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

Introduction

Large R/C aerobatic power model aircraft F3M is a competition class inspired by CIVA Unlimited full scale aerobatics from the F.A.I.

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 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 Large Radio Controlled Aerobatic Power Model 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 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 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 utilizing an internal combustion engine, only one engine is allowed. If the aircraft is utilizing 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) Paragraph B.3.1.a) of Section 4B (Builder of Model aircraft) is not applicable to F3M class.

f) 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 Volume ABR B.11.2). Auto-pilot control utilizing 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 stabilization 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.

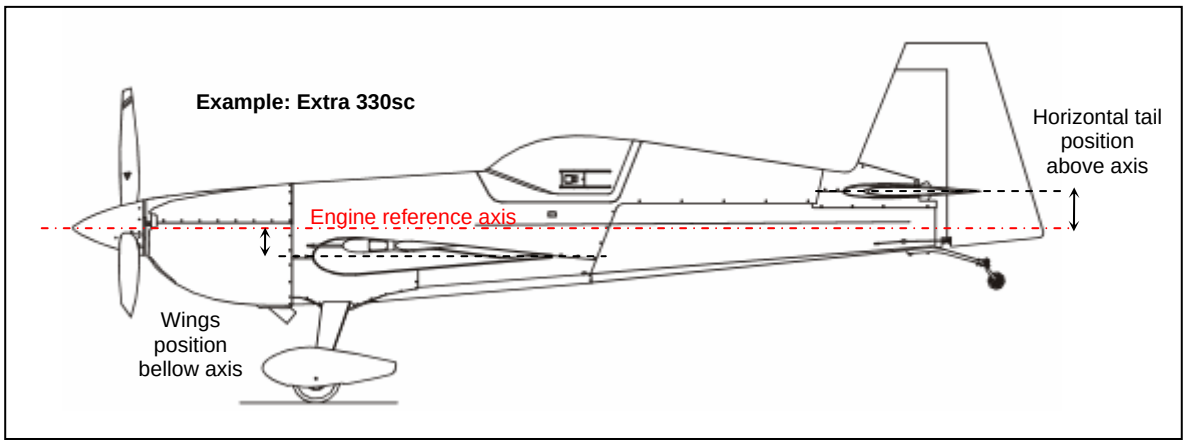
b) The model shall be judged for likeness at a distance of approximately 3 meters.

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 bellow.



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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).

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 practicing 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 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.

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 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 organizer 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 organizers 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 meters ahead of the pilot point. This line delimits the "no-fly" zone for safety reasons and the aircraft must at all time remain on the side of the safety line away from the contestant, 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.

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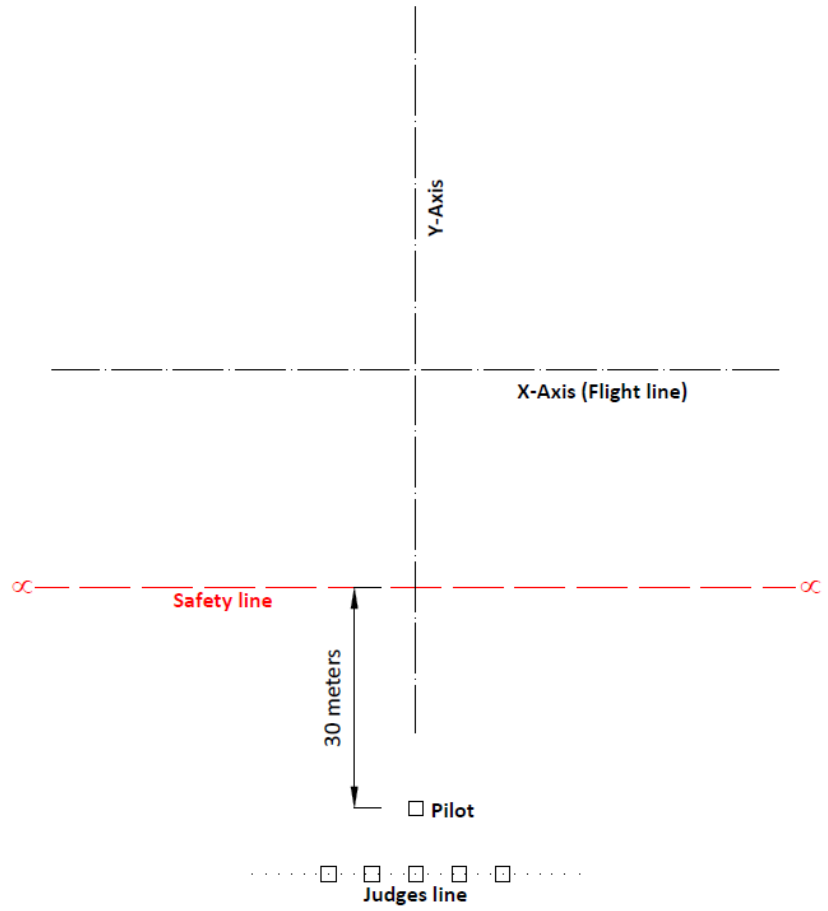
If there is no natural barrier or demarcation at or beyond 30 m that can be used to clearly mark the safety line, the contest director must set up clearly visible markers at the safety line distance for the judges to use in enforcing deadline observance.

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 criterions 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.

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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 reflight 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 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 mark 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 accessing the pilot’s performance in maintaining control and awareness of the aerobatic airspace and placing figures in the airspace in a manner that allow the figures to be optimally judges.

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).

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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 three normalized flights scores: 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 unknowns, 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 unknowns normalized flights score 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.

5.10.111. For World and Continental championships:

a) Preliminary: Each competitor will have preliminary 6 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

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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.

5.10.112. 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 will 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 organizer 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 a current list of FAI aerobatic International Judges. Those selected must reflect the approximate geographical distribution of pilots participating.

b) For domestic's competition, the organizer 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 organizer 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 a current list of 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.

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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 be selected from the current list of FAI International Judges and must have had a reasonable amount of F3M judging experience of known current sequence, and must submit a résumé of his 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 an other the same round or at the same time in case of two flight lines as follow:

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.

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5.10.13. Organization for Large R/C 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 Volume ABR Section 4B, paragraph B.11.

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 competitor 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.

<u>Execution of figures:</u>

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 sequence is valid for a one year period.

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.

h) The known sequences with form A: Score sheet, B and C: Wind directions are given at Annex 5L.

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:

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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 organizers 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.

cont/…

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).

5.10.161. 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 complimentary 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.

5.10.162. 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 meters 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.

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ANNEX 5C

F3M LARGE R/C AEROBATIC POWER AIRCRAFT OFFICIAL FLYING AND JUDGING GUIDE

5C.1. Purpose:
The purpose of this Large R/C aerobatic power aircraft flying and judging Guide is to provide an accurate description of each type of figure used in competition and to provide a reference for use in developing a uniformly high standard of judging in all CIAM sanctioned contests. Study of this guide by the competitor will help him or her learn exactly what is expected, while study by the judges will help them decide precisely how well the competitor meets these expectations.

Flying and judging are very similar in nature. This is why contestant judging is generally promoted. Nevertheless, there are some key differences between judges and pilots, mostly related to Mental Attitude and Technical Knowledge. Reference to any gender in this document shall include both male and female.

5C.2. Mental attitude: Mental attitude by itself can be divided into four (4) sub-categories:

5C.21. Bias: Bias can either be conscious or unconscious. The conscious bias is fortunately rare, and would be for instance when a judge deliberately awards a score lower or higher than the competitor deserves. The word for that action is cheating and it shall not be tolerated. Conscious bias can also occur because a friendship or regional relationship with the competitor. Most problems with bias are of the unconscious or unintentional type since they are more prevalent. A good example would be the 'halo' or recognition for a champion or well-known flyer who might unintentionally be awarded extra points based on recognition alone. This can work against an unknown flyer having a great day. This type of bias can also work against the champion flyer, just because the judge unconsciously might want to see a new face in the winner's circle. Another example might be bias towards a certain type of airplane like mono versus biplane, or bias towards a style of flying.

For instance, a pilot cuts crisp corners on square manoeuvre versus a flyer with a more graceful style. Sometimes we even see an equipment bias where a judge may unknowingly try to support a previous personal opinion regarding a certain brand of radio, certain type of engine, or size of aircraft. These unconscious biases are easily understood as we all have personal preferences. Nevertheless, the judge must try hard to base his or her score solely on the quality of the flight, and nothing more.

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5C.22. Self-confidence: The self-confidence factor is based on knowledge instead of arrogance or ego. A judge with self-confidence can score a pilot fairly, whether he is a World Champion or not. A judge with self-confidence will not be uncomfortable in giving a wide range of scores in a single sequence. Scores as low as 2 or 4, or as high as 9 or 10 will not be uncommon.

5C.23. Sense of independence: A judge doesn't operate in a glass cage but shares the flight line with another judge and scribes. The judge cannot allow himself or herself to be influenced by more dominant or experienced personalities sitting nearby. Judging is an independent exercise and caution should be exercised not to influence or be influenced by others on the flight line. If scribes are used, scores should be communicated using a low tone voice so that the other judge and the pilot cannot hear and be influenced by it.

