FAI Sporting Code

Section 4 – Aeromodelling

Volume SM

Space Models

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(No change since 2005)

FEDERATION AERONAUTIQUE INTERNATIONALE
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1 FAI Statutes, Chapter 1, para. 1.6
2 FAI Sporting Code, General Section, Chapter 3, para 3.1.3.
3 FAI Statutes, Chapter 1, para 1.8.1
4 FAI Statutes, Chapter 5, para 5.1.1.2; 5.5; 5.6 and 5.6.1.6
5 FAI Bylaws, Chapter 1, para 1.2.1
6 FAI Statutes, Chapter 2, para 2.3.2.2.5,
7 FAI Bylaws, Chapter 1, para 1.2.3
8 FAI Statutes, Chapter 5, para 5.1.1.2; 5.5; 5.6, 5.6.1.6
9 FAI Sporting Code, General Section, Chapter 3, para 3.1.7
10 FAI Sporting Code, General Section, Chapter 1, paras 1.2. and 1.4
11 FAI Statutes, Chapter 5, para 5.6.3
12 FAI Bylaws, Chapter 1, para 1.2.2

VOLUME SM
SECTION 4 - SPACE MODELS
GENERAL REGULATIONS AND SPECIAL RULES FOR CONTESTS, CHAMPIONSHIPS AND RECORDS

THIS 2006 EDITION INCLUDES THE FOLLOWING AMENDMENTS MADE TO THE 2005 CODE

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

Paragraph approving change	Plenary meeting Brief description of change	Change incorporated by
Table I	n/a No changes in 2005 other than to record numbers in S1, S3, S5, S6. S9 & S10 in accordance with established procedure.	Srdjan Pelagic Sub-Committee Chairman

RULE FREEZE FOR THIS VOLUME

With reference to paragraph A.12 of Volume ABR :

In all classes, the four-year rule for no changes to model aircraft/space model specifications, manoeuvre schedules and competition rules will be strictly enforced, but in step with the World Championship cycle of each category. This means that in Volume SM:

(a) changes can next be agreed at the Plenary meeting 2008 for application from January 2009.

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

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

1 GENERAL DEFINITIONS

1.1 SPACE MODEL

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

1.2 SPACE MODEL ENGINE

"Space model engine" means a solid propellant rocket reaction engine in which all chemical ingredients of a ombustible nature are pre-mixed and ready for use.

1.3 CLASSIFICATION OF SPACE MODELS

S1 Altitude Models
S2 Payload Models
S3 Parachute duration models
S4 Boost-glider duration models
S5 Scale-altitude models
S6 Streamer duration models
S7 Scale models
S8 Rocket glider duration models
S9 Gyrocopter duration models
S10 Flex-wing duration models
Each class, except class S7 has been subdivided related to engine size. Refer to the rules applicable to each particular class.

2 SPACE MODEL SPECIFICATIONS

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

2.1 WEIGHT

Gross or maximum weight, including space model engine or engines shall in no event exceed 0,5 kg (500grams) except S7 shall not exceed 1.00 kg (1000grams)

2.2 PROPELLANT

No more than 125 g of propellant materials shall be contained in its space model engine(s) at the moment of launch.

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 engines 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. Engines ignited simultaneously are considered one stage regardless of the number of separated parts; for example Soyuz.
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2.3.2 Total impulse of engine(s) in a lower (booster) stage must, for safety reasons, be equal or greater than total
impulse of engine(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 engine(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. and, in the case of boost-gliders, engine casings not enclosed in an airframe or boost-glider engine pods, must descend with a deployed streamer with dimensions no less than 25 mm by 300 mm or a parachute with an area no less than 4 dm². The engine(s) of the models cannot be fastened by flue and cannot be an integral part of model's construction. Tumble recovery of lower stages of multi-staged models is permitted without recovery device provided that:
1.The lower stage has three or more fins.
2.Length is no greater than 1-1/2 times the engine length.
3.Descent is declared safe by the Range Safety Officer.
2.4.3 Construction shall be of wood, paper, rubber, breakable plastic or similar materials without substantial metal
parts. Models of Classes S1,S2, S3, S6, S9 and S10 must have minimum diameter of 30 mm of enclosed airframe for at least 50 % and for Class S5 for at least 20 % of the overall body length. In case of Class S1 the smallest body diameter must be not less than 18 mm for at least 75% of the overall length of each stage, including their back sections. No boat tails or reducers are allowed unless they meet this requirement.
2.4.4. Minimum dimensions of subclasses of classes S1, S2, S3, S5, S6, S9 and S10 must not be less than:
Event Class Minimum diameter (mm)
(for at least of 50% of the
overall length and 20% for S5)
Minimum overall
Length (mm)
A 40 500
B 40 500
C 50 650
D 60 800
E 70 950
F 80 1100
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 safety officers or judges, the builder of 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.
2.4.6 A space model shall not contain any type of explosive or pyrotechnic payload.
2.4.7 Minimum gross launching weight (including engine and/or pod) of the models which return to the ground in
stable gliding flight supported by aerodynamic lifting surfaces which sustain it against gravity (S4, S8 and S10) shall not be less than 30% of the maximum specified weight for the particular subclass.
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3 SPACE MODEL ENGINE STANDARDS

A space model engine 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 engine shall be a solid propellant reaction engine which has all propellant ingredients preloaded into the casting in such a manner that they cannot easily be removed. Delay trains 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 0,00 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
Note: A/2 models shall have 30 mm in diameter and will be 350 mm long. They will be used mainly for teaching beginners and for their practice.
3.1.3 Total impulse of a single engine is equal to the upper limit of the total impulse for the engine class.
3.1.4 In space modelling competitions usage of engines of the following total impulse is allowed:
Engine 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 engine 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 casting diameter shall not be less than 10 millimetres.

3.3 INTERNAL OVERPRESSURE

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

3.4 SPONTANEOUS IGNITION

A space model engine 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 engine 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 that 0,050 seconds.

3.6 STORING AND SHIPPING

A space model engine 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 engine 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 engine is designed to perform its function with the seals in place.

3.8 BURNING

A space model engine 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 engine.

3.9 MODIFICATIONS

A space model engine shall not be altered in any manner to change its published and established performance characteristics or dimensions.

3.10 CERTIFICATION FOR FAI CONTESTS

A space model engine 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 an FAI representative National Airsports control.
3.10.1 Competitors or team managers must submit to the competition Organiser in advance of the competition the
aero club certification documents of all engine types to be used during the competition. These certification documents must include data on engine dimensions, loaded weight, propellant weight, total impulse, thrust time curve, and time delay. Th e certification documents must contain an affidavit stating that the space model engine type meets all FAI standards as set forth in these rules.
3.10.2 The competition organisers must perform a static test on a random sample of each engine type to check the
data of an FAI representative Airsports Control if requested by a team manager.

3.11 STATIC TESTING

Static testing by an FAI representative Airsports Control may be carried out by the club or by an organisation
designated by the club. In all cases, the FAI representative Airsports Control shall be responsible for the accuracy and correctness of all test data.
Copies of the test results should be at their request be given to the team managers of the competing countries.
Engines must be submitted in batches for testing. Batch is defined as the engines required for one engine class in an event regardless of delay length. Maximum three batches are allowed per engine class per an event. In case of failure of any engine in the batch or if the total impulse of the engine class is exceeded, the entire batch will be rejected.

3.12 STATIC TEST EQUIPMENT

Static test equipment utilised for FAI certification of space model engines shall meet the following specification:
3.12.1 Engine thrust will be measured with the engine in horizontal position. Thrust shall be measured and recorded to an accuracy of +/- 1% of the full scale for the particular measuring range.
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 or +/- 0,1 seconds.

3.12 SPACE MODELS ENGINE TESTING STANDARDS

A space model engine type may be certified by an FAI representative National Airsports Control if the performance of a randomly selected sample meets the following standards:
3.13.1 The total impulse of any individual engine tested should not depart more than + 0% / - 10% from the established mean value for that engine type.
3.13.2 The time delay of any individual engine tested should not depart more that +/- 20% from the established
mean value to the engine type, and this variation for any engine should not exceed +/- 3 seconds.
3.13.3 No engine tested should malfunction in any manner.
3.13.4 Static tests shall be conducted with the test engine at a temperature of 20 degrees Centigrade, +/- 5 degrees
Centigrade.

