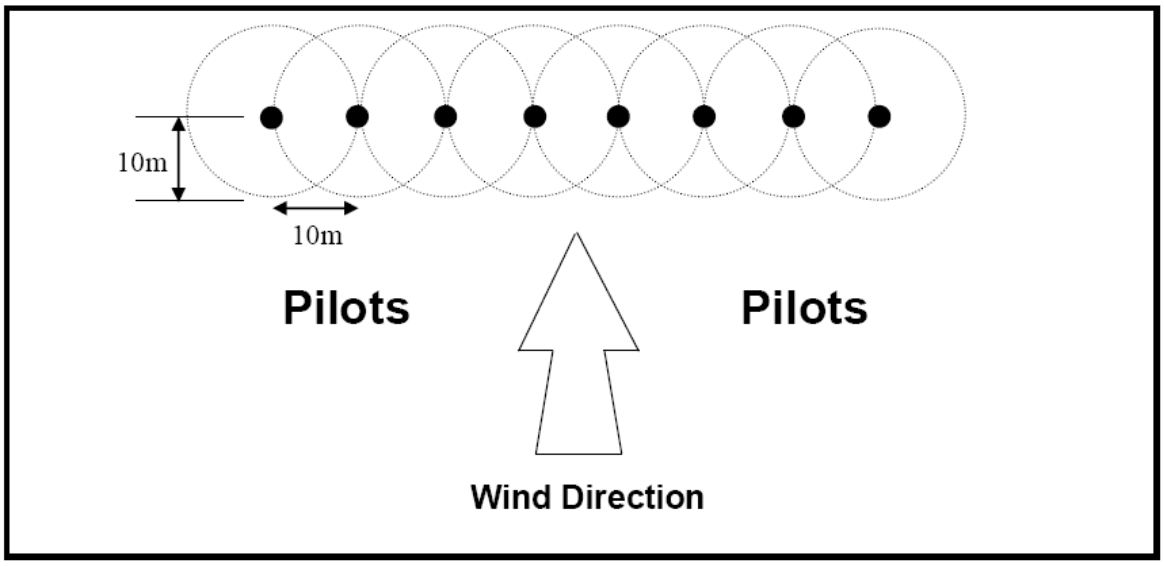
11.7.5.2. Each group is entitled to three minutes of preparation time before the starter gives the order to count off the working time.

11.7.5.3. Each group of competitors has 12 minutes of working time to perform an official fight. In the case of the working time being exceeded (a delay in landing), the competitor will be disqualified for the round.

Note: Working time can be repeated at the Contest Director's discretion for any unforeseen reason outside the competitor's control (for example, radio interference). The working time shall be repeated immediately after the end of the current round.

11.7.5.4. The starting order of competitors in each group will be determined from the order in which competitors announce their start to the Range Safety Officer. In the case of a misfire, the competitor is allowed to repeat a launch attempt only after all the other launch attempts by the competitors in the same group have been made.

S8P LANDING AREA



In normal situations the circles will overlap each other but the centres should never be closer than 10 metres apart as in the diagram above. A competitor (pilot) and one helper may stay at the landing area either inside or outside the landing circles.

The timekeepers must stand outside the landing circles behind the pilots.

The LSO (landing safety officer) supervises the pilots, helpers and timekeepers and the measuring team of the landing points to prevent obstructions to landing models.

PART TWELVE – GYROCOPTER DURATION COMPETITION (CLASS S9)

12.1. GENERAL

Gyrocopter Duration Competition comprises a series of events open to any single-staged space model which uses the principle of auto-rotation as the sole means of recovery.

12.2. PURPOSE

The purpose of this competition is to achieve the longest flight duration using an auto-rotating recovery system.

12.3. SPECIFICATIONS

12.3.1. Each entry must be decelerated during descent by its auto-rotating recovery device. The resulting autorotation must be around the roll axis of the auto rotating recovery device and must be the result of proper deployment and operation of the recovery system.

12.3.2. Flexible materials can only be used for covering rigid support auto-rotation surfaces. The recovery system shall not be constructed solely, or in part, of flexible materials and rigging (e.g., a parachute with rigid stringers or folding rotors of flexible materials between rigid stringers). entries using a recovery system which is designed to act (or which actually acts) in a manner similar to a parachute, a rigid inverted bowl, or similar techniques are specifically excluded from this competition.

12.4. TIMING AND CLASSIFICATION

Timing and classification rules 4.8 will be used for this competition.

12.5. SUB-CLASSES

Class	Maximum Weight (g)	Maximum Flight Time (sec.)
S9A	60	180
S9B	90	240
S9C	150	300
S9D	200	360

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ANNEX 1
SCALE SPACE MODELS JUDGE'S GUIDE

EVENT:.....( ) Scale (Class S7)

.....( ) Scale Altitude (Class S5)

Name:

_____

FAI ID Number:

_____

Competitor Number:

_____

National Team:

_____

Prototype Name:

_____

Prototype Serial Number:

_____

****

DISQUALIFICATIONS

(Applicable FAI Rule Number Shown in Parenthesis)

Prototype is not a guided missile, rocket, or space vehicle (9.1)

Entry has no lower stage (multi-stage prototypes only) (9.2)

No length and/or diameter data supplied for prototype (9.4)

No photograph of prototype supplied (9.4)

Entry utilises plastic kit and/or 3D printed parts not identified as such (9.7)

Entry not submitted in flight configuration (minus motors, detachable plastic fins and recovery device packing) (9.8)

Entry does not carry competitor's FAI ID number (4.4.2)

FAI CATEGORY	SUB-CATEGORY	JUDGING CONSIDERATIONS	POINTS
Technical Data	Prototype Drawings and Data	To what degree is external prototype detail substantiated by drawings? - authentic, authorised drawings - data which define colour and markings on it. - workshop drawing of scale model - file containing all necessary data including those from paragraph 4.4.3 and 2.4.5.	Note: no points for technical data. Check only what is submitted of the required data and below, give points only to those items documented by these technical data.
	Prototype Photographs	- at least one colour photograph of the whole prototype with clearly visible details.	
	Flight Profile	- authentic flight profile of the prototype, taken from official sources (official publications, magazines, books, specifications of the design bureau or developer of space rocket systems)	

FAI CATEGORY	SUB-CATEGORY	JUDGING CONSIDERATIONS	POINTS
Degree of Difficulty	Configuration	To what degree does the entry depart from the configuration of a "finned cone-topped cylinder".	(0-25)_____
	External Components	Consider the number and complexity of the entry's external components including fins, transitions, interstage adapters, shrouds, strap-on booster, launch lugs, antennae, etc. Also consider to what extent the aforementioned components were prefabricated by none other than the entrant.	(0-30)_____
	Detailing	Consider the number of separate details including nuts, bolts, screws, rivets, fasteners, welds, hatches, panels, corrugations, etc. Also consider to what extent the aforementioned details were prefabricated by anyone other than the entrant.	(0-35)_____
	Paint Pattern	Consider the number of colours and complexity of the entry point pattern. Also consider the number and complexity of the entry's markings and to what extent these markings were prefabricated by anyone other than the entrant.	(0-20)_____
		Category Total (110 max)	
Originality		Bonus points: 40 points for a prototype of one kind in the competition; 20 points if there are two of the same prototype; zero points if there are three models of the same prototype.	(0-40)_____
		Category Total (40 Max)	

FAI CATEGORY	SUB-CATEGORY	JUDGING CONSIDERATIONS	POINTS
Scale Adherence	Colour	Comparing the entry to colour photographs, paint samples, or other colour substantiation, to what degree does the entry's colour(s) resemble that prototype's colour? *Subtract points if differs*.	(10-0) _____
	Markings (lettering & insignia)	Comparing the entry to photographs, marking diagrams, or other marking substantiation, to what degree to the entry's markings resemble the prototype's markings? *Subtract points if differs.*	(10-0)_____
	Dimensions	Overall model length	(20-0)_____
		Greatest measurable body diameter	(20-0)_____
		Length of the body of the first stage	(20-0)_____
		Fin span (individual fin or tip-to tip)	(20-0)_____
		Selected dimension greater than 20 mm (second stage length, diameter, etc.)	(30-0)_____
		Award points shall be based on a % deviation from the prototype's scaled dimensions. Each 1% error reduces the value by 2 points. Deviation > 10% shall be awarded a value of 0.	
		* If prototype is finless, select one other dimension greater than 20 mm and check here ( )	
		Category Total (130 Max)	

FAI CATEGORY	SUB-CATEGORY	JUDGING CONSIDERATIONS	POINTS
Workmanship	Construction	Consider the absence of visible glue joints, that edges and demarcations should be precise, that planar surfaces should be flat, etc. *Subtract points from maximum.*	
		Body & transitions	(40-0) _____
		Fins or Stabilising surfaces (including clear plastic)	(40-0) _____
		Details	(50-0) _____
	Finish	Consider that surface textures should duplicate base material of prototype; that paint and other surface coatings should be uniform (unless this would deviate from prototype's finish) thin, dust-free and of the proper texture; that colour demarcations and markings should be crisp* and precise. *Subtract points from maximum.*	
		Body & transitions	(20-0) _____
		Fins *	(20-0) _____
		*If the prototype is finless, then 40-0 points for "Body & transitions" and check here ( ).	
		Category Total (170 Max)	

FAI CATEGORY	SUB-CATEGORY	JUDGING CONSIDERATIONS	POINTS
Flight Characteristics	Launch	Was the launch successful? If not, subtract 10 points for each misfire or hang-fire for a maximum of minus 30 points (0 or minus)	0 or minus _____
		Realism of launch compared to prototype. Was the take-off speed abrupt or was it a smooth lift off from the launch pad? *Subtract points for each difference from the original.*	(20-0)_____
	Flight of 1st part (whole configuration)	Realism of flight. Was it a vertical flight without weather-cocking of launcher tip-off? No rotation unless prototype rotated. Stable straight flight without oscillation? *Subtract points for each difference from prototype's flight.*	(35-0)_____
	Flight of 2nd part (after first powered separation*)	Was it a vertical flight without weather-cocking of launcher tip-off? No rotation unless prototype rotated. Stable straight flight without oscillation? *Subtract points for each difference from prototype's flight.*	(35-0)_____
	Flight of 3rd part (after second powered separation)	Was it a vertical flight without weather-cocking of launcher tip-off? No rotation unless prototype rotated. Stable straight flight without oscillation? *Subtract points for each difference from prototype's flight.*	(35-0)_____
	*Powered separation	Realistic powered separation of a powered portion of a model (capsule, stage, powered spacecraft, etc.) in accordance with paragraphs 2.3.1., 2.3.2. and Annex 2: 4.d.	
	Special Effects	Did the model exhibit any special effects such as Launching a space probe, separating boosters, radio control devices, ejecting satellites, deploying shield, scale launcher, gliding recovery etc. Special effects can only emulate the actions of the prototype. Maximum of 20 points for each effect.	(0-80)_____
	RC Gliding Descent	Stabile gliding, realism of gliding descent of the prototype and safe landing without damage. *Subtract points for each difference from prototype's flight.*	(50-0)_____
	Motors	To what extent does the placement of the entry's motors coincide with the prototype? *Subtract points for each difference from prototype.*	(30-0)_____
		Subtract 10 points for each engine that fails to ignite in clusters of the first stage.	0 or minus _____
		Functionality of recovery device(s).	(15-0)_____
		Category Total (300 Max)	_____

ANNEX 2
SPACE MODELLING JUDGES AND ORGANISERS' GUIDE

1. PURPOSE and FUNCTION of JUDGES GUIDE:

The purpose of this guide is to provide a uniform understanding, interpretation and application of the FAI Sporting Code for Space Modelling. This guide describes how Space Modelling Judges and other officials will officiate at the World or Continental Space Modelling Championships. Judges must acquaint themselves with the FAI Sporting Code, CIAM General Rules and Volume S - Space Models.

2. JUDGES TASKS:

Timekeepers/Field Monitors/Judges Duties:

a. Impound, safeguard, and distribute certified contest motors.
b. Impound, safeguard, and distribute FAI approved payloads.
c. Impound, safeguard and distribute electronic altimeters.
d Maintain stocks of flight cards as needed for the competitors.
e. Check models and recovery devices for proper identification.
f. Measure the size of recovery devices, if needed.
g. Know the maximum time limit for each duration type round.
h. Determine flights adherence to rules and safety. (safety rulings will also be made by the RSO or his deputies).
i. Declare disqualifications and note rationale on flight cards.
j. Time and record duration data onto flight cards.
k. Ensure completed flight cards are sent for data reduction.
l. Check-in and out stop watches, binoculars, and clipboards as needed to perform their duties.

Special Judge Duties:

a. Announces the start and stop of each round/event.
b. Responsible for the check-in and out of judges' stop watches, binoculars, electronic altimeters and other tools.
c. The steward or the judge will also monitor radio frequencies to detect interference and communicate this information to the pilot.
d. Altitude competitions with electronic altimeters require that all electronic altimeters be impounded and kept under the control of a steward and be issued to the competitor at the flight time and then returned.

Safety and Rule Compliance Officials:

a. Will give models and recovery devices a pre-flight safety and rule compliance inspection and mark each part.
b. Attest to the appropriateness of submitted FAI payloads.
c. Supervise calibration of electronic altimeters.

Motor Test Officials:

a. Will attest to the certification of team submitted motors.
b. Motors will not exceed Newton seconds value of class.
c. Test two motors of each batch.
d. Any failure of tested motors requires rejection of batch.
e. Batch is defined as the motors required for one motor class in an event regardless of delay length. Maximum three batches are allowed per a motor class per an event.
f. The calibration control of electronic equipment undergoing static rocket test shall meet the requirements of 3.12.1; 3.12.2; 3.12.3; 3.13.4.

Electronic Altimeter Test Officials:

a. Will attest to the certification of team submitted electronic altimeters.

b. Will give electronic altimeters to competitors and after flights readout, register and safely store results during the competition and when competition is finished to present them on an electronic memory to the organiser of the event.

Scale Judges:

a. Will award scale static and flight points in accordance with scale judging guide.

b. Will be responsible for giving copies of the scale judging forms used to record a competitor's points in Scale (S7) and Scale Altitude (S5) to each competitor in these events, before the end of the contest.

3. GENERAL JUDGING CRITERIA:

Experience shows that often two different sets of eyes, knowing the same rules, and seeing the same occurrence will result in two different opinions on what happened. The following section attempts to anticipate areas where different judgements can occur and provide the definition and interpretations necessary so we can reduce potential ambiguities on the field.

a. Who can disqualify a flight (DQ)? The RSO and his deputies are the only persons who can disqualify a flight in the FAI First Category events (World Air Games, World and Continental Championships and International sporting events approved by CIAM). Time-keepers may be called upon to make decisions on flight adherence to rules and safety in the FAI Second Category events (other international sporting events organised by or under the authorisation of NACs. In the case of Scale competition (Class S7), Scale Judges who judge flights for flying characteristics shall continue to judge even if the RSO declares a DQ, in case any protest is upheld by the FAI Jury and the points given for flight characteristics shall then count.

b. Catastrophic Failure. A catastrophic failure by nature of the name has to be obvious. You as a judge must know of the failure when it occurs. To look later at what appears to be a normal spent casing after a flight while a competitor argues that the delay was too long, short, or missing offers no proof to the claim of a catastrophic failure.

c. Instability. Any non-glider model that loops while coasting or thrusting in unstable. Unstable models are unsafe and cannot be qualified. Likewise, a power pod that detaches from an otherwise true-flying model and spins about, disqualifies the flight.

d. Unsafe Recovery. Crashes and other unsafe recoveries cannot be qualified. What constitutes an unsafe recovery? The rules state it is one that creates a hazard to property or people. For consistency let us ask ourselves if we would like to be under the rocket we are judging when it lands. If the answer is "no" then a disqualification is called for especially during payload flights where no minimum size parachute is required.

In the case of scale models unsafe recovery is when a recovery device (parachute or streamer) of a substantial part of the model ie nose cone, any of the stages or boosters does not deploy and can be hazardous for persons or property on the ground. If a streamer or a parachute of a smaller and insignificant part of the model eg light Styrofoam or similar forms that represent satellites or other special effects, does not deploy properly, then this is not a reason for disqualification but for a reduction of points for Flight Characteristics, Functionality of recovery device(s).

4. SPECIFIC EVENTS:

a. Rocket Glider and Boost Glider.

These models must ascend in a near vertical/non-shallow manner. Where is the cut off on a shallow ascent? Interpret this as a qualified flight: a glider that ascends under power at an angle or more than 60 degrees from the horizontal.

Gliders also may not loop while thrusting. After burnout, during the motor coast and ejection, looping is permitted - as long as the model does not present a safety hazard to people or property.

Rocket Gliders and Boost Gliders cannot separate into two or more pieces.

Gliders have to have a stable aerodynamic glide recovery. Often opinions will differ on "what is a glide." Here is how to interpret this. The recovery has to be effected by a stable, predictable, aerodynamic glide with air passing over the wings. The model must descend with a nearly horizontal angle of attack.

When is the descent not a glide? Imagine a pilot inside a full sized glider exhibiting the same flight characteristics as the model you are judging. Would you be willing to trade places with the pilot? A "no" earns the flight a disqualification. Rationale: No glide is unsafe recovery.

b. Streamer Duration.

Streamer lengths have to be a 10:1 ratio to minimum width.

Rules state that a streamer has to be a single piece of flexible material. This shall be interpreted as one uncut, homogeneous piece; not two or more pieces joined together to form one length.

Rules state that a streamer must unfurl. This shall be interpreted to completely unfurl so that the 10:1 length/width ratio is exhibited. A small ball of wadded streamer at the end of an almost completely unfurled streamer, then must disqualify the flight.

FAI rules do not prohibit streamers that form loops or bows once fully deployed. If the wind loops a streamer fully deployed the flight must be considered official as long as no ground hazard results.

c. Payload Flights. See General, paragraph 3d. Unsafe Recovery.

d. Scale Events. : The scale judges will judge entries for flight characteristics in accordance with Annex 1 particularly taking care of the following:

d.1. Flight Characteristics - Special Effects and Powered Separation: As Special Effects (according to the judging rules) may only emulate the action of the prototype. Three staged rockets, like Ariane, shall not deploy nose cone cover shield and jettison a satellite during operation of the 1st or 2nd stage. On the contrary, with Saturn or Soyuz function of rescue system during the 1st stage operation is planned and possible. In case of doubt, competitor is obliged to prove reality of declared special effect and/or powered separation by relevant technical data. How many points award for several special effects? Compare the degree of difficulty of four booster separation to smoke before lift off!

d.2. Definition of a scale model prototype: A scale model prototype is defined as the first sub-class of a rocket family (according to NASA and Wikipedia this is defined as version). For example : Ariane is the name of a rocket family, which has flown five launch vehicles up to date, thus: Ariane 1, 2, 3, 4 and 5. These five launch vehicles are defined as different scale model rocket prototypes.

e. Parachute Duration.

Parachutes must deploy. No minimum sizes are stated. Where then is the cut off of a deployed parachute and one not deployed? FAI rules state that at least three shroud lines make up the parachute. Broadly speaking: "to deploy" means "to widen". The working definition on a "deployed" parachute then will be one which exhibits at least three shroud lines and widens out when ejected.

Thus, if a model descends under a crumpled wad or slender stick of parachute material then this is not deployment. However, if the model descends with the parachute partially open or spread out as a fan, the flight is qualified. This un-blossomed parachute will be timed and considered an official flight. The descent must still be safe.

The decision of the RSO or his deputies on matters of safely takes priority.

5. ORGANISERS TASKS:

Before the beginning of any Space Modelling competition, the organiser is obliged to provide conditions for competition in accordance with the provisions of the FAI Sporting Code, *CIAM General Rules*.

a. Scale Events - The organiser of an international contest shall appoint three scale judges from the nomination list of Space Models FAI Judges. In case of World or Continental Championships, there will be appointed five FAI judges and one reserve judge of different nationalities, including the Chief Scale Judge. Their names will be submitted to the CIAM or CIAM Bureau for approval. The Chief Scale Judge may not be from the organising NAC. He shall organise work of the judging panel and shall represent it. An extra judge (who may be the reserve judge) shall be appointed as the chief of the dimension measuring team.

In World and Continental Championships a panel of five judges shall award their points independently. The highest and the lowest score shall be neglected and the average of the remaining three scores shall give the final score. In World Cups and/or in Open International-non World Cup events a panel of three judges not necessarily from different countries shall give points.

The organiser shall also provide an adequate area for relevant number of entries with bright overhead lights and with tables for turn in, static judging and dimension measuring. The static judging area will be equipped with dimension measuring devices and a PC with a qualified operator. Access to the static judging area during static judging will be restricted to all persons except for static judges, dimension measuring team, PC operator, contest director and FAI Jury.

b. Altitude Events

b.1. Tracking by Theodolites: Organiser of an international altitude event must provide altitude measuring devices in compliance with the rule 4.9.1.2. and qualified personnel for altitude measuring. He also must provide radio communications between tracking stations, RSO and the computer centre in the field. Altitude measuring team shall do test tracking on duration and/or scale models on the day preceding the competition day(s) for altitude events to check tracking and data reduction systems. The head of the altitude measuring team shall present test altitude measuring results to the Jury to prove altitude measuring team readiness and necessary accuracy of measurements and get Jury approval, before the official flights begin in an altitude event.

b.2. Electronic altitude measurements with an electronic altimeter shall use the new Sporting Code Volume EDIC – Electronic Devices in Competition – Section 2 - Technical Guidance Notes and Technical Specification for Altimeters Used in Space Modelling Competition V.1.0 for the documentation regarding specifications and guidance.

c. Range Safety Officer (RSO) - Organiser of an international contest will appoint a person to act as Range Safety Officer (RSO) from the FAI nomination list of judges – specialised in space modelling. He may appoint other qualified persons to act as his deputies in accordance to the provisions of the rule 4.3. In case of World or Continental Championships, the organiser of the contest shall submit the name of the RSO to CIAM or CIAM Bureau for approval. RSO may not be from the organising NAC. When there are junior and senior classifications at the same place and at the same time, the organiser shall appoint two RSOs, one for senior and the other for junior classification. They shall be not of the same nationality but shall have one language in common.

d. Landing Safety Officer (LSO) – Organiser of an international S8 contest will appoint a person to act as Landing Safety Officer (LSO). The LSO can be from the organising NAC. When there are junior and senior classifications at the same place and at the same time, the organiser shall appoint two LSOs, one for senior and the other for junior classification.

e. Contest Documentation Software - The organiser of a space models international contest listed in the FAI Contest Calendar shall provide and use to produce documentation of the contest, a software approved by CIAM. It shall contain:

Basic version: Templates for Bulletins 0 to 3, list of the contest officials, result tables for individuals and teams for all space models classes, template for jury report, contest calendar for the current year.

Advanced version: Basic version with its on-line presentation, on-line registration of participants, on-line presentation of the results in real time during the contest with automatic sorting of placings, downloadable pdf versions of the presented documents after the contest and downloadable excel versions of result tables.

Sophisticated version: Advanced version completed with checking of on-line registrations in the FAI data base, selecting contests per year, per country and per class, some statistical calculations and presentations etc.

This software shall have a tutorial for those who use it. The updated version if needed shall be approved by CIAM at the end of preceding year for the next year.

ANNEX 3
SPACE MODELS WORLD CUP

1. **Classes**

The following separate classes are recognised for World Cup Competition: S4, S6, S7, S8P and S9.

The subclasses to be performed are defined in CIAM General Rules C.15.2.2.

2. **Competitors**

All competitors in the specified open international contests are eligible for the World Cup.

3. **Contests**

Contests included in the World Cup must appear on the FAI Sporting Calendar and be run according to the FAI Sporting Code. The contests to be counted for a World Cup in one year are to be nominated at the CIAM Bureau Meeting at the end of the preceding year and are to be indicated on the FAI Contest Calendar.

The Bulletin No1 of each World Cup contest must be published not later than 30 days before the start of the competition by sending it to the Chairman of the Space Models Subcommittee and the World Cup Coordinator. In this bulletin all necessary data must be published: date and venue of the event, time schedule, names of the FAI Jury, Scale Judges and Range Safety Officer, offers for board and lodging. President of the FAI Jury must be from another country. All officials (FAI Jury, Scale Judges and RSO) can be selected only from the current list of FAI Judges and Experts.

4. **Points Allocation**

Points are to be allocated to competitors at each contest according to their placing and results as given in the following formula below:

$$B = K \times \left(\frac{X}{Y} + \frac{\log(A) - \log(N)}{10} \right) \times 100$$

where: B = points awarded to the competitor
X = competitors score
Y = winners score
A = number of competitors
N = placing of competitor
K = depending on the number of countries attending a class, K will be the following:

Number of different Countries	K
2	1,0
3	1,05
4	1,10
5	1,15
6	1,20
7	1,25
8 and more	1,30

Points are awarded only to competitors completing at least one flight in the contest. The score shall be recorded (rounded) to one place after the decimal point.

In the case of a tie for any placing, all competitors with that placing receive the number of points appropriate to that placing.

5. **Classification**

The World Cup results are determined by considering the total number of points obtained by each competitor in the World Cup events. Each competitor may count the result of all competitions, except that only one competition may be counted from each country in Europe (taking the better score for any European country in which he has scored in two competitions). To determine the total score, up to three events may be counted, selecting each competitor's best results during the year.

No more than two World Cup competitions per country shall be organised unless the particular country extends over three or more time zones, when two competitions per time zone may be organised. The better score per time zone counts.

In the case of a tie the winner will be determined according to the following scheme. The number of events counted will be increased from three, one at a time, until the winner is obtained. If this does not separate the tied competitors then the winner will be determined by considering the points obtained in the best three events multiplied by the number of competitors flying in each event. The winner is the one with the greatest total thus calculated.

6. **Awards**

The winners earn the title of Winner of the World Cup. Certificates, medals or trophies may be awarded by the Subcommittee as available.

7. **Organisation**

The Subcommittee shall be responsible for organising the World Cup and may nominate a responsible person or a special subcommittee to administer the event.

8. **Communications**

The Chairman of the Space Model Subcommittee should receive the results of each contest in the World Cup and then calculate and publish the current World Cup positions. These should be distributed to the news agencies and should also be available to any interested bodies or individuals. Latest results will also be sent to the organiser of each competition in the World Cup for display at the competition. Final results of the World Cup are sent to the FAI, National Airsports Controls and modelling press. Each World Cup Contest Organiser is obliged to send results of his contest to the Chairman of the Space Models Subcommittee and to another person (if nominated) responsible to administer, the event within three days after the contest has ended. The current World Cup position will be calculated and distributed within the next seven days.

9. **World Cup Board**

A Board of three persons shall be nominated by the relevant CIAM Subcommittee Chairman to rule on any issue concerning the implementation of World Cup rules during a year. Any such issue must be submitted in writing to the relevant Subcommittee Chairman and the Board. The World Cup Board is not entitled to deal with any kind of complaint or protest concerning a single competition, which must be considered by the FAI Jury for that competition.

ANNEX 4
SPACE MODELS INTERNATIONAL RANKING

1. Definition/Description

This is a continuous classification based on the results of all open and limited international events, as well as continental and world championships and world cup contests. The intent of the classification is to encourage competitors to enjoy versatility of space models by flying more than one, traditional, class and to be awarded for efforts made in whole space models activity during the year.

2. Classes

All classes listed in rule 4.3. as World Championships Events for Space Models are recognised for Space Models International Ranking.

3. Competitors

All competitors in specified international contests are eligible for Space Models International Ranking (SMIR).

4. Contests

Contests appearing on the FAI Sporting Calendar, run according to the FAI Sporting Code and nominated at the CIAM Bureau Meeting at the end of the preceding year will be recognised for SMIR.

5. Points Allocation

Points are allocated as follows:

$$B = K \times \left(\frac{X}{Y} + \frac{\log(A) - \log(N)}{10} \right) \times 100$$

B = points awarded to the competitor
X = competitors score
Y = winners score
A = number of competitors
N = placing of competitor.
K = ranking factor of a contest where for:

- World Championships .....K = 2
- Continental Championships .....K = 1.5
- World Cups .....K = 1 – 1.3
- Open Internationals not World Cup.....K = 0.75

6. Classification

SMIR results are determined by considering the total number of points (but not fly-off points) obtained by each competitor in events registered in FAI Sporting Calendar according the following ranking algorithm:

a) Points are awarded only to competitors completing at least one flight in the contest.
b) Only one competition of the same rank for the same class may be counted from each country in Europe or per time zone for countries extending over three or more time zones (taking the better score for any European country or time zone in which he had scored in two competitions).
c) To determine the total score up to twelve events of at least three different classes will be counted, selecting each competitor's best results during the year.
d) In the case of a tie the winner will be obtained by increasing number of events counted, one at the time, until the winner is obtained.

7. Awards

The winner earns the title World Space Modeller of the Year. The list of the best junior competitors will be announced separately. Certificates, medals or trophies may be awarded by the Subcommittee if available

8. Organisation

As per World Cup contests.

9. Communication

As per World Cup contests.

10. Classification Supervision

As per World Cup contest.

ANNEX 5
FAI SPACE MODEL SAFETY CODE

1. Materials

Space models shall use only lightweight, non-metal parts for the nose, body, and fins and shall not use any internal heavy metal part that could cause injuries to persons or damage to property.

2. Motors

Space models shall only be flown with space model motors that have been certified by a National Airsports Control, and these motors shall not be tampered with or used for any purposes except those recommended by the manufacturer.