5C.23. Adherence to the rules: Adherence to the rules is probably the most significant of all the elements required to make a good judge. A good judge has developed a sense of fair playing and knows that a good contest is one in which everyone plays by the same rules. Anyone sitting in a judging chair must adhere to the rules existing at that time or disqualify him or herself.

5C.3. Technical knowledge:
Technical knowledge employs the use of an organized system of downgrading as well as the need to be consistent and accurate. The downgrading or deficit grading system assumes that the contestant is going to fly a perfect figure that starts with a 10, and then downgrades it based on the mistakes observed as they occur, rather than falling into the trap of scoring on overall impression. It should be assumed by a judge that a contestant is going to fly a well-formed figure, so he should start with the grade of 10. As he watches the figure, he then begins to find fault with what he sees and starts downgrading as it progresses. This system is preferable to waiting until the figure is finished, and tries to assign a grade on overall impression. The latter can be erratic and inconsistent, and also confines grading into a too narrow range. However, as a final check, the score should be consistent with the figure's overall quality.

Every judge should strive for a high degree of consistency and accuracy. The most important aspect of consistent judging is for each judge to establish his or her standard and then maintain that standard throughout the contest.

5C.4. FAI ARESTI System (condensed)

The F3M Large R/C aerobatic power aircraft aerobatics sequences are based on a catalogue of figures adopted by the FAI (Fédération Aéronautique Internationale), from the "ARESTI Aerobatic Catalogue (Condensed)" for full scale aerobatics. The catalogue consists of the following nine (9) families of figures:

Family 1 – Lines and Angles
Family 2 – Turns and Rolling Turns
Family 3 – Combinations of Lines
Family 4 – (Not in Use)
Family 5 – Stall Turns (Hammerheads)
Family 6 – Tail Slides
Family 7 – Loops and Eights
Family 8 – Combinations of lines, Angles, and Loops
Family 9 – Rolls and Spins

It is beyond the scope of this Flying and Judging Guide to explain in detail the structure of the ARESTI catalogue, and how to read the ARESTI drawing language used. A good judge (as well as a pilot) must become very familiar with the above and should be able to quickly understand the figure simply by looking at the ARESTI drawing. The complete catalogue of figures is available directly from the ARESTI Web site at (http://www.arestisystem.com). Judges and pilots are strongly encouraged to download this document for personal reference.

5C.41. Rules: Large R/C aerobatic power model aircraft class F3M has several rules that differ from either Full Scale Aerobatics (CIVA) or class F3A. Because the judging pool used in F3M contests sometimes comes from both or either of those two groups, it is useful to go through the major differences:

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Rules	CIVA Powered Aircraft	F3M / AMA RC SCALE AEROBATICS	F3A
Downgrade one (1) point for each deviation of:	5 degrees	10 degrees (1/2 point for 5°)	15 degrees (1 point for 15°)
Judging criteria:	Aircraft attitude and Flight path	Flight path	Flight path

5C.42. Definitions:
There are some words and phrases which are used consistently throughout the text in a very precise sense, and it is as well to define at the start the sense in which each is used:

Figure: Each individual component of a sequence, which may comprise one or more manoeuvres in combination; it starts and ends with a horizontal line.

Manoeuvre: Any one of the basic aerobatic movements, which may be combined to make a figure (e.g. an avalanche is one figure consisting of two manoeuvres -- loop and flick roll)

Mark/Point/Score: Marks are assigned (from 0 to 10) by judges, and may be devalued by various point values. The score is calculated by multiplying the judges' marks by the coefficients (K factors) and adding the products.

5C.5. Flight Path, Aircraft Attitude, and Wind Correction:

Large R/C aerobatic power model aircraft requires all figures within the sequence to be wind corrected.

Judges should evaluate any figure focusing primarily on the aircraft flight path, but at the same time, also downgrade for any variation of the aircraft attitude that is not directly related to maintaining a correct flight path.

5C.51. Flight path. Think of the aircraft condensed into a single dot and watch the path this dot takes through the sky. This is the flight path, or track, or the aircraft's centre of gravity. Judging the flight path consists of comparing the observed path with fixed references such as the horizon, or the X and Y-axis of the aerobatic airspace.

5C.52. Attitude. The aircraft attitude is defined as the position of the aircraft in the sky, and is characterized by the variations it has on the yaw, pitch, and roll axis. In a "no-wind" and normal speed condition, the aircraft's attitude (its heading) will generally point in the same direction as the flight path. In case of a cross wind, the aircraft attitude must vary (on the yaw axis) in order to maintain a constant and straight flight path, as required by the Large R/C aerobatic power model aircraft rules (Fig. 2).

Also, a reduction in speed will force the aircraft to change its pitch in order to maintain the correct flight path (Fig. 3).

Depending the type of aircraft (low wing, high wing, etc.), the flight attitude might be different from one to another to maintain the correct flight path. Judges should disregard this difference in attitude and only concentrate on the flight path described by the aircraft.

5C.53. Wind correction. When judging a manoeuvre, understanding what constitutes wind correction, and what is not, is one of the toughest challenges. The general rule is that judges should ignore any aircraft change of attitude required to maintain a correct flight path. At the same time, the usual 0.5 point deduction per 5 degrees of deviation shall be applied to anything that is not related with wind correcting. For instance, when the wind is blowing parallel to the flight path, the pilot flying a vertical line might use its elevator to change the aircraft's attitude in order to maintain a straight vertical flight path (Fig. 4).

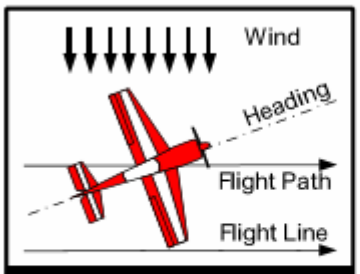


Fig. 2

Cross winds will force the aircraft to 'crab' or change its attitude in order to maintain a flight path parralel to the flight line.

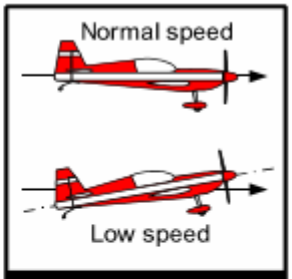


Fig. 3

At normal speed, the attitude is similar to the flight path. When the speed is reduced, the attitude may change to maintain a constant flight path.

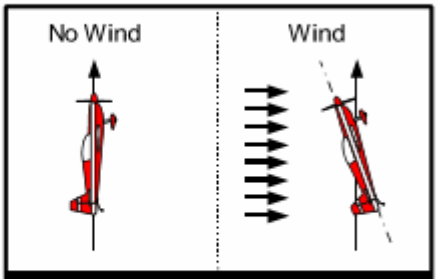


Fig. 4

For a vertical line with a wind parallel to the flight line, the aircraft attitude must be angled in order to maintain a constant flight path.

This change of attitude should not be downgraded. On the other hand, any bank angle of the wing in the roll axis should be downgraded using the standard rule of 0.5 point deduction per 5 degrees (Fig. 5). The judges should only downgrade for induced pilot corrections and disregard any sudden attitude changes due to wind bumps. Always give the competitor the benefit of the doubt when not sure.

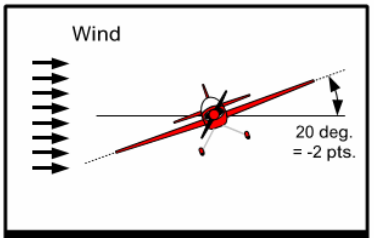


Fig. 5

In a cross wind situation, only the yaw axis is to be used for wind correction. Any change in the roll axis should not be considered wind

The only manoeuvres that are not to be wind corrected are the ones involving a stalled condition, such as a Stall Turn (otherwise known as “Hammerhead”), Tail Slide, spin and snap roll(s) (otherwise known as a “flick roll”). During the period of time that the aircraft is in a stalled, or near stalled condition, any wind drift should be disregarded by the judges and not downgraded.

Wind correction should be used throughout the aerobatic airspace. Any drift observed on any line (horizontal, 45 degrees or vertical) should be downgraded using the 0.5 point deduction per 5 degrees rule (Fig. 6).

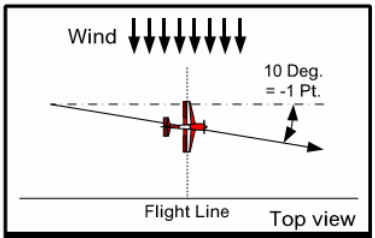


Fig. 6

For instance, in the case of a Stall Turn performed with a severe crosswind, the vertical line will start directly after the ¼ loop. This is the first point of reference to be used for the upline. The flight path on the way up is 15 degrees off compared to the perfect vertical up line; the downgrade should then be 1.5 points. When the aircraft starts its Stall Turn, it is in a stalled condition and no downgrade should be applied for wind drift during that time. Once the rotation is complete, a new reference point should be established for the perfect vertical downline. If the flight path on the downline is 20 degrees off, the downgrade should then be 2 points (Fig. 7).

