FAI Sporting Code

Fédération Aéronautique Internationale

Section 4 – Aeromodelling

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Radio Control Aerobatics

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5.10. CLASS F3M – RADIO CONTROLLED LARGE AEROBATIC AIRCRAFT

Introduction

R/C Large Aerobatic Aircraft F3M is a competition class inspired by CIVA Unlimited full scale aerobatics from the FAI.

The rules which follow, contain material sourced from the *AMA Scale Aerobatics Rulebook (2015)* and the *Known and Unknown Sequences.* Permission has been granted to use this material by the International Miniature Aerobatic Club (IMAC).

5.10.1. Definition of a Radio Controlled Large Aerobatic Aircraft

A model aircraft, but not a helicopter, which is aerodynamically manoeuvred by control surface(s) in attitude, direction, and altitude by a pilot on the ground using radio control.

The model aircraft must be a scaled-down version of a full-size aerobatic aircraft. The general outlines of the model shall approximate the full size outlines of the subject aircraft. Exact scale is not required.

General characteristics of Radio Controlled Large Aerobatic Aircraft shall be verified in processing procedures as per FAI Sporting Code, Section 4, Volume ABR, for each participating model aircraft prior to a competition

5.10.2. General Characteristics of R/C Large Aerobatic Aircraft

Minimum overall span for monoplanes	2.1 m
Minimum overall span for biplanes	1.8 m
Maximum take off weight (with fuel and enhancers devices)	25 kg

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

b) Propulsion device limitations: Any suitable propulsion device may be used. Propulsion devices that are not permitted are those requiring solid expendable propellants, gaseous fuels (at room temperature and atmospheric pressure), or liquefied gaseous fuels.

c) Only one propeller per aircraft is allowed. If the aircraft is utilising an internal combustion engine, only one engine is allowed. If the aircraft is utilising electric motors, more than one electric motor may be used.

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

e) Radio equipment shall be of the open loop type (i.e. no electronic feedback from the model aircraft to the ground except for the stipulations in CIAM General Rules C.16.2.3). Auto-pilot control utilising inertia, gravity or any type of terrestrial reference is prohibited. Automatic control sequencing (pre-programming) or automatic control timing devices are prohibited.

Example:

Permitted:

1. Control rate devices that are manually switched by the pilot.

2. Any type of button or lever, switches, or dials control that are initiated or activated and terminated by the competitor.

3. Manually operated switches or programmable options to couple and mix control functions.

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Not permitted:

1. Snap roll buttons with automatic timing mode.
2. Pre-programming devices to automatically perform series of commands.
3. Auto-pilots or gyros for automatic wing levelling or other stabilisation of the model aircraft.
4. Automatic flight path guidance.
5. Propeller pitch change with automatic timing mode.
6. Any type of voice recognition system.
7. Any type of learning function involving manoeuvre to manoeuvre or flight to flight analysis.

Note: A Spread Spectrum technology receiver that transmits information back to the pilot-operated transmitter, is not considered to be a "device for the transmission of information from the model aircraft to the competitor", provided that the only information that is transmitted is for the safe operation of the model aircraft.

5.10.3. **Technical verifications**

1. Proof of scale:

a) To prove that the general outlines of the model approximate the full size outlines of the subject aircraft, the competitor or his helper/team manager must submit, before the start of the competition, an accurate three-view drawing of the subject aircraft and some photos of the full size aerobatic aircraft in relation to the three-view drawing.

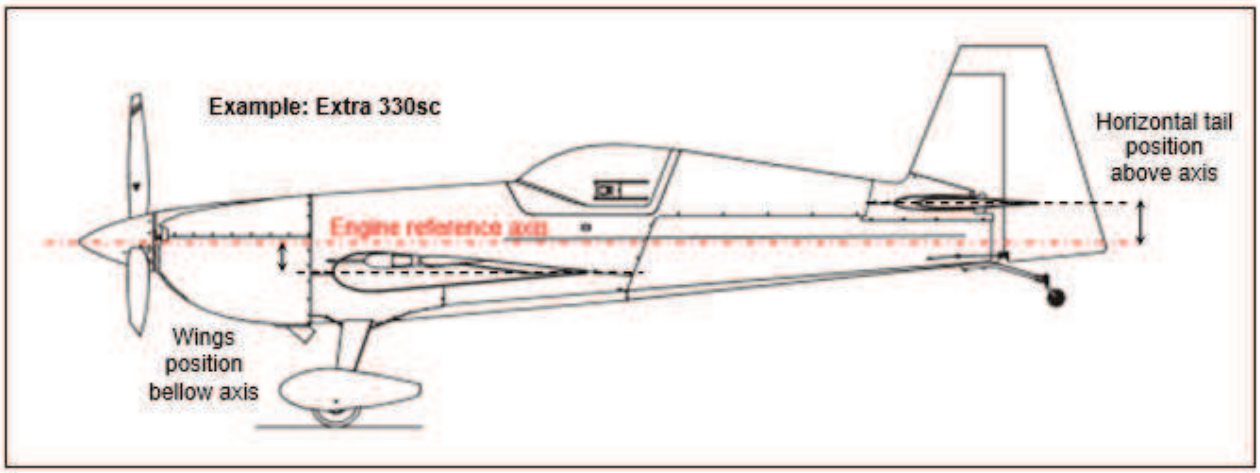
b) The model shall be judged for likeness at a distance of approximately 3 metres.

c) General outlines of the model should approximate the full size subject aerobatic aircraft.

d) The area of control surfaces compared to fixed surfaces will not be considered.

e) Example: only the general outline of the wing, stabilizer and fin will be considered, not the ailerons, elevator, or rudder, but the concept of moving surfaces must be the same as on the subject aircraft. (Aileron may be in two parts, moving part of the fin for aerodynamic balance, etc. Trim tabs or winglets are forbidden, if not on the full-size aircraft.)

f) From the side view of the model aircraft (with stabilizer set at 0° incidence) and on the engine axis line reference, the wings and horizontal tail position must be seen as they are on the full size subject aircraft: On the axis or above or below.



2 .Sound / Noise Level test:

a) The maximum noise level will be 94 dB(A) measured at 7 m from the centre line of the model aircraft with the model aircraft placed on the ground over concrete or macadam at the flying site. If a concrete or macadam surface is not available then the measurement may be taken over bare earth or very short grass in which case the maximum noise level will be 92 dB(A).

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b) The tolerance of the sound/noise level measurement is the specified tolerance of the manufacturer of the measuring instrument.

c) With the propulsion device running at 5700 rpm (+/- 10%), the measurement will be taken 90 degrees on the right-hand side, with the nose of the model aircraft pointing into the wind. The Class 1 SLM (Sound Level Meter) microphone shall be placed on a stand 30cm above the ground in line with the propulsion device other than the helper restraining the model aircraft, and the sound steward, nobody or sound/noise reflecting or sound absorbing objects shall be nearer than 7 m from the model aircraft or the microphone. The sound/noise measurement shall be made as a part of model processing. Electric powered model aircraft must have installed the same batteries for all model processing procedures. The sound test area must be located in a position that does not create a safety hazard to any person around.

d) In the event of a model aircraft failing the sound/noise test, indication of the result or the reading shall be given to the competitor and his team manager. The model aircraft shall be impounded by a flight line official immediately following the sound test. The competitor and his equipment shall remain under supervision of the flight line official, while some modifications or adjustments may be made and the propulsion battery fully recharged. The model aircraft shall be re-tested under regular operational conditions within 90 minutes by a second noise steward using a second sound level meter, and in the event that the model aircraft fails the re-test, the model processing fails.

e) If the technical verifications are not in accordance with the rules, the model aircraft is not allowed to fly.

5.10.4. **Number of flights**

A competition for model aircraft class F3M unlimited is based on three rounds:

- A minimum of one flight of 1 known sequence, valid for one year.

- A minimum of one flight of 1 unknown sequence. This unknown sequence is given to each pilot before the round, without any possibility of practising the sequence. The difficulty of this round shall be equivalent to that of the known sequence.

- A minimum of one flight of a 4 minutes freestyle program chosen by the competitor.

Each competitor has the right to a minimum of three official flights (one known schedule + one unknown schedule + one freestyle schedule).

5.10.5. **Definition of an attempt**

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

An attempt begins when the pilot or caller makes a visual signal indicating to the judges when the pilot is starting the sequence. A visual signal is mandatory to initiate the attempt. If there is no visual signal made the pilot becomes subject to the other standard constraints stipulated in these rules, e.g., time limit for starting, no aerobatics before starting the sequence, etc. Once the attempt is made by means of the visual signal, judging will begin as soon as the aircraft departs from the wings-level horizontal entry line and enters the first figure of the sequence. The horizontal entry line to the first figure of a sequence is not judged.

5.10.6. **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 (e.g. 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 sequence being flown and judged, but only the affected figure and the unscored figures that follow will be tabulated. This reflight should occur on the first flight after the judges' break or last in the round, in front of the same set of judges, 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.

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5.10.7. **Definition of an Official Flight**

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

5.10.8. **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 propulsion device. One person, either a helper, or the team manager, or the caller, must place the model aircraft for take-off and keeps the model aircraft restrained before take-off.

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 or an umbrella as protection from the rain. These protection devices must not interfere with the judges' vision of the figures. 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 competition. 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.

5.10.9. **Aerobatic airspace**

a) X-Axis and Y-Axis:

The X-Axis is the main flight axis, parallel to the flight line. The Y-Axis is perpendicular to the X-Axis (flight line).

Depending on local airfield conditions, the organisers shall define an X-Axis of flight line so that the sun does not interfere with competitors or judges.

The X-axis can only be changed between rounds of flights and not during a round.

b) Safety line:

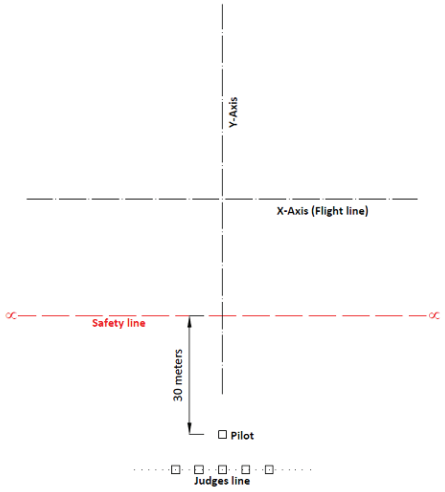
From the competitor's position, the "safety line" is located 30 metres ahead of the pilot point. This line delimits the "no-fly" zone for safety reasons and the aircraft must at all times remain on the side of the safety line away from the contestants, pits and spectators. The safety line extends to infinity. The judges shall zero (0) any figures where the aircraft completely or partially crosses the safety line. For repeated safety line violations by a competitor during a flight, the contest director may ground the flight in progress and zero the round. If a competitor repeatedly violates the safety line, the contest director may disqualify the competitor.

If there is no natural barrier or demarcation at or beyond 30 m that can be used to clearly mark the safety line, the contest director must set up clearly visible markers at the safety line distance for the judges to use in enforcing deadline observance.

Audible and visual signals to indicate violations of the aerobatic airspace are not to be employed.

c) Judges position:

The judges shall be seated on a line parallel to the X-Axis behind the competitor's position.



5.10.10. **Marking**

a) Each judge has to assess each figure and any other relevant action of the competitor individually and independently from the other judges.

b) Take-off and landing procedures are not judged and are not scored.

c) 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.

d) Each figure is scored with a mark on a scale of 10 to 0. Half (0.5) points may be used in judging. Points are deducted for imperfections following the criteria for judging as per the *Large R/C Aerobatic Power Aircraft Official Judging Guide*.

e) Figures must be performed where they can be seen clearly by the judges. If a judge, for some reason outside the control of the competitor, is not able to follow the model aircraft through the entire figure, the Judge will give a mark of "Average" or "A" to that figure. In this case, the judge's mark for that particular manoeuvre will be the average of the numerical marks given by the other judges.

f) If a judge misses seeing a figure, or any part of a figure such that a grade cannot be given with full confidence, the Judge will give a mark of "Average" or "A" to that figure.

g) If all the judges give an "A" mark to a figure, then the pilot is allowed to refly this figure. This reflight should occur on the first flight after the judges' break or last in the round, in front of the same set of judges. The result of the reflight will be final.

h) Any figures not completed, or flown out of sequence with the stated schedule shall be scored zero (0). Zero scores do not need to be unanimous, except in the case where an entirely wrong figure was performed. Judges must confer after the flight in this case, bringing it to the attention of the flight line director/contest director on site.

i) Degree of difficulty factor (K-factor) values shall be assigned to individual figures based upon the current Aresti Aerobatic Catalogue located on the Aresti website. When calculating contestant scores, each individual figure mark shall be multiplied by its K-factor. The flight raw points score shall be the result of summing the "K-factored" (figure marks multiplied by K-factor) scores

1. Sound presentation score for Known and Unknown flights:

a) Judges will evaluate each individual flight flown in its entirety for overall sound presentation. Each judged Known and Unknown sequence, shall have one "figure" added to the end of the score sheet after individually judged figures. This figure shall be known as the Sound Score. The Sound Score will have a 30 K value.

b) The sound presentation will be scored with a mark on a scale of 10 to 0 with 10 denoting "Very Quiet," 5 denoting "normal" and 0 denoting "Very noisy." Whole mark will be used for scoring. This sound mark will then be multiplied by the 30 K value and included in the total flight raw points score for the sequence. Note that each judge's score is independent of the other(s) and no conferencing on the sound score is required.

c) If a competitor receives a sound score of three (3) or less for the round from two or more judges, the competitor and his team manager will be notified of the problem and will be requested by the Contest Director to adjust or modify the aircraft in order to reduce the sound level before the next round. If that competitor, after notification, again receives a sound score of three (3) or less for the next round from two or more judges, that pilot will be disqualified.

2. Airspace Control Score:

a) Judges will evaluate each individual sequence flown, in its entirety, for overall airspace control. Each judged Known and Unknown sequence, shall have one "figure" added to the end of the score sheet, after individually judged figures. This figure shall be known as the Airspace Control Score and will be assigned by each judge. The Airspace Control Score will have a 15 K value.

b) The airspace control will be scored with a mark on a scale of 10 to 0. Whole marks will be used for scoring. This mark will then be multiplied by the 15 K value and included in the total flight raw points score for the sequence.

c) The following standard will be used for assessing the pilot's performance in maintaining control and awareness of the aerobatic airspace and for placing figures in the airspace in a manner that allows the figures to be optimally judged.

d) The highest standard for Airspace Control will be the pilot that exhibits a significant ability to control the location of the aircraft inside the airspace, relative to the judges, which results in a tight footprint and has the aircraft such that it can be optimally judged at all times. The pilot that exhibits excellent airspace control should receive a mark ten (10).

e) The lowest standard for Airspace Control will be the pilot that exhibits a poor ability to control the location of the aircraft inside the airspace, relative to the judges, which results in an excessively large footprint and has the aircraft consistently so far away as to be difficult to properly judge. The pilot that exhibits very poor airspace control should receive a mark zero (0). Pilots exhibiting airspace control within the range of these two standards will be graded with a range of possible marks from ten (10) to zero (0) in whole point increments.

2. Sequence break penalty:

When a break in Sequence occurs, a break penalty of 100 points must be assessed against the competitor‘s raw points score prior to normalizing.

3. Score publishing:

The individual figure mark given by each judge for each competitor must be made public at the end of each round of competition. The team manager must be afforded the opportunity to check that the marks 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.

5.10.11. **Classification**

a) Each flight shall be normalized to a standard 1000 points. The pilot with the highest raw points score receives 1000 points for the flight. Each pilot thereafter shall have their raw points score divided by the high raw points score giving a percentage of that high raw score, which is then multiplied by 1000 to get the normalized score. Scores shall be rounded to two (2) places of decimal accuracy.

b) For example: Contestant A wins the flight with a raw score of 4850 points. Contest B is second with 4766.5 points. Contestant A receives 1000 points for the flight. Contestant B's score is 982.78 points (4766.5 divided by 4850 = 0.982783 * 1000 for 982.783, which rounded to two (2) places of decimal accuracy for a final score of 982.78).

c) Final classification will be done considering the sum of the scores of the three normalized flights: known, unknown, and freestyle multiplied by the following coefficients:

Known 40%

Unknown 40%

Freestyle.....20%

d) In the case where more than one flight of each round have been completed, the sum of the best known flight, the best unknown flight, and the best freestyle flight normalized scores will be considered.

Example: One flight known, two flights unknown, and one free-style flight have been completed: Classification is done by adding the known normalized flight score and the best score of the two unknown normalized flights scores and the freestyle normalized flight score.

e) The highest combined scores will determine the winner. In case of ties, all the normalized flights of the contestant shall be used to determine the winner.

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5.10.11.1 For World and Continental championships:

a) Preliminary: Each competitor will have 6 preliminary flights.

(2) Flights of 1 known sequence

(2) Flights of 1 unknown sequence

(2) Flights of a 4 minutes freestyle schedule of the competitor's choice

b) The sum of the best known flight, the best unknown flight, and the best freestyle flight normalized scores will be considered to determine the preliminary ranking.

c) The top ten pilots are qualified for the final.

d) In the event of adverse weather conditions where no further flying is possible, the preliminary classification may be determined by the sum of the best flights completed.

e) Final: Each of the ten competitors will have 6 final flights.

(2) Flights of 1 known sequence

(2) Flights of 1 unknown sequence

(2) Flights of a 4 minutes freestyle schedule of the competitor's choice

f) The sum of the best final known flight, the best final unknown flight, and the final best freestyle flight normalized scores will be considered to determine the final ranking.

g) In the event of adverse weather conditions where no further flying is possible, the final classification may be determined by the sum of the best flights completed.

5.10.11.2 Team classification:

a) The team classification 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.

b) Note: Final flights to determine the individual winner are usually only required for World and Continental Championships. For open international events, national championships, and domestic competitions, In the case where more than one flight of each round have been completed, the sum of the best known flight, the best unknown flight, and the best freestyle flight normalized scores may be used to determine the individual winner and team placing.

5.10.12. **Judging**

a) For open international events and World or Continental Championship with 30 or fewer competitors, the organiser must appoint a minimum of 1 panel of 5 judges. The judges in a panel must be of different nationalities and must be selected from the applicable list of current or upcoming approved FAI Aerobatic International Judges. Those selected must reflect the approximate geographical distribution of pilots participating.

b) For domestic's competition, the organiser may appoint 1 panel of minimum 3 judges.

c) The highest and lowest marks for each figure must be discarded, but only when the panel is of four or more judges.

d) For World and Continental Championship with more than 30 competitors, the organiser must appoint 2 panels of 5 judges (a total of ten judges). The judges in a panel must be of different nationalities and must be selected from the applicable list of current or upcoming approved FAI Aerobatic International Judges. Those selected must reflect the approximate geographical distribution of pilots participating. Judge assignment to the 2 panels will be by random draw.

e) Panels of judges shall judge all competitors an equal number of times and all competitors shall have an equal opportunity to fly before all judges. Substitution of judges, which precludes equal exposure by all contestants, shall be avoided. If adverse weather conditions preclude equal exposure for all competitors, the results of the round may be disregarded at the discretion of the Contest Director.

f) The invited judges for a World or Continental Championship, must have had a reasonable amount of F3M judging experience of known current sequence, and must submit a résumé of their judging experience to the organiser during the nomination process. The organiser must in turn submit the résumés to the CIAM Bureau for approval.

g) For the preliminary rounds of a World or Continental Championship each panel of 5 judges will judge:

(1) Flight of 1 known sequence

(1) Flight of 1 unknown sequence

(1) Flight of a 4 minutes freestyle schedule

h) The competitors will be arranged in two groups. Assignment to the two groups will be by random draw. The groups fly after one another the same round or at the same time in case of two flight lines as follows:

Rounds	Competitor Group	Panel of Judge	Flight lines
Known 1	1	1	1
	2	2	2
Unknown 1	1	1	1
	2	2	2
Freestyle 1	1	1	1
	2	2	2
Known 2	2	1	1
	1	2	2
Unknown 2	2	1	1
	1	2	2
Freestyle 2	2	1	1
	1	2	2

i) For the final rounds of a World or Continental Championship the 2 panels of 5 judges are combined in a group of ten judges.

j) For each competitor, the score from the 10 judges will be combined for a total score for the flight.

k) The 2 highest and the 2 lowest marks for each figure must be discarded.

l) Before every World or Continental Championship, there shall be a briefing for the judges, followed by training known flights by non-competitors. Also, warm-up flights for the judges should be flown by non-competitors before the first official preliminary known and unknown flight each day.

m) For the final the highest placing non-finalist should be awarded the honour of performing the warm-up of known and unknown flights. Warm-up flights should be judged but under no circumstances should they be tabulated. Any deviations from the above procedures must be stated in advance by the organisers and must have prior approval of the CIAM or the CIAM Bureau.

5.10.13. **Organisation for R/C Large Aerobatic Model Aircraft Contests**

a) Members of a National team may make use of the model aircraft processed by another member of the same national team. However, if that team member did not process the model aircraft, then it must be re-registered and re-marked appropriately. This is the responsibility of the team manager.

b) For transmitter and FM frequency control see CIAM General Rules C.16.2.

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c) The flight competitors' order of each group for the first Known flight 1 of preliminary rounds will be established by a random draw. The flight competitors order for flights two (Unknown 1), three (Free-style1), four (Known 2), five (Unknown 2) and six (Free-style 2) will start 1/6, 1/3, 1/2, 2/3 and 5/6 down the list order with decimals rounded-up.

d) The flight competitors order for the first Known flight 1 of final rounds will be established by a random draw. The flight competitors order for flights two (Unknown 1), three (Free-style1), four (Known 2), five (Unknown 2) and six (Freestyle 2) will start 1/6, 1/3, 1/2, 2/3 and 5/6 down the list order with decimals rounded-up.

e) The draw for flight order will be done for each flight line, so that FM frequencies are separated with two competitors in between. Team members will not be drawn to fly directly after each other and will be separated by at least two competitors.

f) Competitor identification numbers will only be assigned after this flight order draw, by competitor group, and in numerical ascending order.

g) During his flight the competitors must stay in the proximity of the judges and under the supervision of the Flight Line Director.

h) Competitors must be called by a flight line official at least five minutes before they are required to occupy the starting area.

i) If the FM frequency is clear the competitor or his team manager will be allowed to collect the FM transmitter from the transmitter pound. 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. If there is a FM frequency conflict, the competitor must be allowed to a radio check of a maximum of one minute before the beginning of the starting time.

j) The time keeper will audibly notify the competitor when the minute is finished and immediately begin timing the starting time.

k) For electric powered models, the electric power circuit(s) must not be physically connected, before the starting time is began and must be physically disconnected immediately after landing.

l) A competitor is allowed to a two (2) minutes of propulsion device starting time. The timing starts when the contest director, or timekeeper, gives an instruction to the competitor to start.

m) The competitor may not start his propulsion device 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.

n) One person, either a helper, or the team manager, or the caller, must place the model aircraft for take-off and hold the model aircraft before taking off. If the model aircraft taxis to take off point without being held by an assistant, the contest director/time keeper will advise the competitor and helper that the flight may not proceed. The flight shall score zero point.

o) If after two (2) minutes the contestant is unable to start the propulsion device, he will move to the first flight after the judges' break or at the end of the round rotation. If the contestant fails to start a second time, he shall receive zero for the round.

p) The contestant has one (1) minute from the time the wheels leave the ground during takeoff to start the sequence.

q) The model aircraft must take-off and land unassisted, that is, no hand launched flights.

r) There shall be no time limit for sequence execution.

s) During the flight, the pilot and his helper/caller (if required) must stay in the designated position in front of the judges, at the pilot point and under the supervision of the flight line director. The pilot must wear or display his identification/start number.

t) Before to start the sequence and before landing, competitors shall only be allowed to perform the following trim and positioning manoeuvres:

- Turns.
- Half Cubans with only a single ½ roll on the 45 down line.
- Reverse Half Cubans with only a single ½ roll on the 45 up line.

-The ½ roll is optional based on aircraft positioning required starting the sequence.

- Half loops up or down (Immelman or Split S) with only one half roll on entry or exit.

-Single half roll to inverted immediately before to start the sequence for the case in which an inverted entry to the first figure is required.

-Single half roll to upright after the end of sequence for the case in which an inverted exit from the last figure is required.

- A vertical up or down line with a simple push/pull for entry and exit. A single 1/2 roll is allowed on this vertical line only if required to orient the aircraft properly for entry to the first figure.

Exceptions to this limitation may only be directed by the contest director or flight line director in the normal course of safely managing the airspace. Pilots will follow such directions and no penalty will apply.

u) Turnaround manoeuvres may not be performed at low altitude or directly in front of the judges. No other aerobatic manoeuvres are allowed immediately following the airplane breaking ground except for the Four Minute Freestyle. Any infraction shall result score zero point for the flight.

v) No public address or commentary should be made during flights.

w) The contestant has two (2) minutes between the end of the sequence and touchdown for landing, unless required to hold upon command from the appropriate official.

x) The scoring will cease at the end of sequence except for the sound presentation score, which is judged after the model aircraft has landed, irrespective of the time.

y) The flight ends when the model aircraft has landed.

z) The propulsion device must be shut-off immediately after the model aircraft has landed, otherwise the flight shall score zero points.

Execution of figures:

The figures must be executed during an uninterrupted flight in the order in which they are listed in the sequence. The competitor may make only one attempt at each scored figure during the flight.

The direction of the first manoeuvre or the landing may be different from that of the take-off.

5.10.14. **Sequences of figures**

a) The known and unknown sequences must be drawn according to the current FAI ARESTI Aerobatic catalogue.

b) The known sequences (Unlimited and Unlimited Alternate) are valid for a one year period.

They are sourced from the International Miniature Aerobatic Club (IMAC) and will be published on the CIAM website as soon as possible. They will be effective 1st January of the year.

Unlimited Alternate sequence is used when the local airfield has restricted aerobatic airspace on Y axis.

The organiser must inform the competitors before the competition which known sequence will be flown.

c) The unknown sequence must be completely new, unknown, and equal in difficulty factor to the known sequence.

d) The Unknown sequence is given to the competitors in the evening before the competition day, or on the morning of the competition day with a minimum of two (2) hours before the round, with no possibility of practice flying. In a proven case of a competitor having practised the unknown sequence with a flying model or on a computerized flight simulator, the competitor must be disqualified. Hand-held stick models are permitted.

e) Before the beginning of the round of the unknown flight, the judging co-ordinator will brief the judges and the competitors to clearly explain the figures (if needed the figures can be corrected), and what is expected from the competitors.

f) Knowledge of the Aresti cryptographic system is mandatory to all competitors and judges. No text descriptions will be given.

g) For each figure, judges and competitors must refer to the Large R/C aerobatic Power aircraft official flying and Judging Guide rules that define all manoeuvres, and the referring errors that can be avoided.

5.10.15. Unknown figure sequences for final flights

a) Unknown figures sequence shall be used in the two final flights for World or Continental Championships and shall be composed by the 10 finalists. The composition of any unknown sequence shall be completed no less than 2 hours before the commencement of finals flights for unknown sequences.

b) The composition of the unknown figure sequence is done by the 10 finalists.

c) Each finalist nominates in turn an appropriate figure from the current FAI ARESTI Aerobatic catalogue (condensed). This nomination and selection of figures may be either manual or computer-aided.

d) The order of selection will be determined following the random flight draw with the order repeating until the figure sequence is complete. The nominated and selected figures must conform to the following construction rules:

e) The entry of one figure must be matched to the exit of the previous figure, for entry altitude, entry attitude (level upright or level inverted flight) and direction of flight.

f) No duplication of figure with the same elements.

g) Spins are entered into the wind.

h) The summary of K-factors must be at least similar to the known sequence.

i) In order to achieve versatility in the design of the sequences, it is a mandatory requirement that competitors shall include the following. Sequences not including these figures will not be accepted:

Family	Figures
1	At least one figure
2	At least one figure
5	Maximum one figure
6	Not mandatory. Maximum one figure into the wind
7	At least one figure
8	At least one figure
9	Not specified

j) Once an unknown sequence has been composed and checked for correctness it must receive the final approval of the Jury and the contest director. Printed copies of forms A, B and C shall then be distributed to team managers, finalists, judges, jury members, and non- finalists who are scheduled to perform warm-up flights. A sufficient number shall be made available by the organisers for spectators.

k) Finalists may not attempt practice flights of an Unknown schedule between its composition and the finals flights either with a model aircraft or via electronic flight simulator. Evidence of such practice shall be deemed cheating and shall lead to disqualification for the championships. Hand-held stick models are permitted.

5.10.16. **Freestyle program**

a) The (4) four minutes Freestyle program give a competitor the opportunity to demonstrate his own skill and the qualities of his model aircraft. There are no rules governing the composition of the program. However, safety is of prime importance.

b) The freestyle program is freely composed by the competitor and flown in harmony to simultaneously played music of his choice. Any possible flight manoeuvres may be flown and

"show effects with enhancers" presented. It is permitted to perform different programs in conjunction with different music in each round.

c) The model aircraft flown by a competitor in the freestyle round may be different than for the known and unknown rounds. This model aircraft must be conform to the general characteristics of the F3M class.

d) The maximum duration of a freestyle flight is four (4) minutes.

e) The timing and music begins when the pilot or caller makes a visual signal indicating to the judges when the pilot is starting the program (during take-off or maximum 1 minute after take-off)

f) After the end of the four-minute period, the judges cease to consider any further manoeuvres that may have been performed. If the model aircraft is still airborne it must be landed immediately, otherwise the judges will mark a zero score for the criteria “Technicality of the manoeuvres” (K20).

g) If the pilot lands any time prior to 3 minutes 30 seconds (three and one-half minutes) the judges score is “prorated” Example: the pilot lands at the three (3) minutes time. The judges will score the contestant as through he flew four minutes. The score room will tabulate the scores normally and the pilot will receive three-fourths (75%) of the judges score for his final score. If the pilot lands any time after three and one-half minutes there is no penalty.

h) Specific circumstances that will disqualify the competitor’s flight:

A: If the model airplane touches the ground during the flight or crashes, it is a disqualification.

B: If the model airplane goes behind the deadline, it is a disqualification.

C: If the pilot performs dangerous or unsafe manoeuvres or high energy manoeuvres directed at the judges or spectators, it is a disqualification. (As determined by a majority of the judges and/or the line officer/steward).

5.10.16.1. Marking Criteria

Judging of the Freestyle program comprises three elements. Each element contains several criteria, with marks ranging from 10 to 0. Half (0.5) points may be used in judging. Each mark is multiplied by a difficulty coefficient (K-Factor).

a) Technical performance: Three criteria

Technicality of the manoeuvres: K= 20.

Complicated and technically challenging manoeuvres must be awarded higher marks, provided there is not a lack of quality in their execution. Simple and less complex manoeuvres should attract fewer marks.

Quality: K= 20.

The entire flight must be devoid of “missed” manoeuvres, and must exhibit all-round good quality. The fact that it is a freestyle schedule must not allow the performance to become sub-standard in technicality and quality. It is not intended to be a circus performance.

Diversity: K= 20

The competitor must avoid repetitive use of the same manoeuvres, and only in exceptional circumstances will repeat manoeuvres be tolerated to emphasise a particular passage in the music.

b) Artistic impression: Two criteria

Harmony with music, program choreography: K= 40

The music (choreography) has to enhance the presentation and to create a complementary atmosphere. The flight performance should be synchronised with the music and must not be a "3D-sketch" with background music. On the other hand the music must not detract from the presentation. The selected music piece(s) should contain fast-slow, soft-loud and dramatic sections. The manoeuvres should follow the music and end with it. The mood of the selected music

should be reflected in the manoeuvres and the presentation. Show effects can support this. Music pieces with little contrast, variety or tempi result in downgrades.

Enhancers: Smoke producing devices, or streamers: K=20

The use of these devices should be used to accentuate or emphasise some manoeuvres. Improper or inefficient use, even if impressive, should not result in full marks being given.

When, for example, an impressive smoke producing device is used to accentuate a manoeuvre or a dramatic section of music, 3 points mark should be given. If the smoke is used throughout the duration of the flight, only 1 point should be given.

c) Positioning: Two criteria

Setting of the manoeuvres: K= 30

The schedule must be well structured, with good placement and positioning of the manoeuvres, giving judges the best visibility of the entire performance. Marks should be deducted if, by design or by the influence of the wind, the schedule is noticeable biased to the left or to the right.

Sequence of manoeuvres: K= 30

The entire flight must retain the interest of judges, with a natural flow from start to finish, with coherent matching of manoeuvres.

5.10.16.2. Safety

a) The contest director will nominate a safety line officer/steward. This officer/steward is in charge of safety and will be located within hearing distance from the competitor. The safety steward must observe the model aircraft and the competitor's actions during a flight, and is empowered to instruct a competitor to terminate his flight and to land his model aircraft immediately if necessary during a safety conflict.

b) From the competitor's position, the "safety line" is located at 20 metres ahead of the pilot point. This line delimits the "no-fly" zone for safety reasons and the aircraft must at all time (except for take-off and landing) remain on the side of the safety line, away from the contestant, pits and spectators. The safety line extends to infinity.

c) If there is no natural barrier or demarcation at or beyond 20 m that can be used to clearly mark the safety line, the contest director must set up clearly visible markers at the safety line distance for the safety line officer/steward to use in enforcing deadline observance.