3.13 TYPE IDENTIFICATION

All space model engines 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 engine's type and/or performance. Colour coding of the nozzle end of the casting indication type is recommended.

4 GENERAL RULES FOR INTERNATIONAL CONTESTS

See Section 4b, of Volume ABR of the Sporting Code for details. Moreover the following additions apply:

4.1 WORLD CHAMPIONSHIP EVENTS for SPACE MODELS

The following events are recognised (2001) as World Championships for Space Models:
i) W/CH for Senior classes:
a) altitude models – S1B
b) parachute duration models – S3A
c) boost glider duration models – S4A
d) scale altitude models – S5C
e) streamer duration models – S6A
f) scale – S7
g) rocket glider duration and precision landing models – S8E/P
h) gyrocopter duration models – S9A
ii. W/CH for Junior classes:
a) altitude models S1A
b) parachute duration models – S3A
c) boost glider duration models – S4A
d) scale altitude models – S5B
e) streamer duration models – S6A
f) scale – S7
g) rocket glider duration models – S8D
h) gyrocopter duration models – S6A

4.2 NUMBER OF MODELS

The number of models eligible for entry is as follows:
Class S1A, B, C, D, E, F..... Two (2) only
Class S2C, E, F ..... Two (2) only
Class S3A, B, C, D..... Two (2) only
Class S4A, B, C, D, E, F..... Two (2) only

Class S5A, B, C, D, E, F..... One (1) only
Class S6A, B, C, D..... Two (2) only
Class S7..... One (1) only
Class S8A, B, C, D, E (E/P), F ..... Two (2) only
Class S9A, B, C, D..... Two (2) only
Class S10A, B, C, D..... Two (2) only
For classes S3, S4, S6, S8, S9 and S10 one (1) additional model may be processed and flown by the competitor on there being a tie for first place at the end of the third round.

4.3 LAUNCHING

4.3.1 Organisation
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 an FAI Representative Aero Club 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 engines 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 lunching 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 must not impart to the model any velocity or change of momentum except that caused by the space model engine(s) contained in the model. A launch assisted by mechanical devices built into the launcher shall not be allowed.

4.3.5 Launching Procedure

Launching or ignition must be conducted by remote electrical means at least five (5) metres distant from the model and must be fully under the control of the person launching the model. The Range Safety Officer or his authorised deputy shall possess an interlock key to the firing device that will prevent the model from being ignited and launched unless said interlock key has been inserted into the device. Upon determining that the model may be ignited and launched in a safe and satisfactory manner, the Range Safety Officer or his authorised deputy will insert the interlock key into the firing device to permit ignition and launching. 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 minimum five (5) second “count down” must be given before ignition and launching of a space model.

4.3.6 Weather Conditions

See General Rules for International Contests, Para. B.11.1.

4.3.7 Hazard

A space model in flight shall not create a hazard to aircraft and shall not be used as a weapon against ground or air targets.

4.3.8 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. The next model can be inspected 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

Each entry shall carry, prominently displayed upon its body, fins, or other exterior part, the competitor’s FAI license number in letters and numbers approximately one (1) centimetre high. The name, national insignia, or international identification mark (see Section 4b, Annex 2) of the competitor’s nation must be displayed on
the exterior of the model.

A light coloured area of minimum dimensions 1 cm by 3 cm must be provided for the organiser’s processing mark.

4.4.3 Builder of the Model

The judges shall make every reasonable effort to insure 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.

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.

4.5.2 Number of flights

In each event, except Scale (S7), 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 events 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 then the competitor is entitled to the second attempt.

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 practice or observe reasonable safety
measures, published or otherwise, for poor sportsmanship, for failure to abide by the orders of the Range Safety Officer or his authorised deputy or for misconduct on 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.

4.7 RADIO CONTROLLED SPACE MODELS

4.7.1. For transmitter and frequency control see Volume ABR, Section 4b, paragraph B.8.
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. The competitor has to have ability to fly on at least two frequencies.

4.8 TIMING AND CLASSIFICATION

4.8.1. See Section 4b, para. B.9.
4.8.2. The timing of flights is limited to a maximum determined by the individual class and size of engine used. The
total flight time is taken from the model’s first motion on the launching device to the end of the flight.
4.8.3. The total time of the three flights of each competitor is taken for the final classification.
4.8.4. 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. The maximum time of flight in each additional round shall be increased by two (2) minutes on the maximum time of flight of the previous round. 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. There shall be no more than two fly-off rounds to determine the winner. The second fly-off round will be timed to the completion of the flight for final results.
4.8.5. 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).

4.9 ALTITUDE DATA

For measuring and calculating altitudes may be used the method based on the principles of triangulation, the
method of electronic or radar tracking or the method based on calculation of the height where the horizontal distance of tracking lines of pairs of stations in space achieves their minimum.

4.9.1 Triangulation Method

4.9.1.1 Tracking
All models in any event for which an achieved altitude figure is scored shall be tracked in flight be at least tow (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 would 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.
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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.
4.9.1.2 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.
4.9.1.3 Tracking Procedure
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.
4.9.1.4 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" 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" 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 is disqualified
for safety reasons.
In the event of a "No Close" or a "Tr ack Lost" 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" or "Track Lost" 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.
4.9.1.5 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.

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.

4.9.3 Minimum Horizontal Distance Method (S1X Method)

4.9.3.1 Definitions

MSl Y
Z
X
Co-ordinates:
Degree: Angle of 1/360 of a circle
Launch Position: Point on the launch site in the near of the launching pads, defined by the judge.
Measure Station: What ever includes a measuring device.
Station Position: Space co-ordinates of a Measuring Station (MS) relative to the launch position, where the Measuring Station 1 (MS1) has co-ordinates X = 0, Z = Horizontal Distance to the launch position (LP).
Y= Vertical difference to the launch position
Tracking: Searching the powder cloud ejected by a model.
Track Line: Line defined by the station position (SP) and the horizontal and vertical angles, measured by a measuring station for a flight.
Station Pair: Two measuring stations, which measured angels and positions will be computed to a PairResult. All possible combinations of measuring stations will be used as Station Pairs (eg: 5 Measuring-Stations will get 15 Station Pairs).
PairResult: Height, where the horizontal distance between the Track Lines of a Station Pair achieves the minimum, rounded down to metres.
Altitude Point: Point defined by the space co-ordinates of the middle-point of the horizontal distanceline between the Track Lines of a Station Pair in the height of the PairResult.
Pair Error: Average of differences between the measured angles by the Measuring Stations of a Station Pair and the respectively angles from Station Positions to the Altitude Point, rounded down to degrees.
Flight Result: Average of considered PairResults, rounded down to metres.
Flight Error: Average of differences between Flight Result and PairResults in percent of the Flight Result, rounded down to percents.

4.9.3.2. Validations

A PairResult is valid, when the Pair Errors in horizontal and vertical directions are both not greater than 5 degrees. The minimum number of valid PairResults for record attempts is 5.
If for a flight are calculated more than 3 valid PairResults, the results of the Station Pairs with the minimum and the maximum height will be ignored.
The Flight Result is valid, when the Flight Error is not greater than 10%.

4.9.3.3. Accuracy of Measuring Devices

The measuring devices shall have a minimum accuracy of ± 5 degrees in the horizontal (azimuth) and ± 1 degree in the vertical (elevation).

4.9.3.4 Number of Measuring Stations

During an ordinary contest must be work at least three (3) calibrated measuring devices. At world championships and for record attempts the minimum of measuring devices is 5.

4.9.3.5 Position of Measuring Stations

The distance between Measuring Stations and the LaunchPosition must be at least 50 metres. The minimum
distance between Measuring Stations is 100 metres. The LaunchPosition must be seen from every Measuring Station.

4.9.3.6. Communication between Judge and Measuring Stations

The judge must get a sign of readiness from every Measuring Station and transmit number of stages and colours of powder before beginning the count down. Transmitting any information about the competitor is prohibited. The judge must transmit immediately to the Measuring Stations when the ejected cloud will be visible.

4.9.3.7. Disqualification

If neither the judge nor any Measuring Station saw an ejected cloud, the flight will be disqualified. In other cases where the Flight Result is invalid, the flight is TrackLost and the competitor has a chance for a new attempt during the same round whenever he is ready for a new attempt. Disqualifications and TrackLosts must be published immediately.

4.9.3.8 Computer Calculation

The FAI will make available computer programmes for altitude calculations based on the described method for MS-Windows environment to every National Airsports Control free of charge.
Interested National Airsports Controls can get the source programmes for developing their own versions if they make the new programme also available to the FAI and all other National Air sports Controls free of charge**.**

4.9.2.9. Documentation
The official result of a contest must include data of the positions of Measuring Stations relative to the defined
LaunchPosition, angles measured by every Measuring Station for every flight, PairResults and Pair Errors, Flight Results and Flight Errors as well as the highest Flight Results of the competitors, so that everybody can verify calculations.

5 ALTITUDE COMPETITION (CLASS S1)

5.1 DEFINITION

In any altitude competition event, the model achieving the highest maximum altitude as tracked and reduced
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 engine or engines powering the model. Any number of engines may be used in any arrangement provided that the sum of the total impulses of the individual engines does not exceed the allowable total impulse maximum for the competition class.
The following event classes are in effect for altitude competition:
CLASS TOTAL IMPULSE MAXIMUM WEIGHT
(Newton-seconds) (g)
S1A 0,00 - 2,50 30
S1B 2,51 - 5,00 60
S1C 5,01 - 10,00 120
S1D 10,01 - 20,00 240
S1E 20,01 - 40,00 300
S1F 40,01 - 80,00 500

6 PAYLOAD COMPETITION (CLASS S2)

6.1 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.

6.2 STANDARD FAI PAYLOAD SPECIFICATION

The Standard FAI space model payload is a solid cylinder of either lead (Pb) or an alloy of lead containing no
less than 60% lead by weight and weighing no less than 28 grams. This cylinder shall be 19,1 +/- 0,1 mm in diameter. No holes may be drilled or punched into it, and no other material may be affixed to it.

6.3 PAYLOAD CARRYING REQUIREMENTS

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

6.4 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.

6.5. DISQUALIFICATION

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

6.5 ALTITUDE DATA

ALTITUDE DATA rules 4.9 will be used for this competition.

6.6 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 engine or engines. The following classes of FAI space model payload competition are established:
CLASS TOTAL IMPULSE MAXIMUM NUMBER OF
(Newton-seconds) WEIGHT PAYLOADS
(g) CARRIED
S2C Single 5,01 - 10,00 90 1
S2E Dual 20,01 - 40,00 180 2
S2F Open 40,01 - 80,00 500 4

7 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
engine used. During the flight no part of the model other than parachute protectors or wadding may be detached or jettisoned.

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 engine, 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 engine, 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 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 TOTAL IMPULSE MAXIMUM MAXIMUM FLIGHT TIME
(Newton-seconds) WEIGHT PARACHUTE STREAMER
(g) (sec) (sec)
S3A/S6A 0,00 - 2,50 100 300 180
S3B/S6B 2,51 - 5,00 100 420 240
S3C/S6C 5,01 - 10,00 200 540 300
S3D/S6D 10,01 - 20,00 500 660 360

8 BOOST/GLIDE DURATION COMPETITION (CLASS S4)

8.1 DEFINITION/DESCRIPTION

This competition comprises a series of events open to any free flight 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 engine; and that returns its glider portion to

the ground in stable gliding flight supported by aerodynamic lifting surfaces which sustain the portion 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. In this competition the entry must eject its engine(s) in accordance with the provisions of paragraph 2.4.1.
Any model that qualifies as a flex-wing (Rogallo) rule 13.1.1 is not eligible for this event.
Any model that qualifies as a radio controlled model rule 11.5 is not eligible for this event.

8.2 PURPOSE OF COMPETITION

8.2.1. 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 motion on the launcher until the instant the gliding top portion 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	TOTAL IMPULSE (Newton-seconds)	MAXIMUM WEIGHT (g)	MAXIMUM FLIGHT TIME (sec.)
S4A	0,00 - 2,50	60	180
S4B	2,51 - 5,00	90	240
S4C	5,01 - 10,00	120	300
S4D	10,01 - 20,00	240	360
S4E	20,01 - 40,00	300	360
S4F	40,01 - 80,00	500	360

9 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.

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 model's adherence to scale in dimension, shape, colour, and point pattern. Minimum allowable data consists of length and diameter of the prototype and one photograph. 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

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 not 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

9.7 PLASTIC MODEL KIT PARTS

Parts from plastic model kits 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

Models will be judged for scale qualities in flight condition minus space model motors. All clear plastid fins, launching lugs, and 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 and recovery device packing.

9.9 MAXIMUM WEIGHT AND IMPULSE

Maximum allowable gross launching weight in limited to 1000 grams.
Maximum allowable total impulse is 160,00 Newton-seconds. Maximum engine size allowed is 80 Newtonseconds.

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 a maximum 50 points:
– authentic, authorised drawing(s) of the prototype with at least ten dimensions and three cross sections, i.e. data which define colour of cross sections and markings on it;
– workshop drawing of scale model - scale 1:1;
– at least one colour photograph of the whole prototype with clearly visible details of colour and markings;
– at least three photographs of details and assemblies;
– file containing all necessary technical data.
9.11.2. **Adherence to scale: 250** points maximum. To be considered as a scale model the dimensions of the body
diameter, overall length, overall fin span (if finless, use body length) should not depart from scale by more than 10% or else the model is disqualified. The judging category should be judged in three areas: 1) body and nose cone - 125 points maximum; 2) fins - 75 points maximum; 3) colour and markings - 50 points maximum. This rule shall not be applied to dimensions less than 5 millimetres
For models with clear plastic fins see Annex 9, Cat. Scale Adherence, Sub-Cat. Fins
9.11.3. **Workmanship:** 350 points maximum. To be judged on neatness, care of construction, and degree of finish.
The judging category will be judged in two areas: Workmanship of nose cone, body, fins and details: 200 points maximum and Finish of nose cone, body and fins 150 points maximum. Good workmanship that detracts from scale-such as a high gloss finish on a model that should have a flat or dull finish - will detract from maximum points.
9.11.4. **Degree of difficulty:** 200 points maximum. To be judged on the degree of difficulty involved in constructing
the model. Factors to be considered include symmetry of model. Number of external components, intricacy

of paint pattern, degree of detailing, and degree of difficulty in adapting the model for flight conditions.
9.11.5. **Flight, characteristics:** 250 points maximum. To be judged on launch, stability of flight, staging (if any), and
recovery. a competitor has to designate which operations his models are to perform in flight (e.g. separation of stages. radio controlled trajectory, ejection of payload, etc.).
If the model 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.
9.12. Should the model experience a catastrophic failure, be incapable of additional flights (4.6.3.) and have scored no Flight Characteristic points, the competitor's static scale points will be taken to decide final classification.

10 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 a-chieve
the highest altitude with a scale space model.

10.2 RULES

All entries must comply with the rules of Scale competition (Part Nine) and will be judged under the same rules and receive the same number of maximum scale quality points except that three 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 three 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 TOTAL IMPULSE MAXIMUM WEIGHT
(Newton-seconds) (g)
S5A 0,00 - 2,50 90
S5B 2,51 - 5,00 120
S5C 5,01 - 10,00 150
S5D 10,01 - 20,00 180
S5E 20,01 - 40,00 240
S5F 40,01 - 80,00 500

11 ROCKET GLIDER DURATION COMPETITION (CLASS S8)

11.1 GENERAL

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 takeoff
and a stable aerodynamic glide recovery without any separation or discarding of engine casting(s).

11.2 PURPOSE

The purpose of this competition is to achieve the longest flight duration times. Model shall be timed from the instant of first motion on the launcher until the instant it touches the ground.
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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 engine 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.
11.3.5. Any model that qualifies for flex-wing rules 13.1.1 or 13.2 is not eligible for this event.