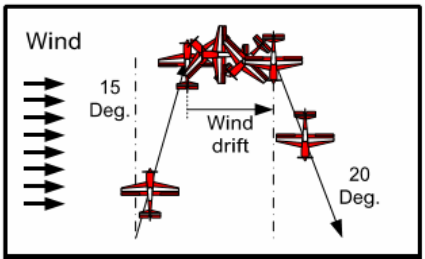


Fig. 7

In the case of a cross wind hammerhead, the above maneuver should not receive more than a 6.5 score (no downgrade for wind drift while stalled).

The competitor is required to make the shape of all manoeuvres perfect regardless of the wind conditions.
Loops and partial loops must be round, vertical lines must be perpendicular to the horizon and horizontal line parallel to the X or Y-axis. For 45-degree lines, judges must make an allowance for the aircraft’s position relative to their own.

A true 45 degree line flown at the end of the aerobatic airspace will appear steeper when flown towards the end of the airspace and shallow when flown towards the center. Judging is of the true line flown and judges should not downgrade the manoeuvre for visual deformation due to the angle it is observed. Always give the competitor the benefit of the doubt when not sure.

5C.54. Grading of Figures: The judges will independently assess the quality of each figure and its components as performed in the sequences, grading with numbers from ten (10) to zero (0) in increments of one-half (0.5) point. A grade of ten (10) represents a perfect figure in which the judge saw no deviations from prescribed criteria.

Remember, it is the judge's job to find fault: be a nitpicker. On the other hand, give a grade of 10 if you see a perfect figure—but if you are really being critical, you won't see too many. Don't get in a rut. Guard against confining your grades in too narrow a range. If you watch carefully and grade consistently, you will find yourself giving an occasional 2, 3, or 4 on some sloppy figures that are not quite bad enough for a zero. You will also be giving an occasional 9 or 10 for the superlative figure which you can find little or no fault.

As a judge, you are expected to grade only against one standard, and that is perfection. The performance of the aircraft, the difficulty in performing a figure (on the basis of your personal experience or perception), the weather condition or the pilot's name and reputation should not be considered in formulating your grade.

5C.6. Grading Principles

5C.6.1. General principles.
When grading the quality of the performance of individual figures, judges should consider the following general principles:

a: The geometry of the figures (including the shape, radii, angles, flight path, direction of flight, heading and bank angle) must comply with the prescribed criteria.

b: The precision of the performance compared to the criteria as explained later in this guide.

c: The smoothness of the performance

d: The distinctly recognizable start and finish of each figure with a horizontal line.

e: The figure must be the one depicted on the flimsy (Form B or C) appropriate to the direction of the flight chosen by the pilot to perform and flown in its proper order within the sequence. For figures with a Y-axis component, it is the pilot's discretion, in addition to fly inbound or out bound, as to which direction to fly the turn, left or right. For Family 9, Rotational Elements it is the pilot's discretions to which direction to perform the roll or first roll, if it is unlinked roll combination. In all cases, the figure flown must have the entry and exit direction as depicted on the flimsy appropriate to the direction of flight chosen by the pilot to perform (Form B or C) in the X-axis.

f: The grading criteria of each component will apply in a combination figure so that one overall grade for the figure will result.

g: The length of the lines and the size of the radii caused by the flying characteristics of an aircraft are not to be taken into account in the grading.

h: Negative figures are graded by the same criteria as positive figures.

i: Speed of aircraft is not a criterion. A reduction of grade will be applied for each deviation from the prescribed criteria for the figure. The grade will be reduced by 0.5 points for each 5 degrees of deviation.

5C.6.2: Beginning and ending of a figure. The first figure of a sequence begins at the moment the aircraft departs from its wings-level, horizontal flight path.

A figure is complete at the moment the aircraft returns to a wings-level, horizontal flight path of one fuselage plane length. The only exception to this are the exit lines in the "ARESTI Aerobatic Catalogue (Condensed)", Families 7.4.3 and 7.4.4 (Square Loops) and 7.4.6 (Octagon Loops). Once a horizontal flight path of one fuselage plane length is established at the end of a figure, the beginning of the next figure is deemed to have occurred (Fig. 8). If an aircraft does not return to wings- level, horizontal flight before commencing the next figures the one (1) point per figure deduction will be applied. Ref. Rule 5C.7. If the competitor corrects any errors in exit flight path, bank

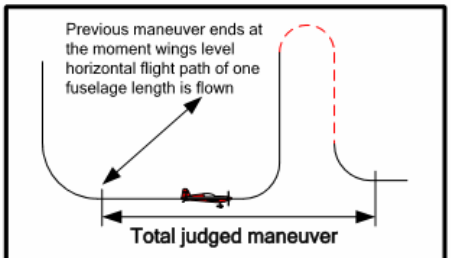


Fig. 8

The horizontal line prior the maneuver to be judged is also part of this maneuver, and therefore subject to the same downgrades as any other lines.

angle, or heading before initiating the subsequent figure, only the first figure shall be downgraded. Failure to correct such errors shall result in a downgrade to both figures.

5C.6.3: Zero. A zero will be given for:

a: Omitting a figure in the program. In this case, only the omitted figure will be zeroed. For instance, if the pilot omits the center figure and flies straight to do the next figure, only the center figure will receive a zero and the next figure will be scored normally.

b: Flying a figure that deviates from the ARESTI drawing held by the judges for scoring purposes. For instance, if the pilot flies a Humpty Bump instead of a Stall Turn, the figure will be marked zero (0).

c: Adding a figure to a program will zero the next following correct figure except when it is necessary to perform a Corrective Manoeuvre (c.1) due to the previous figure not being completed as per the program. A zero will be given to the figure immediately following any other added figure, even if the following figure is performed correctly.

c.1: A Corrective Manoeuvre can only be a turn of 270 degrees or less, and /or a roll of 180 degrees or less. In this case, a break penalty will be assessed against the competitor's raw score prior to normalizing.

For instance:

1: If the exit of a figure is done upright instead of inverted (the pilot forgot to perform a ½ roll on the downline), and corrects this by doing ½ roll after the exit, on the horizontal line, the original figure will be marked zero (0) because the ½ roll was omitted on the downline, however the following figure will be scored because this ½ roll was added only to correct the attitude of the aircraft for the beginning of that next figure. (Fig. 9). A break penalty will be applied, see **Rule 5C.6.3.c.1.**

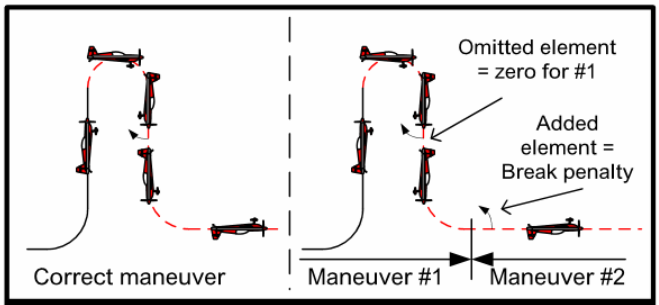


Fig. 9

If part of the maneuver is either omitted or added, all of maneuver #1 must be zeroed. The half roll performed after the end of maneuver #1 will cause a break penalty. Maneuver #2 will be judged.

2: If the pilot exits the figure in the wrong direction on the X-axis (pull instead of push at the bottom of a figure), then adds a 180 degree turn and a 180 degree roll to correct the mistake and comes back to the correct flight direction he/she will be assessed a break penalty, **see Rule 5C.6.3.c.1**. The original figure will be marked zero (0) because the exit ¼ loop was not performed per the ARESTI, and the following figure will be scored from wings level after the completion of the 180-degree turn.

Note: Corrective actions that exceed 270 degrees of turn or 180 degrees of roll constitute a Break in Sequence.

d: Break in the sequence. A break in the sequence is characterized by a total departure from the sequence to be flown. For instance, a pilot that becomes disoriented; aborts the figure and circles around a couple times before resuming the sequence again. Another example might be a pilot that aborts a figure thinking that the aircraft has equipment problems, makes a couple of fly-bys in order to confirm that everything is operating normal, and then decides to resume the sequence. A deadstick, or a landing during the sequence shall not be

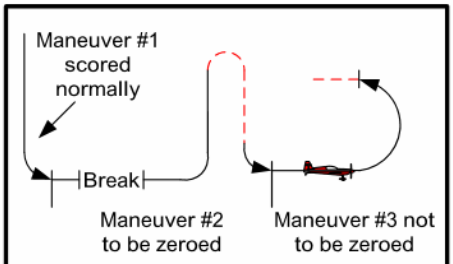


Fig. 10

A break happening at any time during a maneuver will zero the maneuver in process (#2) but not the following one (#3).

considered as a break and all remaining figures that were not flown will be marked zero (0).

When a Break in Sequence occurs, the figure in progress (at the time of the break) should be marked zero (0) and a break penalty will be assessed against the competitor‘s raw score prior to normalizing. Situations may occur where a pilot performs an incorrect manoeuvre, resulting in a zero, exits that figure improperly, and then performs a break in sequence. In this instance, the pilot receives a zero for the first failed figure, and a zero for the next figure in which the Break in Sequence occurred.