3. Ignition System

Space models shall be launched with an electrical launch system and electrical motor igniters. The launch system shall have a safety interlock in series with the launch switch, and it shall use a launch switch that returns to the "off" position when released.

4. Range Safety Officer

All space models presented for operation on the flying field shall be permitted or denied flight by the Range Safety Officer on the basis of his considered judgement with respect to the possible safety of the model in flight.

5. Launch Safety

Space models shall be launched from a launch device that is within 30 degrees of vertical and is of sufficient length to ensure that the space model flies nearly straight up. They shall be launched only after a 5-second countdown that is audible to all persons nearby and only if all persons are at least 4 metres away. When launching space models with multiple stages, with clusters of multiple motors, or with motors exceeding 20 N-sec, all persons must be at least 8 metres away and the launch device must be at least 10 degrees away from vertical. If the safety or stability of a space model is in question, it shall only be flown after warning spectators and clearing them away to a safe distance and direction as determined by the RSO.

6. Fire Safety

Space models shall not eject any materials such as recovery device protection that may burn or smoulder and shall use containment tubes for fuse-type dethermalizers, so that the space models do not present a fire hazard. Launch devices shall have a means to prevent the engine's exhaust from directly hitting the ground, and any dry grass close to the launch pad shall be cleared before launch.

7. Flight Safety

Space models shall not be launched at targets, into clouds, or near airplanes, and shall not contain any flammable or explosive payload.

8. Launch Site

Space models shall be launched outdoors, in an open area free of hazards to the safety of fliers or spectators and whose size is appropriate to the power of the models and to the weather conditions, as determined by the RSO, and with wind speeds no greater than 9 metres per second.

9. Recovery

Space models shall be so constructed to be capable of more than a single flight and shall contain a means for retarding the descent of all parts of the model to the ground so that the space model’s structure may not be substantially damaged and so that no hazard is created to persons and property on the ground.

10. Recovery Safety

No attempt shall be made to recover space models from power lines or other dangerous places.

11. Recovery Device Dimensions

In classes S1, S5 and S7, the minimal recovery device dimensions are: 25x400mm for streamer and 4dm^2 for parachute recovery for parts under or equal to 20 grams of mass. Streamer recovery might be used to a maximum weight of 50 grams, where the minimal streamer area is 3dm^2 for parts heavier than 20 grams. For parachute recovery, the minimal area is 7dm^2 for every 50 grams the part weighs (e.g. 150g part has to have a minimal parachute area of 21dm^2). An area tolerance of maximum 10% is allowed. The RSO, Judges and Jury may request to have the recovery device area re-measured if there is a doubt. If the recovery device is not matching the minimal allowed size, the flight is considered DQ.
For selected masses, the minimal parachute (with approximate diameter) and streamer areas are:

Part mass (g)	Minimal streamer area (dm^2)	Minimal parachute area(dm^2)	Minimal diameter for area - round parachute (dm)	Minimal side for area - square parachute (dm)
0 - 20	1	4	2.26	2.00
21 – 50	3	7	2.99	2.65
51 – 100	-	14	4.22	3.74
101 – 150	-	21	5.17	4.58
151 – 200	-	28	5.97	5.29
451 – 500	-	70	9.44	8.37
951 – 1000	-	140	13.35	11.83
1451 – 1500	-	210	16.35	14.49

ANNEX 6
TRIANGULATION METHOD

1. Tracking

All models in any event for which an achieved altitude figure is scored shall be tracked in flight by at least two (2) calibrated measuring devices which are situated on a measured baseline of at least three hundred (300) metres. The distance to the launch pad shall be a minimum of 2/3 (two thirds) of the current world record rounded to the nearest lower 100 metres. At world championships, a redundant tracking system shall be implemented with four measuring devices (Theodolites), two at each tracking station. The best tracking pair will be designated as the primary trackers and their data will be used first. If the primary trackers fail, the data from the secondary trackers will be used. If they fail, the combination of azimuth and elevation from each tracking station will be used. For models with engines over 20 Newton-seconds the base line must be a minimum of 450 metres. The distance from the launch site to the centre line of the base line must be 1/2 the base line length. The distance to the launch pad shall be at least 300 m for models with up to 2,5 Ns impulse. The launch site must be seen from the measuring devices.

2. Tracking Accuracy

The measuring devices must be able to measure angles in both the horizontal (azimuth) and vertical (elevation) axes and shall have a minimum accuracy of +/- 0,5 degrees in both azimuth and elevation.

3. Tracking Procedure

A model for which an achieved altitude figure is required will be tracked aloft visually by measuring device operators manning each tracking device until they see that the model has reached the maximum vertical altitude of its flight. The angle of azimuth from the baseline and the angle of elevation from the horizontal shall then be read to the nearest degree of arc and reported to the launching area. Angular data thus recovered from tracking will be reduced to altitude data by use of the principles of triangulation.

4. Computed Altitude

The computed altitude from each station's reduced altitude data must be within ten percent (10%) of the average altitude computed utilising data from both stations. Computed station altitudes not falling within 10% of the average computed altitude will result in a "no close" (NC) for the model. All altitudes will be rounded-off to the nearest metre before this "10% rule" is applied. The official scored altitude is the computed average altitude. A "Track Lost" (TL) is recorded where the trackers are unable to determine the position of the model sufficiently to obtain any angles. A zero is recorded if the flight path is erratic, unpredictable, malfunctions or the flight is disqualified for safety reasons. In the event of a "No Close" (NC) or a "Track Lost" (TL) for the model, the competitor may be allowed to fly again until the end of the round. The organiser is obliged to announce altitude calculations of each flight not more than ten minutes after the launch, to leave modellers whose flights are considered "No Close" (NC) or "Track Lost" (TL) enough time to make another flight in the same round. A safety disqualification or a model malfunction making the model difficult to track will result in a "zero" for the flight.

5. Visibility of Models

All models that are to be tracked for altitude shall disperse a coloured powder at ejection which will aid tracking. Theodolite operators may lose track of models which do not contain sufficient powder or contain powder which does not contrast well with the sky. The organiser will have tracking powder available for competitor's use.

PROVISIONAL RULES

CLASS S6A/P - STREAMER TARGET TIME DURATION COMPETITION

7.5 Class S6A/P – Streamer target time duration competition

7.5.1. **Purpose of competition**

The purpose of this competition is to achieve the target time of 240 sec and to launch the model within the five (5) minutes working time for the relevant group. The model shall be timed from the instant of first motion on the launcher until the instant it touches the ground.

7.5.2. **Construction requirement and specification**

Models for this class are identical with those in Class S6A – Streamer duration competition.

Entry: two models are shall be inspected and marked by the judges for this competition.

7.5.3. **Timing and classification**

Timing and Classification Rules 4.8 will be used for this competition

One point will be awarded for each full second of flight time up to a maximum of 240 points (ie 240 seconds a maximum).

The winner of a particular flight in the relevant group receives a score of 1000 points. Other competitors receive points as follows:

$$PC = 1000 \frac{RC}{RW} *$$

Where:

PC - points of the competitors

RW - result of the winner in the relevant group

RC - result of the competitor

The five competitors with the highest scores after three starts qualify for the final round.

There will be one flight for the group consisting of all the participants of the final round.

The winner of competition will be determined by the result of the final round.

When there is a tie, the best score of the previous rounds shall be used to determine the individual winner. If a tie still exists after this, then the next best score is used and so on until the tie is broken.

7.5.4 **Organisation of starts**

(a) The competitors shall be combined in groups by draw, to permit 5-7 to fly simultaneously. The draw is organised in such a way that, as far as possible, there are no competitors of the same team in the same group. The flying order of different groups is also established by a draw. A different composition of groups shall be used for each round.

(b) Each group is entitled to five minutes of preparation time before the starter announces the beginning of the working time. During the preparation time, each competitor shall prepare his models for flight.

(c) Each group of the competitors has five minutes of working time to attempt one official flight. Each competitor has only two attempts to launch. In the case of the catastrophic failure of the model, caused by the catastrophic failure of the motor, the competitor may launch his second model in the same working time.

(d) The starting order of the competitors in each group will be determined by the order in which the competitors announce their wish to fly to the Range Safety Officer. In the case of a misfire, the competitor is allowed to repeat the start only after the attempts of the rest of the competitors who were registered for start at the time of his attempt.

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CLASS S12/P TIME DURATION TRIATHLON TOURNAMENT

12.6 CLASS S12/P

12.6.1. Definition/Description

Time Duration Triathlon Tournament comprises a series of events open to any single-staged space model which uses subsequently as means of recovery: a) autorotation; b) streamer; c) parachute.

The intent of the competition is to provide the sporting competition which points out versatility of space model design and the skills of the competitors. It combines competitions in autorotation, streamer and parachute descent with a same single model, by changing the means of recovery in subsequent rounds respectively.

12.6.2. Purpose

The purpose of this competition is to achieve the longest flight duration using different recovery systems with the same model: a) autorotation; b) streamer c) parachute.

12.6.3. Specifications

Model specifications must be in compliance with the provisions of paragraphs:

12.3. for autorotation recovery;
7.2.2. for streamer recovery;
7.2.2. for parachute recovery.

12.6.4. Timing And Classification

12.6.4.1. Timing and classification rules 4.8., 7.4. and 12.5 will be used for this competition.

12.6.4.2. The winner of a particular round receives a score of 1000 points for that round. Other competitors receive points for the round as follows:

$$PC = 1000 \frac{RC}{RW} *$$

Where:

PC - points of the competitors
RW - result of the winner in the relevant group
RC - result of the competitor

12.6.5. Sub-Classes

Class	Maximum Weight (g)	Maximum Flight Time (sec.)
S12A/P	60	180
S12B/P	90	240
S12C/P	150	300
S12D/P	200	360

12.6.6. Replacement of Model

A competitor may replace a model if:

1) A competitor cannot return his/her model from an inaccessible place where recovery would pose a hazard to the competitor but can point it out to an official. The Contest Director must state prior to the start of competition what distance limits officials may travel.
2) A model is damaged by a catastrophic failure of the motor.

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