11.4 TIMING AND CLASSIFICATION

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

11.6 SUB-CLASSES

CLASS TOTAL IMPULSE MAXIMUM MINIMUM MAXIMUM
(Newton-seconds) WEIGHT WING SPAN FLIGHT TIME
(g) (mm) (sec)
S8A 0,00 -2,50 60 500 180
S8B 2,51- 5,00 90 650 240
S8C 5,01- 10,00 120 800 300
S8D 10,01- 20,00 300 950 360
S8E & S8E/P 20,01 -40,00 300 1100 360
S8F 40,01 80,00 500 1250 360

11.7. CLASS S8E/P RADIO CONTROLLED ROCKET GLIDER TIME DURATION AND PRECISION LANDING COMPETITION

11.7.1. PURPOSE

The purpose of the competition is to achieve as exactly as possible the given time of 360 seconds and to precisely land the model in a specified rectangular area 50 metres long.

11.7.2. SPECIFICATIONS

The competition has only one subclass determined for models which comply with subclass S8E. Total impulse of engine(s) 20,01 to 40,00 is allowed.
The radio shall be able to operate simultaneously with other equipment at 20 kHz spacing. 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

The organiser must provide the landing area 50 metres long aligned with the wind direction before the start of each round. The contest director is responsible for determining the direction of the landing area. 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.

11.7.4. TIMING AND CLASSIFICATION

11.7.4.1. Section 4b, (General rules) B.9 applies to 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 with 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 model comes to rest in the central landing area one metre in breadth, 100 points will be given. Coming to rest in one of the two outer landing areas two metres in breadth gives 50 points and 25 points will be awarded for landing in the rest of marked landing area.

No additional points will be awarded if the landing occurs 390 seconds after the start or if the model lands out of the landing area.

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 in the relating group receives a score of 1000 points. Other competitors receive points as follows:

$$P_C = \frac{W}{C} \frac{R}{R} 1000 \times$$

where P_C = points of the competitor

R_W = result of the winner in the relating group

R_C = result of the competitor

11.7.4.9. The five competitors with the highest scores after three starts qualify for the final round. There will be one final flight for a group consisting of all participants of the final round. . If there is a frequency conflict, the competitor with the worst score in three qualifying flights must change the frequency of his radio.

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 14 minutes of working time to collect transmitters from the official, perform an
official fight and return the transmitters to the official. In the case of the working time being exceeded (a delay in returning the transmitter to the official), 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.
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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 the start only after the attempts of all competitors registered for start at the time of his attempt.

12 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 model, 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 members. 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.
12.3.3. The entry may not separate into two or more unattached parts, and shall be disqualified if it does so.
12.3.4. The 50% requirement of Rule 2.4.3. applies.
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12.4 TIMING AND CLASSIFICATION

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

12.5 SUB-CLASSES

CLASS TOTAL MAXIMUM MAXIMUM
IMPULSE WEIGHT FLIGHT
(Newton-seconds) (g) TIME (sec.)
S9A 0,00 - 2,50 60 180
S9B 2,51 - 5,00 90 240
S9C 5,01 - 10,00 150 300
S9D 10,01 - 20,00 200 360

13 FLEX WING DURATION COMPETITION (CLASS S10)

13.1 GENERAL

13.1.1. Flex-wing (Rogallo) duration competition comprises a series of events open to any single-staged space
model which returns to the ground in stable, gliding flight supported by flexible aerodynamic lifting surfaces which sustain it against gravity.

13.1.2. The model must utilise a vertical ballistic take-off and achieve a stable aerodynamic glide recovery without
any separation of parts or discarding of engine castings(s).

13.2 CONSTRUCTION:

The aerodynamic lifting surfaces must be constructed from flexible materials such as fabric. tissue, or plastic
foil. Ribs, spars, stringers, and the remainder of the model may be of any material in accordance with requirements of Rule 2.4. The 50% requirement of Rule 2.4.3 applies.

13.3 DISQUALIFICATION

13.3.1. Any entry which, under any circumstances or in any manner separates into two or more unattached pieces,
or discards its engine casing(s) shall be disqualified.
13.3.2. Any entry that is supported by other than flexible aerodynamic lifting surfaces or ascends in a climb not near
vertical while under rocket power shall be disqualified from the competition.
13.3.3. Any entry that descends with parachute or streamer recovery device(s) attached shall be disqualified.

13.4 TIMING AND CLASSIFICATION

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

13.5 RADIO CONTROLLED FLIGHT:

The model may be radio controlled to maintain its flight path in the vicinity of the launch site. Rule 4.7 applies.

13.6 SUB-CLASSES

CLASS	TOTAL IMPULSE (Newton-seconds)	MAXIMUM WEIGHT (g)	MAXIMUM FLIGHT TIME (sec.)
S10A	0,00 - 2,50	60	180
S10B	2,51 - 5,00	90	240
S10C	5,01 - 10,00	120	300
S10D	10,01 - 20,00	240	360

14 SPACE MODEL RECORDS

14.1 GENERAL

All FAI space model performance records must be established in competition sanctioned by the FAI representative National Airsports Control or its affiliate in accordance with this Sporting Code.
Established records for any class of model for which new rules or rule changes apply, such that the performance of that class of models is affected in any way, shall be retired whenever those new rules or rule changes become effective.

14.2 SURPASSING PREVIOUS RECORD

Attempts to surpass an established record must exceed by one percent (1%) the value of the established record performance.
All models used for establishing or surmounting of the existing record must correspond to all regulations of Part 2 of the Sporting Code, Section 4, Volume SM.

14.3 HOMOLOGATION REQUIREMENTS

In addition to the standard FAI homologation data, the following special space model record homologation requirements must be met by any record claimant.
14.3.1. The competition flight card of the submitted record attempt shall be marked, “Record Attempt.” Tracking
station angular data must be entered in ink. The name, signature, license number and address of the record

aspirant must appear, written in ink, on the contest card. The following data, entered in ink, must also appear
on the contest flight card: competition sanction number, event in which the record attempt was flown, date of
record attempt, location of record attempt, certifying signatures of three witnessing judges, a signed statement certifying the calibration and accuracy of the tracking system used, and a statement signed by the
three judges giving the make, type and manufacturer of the engines used in the attempt.
14.3.2. In the case of parachute/streamer duration record attempts, the three witnessing judges must submit a
signed statement giving size, material and design of the parachute used.

14.4 HOMOLOGATION DATA

The record claimant must submit the following homologation data:
a). An accurate drawing to scale of the model used in the record attempt, said drawing to include all principal dimensions, gross weight, and burnout weight.
b) A clear, glossy photograph enlargement of the model used in the record attempt with a ruler, hand, or other object of known size appearing in the photograph indication size of the model.
c). The record dossier should contain the completely filled out forms as shown in tables II through V as far as applicable to the class concerned.

14.5 JUSTIFICATION

It is the purpose of homologation procedures and requirements to ascertain as will as possible that a given model did indeed attain the flight performance claimed and that the flight was made within the requirements and standards of this Sporting Code. The many factors involved in the flight of a space model require that the above additional data be submitted to conform a record attempt. In unusual circumstances, the FAI may request additional substantiating data to insure that these purposes have been achieved.

TABLE I
SPACE MODELS “S” CLASSIFICATION OF RECORDS

Space Model
Category
Record
No.
Class Total Impulse
N sec
Maximum
Weight
Number of
Payloads
240 S1A 0,00 - 2,50 30
141 S1B 2,51 - 5,00 60
102 S1C 5,01 - 10,00 120
142 S1D 10,01 - 20,00 240
143 S1E 20,01 - 40.00 300
S-1 Altitude
104 S1F 40,01 - 80,00 500
105 S2C 5,01 - 10,00 90 1
106 S2E 20,01 - 40,00 180 2
S-2 Payload
Altitude
107 S2F 40,01 - 80,00 500 4
208 S3A 0,00 - 2,50 100
109 S3B 2,51 - 5,00 100
110 S3C 5,01 - 10,00 200
S-3 Parachute
Duration
111 S3D 10,01 - 20,00 500
012 S4A 0,00 - 2,50 30
013 S4B 2,51 - 5.00 60

014 S4C 5,01 - 10,00 120
044 S4D 10,01 - 20,00 240
045 S4E 20,01 - 40,00 300
S-4 Boost
Glider
Duration
016 S4F 40,01 - 80,00 500
217 S5A 0,00 - 2,50 90
018 S5B 2,51 - 5,00 120
119 S5C 5,01 - 0,00 150
146 S5D 10,01 - 20,00 180
147 S5E 20,01 - 40,00 240
S-5 Scale
Altitude
121 S5F 40,01 - 80,00 500
222 S6A 0,00 - 2,50 100
123 S6B 2,51 - 5,00 100
124 S6C 5,01 - 10,00 200
S-6 Streamer
Duration
125 S6D 10,01 - 20,00 500
026 S8A 0,00 - 2,50 60
027 S8B 2,51 - 5,00 90
028 S8C 5,01 - 10,00 120
029 S8D 10,01 - 20,00 240
030 S8E 20,01 - 40,00 300
S-8 Rocket
Glider
Duration
031 S8F 40,01 - 80,00 500
232 S9A 0,00 - 2,50 60
133 S9B 2,51 - 5,00 90
134 S9C 5,01 - 10,00 150
S-9
Gyrocopter
Duration
135 S9D 10,01 - 20.00 200
236 S10A 0,00 - 2,50 60
137 S10B 2,51 - 5,00 90
138 S10C 5,01 - 10,00 120
S-10 Flex -
wing Duration
139 S10D 10,01 - 20,00 240
Note: Three figures record numbering was introduced to designate version of rules revision. First figure "0" shows the rules stayed unchanged with respect to the FAI Sporting Code Section 4d - edition 1997. The first
figure "1" shows the new rules became effective Jan 1, 2001, and established record was retired. The first figure "2" corresponds to the rules effective Jan 1, 2005 and established record was retired."
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TABLE II
APPLICATION FOR RECORD ATTEMPT CONFIRMATION
SPACE MODELS

RECORD CATEGORY (Class) :
PERFORMANCE (Altitude or Duration) :
DATE AND PLACE OF THE RECORD ATTEMPT :
CONTEST :
EVENT :
NAME OF SPACEMODELLER :
SPORTING LICENCE NUMBER :
NATIONALITY :
NATIONAL AERO CLUB :

CHARACTERISTICS OF MODEL :
TYPE OF MODEL :
TOTAL SURFACE AREA (for classes S4, S8 and S10):
LENGTH :
TOTAL WEIGHT WITHOUT FUEL :
TOTAL WEIGHT WITH FUEL :
ENGINE: TYPE :
MANUFACTURER :
DESIGNER :
TOTAL IMPULSE IN Ns :
NUMBER OF ENGINES :
TOTAL IMPULSE (ALL ENGINES) IN Ns :
We confirm, that all conditions necessary for this event, in accordance with Sporting Code of the FAI have been fulfilled.
First Judge: ..... Signature: .....
Judges: ....
....
....
Signature of Spacemodeller:
.....
Date: .....
Certification by NAC Official:
Name: ..... Signature .....
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TABLE III
PERSONNEL

SPACEMODELLER:
Name: .....
Permanent address: .....
Sporting license No.: .....
FIRST JUDGE:
Name: .....
Permanent address: .....
Sporting license No.: .....
JUDGES AND TIME-KEEPERS:
Name: .....
Permanent address: .....
Sporting license No.: .....
Name: .....
Permanent address: .....
Sporting license No.: .....
Name: .....
Permanent address: .....
Sporting license No.: .....
CERTIFICATION BY NAC OFFICIAL:
Name ..... Signature .....
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TABLE IV
DURATION RECORD ATTEMPT DATA

DURATION OF RECORD FLIGHT :
DATE OF ATTEMPT :
PLACE OF ATTEMPT :
NAME OF SPACEMODELLER :
SPORTING LICENSE NO. :
CATEGORY AND CLASS OF MODEL :
DIMENSIONS OF PARACHUTE(S)/STREAMER :
MATERIAL OF PARACHUTE(S)/STREAMER :
DESIGN OF PARACHUTE(S) :
CHRONOMETERS (Type used) :
OPTICAL INSTRUMENTS USED :
TIME OF START :
TIME OF LANDING :

TIME OF RETURN OF MODEL :
Name of Time of Duration Signature
Judge-Timekeeper: of flight: of Judge:

_____ _____ _____
_____ _____ _____
_____ _____ _____

AVERAGE TIME OF DURATION OF FLIGHT: _____
DATE AND PLACE: _____
SIGNATURE OF FIRST JUDGE: _____
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TABLE V
(SHEET 1)
ALTITUDE RECORD ATTEMPT DATA- TRIANGULATION METHOD

ALTITUDE OF RECORD ATTEMPT :
DATE OF ATTEMPT :
NAME OF SPACEMODELLER :
SPORTING LICENSE NO. :
CATEGORY AND CLASS OF MODEL :
TRACKING THEODOLITES USED :
NUMBER OF THEODOLITES :
THE LENGTH OF BASELINE :
METHOD USED TO DETERMINE
BASELINE MEASUREMENT :
BALANCE OF HEIGHT DIFFERENCE
BETWEEN THEODOLITES AND THE
LAUNCHER (Method used) :
ANGLES TAKEN WITH THEODOLITES:
THEODOLITE 1: AZIMUTH (α)
ELEVATION (ϕ)
THEODOLITE 2: AZIMUTH (β)
ELEVATION (θ)
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TABLE V
(SHEET 2)
ALTITUDE RECORD ATTEMPT DATA – TRIANGULATION METHOD

α?= _____o _____ sin α = _____
β?= _____o _____?sin β =? _____?_____
γ = _____ 180o - (α + β) = _____ sin γ = _____
a = length of base in metres _____ m
b = sin β
sin *g*
a = _____ m
c = sin α
sin *g*
a
= _____ m
H1 = b. tan φ = _____ m
And H2 = c. tan θ = _____ m
Average altitude H =
2
$(H2 + H1)$
= m
THE RESULT _____ m and _____ m IS IN COMPLIANCE WITH THE ADMISSIBLE TOLERANCE OF 10% ACCORDING TO SPORTING CODE SECTION 4d ART No. 4.9.4.
PLACE AND DATE:
SIGNATURE OF OBSERVERS : 1. _____
2. _____
SIGNATURE OF FIRST JUDGE: _____
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TABLE V
(SHEET 3)
ALTITUDE RECORD ATTEMPT DATA PAGE 1
(METHOD OF HORIZONTAL DISTANCE MINIMUM)

ALTITUDE OF RECORD ATTEMPT:
DATE OF ATTEMPT:
PLACE OF ATTEMPT:
NAME OF SPACEMODELLER:
SPORTING LICENSE:
CATEGORY AND CLASS OF MODEL:
Station 1 Station N
Horizontal
Rectangle
Vertical Rectangle
Horizontal Accuracy
Vertical Accuracy
X Co-ordinate
Z Co-ordinate
Y Co-ordinate
Drawing of Launch Site
Measuring Station 1
Measuring Station 2
Z
Measuring Station 3
Measuring Station 4 Measuring Station N
X
Launching Site

TABLE V
(SHEET 4)
ALTITUDE RECORD ATTEMPT DATA PAGE 2
(METHOD OF HORIZONTAL DISTANCE MINIMUM)

Measuring Station Horizontal
Angle
Vertical
Angle
1
. . .
N
Station Pair Pair Result Horizontal
Error
Vertical
Error
Pair Status*
1/2
. . .
N/1
* OK = Valid PairResult
NC = NotClosed (One of horizontal or vertical Pair Errors are greater than 5°)
TL = TrackLost (One of the Measure Stations has no tracking angles)

TABLE VI
FAI /CIAM
CHECK LIST DOSSIER – SPACE MODELS

WHEN PREPARING A WORLD RECORD DOSSIER PLEASE CHECK AGAINST THIS LIST THAT ALL REQUIREMENTS HAVE BEEN MET
In Check Mark Column: If OK Mark 4, if not applicable mark X.
ITEM
No.

DESCRIPTION
CHECK
MARK
0 GENERAL
FAI Office in Lausanne notified by email or fax within seven (7) days after the record was set.
1 Form Table II completely filled out and properly signed (names also in block writing).
DO NOT FORGET CERTIFICATION BY NAC OFFICIAL
Drawing of model, including principal dimensions and weight certified by NAC Official.
2
Reference Sporting Code Section 4c (7.10.1.2.) and Section 4d (14.4.1.).
3 Photograph of model, certified by NAC Official
Reference Section 4c (7.10.1.3) - Section 4d (14.4.2.).
4 List of officials and observers, signed by Directing Official/First Judge
Reference Section 4c (7.11) - Section 4d (Table III).
5 Summary of all supporting data supplied. Reference Section 4c 7.10.1.4.)
6 All supporting data signed by Directing official/First Judge.
7 Description of record attempt. Reference Section 4c (7.11).
Competition Flight Card, properly marked and signed, with data entered in ink, as per Section 4d para. 14.3.1.
8
Competition Flight Card, reference item 8 above, showing both stopwatch readings entered in ink and signed by both official timekeepers.
9
10 Form Table IV completely filled out and properly signed.
Final record figure rounded off to lower whole second, discarding fractions of a second. Reference Section 4c (7.3.4.).
11
12 Certificate on accuracy of stopwatches or special time device.
ALTITUDE RECORDS
13
Form Table V (2 sheets) completely filled out and properly signed
Competition Flight Card, reference item 8 above, showing theodolite readings in ink and signed by both official theodolite operators
14
Reference Section 4d (14.3.1).
15 Statement on calibration and accuracy of the tracking system used.
Reference Section 4d (14.3.1.).
NOTE: ALL DOCUMENTS MUST BE ORIGINAL DOCUMENTS. COPIES WILL NOT BE ACCEPTED.
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ANNEX 1
SCALE SPACE MODELS JUDGE'S GUIDE

EVENT: ..... ( ) Scale (Class S7)
..... ( ) Scale Altitude (Class S5)
Name:
_____
FAI Licence 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 parts not identified as such (9.7)
____ Entry not submitted in flight configuration (minus motors and recovery device packing) (9.8)
____ Entry does not carry competitor's FAI number (4.4.2)

FAI
CATEGORY
SUBCATEGORY
JUDGING
CONSIDERATIONS
POINTS
Technical
Data
Prototype
Drawings
To what degree is external prototype detail substantiated by drawings?
How authentic are these drawings compared to prototype manufacturer's drawing?
- authentic, authorised drawings (0-8)_____
- authentic cross-section drawing(s) (0-6)_____
- data which define colour and markings on it. (0-3)_____
- workshop drawing of scale model - scale 1:1 (0-6)_____
- file containing all necessary data (0-2)_____
Prototype
Photographs
To what degree are external prototype detail, colour, and marking substantiated by photographs?
- at least one colour photograph of the whole prototype with clearly visible details.
(0-10)_____
- at least three photographs of details and assemblies
(0-15)_____
Category Total (50 Max.)
FAI
CATEGORY
SUBCATEGORY
JUDGING
CONSIDERATIONS
POINTS
Degree of
Difficulty
Configuration To what degree does the entry depart from the configuration of a "finned cone-topped cylinder.
(0-40)_____
External
Components
Consider the number and complexity of the entry's external components including fins, transitions, interstage adapters, shrouds, strapon booster, launch lugs, antennae, etc. Also consider to what extent the aforementioned components were prefabricated by none other than the entrant.
(0-40)_____
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.
(0-40)_____
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.
(0-40)_____
"Flyability" Consider the difficulty in adapting the entry to make a qualified flight including absence of fins, small fin area, extremes of CP and/or CG, etc.
(0-40)_____
Category Total (200 Max.)
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FAI
CATEGORY
SUBCATEGORY
JUDGING
CONSIDERATIONS
POINTS
Scale
Adherence
Body and
Nose Cone
Award points based on a % deviation from prototype's scaled dimensions as follows:
Less than 1% deviation = 25 points
Greater than or equal to 1%, less than 5% deviation
= 20 points
Greater than or equal to 5%, less than 10% deviation
= 10 points
10% or greater deviation = 0 points
Nose cone length (0-25)_____
Body length (0-25)_____
Body diameter (0-25)_____
Overall length (0-25)_____
Selected dimensions (0-25)_____
Fins Award points based on a % deviation from prototype's scaled dimensions as follows:
1% of less deviation = 25 points
2% - 5% deviation = 20 points
6% - 10% deviation = 10 points
Greater than 10% deviation = 0 points
Fin length (0-25)_____
Fin width (0-25)_____
Overall fin span (0-25)_____
NOTE: If prototype is finless, select one (each) SIGNIFICANT length, width, thickness, and span and award points based on % deviation from prototypes scaled dimensions as above and check here ( ).
Colour and
Markings
(lettering &
insignia)
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?
(0-25)_____
Comparing the entry to photographs, marking diagrams, or other marking substantiation, to what degree to the entry's markings resemble the prototype's markings?
(0-25)_____
Category Total (250 Max.)
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FAI CATEGORY SUBCATEGORY 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.
Nose cone & transitions (0-50)

_____
Body (0-50)

_____
Fins or Stabilising surfaces (including clear plastic)
(0-50)

_____
Details
(0-50)
Finish Consider that surface textures should duplicate base material of prototype; that paint and other surface coatings should be uniform*, thin, dust-free and of the proper texture; that colour demarcations and markings should be crisp* and precise.
Nose cone & Transitions (0-50)

_____
Body (0-50)

_____
fins (see NOTE)
* unless this would deviate from prototype's finish
(0-50)

_____
Category Total (300 Max.)
NOTE: If prototype is finless, add the points awarded for finish on "nose cone transitions" to the points awarded for finish on "body," divide the sum by 2, enter the result as points for "fins" and check here
( )
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FAI CATEGORY SUBCATEGORY 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)

_____
Realism of launch compared to prototype. Was

the take-off speed abrupt or was it a smooth lift
off from the launch pad?
(0-30)_____
Flight 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?
(0-30)_____
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 15 points for each
effect.
(0-60)_____
Staging Add 30 points for each successful stage
separation. No points for a single stage model.
(0-60)_____
Clusters Add 5 points for each engine that ignites up to a
maximum. No points for single engine models.
(0-30)_____
Staging and
Cluster
Misfires
Subtract 15 points for each engine that fails to
ignite.
(0 or minus)
_____
Recovery Recovery device deployment. (0-20)_____
Multiple recovery device deployment (0-20)_____
Category Total (250 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 Spacemodelling. This guide describes how Flight Judges will officiate at the World or Continental Space Modelling championships. Judges must acquaint themselves with the FAI Sporting Code,
Section 4d - Space Models, General Regulations and Special Rules for Contests, Championships and records.

2. JUDGES TASKS:

Flight Timers/Judges Duties:

a. Impound, safeguard, and distribute certified contest engines.
b. Impound, safeguard, and distribute FAI approved payloads.
c. Maintain stocks of flight cards as needed for the competitors.
d. Check models and recovery devices for proper identification.
e. Measure the size of recovery devices, if needed.
f. Know the maximum time limit for each duration type round.
g. Determine flights adherence to rules and safety. (safety rulings will also be made by the RSO or his deputies).
h. Declare disqualifications and note rationale on flight cards.
i. Time and record duration data onto flight cards.
j. Ensure completed flight cards are sent for data reduction.
k. 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 and other tools.
c. Radio control events require that all transmitters be impounded and kept under control of a steward and be issued to the competitor at flight time then returned. The steward or the judge will also monitor radio frequencies to detect interference and communicate this information to the pilot.

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.

Engine Test Officials:

a. Will attest to the certification of team submitted engines.
b. Engines will not exceed Newton Seconds value of class.
c. Test two engines of each batch.
d. Any failure of tested engines requires rejection of batch.
e. Batch is defined as the engines required for one engine class in an event regardless of delay length. Maximum three batches are allowed per an engine class per an 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).** Timers will be called upon to make decisions on flight adherence to rules and safety. The RSO and his deputies will also judge flight safety. The Judges, the RSO and his deputies are the only person who can declare a disqualification - not team managers, competitors or bystanders.

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.
e. **Engine Ejection.** No engines can be ejected - even if they have attached streamers or parachutes, except for boost gliders. All engines have to descend within an airframe that provides for safe recovery. Exception: Boost glider models may eject pods or engines if they have a streamer or parachute. (See below for minimum sizes)
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 engine coast and ejection, looping is permitted - as long as the model does not present a safety hazard to people or property.
Rocket Gliders cannot separate into two or more pieces; boost gliders may eject an engine pod. The pod (airframe) must descend by streamer or parachute. The minimum sizes (25 mm x 300 mm for streamer, 4 dm^2 for parachute) are interpreted as the deployed sizes. That is, if a Boost Glider airframe’s streamer does not unfurl at least 25 mm x 300 mm, then the flight cannot be qualified; 4 dm^2 area minimum deployments for
a parachute is necessary for qualification. The same applies to an ejected engine.
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.
In classes S4, S8 and S10, a flight is declared official if the model maintains a stable aerodynamic glide for at least 60 seconds, or it lands by stable flight.
b. **Streamer Duration.**
Streamer lengths have to be a 10:1 ratio to widths minimum.
Rules state that a streamer has to be a single piece of flexible material. This shall be interpreted as one uncut, no joints, 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, par. 3d. Unsafe Recovery.
d. **Scale Events. :** The scale judges will judge scale models for flight characteristics in accordance with Annex 9 particularly taking care of the following:
d.1. Flight Characteristics-Staging: Stages must separate step by step. If the 3 rd stage separate simultaneously with the 2nd stage the flight will be considered two stage only. With Saturn 1B and Soyuz if the competitor performs a powered flight of command module, this shall be evaluated as "modeller's third stage" , according to par 2.3.1.
d.2. Flight Characteristics - Special Effects: 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 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.3. Flight Characteristics-Recovery: For single stage, one parachute up to 10 points will be awarded. If a single stage rocket separates up to 20 points will be awarded. With multistage models deployment of a parachute will be awarded up to 10 points and a deployment of streamer 5 points. Maximum recovery points in any case may not exceed 40. To prove if the scale models to be launched are the same models

which were submitted for static judging, judges will designate each model with an appropriate marking during the static judging.

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 of his deputies on matters of safely take priority.

5. ORGANISERS TASKS:

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.

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 - 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 radiocommunications between tracking stations, RSO and the comput er 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.

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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 spacemodelling. 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, organiser of the contest shall submit name of RSO to CIAM or CIAM Bureau for approval. RSO may not be from the organising NAC. When the there are junior and senior classifications at the same place and at the same time 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.

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ANNEX 3
SPACE MODELS WORLD CUP

1. **Classes**

The following separate classes are recognised for World Cup Competition: S4A, S6A, S7, S8E/P and S9A.

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 Contest 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.

4. **Points Allocation**

For S4A, S6A and S9A :

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

$$B = \frac{100}{10} \times \left(\frac{\log(\,)}{\log(\,)} - \left(+ \left| \right. \right) \right) \times \left(\frac{A\ N}{Max} \right)^{X^K}$$

where: B = points awarded to the competitor
X = competitors score
Max = 3 x180 = 540 – total maximum flight time points for three flights in a class,
A = number of competitors
N = placing of competitor.

For S7 and S8E/P

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

where: B = points awarded to the competitor
X = competitors score
Y = winners score
A = number of competitors
N = placing of competitor.

For all classes

Points are awarded only to competitors completing at least one flight in the contest.

In the event of a tie for any placing, all competitors with that placing receive the number of points appropriate
to that placing, rounding up the score to the nearest whole number of points

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.
In the event 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. **Jury**

A jury of three responsible people shall be nominated by the CIAM Space Modelling Subcommittee to rule on
any protest concerning the World Cup during the year. Any protest must be submitted in writing to the Space Model Subcommittee Chairman and must be accompanied by a fee equivalent to 35 €. In the event of the Jury upholding the protest, the fee will be returned.

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 Contest 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:
For classes S3A, S4A, S6A and S9A:
B = 100
10
log( ) log( )
× |
)

$$\left(1-\left(\frac{A-N}{Max}\right)\times\left(\frac{X}{K}\right)\right)$$

For classes S1B, S5C, S7 and S8E/P:

$$B = 100\times\left(\frac{\log(10)}{\log(10)}\times\left(1-\left(\frac{A-N}{Max}\right)\times\left(\frac{Y}{X}\right)\right)\right)$$

B = points awarded to the competitor

Max = 3 x 180 = 540 – total maximum flight time points for three flights in a class for classes S4A, S6A and S9A, but it *is 3x300=900* sec for class S3A,

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
- 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) Point 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 (taking the better score for any European country in which he had scored in two competitions).

c) To determine the total score up to seven events of at least two different classes will be counted, selecting each competitors best result during the year.

d) In the event of 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. 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
GENERAL ORGANISATION OF A WORLD CHAMPIONSHIP

1. Time to Elapse: 12 months. **Planning**: Models Commission of National Airsports Control or equivalent investigates sites, accommodation and business management of potential championships including sponsorship. Produce estimates based upon number of competitors, administrators, supporting officials, press, etc.
Action: Contact with airfield authorities and possible sponsors.
2. Time to Elapse : 11 months. **Planning**: Specialist committee created for organisation (Chairman, FAI Delegate, Treasurer, Event specialists and Contest Director). Financial estimates produced. Decision made
to proceed with an offer to host event.
Action: FAI Delegate briefed to present proposition to CIAM.
3. Time to Elapse : 9 months. **Planning**: Proposition made to CIAM Plenary Meeting, naming location, accommodation facilities, esteemed fees, period of meeting, associated events.
Action: CIAM accepts offer, approves associated events and fees on estimate.
4. Time to elapse : 8 months. **Planning**: Decision made on contest site plan. Liaison Committee formed with
site officials e.g. FAI Delegate, Chairman, Vice-Chairman, Treasurer and Contest Director with Airfield or Contest site administration officials. Site measured and plan of proposed area prepared including flight areas and buildings.
Action: Meeting of preliminary planning personnel on location; minutes and data circulated to all organising personnel.
5. Time to Elapse : 7 months. **Planning**: Full Budget prepared. Based on quotation for accommodation, feeding, travel costs of Judges, equipment, purchase, printing, hire of materials and other expenses. First publicity release and advance information memorandum prepared. Cost of entry fee finalised. Programme visualised and advertisement support solicited.
Action: Issue of invitation to all member NACs of FAI with memorandum containing rules for event(s).
6. Time to Elapse : 6 months. **Planning**: Jury, Judges and Timekeepers nominated. Fully detailed site plan prepared by Contest Director. Firm duties allocated for:
a) Liaison with Site officials
b) Field Organisation
c) Printing and Publicity
d) Finance
e) Preparation of special equipment
f) Accommodation.
Action: Report to CIAM Bureau meeting by FAI delegate. Judges and reserves confirmed. Method of judging approved by CIAM Bureau.
7. Time to Elapse : 5 months. **Planning**: Meeting with site officials. Confirming accommodation available. Local town accommodation reserved for visitors, married personnel, etc. Flying area surface inspected, contest layout planned for ceremonies, pit areas, processing bays. Event emblem and programme layout defined. Second publicity releases issued. All jury and Judges announced. Quotes accepted for public service toilets, field refreshments, etc. Banquet and prize giving planned.
Action: All officials active in procurement of material, particularly publicity officer, FAI delegate and Programme Producers.

8. Time to elapse : 4 months. **Planning**: Personnel for each event nominated or chosen from volunteers in NAC. Requirements as follows: Processing team; Director for each event circle; timekeepers; scorers; lap counters; messengers; monitors.
Action: All personnel advised of duties and obligations. Work delegated to spread responsibility.
9. Time to Elapse : 3 months. **Planning**: First entries acknowledged. By information memorandum, of-fering
travel advice, cost and request for notice of arrival. Programme and contest recording printing ordered. Souvenir plaques ordered. Tents ordered. Early arrivals anticipated. Auxiliary events planned - exhibition, etc. Judges' travel tickets issued. Local practice area selected. Third Press release issued concerning entries .
Action: By FAI Delegate and Publicity Officer.
10. Time to Elapse : 2 months. **Planning**: Entries officially complete. Numbers finalised for on-site and off-base
accommodation. Supporters accepted where possible. Programme copy to printer. Delivery dates finalised for all equipment. Numbered waistcoats, flags, awards prepared. Final directive issued to all personnel stating responsibilities and financial obligations. All primary officials to be fully advised of each other's

responsibilities. Daily programme prepared and issued to all competing NACs.
Action: Officers for accommodation, publicity. Contest director active in securing all arrangements.
11. Time to Elapse : 1 month. **Planning**: Field equipment tested. Lap or score indicators checked. Delivery of
barriers or wire mesh. Tables and chairs secured, work benches, spectator stands. Local transport secured.
Accommodation fully planned. Programme passed for printing. Contest record cards delivered and prepared. Score boards stencilled. Full schedules of names for competitors, officials, supporters, VIPs and observers prepared with lapel badges for each. (Colour coded, White - Competitors, Yellow - Judges,, Jury, Officials; Brown - General Staff; Green - Important persons and Chief Officials). Souvenirs allocated (brief cases) after making up. Fuels ordered including extra components for visiting entries unable to travel with fuels. Litter sacks ordered. Traffic control planned with highway authorities. Exhibition planned.
Action: All officials active. Full exchange of information between all concerned.
12. Time to Elapse : 3 weeks. **Planning**: Final Liaison with Site Officials, catering and local authorities. Programmes delivered. All personnel involved in duties other than field events briefed by marshals and event directors as necessary. Fourth press release issued with photographs. Banquet and prizegiving to be finalised.
Action: Contest Director, Accommodation and Publicity Officer.
13. Time to Elapse : 2 weeks. **Planning**: Flight areas marked and finally prepared. Directions issued to Main
Line Railway stations to guide visitors. Treasurer accounts for advance payment of fees. Transport confirmed from nearest rail station. Bedding set aside. Banner, flags and poles prepared. Numbered waistcoats, souvenir plaques, posters delivered and distribution planned.
Action: Contest Director, Accommodation, Treasurer, Publicity Officer.
14. Time to Elapse : 1 week. **Planning**: Advance party on location. To receive and erect tents, tables, barriers
and airfield equipment. All scoring systems, loud speakers, light observation platforms positioned. All equipment tested. Ropes, stakes and litter sack positions planned. Special contest requirements anticipated. Early arrivals diverted to local areas. Fifth press release for local papers.
Action: By Contest Director and staff. Publicity Officer.
15. Time to Elapse: 2 days. **Planning**: All equipment on location including trophies and printed matter. Ropes
and stakes established, public areas controlled. Toilets erected, exhibition staged. Sixth and final press releases issued. Advance radio, TV and photographic reception for publicity arranged. Processing team fully
briefed and reception finally planned.
Action: All officers active on location.

16. Time to Elapse : 1 day. **Planning**: Rehearsals. Models processed, specification cards and FAI licences collected. Briefing of all officials, dummy event to establish standards, for all judges who are pre-briefed, trained through practice flights, then debriefed with analysis of scores. Timekeepers checked for proficiency.
All circuits finally prepared. Draw cards and lists prepared for order of flying. Issue of memorandum detailing all decisions of contest management meeting.
Action: All officials, judges, jury team manager.
THE INTERNATIONAL CONTEST THEN TAKES PLACE IN ACCORDANCE WITH THE SPORTING CODE.
17. Time Elapsed: 2 days. **Planning**: Site Clearance. Rearguard party dispatches all loaned equipment, clears
accommodation area, secures all found property, lists liabilities, breakages, etc.
Action: Rearguard and contest director.
NOTE for WC: RANKING - International Team Classification: Complete three competitor teams are ranked ahead of two competitor teams, which are in turn ranked ahead of single competitor teams.
INFORMATION TO CIAM BUREAU
1) The actual situation, date for entries etc.
2) Undertaken preparations
3) Contest organisation:
FAI Jury
Contest management
Main officials and their duties
Arrival, how to find the place

Lodgings
Camping facilities
Hotels
Parking
Meals
Canteen, if any
Depots
Tracks
Conveniences
Practice flights
Processing
Information
Public Relations
Emergency, first aid
Insurance
Spectators
Programme
4) Distribution of maps of the contest area.
Administration & Organisation chart appears overleaf.

ADMINISTRATION & ORGANISATION

CHAIRMAN OF NAC MODEL COMMISSION
Field Planning Accommodation Finance Publicity and Printing
Contest Director ..... Acc. Officer Treasurer V/Chairman / P.R.C.
FAI Delegate
Issue of invitations
Control of Entries

EVENT DIRECTION

FAI International Jury
Team Managers
Contest Director
Processing Team Event Directors Event(s)
Juries or
Timekeepers
Chief Recorder
Score Board Operator and Public Address
Public Relations Officer
Daily News Sheet producer Base Office Results producer
FAI

PROVISIONAL RULES

CLASS S11/P - ROCKET POWERED AIRCRAFT AND SPACESHIPS

11.8 CLASS S11/P

11.8.1. **Definition:**
The Rocketplane or Spaceship competition is a single class which is limited to models which are scale models, resembling the prototype, of rocketplanes or future (futuristic) spaceship (S-F) past or present. The objective is to build a model of a Rocketplane/Spaceship and fly it by radio control. Rule 4.7. applies.

11.8.2. **Choice of the Model:**
The competitor must have produced a genuine rocketplane or spaceship (futuristic or not). However, the competitor shall do his best to reproduce a model from an original subject.
There are two possible subclasses to be chosen:

- rocket powered aircraft S11/P (R)
- spaceships (futuristic or not) S11/P (S)

11.8.2.1. **Maximum Weight and Thrust:**
Maximum weight (at take-off) .....1000 g
Maximum total impulse 160 Newton seconds
Engines up to 80 Ns are allowed.

11.8.3. **Spaceship with Several Stages:**
If the entry is a scale model of a multi-stage 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 been flown separately, alone and as a vehicle itself.
A futuristic spaceship can have several stages. The last stage must be radio-controlled.

11.8.4. **Stabilisation Flaps:**
The rocketplane model (or spaceship) should have the functional radio-controlled control surfaces of the real
craft.

11.8.5. **Kit of Plastic Parts:**
Parts from plastic model kits cannot be used.

11.8.6. **Introduction of the Model for Judging:**
Models will be judged for scale qualities in flight condition minus space model motors. All clear plastic fins, launching lugs and 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 and recovery device packing.

11.8.7. **Number of Flights:**
Each model must make one stable flight. Two attempts will be accorded to the competitor, time and weather permitting.

11.8.8. **Judging of the Model:**
The models will be judged according to the following rules:

- static judging
- flight execution

Static Judging:
The competitor will present his model on the top of the launcher. Both launcher and model will be judged according to the following criteria:

11.8.8.1 **Quality of technical data - max. 50 points**

- genuine drawings of the prototype
- drawings at the same scale as the presented model colour
- photographs of the model ready to be launched, in flight and landing.

11.8.8.2. **Quality of Design - 300 points**

- level of detail, care given to assembling and degree of finish
- fuselage: 100 points
- moveable flaps: 100 points
- colours and markings: 100 points

11.8.8.3 **Degree of Difficulty - 400 points**
The number of points given will be according to the degree of difficulty encountered during the assembly of the model.

- number of external parts: 100 points
- complexity of the painting pattern: 100 points

- complexity of the design necessary for a flying model: 100 points
- launcher: 100 points

Flight Execution

The flight must be in accordance with the following rules, taking off and ascending within a 60 degree conical

area; a stable gliding flight; perfect precision of landing on a landing area of 20 m x 5 m (no crash allowed). Each model must fly a stable flight.

11.8.8.4 **Judging Criteria - 400 points**

- launching: 100 points
- light stability: 100 points
- landing quality (no crash, no damage): 100 points
- landing precision 100 points in the landing area:

10 points/metre will be deducted for a landing outside the area.

In the case of a major failure caused by an engine malfunction and if the model can not fly again, no points will be given for the flight execution; only the points given for the static judging will be taken into consideration for the final classification.

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.

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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

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

12.6.5. Sub-Classes

Sub-classes for this competition are defined by rule 12.5.