

5.10. CLASS F3M – LARGE RADIO CONTROLLED AEROBATIC POWER MODEL AIRCRAFT

5.10.1. Definition of a Large Radio Controlled Aerobatic Power Model Aircraft

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 aircraft that is able to perform aerobatics. The competitor must prove this by providing a dossier to the contest director, including a minimum of a three-view drawing and a photograph of the full-size aircraft.

5.10.2. Definition of a competition for model aircraft class F3M

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

- One task of a known schedule, valid for two years.
- One task of an unknown schedule. This unknown schedule is given to each pilot before the task, without any possibility of practising the schedule. The difficulty of this task will be equivalent to that of the known schedule.
- A freestyle schedule of the competitor's choice.

5.10.3. General Characteristics of a large R/C Aerobatic Power Model Aircraft

Minimum overall span for monoplanes	2.1 m
Minimum overall span for biplanes.....	1.8 m
Maximum flying weight without fuel.....	20 kg

Paragraph B.3.1.a) of Section 4B (Builder of Model Aircraft) is not applicable to class F3M.

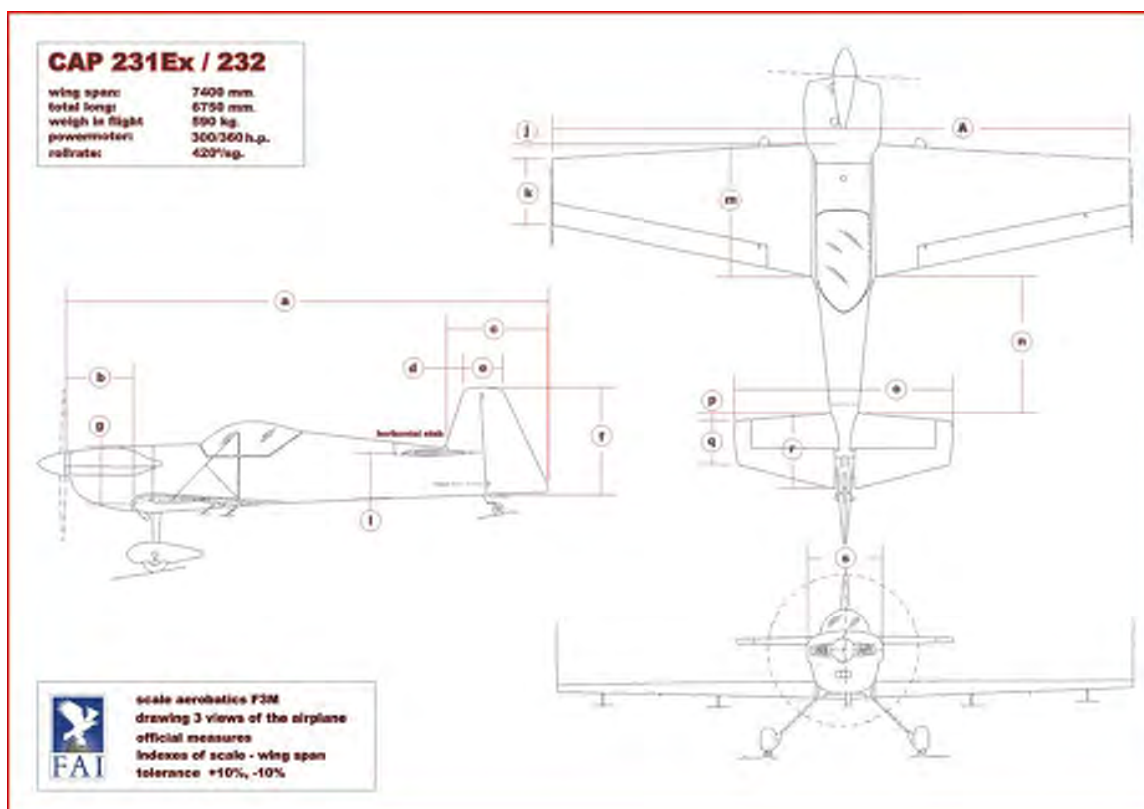
For Power device limitations, Noise rule, and Radio Equipment: See 5.1.2

The maximum noise level will be 96 dB(A) measured at 3 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. With the motor running at full power measurement will be taken 90 degrees to the flight path on the right hand side and downwind from the model aircraft. The microphone will be placed on a stand 30 cm above the ground in line with the motor. No noise reflecting objects shall be nearer than 7 m to the model aircraft or microphone. The noise measurement will be made prior to each flight. 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 94 dB(A). In the event a model aircraft fails the noise test, no indication shall be given to the pilot, and/or his team, or the judges and both the transmitter and the model aircraft shall be impounded by the flight line official immediately following the flight. No modification or adjustment to the model aircraft shall be permitted (other than refuelling). The model aircraft shall be retested by a second noise steward using a second noise meter and in the event that the model aircraft fails the retest, the score for the preceding flight shall be zero.

The flight time will be interrupted while the noise check at the flying site is being made. The competitor shall not be delayed more than 30 seconds for the noise check.

To be eligible to compete, the competitor or his helper/team manager must submit the following documentation, before the start of the competition:

- a) An accurate three-view drawing of the subject aircraft (home made drawings by the competitor or other draftsman are not acceptable).
- b) The dimensions are considered on the top view and side view of the subject aircraft.
- c) The scale of the model aircraft is calculated from the wing span.
- d) Dimensions described on the drawing overleaf can be measured. A tolerance is allowed as follows:
D is the full size measure in cm, s is scale, d is model measure in cm:
 $(D \times s) \times 0.9 - 0.5 \leq d \leq (D \times s) \times 1.1 + 0.5$



- e) The area of control surfaces compared to fixed surfaces will not be considered. Example: only the outline of the wing, stabiliser 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 perhaps in two parts, moving part of the fin for aerodynamic balance, etc. Trim tabs are forbidden, if not on the full-size aircraft.)
- f) The competitor must be able to provide any technical data for technical checking. If the dimensions are not in accordance with the rules, the model aircraft is not allowed to fly and the competitor is disqualified.

5.10.4. **Definition and number of helpers:** see 5.1.3

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

5.10.6. **Definition of an attempt:** see 5.1.5.

5.10.7. **Number of attempts:** see 5.1.6.

5.10.8. **Definition of an official flight:** see 5.1.7.

5.10.9. **Marking:**

- a) Each manoeuvre may be awarded marks, in whole number increments, between 10 and 0 by each of the judges during the flight. These marks are multiplied by a coefficient that varies with the difficulty of the manoeuvre.
- b) Any manoeuvre not completed shall be scored zero (0)
- c) Manoeuvres 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 manoeuvre, he may 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 given by the other judges.
- d) Centre manoeuvres should be performed in the centre of the manoeuvring area while turn around manoeuvres should not extend past a line 70 degrees left and right of centre. Vertical height should not exceed 70 degrees. Also, manoeuvres should be performed along a line of approximately 150m in front of the competitor. Infractions to this rule will be cause for downgrading by each judge individually and in proportion to the degree of infraction.

- e) The manoeuvring area will be clearly marked with white vertical poles, a minimum of 100mm in diameter and a minimum of 4m high, placed on centre, and at 70 degrees each side of centre on a line 150m in front of the competitor. Flags and/or streamers of contrasting colour 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 will also be used to mark the centre and extreme limits (70 degrees left and right of centre) of the manoeuvring zone. Audible and visual signals to indicate violations of the manoeuvring zone are not to be employed.
- f) The judges shall be seated no more than 10m, and not less than 7m behind the competitor's position (the apex of the 70 degree lines) and within an area described by the extension of the 70 degree lines to the rear of the competitor.
- g) At the conclusion of the flight, each judge will independently consider if the in-flight sound level of the model aircraft is too loud. If a majority of the judges consider the model aircraft too loud, the flight score will be penalised 10 points for each counting judge.
- h) If a model aircraft is in the opinion of the safety steward or the judges, unsafe or being flown in an unsafe manner, they may instruct the competitor to land the model aircraft.
- i) The scores given by each judge for each competitor shall be made public at the end of each round of competition.

5.10.10. **Classification:**

Classification will be done considering the sum of the three scores: known, unknown, and freestyle.

In the case where two flights of each schedule have been completed, the sum of the best known, the best unknown, and the best free-style scores will be considered.

In the case where three flights have been completed, only the best score of the repeated flight (known, unknown, and free-style) will be added to the single other flight score.

Example: one known, two unknowns, and a free-style have been completed: Classification is done by adding the known score and the free-style score to the best score of the two unknown flights.

The final classification is done by the sum of the three considered flight scores in each category, multiplied by the following coefficients:

Known	35%
Unknown	45%
Freestyle.....	20%

1000 points will be awarded to the competitor obtaining the highest total for his three retained flight scores. The scores are then normalised to 1000 points as described below:

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

Points_x = Points given to competitor x

S_x = Score of Competitor x

S_w = Score of Winner

The TBL statistical averaging system is not to be applied for the moment. However, as soon as possible, the organisers of competitions for this class may start to use scoring software using the TBL algorithm.

5.10.11. **Judging:**

The criteria to be applied for judging the manoeuvres in this class, are identical to class F3A. However, the judges will have to consider the dimensions and inertia of the model aircraft. The manoeuvres must be flown slower than with F3A model aircraft, but should be more realistic.

The organiser must appoint a panel of five judges. For each manoeuvre, only three scores are counted, the lowest and the highest scores being discarded.

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

For transmitters and frequency control, see section 4B, paragraph B.11.

The draw for flight order will be done for the first task (known, unknown, or freestyle). For the subsequent tasks, the flight order will start at 1/6, 1/3, 1/2, 2/3 and 5/6 down the list.

During the flight, the competitor must stay in front of the judges in the designated area and under the supervision of the Flight Line Director and safety steward.

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

If his frequency is clear, the competitor will be given his transmitter when he occupies the starting area so that he can perform a radio check. Utmost care must be taken by the competitor in the starting area, to not disturb the concentration of the competitor who may be flying.

If there is a frequency conflict the competitor must be allowed a maximum of one minute for a radio check before the start of the 3-minute starting time. The timer will notify the competitor when the minute is finished, and immediately start the 3-minute starting time.

5.10.13. **Execution of manoeuvres**

The manoeuvres must be executed during an uninterrupted flight in the order in which they are listed on the score sheet. The competitor may make only one attempt at each manoeuvre during the flight. The pilot has three minutes to start his motor, and eleven minutes to complete his flight; both the three minutes and the eleven minutes to start when the competitor is given permission to start his motor.

The model aircraft must take-off and land unassisted, that is, no hand launched flights. If any part of the model aircraft is dropped during the flight, scoring will cease at that point and the competitor must be instructed to land his model aircraft immediately.

The direction of the manoeuvres is determined by the heading of the model aircraft during the take-off.

The flight ends when the landing sequence is completed.

Scoring will cease with the expiry of the eleven-minute flight period.

After the known flying schedule has been completed, the competitor is not allowed a free pass, and the landing must follow immediately. Any free passes will result in a zero score for the landing.

The model aircraft must land in the landing area, defined by a 50 metres diameter circle, or within two lines marked on the runway and separated by 100 metres if the runway is wider than 10 metres.

The landing point is considered as the first point where the model aircraft touches the ground. Landing out of the landing area, or a crash will result in a zero score for the landing.

The landing sequence is completed when the model aircraft has run for 10m or comes to a stop within 10 metres.

5.10.14. **Schedules of manoeuvres.**

- a) The **known schedule** is valid for a two-year period.
- b) The **unknown schedule** is given to the competitors in the evening preceding the competition day, or on the morning of the competition day, with no possibility of practice flying. In a proven case of a competitor having practised the unknown schedule, the competitor must be disqualified.

This schedule must be completely new, unknown, and equal in difficulty factor to the known schedule.

For each manoeuvre, judges and competitors must refer to the F3A rules that define all manoeuvres, and errors to be avoided. The same basic criteria of judging are to be used for dimensions of manoeuvres and judging of longitudinal distance (but 70° on each side, and about 150m in distance).

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Before the beginning of the task of the unknown schedule, the judging co-ordinator will brief the judges and the competitors to clearly explain the manoeuvres, and what is expected from the competitors.

Knowledge of the Aresti cryptographic system is highly recommended to all competitors and judges.

Known and unknown schedules must use patterns according to the full size FAI Aresti catalogue.

c - Freestyle schedule:

Freestyle schedules 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 schedules. However, safety is of prime importance.

The model aircraft flown by a competitor in the freestyle task may be different from the one flown for the two other schedules, provided this model aircraft conforms to the general characteristics of the F3M class.

The maximum duration of a freestyle flight is five (5) minutes, from the take-off signal, to the landing. The competitor will be notified at one minute before the end of the five-minute period.

After the end of the five-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" (K2).

Known schedule of manoeuvres	K-Factor
1 Triangle loop with positive snap roll on upline and 4/8-point roll on 45° line.	3
2 Stall turn with one roll and 2/2-point roll opposite on upline, 1½ negative snap roll on downline and 2/2-point roll on 45° leg.	4
3 Half loop with ¼, ½, ¾ alternate rolls on enter and ¾, ½, ¼ alternate roll on exit.	4
4 Two turn negative spin, one opposite roll.	3
5 1 ¼ positive snap roll, same direction roll, opposite ¼ roll.	4
6 Pull-push-push Humpty Bump 4-point roll on upline, opposite ¼ roll and ¼ roll on downline.	3
7 Reverse Cuban eight, one negative snap roll, 2/4-point roll opposite on leg 1, 1½ roll on leg 2, 2/4-point roll and a opposite positive snap roll on leg 3.	6
8 Teardrop with 2 positive snap rolls on 45° downline, 2 linked rolls on upline.	4
9 Diamond loop, a positive opposite snap roll and roll on leg 2, opposite roll and snap roll on leg 4.	5
10 Half square loop, a roll and 1 ¼ opposite negative snap roll.	3
11 ¾ of rolling circle with 3 alternated rolls, first inside.	5
12 45° uphill leg 1½ roll, 5/8 of a loop with one integrated full roll and a roll on exit.	4

The description of the manoeuvres, including judging notes, and the Aresti diagrams are given at Annex 5L.

5.10.15. Marking criteria – Freestyle

Judging of the Freestyle task comprises five elements. Each element contains several criteria, with marks ranging from 10 to 0. Each mark is multiplied by a difficulty coefficient (K-Factor).

Originality: Three criteria:

New Manoeuvres: K= 2

The use of completely new manoeuvres, or manoeuvres not often used, or a diverse range of manoeuvres.

Enhancers. Smoke producing devices, or streamers. K=1.

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

Harmony with music: K= 3

If there is musical accompaniment, the flying and the manoeuvres should be in complete harmony with the music, and the music must not be used only as background.

Harmony and Rhythm: Two criteria

Setting of the manoeuvres: K= 2

The schedule must be well structured, with good placement and positioning of the manoeuvres, giving judges the best visibility of the entire performance. Safety is of prime importance.

Sequence of manoeuvres: K= 2.

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

Performing of the manoeuvres: Three criteria

Technicality of the manoeuvres: K= 2.

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= 2.

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= 2

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.

Safety of the flight:

Safety: The impression must be created with the judges that the competitor is in absolute control of the model aircraft. The safety of persons or equipment should never be endangered during a flying performance.

5.10.16.

Safety

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.

During the Freestyle schedule, the distance between the manoeuvring area and the competitor must be a minimum of 20m. Any manoeuvre performed at a distance closer than 20m to the competitor will score zero marks.

Near the 20m line, model aircraft should be flown either parallel to the public line, or away from it.

The manoeuvring area frame defined for known and unknown schedules is not imposed on the Freestyle schedule. However, any flying behind the competitor will attract an immediate instruction by the safety steward for the competitor to terminate his flight, and the entire flight will score zero points.