Resumption of scored flight: The pilot or the caller should visually indicate to the judges his intention to resume the sequence. He should then first establish a wing-level horizontal line, call the restart of the sequence to get the judges’ attention, perform the last flown figure that is to be marked zero (0), and continue the sequence from there on. Normal judging will resume after the completion of the marked zero (0) figure.

A break in the sequence related to safety, weather, for collision avoidance, or by request from the judges or the Contest Director will not be penalized.

e: Flying a figure in the wrong direction on the X-axis. The Y-axis is non-directional.

f: Any cumulative deviation in excess of 90 degrees in the roll, pitch or yaw axes that are not related to wind corrections.

g: Any figure or figures started and flown completely or partially on the pilot side of the deadline. The aircraft must clearly penetrate the deadline to receive a zero.

Judges should score each figure independently and not communicate with each other while judging of the sequence. Once the sequence is complete, the judges may, but are not required to, confer and review any figure receiving a zero, but need not agree on the score.

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 “AV” to that figure. In this case, the judge’s mark for that particular figure will be the average of the numerical marks given by the other judges. If all the judges give a “AV” mark to a figure, then the pilot is allowed to re flight 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.

5C.7. Basic Components of Aerobatics:

5C.7.1: Lines
All lines are judged in relation to the true horizon and the axes of the Aerobatic Airspace. Horizontal and Vertical lines are judged primarily on flight path (Ref Rule 5C.5.3 for wind correction criteria).

All figures begin and end on definite horizontal lines, and both must be present in order to earn a good grade. A competitor who rushes from one figure to another, without showing this horizontal and well-recognizable line will be downgraded by one (1) point for each missing line in each figure affected.

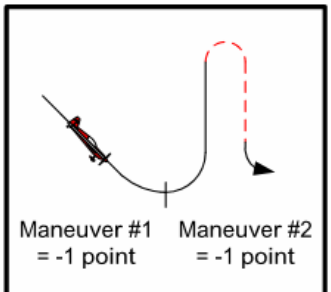


Fig. 11

No visible horizontal line between two maneuvers is a downgrade of (1) point for each maneuver.

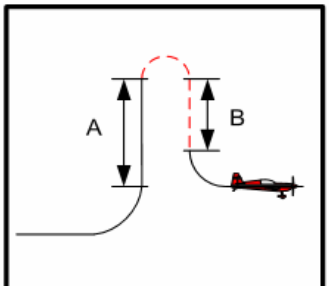


Fig. 12

Lenght of lines A & B are defined as starting on and ending with part loops.

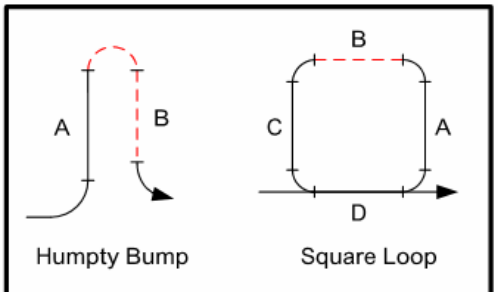


Fig. 13

Humpty: Length A does not need to equal B
Square Loop: Length A shall equal B = C = D

Therefore, leaving out the line between two figures will downgrade the preceding figure by one (1) point and the following figure also by one (1) point. (Fig. 11).

All lines that occur inside a figure have a beginning and an end that define their length. They are preceded and followed by part-loops.

With the exception of Family 3 figures (Three, Four & Eight Corners) and some figures in Family 7 (Loops and Eights), the criterion for the length of lines within a figure states that they do not have to be of equal length (Fig. 12). For example, the length of the lines in a Single Humpty-bump does not need to be equal, but all four lines in a Square Loop must be of equal length (Fig. 13).

Whenever any kind of roll is placed on an interior line, the lengths of the two parts of the line before and after the roll must be equal. Exceptions are when any type of roll follows a spin element. Judges should take care to judge the symmetry of the length of lines in a figure using only the length of the lines and not be elapsed time taken to fly each segment. This difference in length versus elapsed time is most noticeable in figures where rolls are placed on up-lines. As the aircraft loses airspeed, the time it takes to fly a line after the roll will be greater than the time required to fly the line of the same length before the roll.

If within a figure two or more lines must be of the same length, an observed variation is penalized by reducing the grade in the following manner (Fig. 14):

i- A visible variation = 1 point deduction
ii- If the lengths vary by 1:2 = 2 point deduction
iii- And so forth up to a 3 point deduction
iv- No line before or after roll, 4 point deduction.
v- No line at all before and after roll = 2 point deduction.

The basis for judging line length is the first line flown. The absence of one of these lines either before OR after a roll has to be penalized by one (1) additional point. IF there are no lines before AND after the roll, the total penalty is two (2) points only.

Example: The competitor is to fly a vertical up-line with a full roll on the line. However, the aircraft is returned to level flight immediately after the roll. The deduction is 4 points: 3 points are deducted because the lines are of vastly different length and another 1 point is deducted because of the absence of one of the lines.

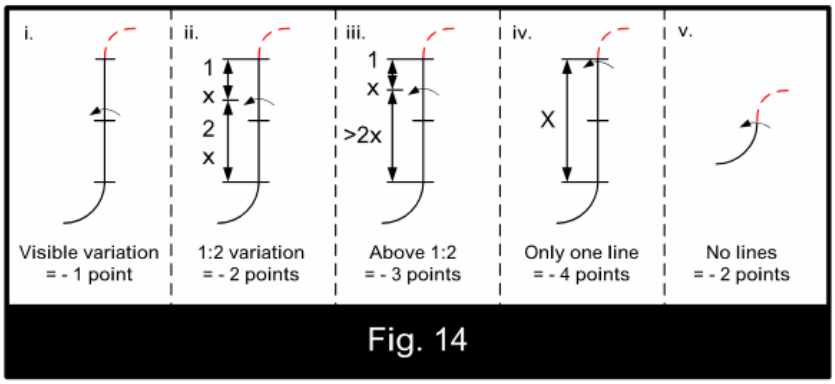


Fig. 14

5C.7.2: Loops and part-loops
The loop is a figure from Family 7, but part-loops are integral to every other family so it is necessary to discuss the loop before going on to the other families.

5C.7.2.1: General criteria
A loop must have, by definition, a constant radius. It starts and ends in a well-defined line that, for a complete loop, will be horizontal. For a part-loop however, such lines may be in any other plane of flight. As the speed changes during execution of a loop or part-loop, the angular velocity around the aircraft's lateral axis also has to change in order to keep the radius constant. When the speed decreases, for example, to half its initial rate, the angular velocity, to keep the same radius, will be reduced by half—this is a fact of physics. Thus, the angular velocity can be an aid for the judge to gauge the radius— especially when the angular velocity in the higher part-loop is seen to be faster, as this is a clear indication that the radius is smaller. This aid becomes more important when a line separates two part-

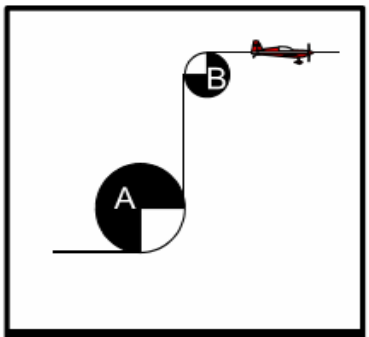


Fig. 15
A & B radii do not need to match

loops. Refer to section 5C.8.7 for specific criteria for judging loops and part loops.

5C.7.2.2: Matching Radii. Certain figures require that the part-loop portion of the figure have the same radius. When identical radii are required depends on the figure in question. This is defined by how a particular figure is depicted (drawn) in the ARESTI Aerobatic Catalogue.

5C.7.2.2a Round Corners For any figure having more than one internal part-loop depicted in the catalogue as an actual round, or looping line, element, all such part-loops must have the same radius – with an exception for all of Family 8.8 (Double Humpty Bumps). For those figures, the radius of the second half-loop is not required to match the radius of the first one.

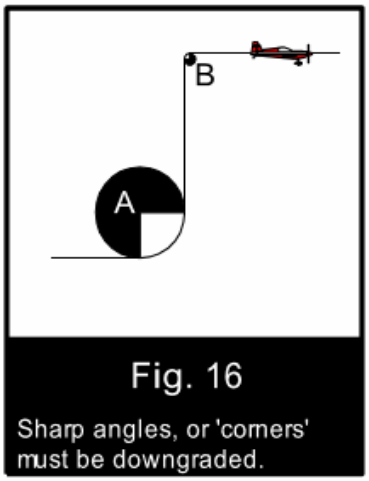


Fig. 16
Sharp angles, or 'corners' must be downgraded.

7.2.2b Corner Angles For any figure having more than one internal part-loop depicted in the catalogue with a hard, or corner, angle, no such part-loop is required to match the radius of any other part-loop depicted in the same figure – with the exception of figures which must maintain a set geometric proportion, i.e.,

a) All of Family 3 (Combination of Lines)
b) Family 7.4.3.x to 7.4.6.x (Hesitation Loops)

For example, the quarter-loop at the top of the vertical line (Family 1 figure) need not have the same size radius as the quarter-loop at the bottom (Fig. 15). However, the top radius must not be “corner” or very sharp angle (Fig. 16). It must have a smooth, distinct, and constant radius.

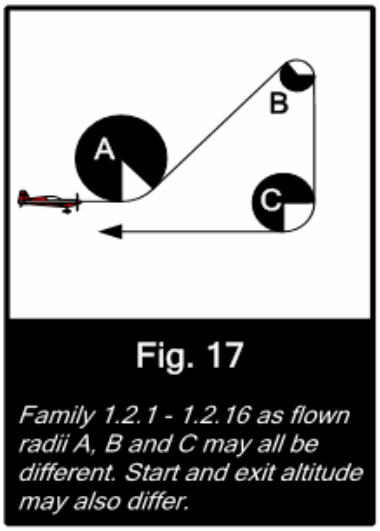


Fig. 17
Family 1.2.1 - 1.2.16 as flown radii A, B and C may all be different. Start and exit altitude may also differ.

5C.8. FAI “ARESTI Aerobatic Catalogue (Condensed)” Families:

5C.8.1: Family 1: Lines and Angles.
Family 1.1.1 to 1.1.11 has been fully covered in the preceding section. Note that the figures in Family 1.2.1 to 1.2.16 are NOT performed as drawn in the “ARESTI Aerobatic Catalogue (Condensed)”. In each of these figures there are three looping components: a one-eight loop, a three-eight loop and a quarter loop. Rolls may be performed on the 45-degree line and/or the 90-degree line, with the part line being of equal length. The initial horizontal line and the line at the end of the figure may be flown a different altitudes (Fig. 17).

5C.8.2: Family 2: Turns and Rolling Turns.

5C.8.2.1: Turns. In aerobatic competition, a turn is divided into three parts:

1: Establishing the bank using a roll on heading.
2: The turn itself.
3: A roll back to straight and level flight on heading.

Let’s look at the turn during each of these three parts. First, the roll to establish the bank. This must be a roll of between 60 and 90 degrees; it must be performed on the entry heading; and the aircraft must maintain a constant horizontal line. Once the roll is completed and the angle of bank is established, the competitor immediately performs the turn. The turn must maintain the established angle of bank throughout. The aircraft must also maintain horizontal flight. The rate of turn is constant throughout and the figure must be wind corrected so that, for instance, a 360-degree turn will be a perfect circle. It should be noted that the wind correction cannot be performed by visibly changing the bank angle.

As soon as the aircraft is on the exit heading, the competitor performs another roll at a rate equal to the entry roll. Again, the aircraft must maintain a constant horizontal line.

Downgrades:

a: The angle of bank established by the initial rolling manoeuvre must be at least 60 degrees and not greater than 90 degrees. Any less or more is a 0.5 point deduction for every 5 degrees.

b: The angle of bank, once established, must remain constant. Any deviation is a 0.5 point deduction for every 5 degrees of deviation.

c: The rate of roll must be the same for the entry and exit rolls of this figure. Any deviation is a one (1) point deduction.

d: The aircraft must maintain a constant altitude throughout the figure. Any variation would be 0.5 point deduction for every 5 degrees of change.

e: The rate of turn must remain constant. Any change would be not more than a one (1) point deduction for each change. Note that the rate of turn may appear to change in a strong wind, when it really isn't changing. The judges must always keep the wind in mind and give the pilot the benefit of the doubt if there is any question.

f: The aircraft must begin and end on the prescribed heading. Any deviation is a 0.5 point deduction for every 5 degrees of deviation.

5C.8.2.2: Rolling Turns

The rolling turn is a figure that combines a turn of a prescribed amount with a roll or rolls integrated throughout the turn. The rolls integrated into the turn may be in the same direction as the turn and are called "rolls to the inside" or may be in the opposite direction of the turn and are then called "rolls to the outside" (Fig. 18). There can also be rolls alternating in and out. The direction of these rolls, to the inside or to the outside, must be flown exactly as depicted in the ARESTI. When we say that the rolls are integrated, we are saying that in addition to there being constant rate of turn throughout the figure, there is also a constant rate of roll throughout. Naturally, the one exception to this constant roll rate is the pause when reversing roll direction. In addition, the entire manoeuvre is to be flown at a constant altitude.

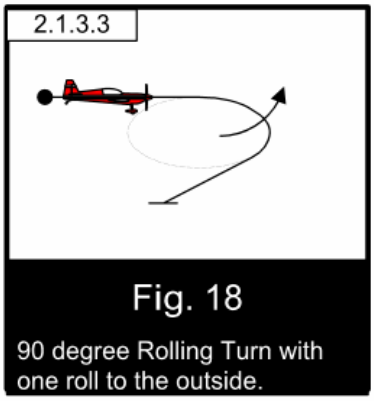


Fig. 18

90 degree Rolling Turn with one roll to the outside.

To help visualize the execution of this figure and facilitate a way for the judges to determine a constant roll rate, let's look at an aircraft performing a 360 degree rolling turn with 4 rolls to the inside from upright (Family 2.4.7.1). First, on the prescribed entry heading, the pilot executes a turn and simultaneously initiates a roll in the same direction as the turn. The judges will expect the aircraft to be inverted at 45, 135, 225 and 315 degrees and to be upright at 90, 180, 270 and 360 degrees. At these interim headings, the judge will NOT downgrade using the 0.5 point for 5 degree rule but will judge changes in the rate of roll, changes in the rate of turn and changes in altitude. At the end of the 4 rolls, the aircraft must have terminated its 360 degree turn and finish at the same point where it started, wings level and on the prescribed heading.

When a rolling turn is performed with rolls alternating directions, the aircraft must change direction of roll at a wings level attitude. The position of the aircraft in the turn is still only used as an aid to determine if the pilot is varying the rate of roll or turn.

Downgrades:

a: Performing more or fewer rolls than the ARESTI description calls for, or rolling in a direction different than depicted on the ARESTI results in the figure being zeroed.

b: All rolls in a rolling turn are standard rolls. If a snap roll is performed, the figure will be marked zero (0).

c: Each stoppage of the rate of roll is a deduction of one (1) point.

d: Each variation in the rate of roll is a one (1) point deduction.

e: Each variation in the rate of turn is a one (1) point deduction.

f: Variations in altitude are deducted using 0.5 points per every 5 degrees difference.

g: 0.5 points per every 5 degrees that the aircraft is not in level flight when reversing roll direction.

h: 0.5 points for every 5 degrees of roll remaining when the aircraft has reached its heading.

i: 0.5 points for every 5 degrees of turn remaining when the aircraft has completed its last roll.

5C.8.3. Family 3: Combinations of Lines.
For all the figures in Family 3, (Three Corners, Four Corners, and Eight Corners) the transition from level flight to a 45 degree line should be at a constant and reasonable one eighth (1/8) looping radius. All lines within the figure should be equal in length. All part loops within the figure should be of identical radii. The 45-degree transitions in Family 3 should have a constant radius and not a sharp corner (Fig. 19). The basis for judging line length is the first line flown. Refer to rule 5C.7.1 for downgrades.

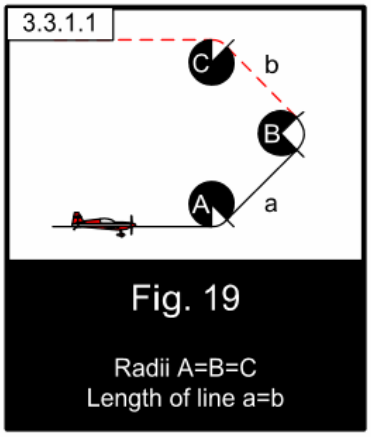


Fig. 19
Radii A=B=C
Length of line a=b

The radius of all part loops in the figure are measured against the first part loop flown in the manoeuvre. Thereafter, each part loop flown within the manoeuvre that has a different radius than the first part loop flown receives a one (1) point deduction.

Each part loop flown in the manoeuvre must have a constant radius. Each variation of radius within a part loop receives a one (1) point deduction.

5C.8.4: Family 4: Not in use.

5C.8.5: Family 5.2-5.4: Stall Turns.
Stall Turns, also referred to as “Hammerheads”, are some of the most graceful figures in the “ARESTI Aerobatic Catalogue (Condensed).” In its most basic form, the figure begins when the aircraft leaves horizontal flight and flies a one-quarter loop to establish a vertical climb or flies a one-eighth loop to establish a 45 degree up line. If the entry is a one-eighth loop to a 45 degree line then, having presented that line, the aircraft will fly another one-eighth loop and establish a vertical up line. At the top of the vertical line, the aircraft stops, pivots and establishes a vertical descent. The vertical line may terminate in a one-quarter loop which will return the aircraft to horizontal flight and end the figure. Or, after the vertical descent from the peak, the aircraft may fly a one-eighth loop to a 45 degree down line. Having presented this line, the aircraft will fly another one-eighth loop to return to horizontal flight thus ending the figure.

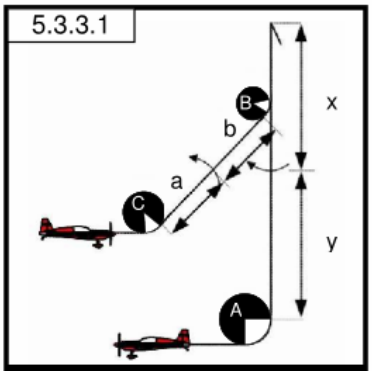


Fig . 21
Length of a=b & x=y
Lengths a & x may be different
Radii A,B,C may be different

The judging criteria are:

a: The up and down lines, vertical or 45 degree, must be wind corrected so that they are flown as a straight line at the correct angle to the horizon.

b: On the up and down lines, any roll deviation, or deviation of the track of the aircraft in pitch or yaw will result in a deduction of 0.5 points per 5 degrees of deviation.

c: Any added roll element(s) on the vertical or 45 degree lines must be positioned so that the line segments before and after the roll elements are of equal length (Fig 21).

d: The length of the up and down lines, vertical or 45 degree need not be equal. Therefore, the altitude of the horizontal lines at the entry and exit of the hammerhead may be different and no downgrade applies for this difference.

e: As the aircraft nears the point where it stops climbing, it must pivot in a plane parallel to vertical. Any alignment deviation from parallel to the vertical should be downgraded 0.5 points for each 5 degrees of deviation.

f: When the aircraft pivots at the top of the vertical line in a stalled or near stalled condition, no deduction should be applied for wind drift during that particular time.

g: In the case of strong cross winds, the aircraft will most probably be “crabbing” to wind correct the up and down lines. The pivot at the top of the line might therefore be less or more than 180 degrees and no downgrade should be applied to it.

h: Any pendulum movement observed after the pivot is subject to downgrade at 0.5 points per 5 degrees of movement off the vertical. This downgrade is applied for each movement either side of the vertical.

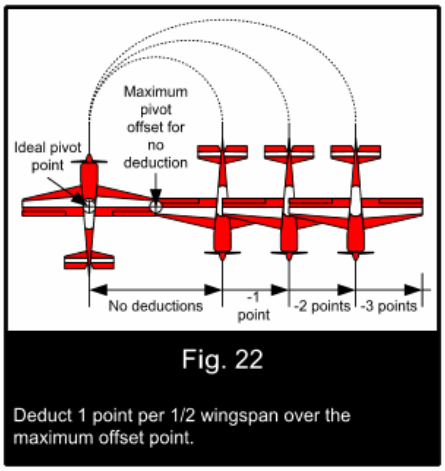


Fig. 22

Deduct 1 point per 1/2 wingspan over the maximum offset point.

When rotating at the top of the manoeuvre, ideally, the aircraft pivots around its center of gravity. To avoid a deduction, the aircraft must pivot around an axis point, which cannot be farther away from its center of gravity on the vertical up line than its wingtip (½ wingspan). The downgrade for this deviation is one (1) point per half wingspan that the point of rotation exceeds the maximum allowed (Fig 22).

Judges must be careful to deduct only for true extended turnaround, and not for any apparent deviation caused by wind drift during the pivot. One way to recognize a “fly-over” from a wind drift will be that the “fly-over” is generally characterized by the continuation of vertical movement and a pivot larger than 4 wingspans. A “fly-over” Stall Turn should be marked zero (0) (Fig 23).

The manoeuvre should also be marked zero (0) if any distinctive backward sliding movement is observed before the start of the pivot, even if the rotation is correctly performed after the slide (Fig. 24). The rate at which the aircraft pivots around its vertical axis is not a judging criterion.

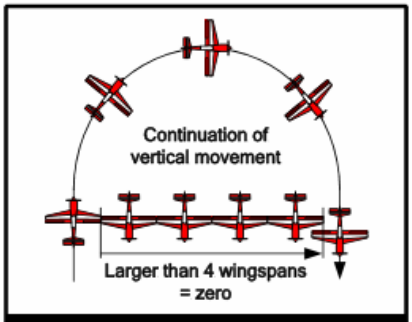


Fig. 23

'Fly-over' is characterized by the continuation of vertical movement and a pivot larger than 4 wingspans.

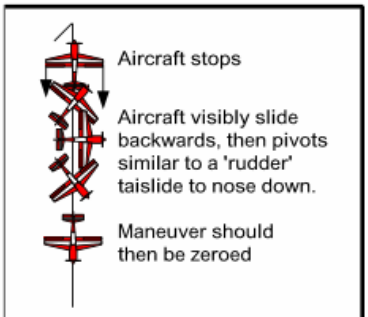


Fig. 24

Any clearly visible downwards slide before the pivot starts will zero the maneuver.

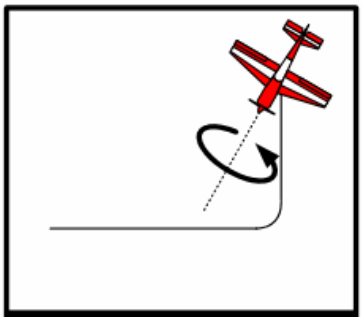


Fig. 25

'Torquing' is a rotation around the roll axis during the turnaround.

During the pivot, the wings must remain in the vertical geometric plane as dictated by the ARESTI. This alignment must be maintained throughout the pivot, and the aircraft’s attitude at the beginning and the ending of the pivot must be absolutely vertical. During the pivot there must be no deviation in pitch or roll. Any pitch and roll deviation observed during the pivot should be downgraded at 0.5 points for each 5 degrees of deviation. Such movement around the roll axis during the pivot is often referred to as “torqueing” (Fig 25).

5C.8.6: Family 6.2: Two Line Tail Slides.

All the criteria of the Stall Turn apply to this figure except, of course, for the manoeuvre at the top of the vertical climb. At the point when the aircraft stops climbing, it must slide backwards a visible amount in the vertical plane. The key here is “visible” and “vertical plane.” If the aircraft pivots directly on the top, without any clearly visible slide, the manoeuvre should then be marked zero (0). Following the slide backwards, the aircraft must then tip over and fall through to a diving position. Often the nose will swing back or “pendulum” in pitch past the vertical after falling through. The figure is not to be downgraded for this, nor downgraded if it

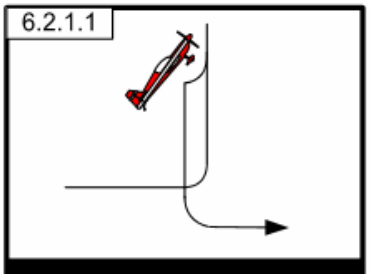


Fig. 26

Wheels down Tailslide

does not happen. It is a function of the length of the slide and the type of aircraft, and is not to be considered in grading the figure.

There are two types of Tail Slides: wheels-down and wheels-up. The wheels-down Tail Slide is depicted in the ARESTI diagram with a curved solid line at the top of the Tail Slide symbol (Fig. 26). The wheels-up Tail Slide is depicted in the ARESTI diagram with a curved dashed line at the top of the Tail Slide symbol (Fig. 27).

This figure must be watched carefully, as the aircraft can fall the wrong way (which is graded a zero) with the correct direction of flight and the proper aircraft attitude still maintained.

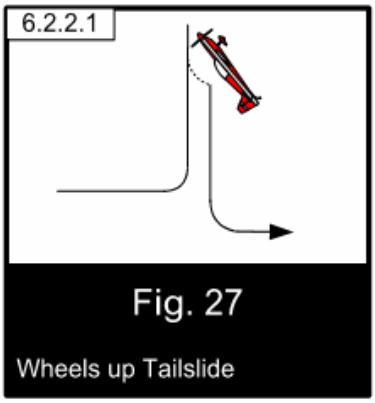


Fig. 27

Wheels up Tailslide

The judging criteria are:

a: All lines and arcs flown in the figure are to be wind corrected and correctly aligned within the airspace as described in sections 5C.5.3, 5C.7.1 and 5C.7.2. Observed alignment deviations receive a deduction of 0.5 points for each 5 degrees of deviation.

b: Absence of any visible backward slide in the vertical plane zero's the entire figure.

c: On all up and down lines, the roll attitude must be perpendicular to the plane of the main axis of flight, either the X or Y axis. This includes the duration of the fall through. Watch for the aircraft torqueing off the correct plane of flight. Any deviation in roll should be downgraded at 0.5 points per five (5) degrees of deviation.

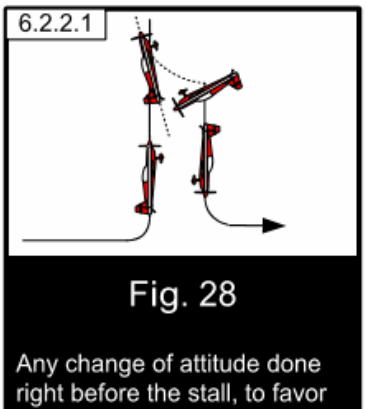


Fig. 28

Any change of attitude done right before the stall, to favor the type of tailslide will be downgraded ½ point per 5°.

d: As with the Stall Turn, the aircraft will be in a stalled or near-stalled condition at the top of the vertical line and no deduction for wind drift should be applied during that particular time.

e: The altitude of the entry and exit horizontal lines need not be the same and the figure must not be downgraded if they are different.

f: When rolls are combined with Family 6 figures, the line segments before and after the roll(s) must be of equal length. Refer to rule 5C.7.1 for downgrades.

g: After performing the Tail Slide at the peak of the manoeuvre, the aircraft must establish a visible vertical down line. If this line is omitted, a downgrade of one (1) point is to be applied.

In summary, the aircraft should make a smooth and steady transition up to vertical flight, and the aircraft should come to a complete stop in this attitude. After sliding backward a visible amount, it should fall through in the appropriate direction without dropping a wing or the nose moving off axis, and recover on the same plane as that of entry. After completion of this, it should again project the 90-degree down line (wind corrected if required) before transitioning into horizontal flight.

5C.8.7: Family 7: Loops and Eights.

5C.8.7.1: General Principles:
Family seven figures are covered in the following sections in groups, sections 5C. 8.7.2 to 5C.8.7.8. Each section provides the manoeuvre description and the overall judging criteria for the group. Each section also provides, for the most part, the downgrades to be applied for deviations. However, some downgrades in some of the sections are not completely specified and, as such, are described here:

a. The size of a loop or part loop is not a grading criterion. It will vary according to the flight characteristics of the aircraft. A large loop is not graded any higher or lower than a small loop, but any variation to the radius will downgrade these figures.

b. All radii are to be constant. Each visible variation in the radii in a loop or part loop is to be downgraded by one (1) point.

c. Where radii of part loops within these figures are required to be the same and they are not, a downgrade of one (1) point is to be applied for each mismatch. The standard is the first part loop flown within the figure.

d. Where complete loops or part loops within these figures are required to be the same size and they are not, a downgrade of one (1) point per mismatch is to be applied.

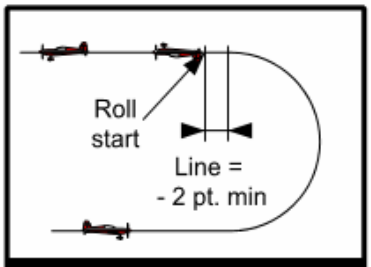


Fig. 29

Drawing a line after the 1/2 loop is a minimum downgrade of 2 points.

e. Roll elements that are to be done on a line must be centered and are to define two equal length line segments, one either side of the roll element. Refer to rule 5C.7.1 for downgrades.

f. Where a roll element is to be done entering or exiting a part loop there is to be no line shown between the part loop and the roll element. The downgrade for showing a line in these situations is a minimum of two points.

g. Where a roll element is to be done on a line between two vertical half loops, or between two full loops that form a vertical eight, and the line is absent, a downgrade of two (2) points is to be applied. There are to be no lines before or after the roll element and, if present, each such added line should result in a two (2) point deduction.

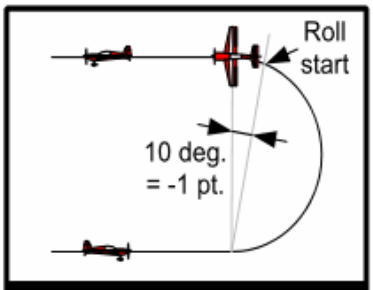


Fig. 30

Aircraft starting the roll ten degrees early before reaching horizontal flight = - 1 point

5C.8.7.2: Family 7.2: Half Loops
The half-loops in this sub-family must be of a constant radius and wind-corrected to appear as a perfect half circle (see full loop discussion below). When a half-loop is preceded by a roll or rolls, the half-loop follows immediately after the roll(s) without any visible line. Drawing a line requires a downgrade of at least two (2) points depending on the length of the line drawn. Should the half-loop begin before the roll is completed, the judge must downgrade the figure 0.5 points for every 5 degrees of half-loop flown on which the roll was performed.

The half-loop followed by a roll is also flown with no line between the half-loop and roll. Again, drawing a line requires a downgrade of at least 2 points depending on the length of the line drawn (Fig. 29). Should the roll begin before the half-loop is completed, the judges must downgrade the figure 0.5 points for every 5 degrees of half- loop on which the roll was performed (Fig. 30). Great care should be taken here to differentiate between aircraft airfoils and the slow speed at the top of the half loop + roll manoeuvre. The aircraft will appear to begin the roll before reaching horizontal flight due to its high pitch attitude. As the aircraft accelerates, it will then establish a cruise pitch attitude.

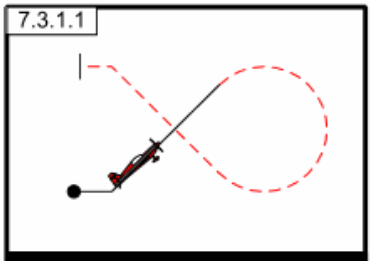


Fig. 31

Three-Quarter Loops or "Goldfish"

5C.8.7.3: Family 7.3: Three-Quarter Loops
Sometimes referred to as “Goldfish” (Fig 31), the lines are judged with reference to the 45 degree flight path. Any rolls on the 45 degree lines must be centered on that line. It is not required that the lengths of the 45 degree lines bear any strict relation to the diameter of the three-quarter (3/4) loop. That is, the entry and exit altitudes do not need to correspond to the altitude limits of the loop.

5C.8.7.4: Family 7.4: Whole Loops

5C.8.7.4.a: Round Loops (7.4.1 – 7.4.2)

All whole round loops must appear perfectly round to the judge (Fig 33). If required, they must be wind corrected to have a constant radius. This wind correction is not only with regards to the roundness of the loop but also for the effect of any crosswind on the figure. Therefore, a standard deduction of 0.5 points per five (5) degrees should be applied if the finish point is displaced in a direction perpendicular to the plane of the loop (Fig. 34). In a heavy crosswind situation, a loop might be flown with visible crabbing and no deduction should be applied in this case. To better quantify deductions for loops, the judges should watch for these irregularities: perpendicular displacement, change of radius, aircraft roll and flat spots (aircraft without a flight path radius) within the loop.

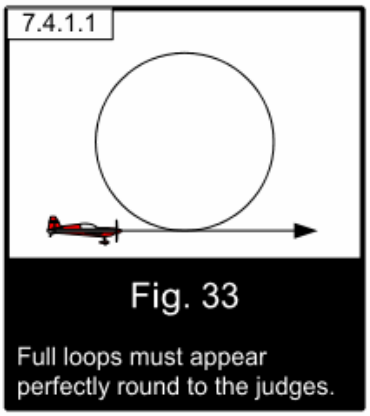


Fig. 33

Full loops must appear perfectly round to the judges.

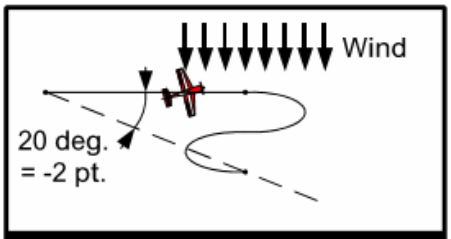


Fig. 34

The ½ pt. per 5 degrees rule apply for any wind drift during the loop, in this case -2 pt. for 20 degrees.

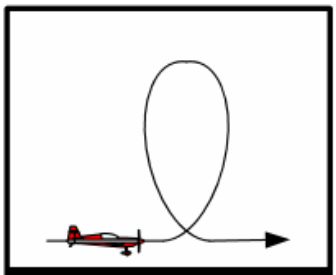


Fig. 35

"L shaped" loop

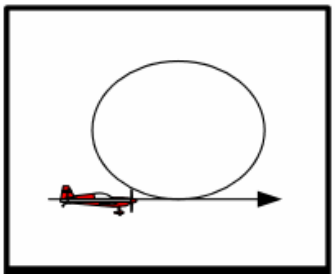


Fig. 36

"Egg shaped" loop

Deductions are as follows:

a. As stated in first paragraph, 0.5 points per five degrees for perpendicular displacement.

b. A variation in the radius will be a one point deduction per occurrence.

c. Aircraft displaying any roll other than during a roll element on the loop, 0.5 point per five degrees of roll.

d. Flight path without any radius (straight line or “flat spot”), one point per occurrence.

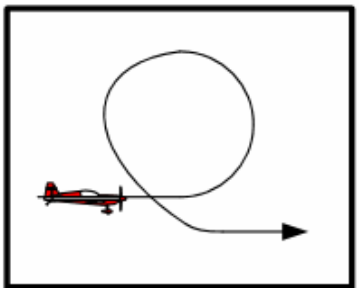


Fig. 37

"E shaped" loop

In judging loops, a common error is for the vertical diameter of the loop to be larger than the horizontal diameter. This is often called an “L” shaped loop (Fig. 35). Less common are loops with a horizontal diameter greater than the vertical. This is called an egg-shaped loop (Fig. 36).

Another common error is in varying the radius of the final quadrant performing an “e” shaped loop (Fig. 37). The downgrades listed above should be applied for each of these errors.

If there is a rolling element (roll, point rolls or snap roll) at the apex of the loop, it must be centered in the loop and flown on the arc of the loop itself (Fig. 38). Flying the roll on a line at the apex of the loop is at least a two (2) point downgrade. If the roll is not centered, it must be downgraded 0.5 points for every five degrees that it is off center.

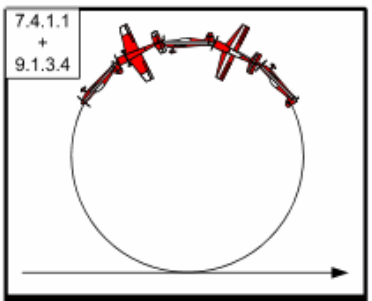


Fig. 38

A rolling element on a loop must be flown centered, at the apex, and on the arc of the loop.

5C.8.7.4.b: Family 7.4.3- 7.4.6: Square, Diamond and Octagon Loops

Square and Octagon loops are flown as hesitation loops with lines of equal length and partial loops with equal radii (Fig. 39). Square and Octagon loops are not considered complete until the last horizontal line is drawn equal to the length of the first line of the figure.

All horizontal, vertical, and 45-degree lines are judged on flight path and should therefore be wind corrected. As such, the judge should always expect to see these figures closed, the same way as a round loop.

Where rolls are flown on the Square or Diamond loops, they must be centered on the line. Aids for judging all hesitation loops are that a good performance will contain changes of angular velocity in all the partial loops, and variations of time taken to draw the length of each interior line, which also varies according to the aircraft's speed. The rhythm of all these partial loops is a help for judging.

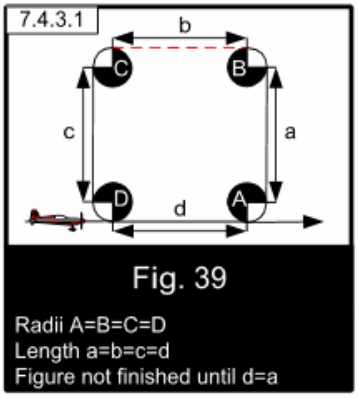


Fig. 39

Radii A=B=C=D
Length a=b=c=d
Figure not finished until d=a

5C.8.7.4c: Family 7.4.7-7.4.14 Reversing Whole Loops
Reversing Whole Loops shall be judged using the same criteria for Whole Loops. No line is to be flown between the ¼ and ¾ loop segments, and the radii of all loop segments must be equal (Fig 39a). Drawing a line between the loop segments requires a downgrade of at least two (2) points depending on the length of the line drawn. Rolls placed either before or after the Reversing Whole Loop shall be flown with no line segment between the roll and the loop. Drawing a line requires a downgrade of at least two (2) points depending on the length of the line drawn. Any rolling element flown at the apex (top of loop) or bottom of the loop shall be judged in accordance with the rules for Whole Loops found in paragraph 8.7.4.a.

5C.8.7.5a. Family 7.5.1-7.5.8: Horizontal "S"s
Horizontal "S"s may be described as two Half Cubans joined together, sharing a common 45 degree line. In these figures, both 5/8ths loops must have the same radii (Fig 39b). When the looping portion of the figure is immediately preceded by (on entry) or followed by (on exit) a roll or rolls, there must be no visible line between the roll and loop elements. Drawing a line requires a downgrade of at least two (2) points depending on the length of the line drawn. This criterion is not meant to imply that one element (roll or loop) must start before the preceding element is completely finished. A brief hesitation between elements (similar to opposite rolls) should not be downgraded.

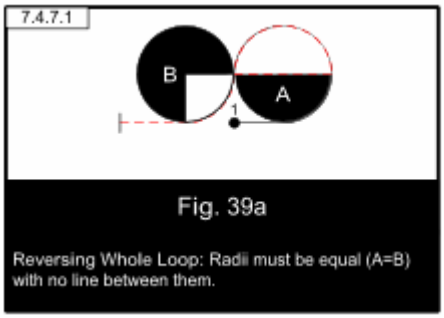


Fig. 39a

Reversing Whole Loop: Radii must be equal (A=B) with no line between them.

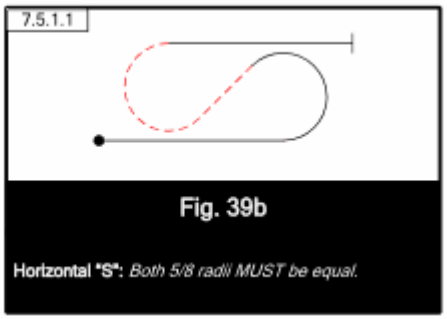


Fig. 39b

Horizontal "S": *Both 5/8 radii MUST be equal.*

Any rolls that are placed on the 45-degree line (between the two 5/8ths looping portions) must be centered on the line, and do not follow or precede the looping portions as described above.

5C.8.7.5b. Family 7.5.9-7.5.10: Vertical "S"s
These figures are accomplished with two joined half-loops flown in opposite directions (Fig. 40). Look for both half-loops to be the same size and perfectly round. The half-loops should be a continuous looping figure when there is no half roll between the half-loops. When a half roll is performed between the half loops (full roll(s) are not authorized), there is no line before or after the half roll. However, the half roll is flown on a horizontal line which begins as soon as the first half-loop is finished. As soon as the half roll is finished, the next half-loop must begin immediately (Fig. 41). Adding a line at either of these points is at least a two (2) point deduction, depending on the length of the line.

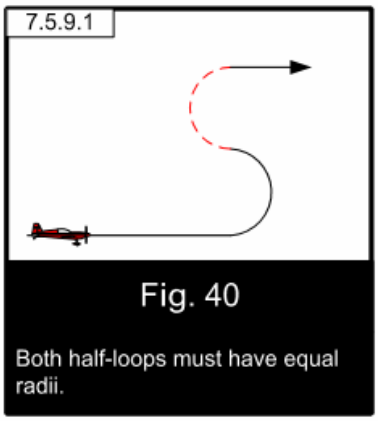


Fig. 40

Both half-loops must have equal radii.

5C.8.7.6: Not in Use
5C.8.7.7: Not in Use

5C.8.7.8a: Family 7.8.1 - 7.8.8: Horizontal Eights

Also referred to as “Cuban Eights,” the 5/8ths and 3/4 loops must have the same radii; lines between the loops flown at exactly 45 degrees (Fig. 42). Wind correction shall be applied throughout the figure so that the 45-degree lines intersect at the exact mid-point of the Horizontal Eight. If there are roll elements on the 45 degree line(s), they will be positioned so that the lines before and after the roll are of equal length.

When the 5/8ths loop portion is preceded or followed by a roll element, there must be no visible line between the roll element and the 5/8ths loop. Inserting a line between the roll element and 5/8ths loop portion requires a minimum downgrade of 2 points.

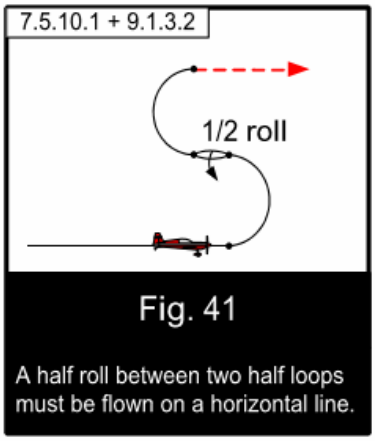


Fig. 41

A half roll between two half loops must be flown on a horizontal line.

The start and finish of the figure and the bottoms (or tops if reversed) of the 5/8ths and 3/4 loops must be at the same altitude.

The radius of the 1/8 loop between the 45 degree line and horizontal flight need not equal the radii of the 5/8ths and ¾ loops of the Horizontal 8.

5C.8.7.8b: Family 7.8.9 - 7.8.16: Horizontal Super “8”s
Besides possessing the unique characteristic of containing three 45-degree lines on which rolls may potentially be placed, this family can be thought of as two linked Three-Quarter Loops (Family 7.3).

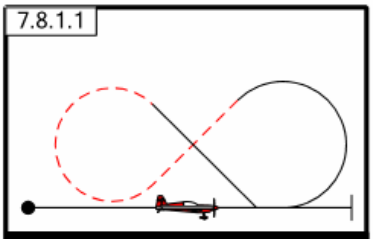


Fig. 42

Horizontal 8. Both loop radii must be equal. 1/8 loop (entry or exit) radius may be different from horizontal 8 loop radii.

The radii of the two 3/4 loops must be identical to each other. Each of the 45-degree lines may be of different lengths, but any rolls placed on them must be centered. The two 3/4 loops need not occur at the same altitude, nor is there any relationship between the horizontal entry/exit altitude and the altitude limits of the two 3/4 loops (Fig. 43).

5C.8.7.8c: Family 7.8.17 – 7.8.22: Vertical “8”s
These figures are performed by flying two loops, one above the other (Fig. 44).

Sub-family 7.8.17-7.8.20 is composed of two loops, both above or both below the entry altitude. