

**5.12 CLASS F3S – RADIO CONTROLLED AEROBATIC JET MODEL AIRCRAFT****5.12.1 Definition of a Radio Controlled Aerobatic Jet Model Aircraft**

A model aircraft, but not a helicopter, which uses turbine jet(s) or ducted fan(s) as the propulsion source(s) and which is aerodynamically manoeuvred by control surface(s) in attitude, direction, and altitude by a pilot on the ground using radio control. Variable thrust direction of the propulsion device(s) is permitted.

**5.12.2 General Characteristics of a R/C Aerobatic Jet Model Aircraft**

The R/C Aerobatic Jet Model Aircraft shall use as a propulsion device turbo jet/s or ducted fan/s. Ducted fans may use turbo jet engines or electric motors as a power source. Rocket or pulse jet engines may NOT be used.

The number of model aircraft eligible for entry is two (2).

Maximum overall span .	3500mm *
Maximum overall length	3500mm *
Maximum take-off weight with fuel (or with battery if EDF)	25 kg *
Electric Motors power source max. no load voltage	72 volts *

\*A tolerance of 1% will be allowed for possible inconsistencies in measurement instruments for size, weight, and voltage unless otherwise stated.

The propulsion device(s) must automatically shut-off (EDF) or fully idle (turbo jet) at the moment an R/C signal failure occurs.

A maximum thrust of turbine is not defined, however limits for the competition area of the event have to be followed and must be submitted to the competitors!

Noise limits do not apply. If there is a noise limit for the competition area of the event, this must be submitted to the competitors!

**Radio Equipment:**

Radio equipment shall be of the open loop type (ie no electronic feedback from the model aircraft to the ground except for the stipulations in CIAM General Rules C.16.2.3).

Permitted:

1. Control rate devices that are manually switched by the pilot.
2. Any type of button or lever, switch, or dial control that is initiated or activated and terminated by the competitor.
3. Manually operated switches or programmable options to couple and mix control functions.
4. The use of electronic stability augmentation devices or gyros with or without speed related automatic gain control derived from a GPS signal.
5. The transmission of information from the model aircraft to the pilot on the ground of propulsion and receiver system health monitoring.

**Not permitted:**

1. Snap roll buttons with automatic timing mode.
2. Pre-programming devices to automatically perform a series of commands, except for landing gear function.
3. Automatic flight path guidance.
4. Any type of voice recognition system.
5. Any type of learning function involving manoeuvre to manoeuvre or flight to flight analysis.

### 5.12.3. Definition and Number of Helpers

A helper may be a Team Manager, another competitor, or an officially registered supporter. Each competitor is permitted one helper (usually the caller) during the flight. Two helpers may be present and assist during the starting of the motor(s). One person, either a helper, or the team manager, or the caller, may place the model aircraft for take-off and retrieve the model aircraft following the landing. In exceptional circumstances, another helper may join the competitor and caller/helper during the flight, but only to hold a sun-shield as protection from direct sunlight. These protection devices must not interfere with the judges' vision of the manoeuvres. Physically disabled competitors requiring an additional helper and/or caller or other assistance, must request permission with full details, with their entry, from the organiser of a championship. This additional assistance must be provided by the competitor, must not give him an unfair advantage over other competitors, and must not unduly delay or interfere with the running of the competition. Except for communication between the caller and the competitor, no other performance-enhancing communication with helpers is permitted during the flight.

### 5.12.4. Number of Flights

Competitors have the right to the same number of preliminary, semi-final, or finals flights. Only completed rounds will be counted. Only when all competitors in the preliminary, semi-final, and final rounds, have had the opportunity to complete the same number of rounds, can the results of the rain-interrupted (or other delay) competition be determined.

### 5.12.5. Definition of an Attempt

There is an attempt when the competitor is given permission to start.

If the propulsion device fails after the model aircraft becomes airborne, the attempt will be deemed complete.

### 5.12.6. Number of Attempts

Each competitor is entitled to one attempt for each official flight.

**Note:** An attempt can be repeated at the contest director's discretion only when any unforeseen reason beyond the control of the competitor, causes the model aircraft to fail to start (eg there is radio interference). Similarly, in a flight that is interrupted by any circumstance beyond the control of the competitor, the competitor is entitled to a reflight, with the entire schedule being flown and judged, but only the affected manoeuvre and the unscored manoeuvres that follow will be tabulated. This reflight should take place within 30 minutes of the first flight, in front of the same set of judges, or be the first flight after the judges' break, or, if it involves a protest, as soon as the FAI Jury has deliberated and communicated the outcome of the protest to the contest director. The result of the reflight will be final.

### 5.12.7. Definition of an Official Flight

There is an official flight when an attempt is made whatever the result.

### 5.12.8. Marking

- a) Each judge has to assess each manoeuvre and any other relevant action of the competitor individually and independently from the other judges. The criteria for judging are contained in the Description of Manoeuvres (Annex 5M) and in the Manoeuvre Execution Guide (Annex 5B)
- b) Each manoeuvre may be awarded marks by each of the judges during the flight. Every manoeuvre starts with the mark of 10 points and will be downgraded for each defect during the execution of the manoeuvre in one or multiple 0.5 point steps, depending on the severity of the defect. The remaining points result in the mark for the manoeuvre. During tabulation, these marks are multiplied by a coefficient (K-Factor) which relates to the difficulty of the manoeuvre.
- c) Any manoeuvre not completed, or flown out of sequence with the stated schedule shall be scored zero (0). Zero scores need not be unanimous, except in cases where an entirely wrong manoeuvre was performed. Judges must confer after the flight in these cases, bringing it to the attention of the flight line director/contest director on site.
- d) Take-off and landing procedures are not judged and are not scored.
- e) The manoeuvring zone is vertically spread in front of and at a distance of approximately 150 m - 200 m from the pilot. (depending on the size of the model aircraft). It is laterally limited by two virtual vertical planes above the extension of two lines on the ground each at an angle of 75 degrees left and right from the intersection of a centre line with the safety line. The centre line is positioned on the ground perpendicular to the safety line on the ground which is parallel to the runway. Two starting circles of 3m diameter are marked on the middle of the the runway, one

left and one right at minimum 15 m off the centre line, also serving for sound/noise measurement, if required. The upper limit of the manoeuvring zone is defined by the virtual plane stretching up 60 degrees from the ground at the intersection of all ground lines.

- f) The dimensions, inertia and speed of a jet model aircraft have to be considered
- g) The pilot is normally placed on the intersection of all ground lines.
- h) Manoeuvres must be performed such that they can be seen clearly by the judges. If a judge, for some reason beyond the control of the competitor, is not able to follow the model aircraft through the entire manoeuvre, he shall set the "Not Observed" (N.O.) mark. In this case, the judge's mark for that particular manoeuvre will be the average of the numerical marks with two digits after the decimal point, rounded up. If the majority of the judges scored "Not Observed", the competitor has the right for a reflight as per paragraph 5.12.6. If, for some reason within the control of the competitor, a judge is not able to follow the model aircraft through the entire manoeuvre, he has to downgrade the manoeuvre accordingly.
- i) Centre manoeuvres should be primarily performed in the centre of the manoeuvring zone while turn around manoeuvres should not extend past the lateral limits. Vertical height should not exceed the upper limit. Also, manoeuvres should be primarily performed along a line of flight approximately 150m -200m in front of the safety line. Infractions of this rule will be cause for downgrading by each judge individually and in proportion to the degree of infraction. Exceptions to this rule are cross-box manoeuvres, 3D-manoevres, or manoeuvres in a stalled condition, as well as the horizontal circle manoeuvres which, of necessity, may deviate from the 150m - 200m distance of flight.
- j) The manoeuvring zone shall be clearly marked with white (or contrasting colour to the background) vertical poles, approximately 100mm in diameter and approximately 4m high, placed on centre and 75 degrees each side of centre on a line 150m in front of the competitor's position. Flags, streamers, or boards of contrasting colour to the background, should be mounted on the poles to improve visibility. White (or contrasting) lines, originating at the competitor's position and extending outward at least 50m, shall also be used to mark the centre and extreme limits (75 degrees left and right of centre) of the manoeuvring zone. Audible and visual signals to indicate violations of the manoeuvring zone must not be used.
- k) The judges shall be seated not more than 10m, and not less than 7m behind the competitor's position (the apex of the 75 degree lines) and within an area described by the extension of the 75 degree lines to the rear of the competitor. The judges must be seated abreast, usually separated by 2m, with scribes or score secretaries separating them.
- l) If a model aircraft is, in the opinion of the judges, unsafe or being flown in an unsafe or inappropriate manner, they may bring this to the attention of the flight line director, who may instruct the pilot to land.
- m) The individual manoeuvre scores given by each judge for each competitor must be made public at the end of each flight of competition. The team manager must be afforded the opportunity to check that the scores on each judge's score document correspond to the tabulated scores (to avoid data capture errors). The score board/monitor must be located in a prominent position at the flight line, in full view of the competitors and the public.

#### 5.12.9 Classification:

- a) For World and Continental Championships, each competitor will have four (4) preliminary flights with schedule F3SP with the best three normalised scores to determine the preliminary ranking. The top 30% (thirty percent) of the classified F3S P competitors with a minimum of ten (10) will have three (3) additional flights. These final flights will be flown as a known, finals schedule (schedule F3SF) The total of the best three preliminary flights of the finalists (normalised again to 1000 points) will count as one score. This score and the finals scores will give four (4) normalised scores. The sum of the three best will give the final classification. In the case of a tie, the sum of all the four (4) scores will determine the winner.

In the event of adverse weather where flying of all rounds is not possible the classification would be determined on rounds completed as follows:

Preliminaries: one round=one flight counts, two rounds= best one flight counts, three rounds= best two flights count.

Finals: one round = the total of the counting preliminary flights (normalised again to 1000 points) with the one Finals flight count.

Finals: two rounds = the sum of the two best of three (normalised preliminary, two finals rounds) count

- b) The team classification in F3S is established at the end of the competition (after the finals) by adding the numerical final placing of the best three team members of each nation. Teams are ranked from the lowest numerical scores to the highest, with complete three-competitor teams, ahead of two-competitor teams, which in turn are ranked ahead of one-competitor teams. In the case of a tie, the best individual placing decides the team ranking

All competitors matching the junior definition as per CIAM General Rules C.15.6.1 are ranked in an additional junior classification.

- c) For World and Continental Championships, the scores for all rounds, preliminary, semi-finals and finals, will be computed using the Tarasov-Bauer-Long (TBL) statistical averaging scoring system. Only computer tabulation systems containing the TBL algorithm and judge analysis programs that have been Subcommittee approved can be used at Categorie 1 events.
- e) All scores for each round, preliminary, semi-final and finals, will then be normalised as follows: The average score of the top half of competitors flown in front of a particular group of judges (ie a round) shall be awarded 1000 points. The remaining scores for that group of judges are normalised to a percentage of the 1000 points in the ratio of actual score over this average score.

$$\text{Points}_x = \frac{S_x}{S_w} \times 1000$$

Points<sub>x</sub> = points awarded to competitor X

S<sub>x</sub> = score of competitor X

S<sub>w</sub> = average score of top half of competitors in round

Note 1: Final flights to determine the individual winner are usually required for World and Continental Championships.

For open international events, national championships, and domestic competitions, the best two out of three flights of Schedule P may be used to determine the individual winner and team placing.

Flights of Schedule F may be incorporated depending on local circumstances and the time available.

Note 2 :The TBL score tabulation system can only be applied for events with at least 5 competitors and 5 judges.

#### 5.12.10. Judging

Judging of jet aerobatics has to be according to Annex 5B by giving consideration to the dimensions, inertia and speed of a jet model aircraft.

- a) For each competition in F3S, there must be a minimum of three (3), and a maximum of five (5) judges, plus one timer.
- b) For larger events, there might be several panels of judges.
- c) For World or Continental Championships the organiser must appoint one or more panels of five judges each. The judges must be of different nationalities. Those selected must reflect the approximate geographical distribution of teams having participated in the previous World Championships and the final list must be approved by the CIAM Bureau. At least one third, but not more than two thirds of the judges must not have judged at the previous World Championship. Judge assignment to the panels will be by random draw.

In the case of more than one panel of judges, the panels may be combined for final rounds of flights.

- d) The invited judges for World or Continental Championships must be selected from the applicable list of current or upcoming approved FAI international judges and must have had a

reasonable amount of F3A or F3S judging experience and must submit a resume of his judging experience to the organiser when accepting the invitation to judge at a World or Continental Championship. The organiser must in turn submit the resumes to the CIAM Bureau for approval.

- e) To avoid errant judging, it is recommended that training flights be performed, before the beginning of official flying. These training flights are judged and tabulated according to the regulations, but the results are not made public.

#### 5.12.11. Organisation for Radio Controlled Aerobatics Contests

- a) Members of a National team, who have processed only one model aircraft each, may make use of the second model aircraft processed by another member of the same team. However, once that model has been used by a team member in that competition, it may not be used by any other competitor. If that team member did not process the model aircraft in the first place, then it must be re-registered and re-marked appropriately. This is the responsibility of the team manager.
- b) Only spread spectrum radio control systems are allowed.
- c) The draw for flight order will be done for each flight line. Team members will not be drawn to fly directly after each other. Team members on separate flight lines will be separated by at least two competitors. Competitor identification numbers will only be assigned after this flight order draw, by competitor group, and in numerical ascending order.
- d) For flights two, three and four of the preliminary rounds the flight order will start  $\frac{1}{4}$ ,  $\frac{1}{2}$  and  $\frac{3}{4}$  down the flight order respectively. Organisers must take care to avoid a flight draw which will cause competitors to fly at approximately the same time each day.
- e) The flight order for the first round of the finals in will be established by a random draw as above. The flight order for flights two, and three will start  $\frac{1}{3}$  and  $\frac{2}{3}$  down the finals flight order with decimals rounded-up.
- f) Competitors must be called by a flight line official at least five minutes before they are required to occupy the starting area.
- g) The competitor and his helper(s) then occupy the starting area so that a radio check can be performed to verify the correct functioning of the radio control equipment. The competitor must be allowed a maximum of one minute for a radio check before the beginning of the starting time.
- h) The time keeper will audibly notify the competitor when the minute is finished and immediately begin timing the starting time.
- i) According to paragraph 5.1.2., the voltage of the propulsion battery of electric powered models, must be checked by an official in the preparation area before the starting time is started.
- j) For electric powered models, the electric power circuit(s) must not be physically connected, before the starting time is begun and must be physically disconnected immediately after landing.
- k) A competitor is allowed six (6) minutes of starting time and eight (8) minutes of flying time for each flight. The timing of an attempt starts when the contest director, or timekeeper, gives an instruction to the competitor to start and the 6-min starting time begins. The competitor must be informed when 6-minutes of the starting time have elapsed. The openly displayed timing device/clock will be re-started to count the 8-min flying time when the model aircraft has been placed in the take-off circle. If the model aircraft is not placed with its wheels in the starting circle before/at the expiration of the 6-minute starting time, the contest director/time keeper will advise the competitor and helper that the flight may not proceed. The flight shall score zero points.  
With the expiry of the 8-minute flying time, the scoring will cease except for the in-flight sound assessment, which is judged after the model aircraft has landed, irrespective of the time. The contest director/time keeper will advise the pilot, helper, and the judges of the expiry of the 8-minute flying time. The clock will be stopped at the end of the last manoeuvre as proof to the competitor of the recorded time.
- l) The competitor may not start his model aircraft unless he has been instructed by a flight line official to do so. Deliberate starts at the flight line during official flying to check the propulsion device will be subject to disqualification from that round. No public address or commentary should be made during flights.
- m) During the flight, the pilot and his helper/caller (if required) must stay in the designated position in front of the judges, at the convergence of the ground lines and under the supervision of the flight line director. The pilot must wear or display his identification/start number.

#### 5.12.12. Execution of Manoeuvres

- a) The manoeuvres must be executed during an uninterrupted flight in the order in which they are listed in the schedule. The competitor may make only one attempt at each scored manoeuvre during the flight.
- b) The model aircraft must take-off and land unassisted, that is, no hand launched flights. If any part of the model aircraft is jettisoned during the flight, scoring will cease at that point and the competitor must be instructed by the flight line director to immediately land his model aircraft. Usually, the judges will be able to determine when a part has been jettisoned from the model aircraft. They should bring this to the attention of the flight line director on site.
- c) The direction of the first manoeuvre or the landing may be different from that of the take-off.
- d) After take-off, only turn-around manoeuvres, and not more than two (2), are allowed before starting the first manoeuvre of the schedule.