ANNEX 5L

F3M – RADIO CONTROLLED AEROBATIC MODEL AIRCRAFT

DESCRIPTION OF MANOEUVRES – KNOWN SCHEDULE

- | | |
|---|-------------------|
| <p>1. Triangle loop with positive snap roll on upline and 4/8-point. roll on 45° line</p> <p>Pull to a 90° climbing vertical line, perform a positive snap roll then pull to a 45° downline, perform half an 8-Point roll, then push to an horizontal inverted flight.</p> <p>Possible mistakes:</p> <ul style="list-style-type: none"> • The snap roll is not positive • Rotations are not in the middle of their respective lines. • Parts of the half 8-point roll are not equals. | <p>K=3</p> |
| <p>2. Stall turn with one roll and 2/2-point roll opposite on upline, 1½ negative snap roll on downline and 2/2-point roll on 45° leg</p> <p>From inverted, push to a vertical line, perform a roll and an opposite 2-point roll, slow down to perform a stall turn. In the downline, perform a 1½ negative snap roll, pull to a 45° downline, perform a 2-point roll and pull to an horizontal positive line.</p> <p>Possible mistakes:</p> <ul style="list-style-type: none"> • Rotations are not in the middle of their respective lines. • Rolls are not opposite. • Snap roll is not negative | <p>K=4</p> |
| <p>3. Half loop with ¼, ½, ¾ alternate rolls on enter and ¾, ½, ¼ alternate roll on exit</p> <p>From upright, perform a ¼ roll, then an opposite half roll, then an opposite ¾ roll. Immediately after push for a negative half loop. Immediately after, perform a ¾ roll, an opposite half roll and a ¼ opposite roll.</p> <p>Possible mistakes:</p> <ul style="list-style-type: none"> • Rolls are not opposites. • The half loop does not start or end on the centre line. • Rotations does not stop exactly on knife-edge or on horizontal flight. • The half loop is not round. | <p>K=4</p> |
| <p>4. Two turn negative spin</p> <p>From inverted, perform two consecutive inverted (negative) spins followed by an opposite roll and push to exit inverted.</p> <p>Possible mistakes:</p> <ul style="list-style-type: none"> • Entry is a snap roll : zero points. • Entry is forced. • Roll is not opposite to spin. | <p>K=3</p> |
| <p>5. 1¼ positive snap roll, same direction roll, opposite ¼ roll</p> <p>From upright, perform a 1¼ snap roll, one roll in the same direction, half a roll, and one opposite ¼ roll.</p> <p>Possible mistakes:</p> <ul style="list-style-type: none"> • The figure is not centred. • Rotations does not stop exactly on knife-edge or on horizontal flight. | <p>K=4</p> |
| <p>6. Pull-Push-Push Humpty Bump 4-point roll on upline, opposite ¼ roll and ¼ roll on downline</p> <p>From upright, pull to a vertical line, perform a 4-point roll, push half a loop to a vertical line, perform ¼ roll and ¼ opposite roll, then push to inverted flight.</p> <p>Possible mistakes:</p> <ul style="list-style-type: none"> • Rotations are not in the middle of their respective lines. • The two ¼ rolls are not opposite. | <p>K=3</p> |

- 7. Reverse Cuban eight, one negative snap roll, 2/4-point roll opposite on leg 1, 1½ roll on leg 2, 2/4-point roll and a opposite positive snap roll on leg 3** **K = 6**
- From inverted perform an inverted Cuban eight. On the first 45°, perform a negative snap roll followed by an opposite 2/4-point roll, one and a half roll on the second 45° line and a 2/4-point roll followed by an opposite positive snap roll on the third 45° line. Exit upright on high level.
- Possible mistakes:**
- The two ¾ loop are not the same radius.
 - The two ¾ loop are not round.
 - Rotations are not in the middle of their respective lines.
 - Rotations are not in opposite directions.
- 8. Teardrop with 2 positive snap rolls on 45° downline, 2 linked rolls on upline** **K=4**
- From upright, push to a 45° downline, perform 2 positive snap rolls, push 5/8 of loop to a vertical line, perform 2 full rolls, push to an inverted flight on high level.
- Possible mistakes:**
- Rotations are not in the middle of their respective lines.
- 9. Diamond loop, a positive opposite snap roll and roll on leg 2, opposite roll and snap roll on leg 4** **K = 5**
- From negative, perform an inverted square loop on corner. On the second leg, perform a positive snap roll followed by an opposite roll. On the third leg, perform a roll and an opposite snap roll. Exit inverted.
- Possible mistakes:**
- Rotations are not in the middle of their respective lines.
 - Rolls and snaps are not opposite.
- 10. Half square loop, a roll and 1 ¼ opposite negative snap roll** **K= 3**
- From inverted, pull to a vertical line, perform a full roll and 1¼ opposite negative snap roll, then push to an inverted flight.
- Possible mistakes:**
- Rotations are not in the middle of their respective lines.
 - Roll and snap are not opposite.
- 11. ¾ of rolling circle with 3 alternated rolls, first inside** **K=5**
- From inverted, perform ¾ of a rolling circle (away from, or towards the runway), with three rolls in opposite directions. The first roll is to the inside of the circle. Exit inverted.
- Possible mistakes:**
- Roll rate must be constant and continuous.
 - Roll reversal must be immediate.
 - Circle must be of constant radius and wind corrected.
- Manoeuvre must be downgraded if the circle is too large, and too far out. If the competitor chooses to perform the circle towards the runway, the manoeuvre must be downgraded if any portion of the circle is outside of the manoeuvring zone.
- 12. 45° uphill leg 1½ roll, 5/8 of a loop with one integrated full roll and a roll on exit** **K=4**
- From inverted, push to a 45° line, perform 1½ roll, then 5/8 of a loop with an integrated roll on its top, finally a full roll on exit.
- Possible mistakes:**
- The roll is not integrated.
 - The exit roll is not performed immediately after the loop.

The Aresti diagrams appear overleaf.

F3M KNOWN SCHEDULE OF MANOEUVRES 2012-1013

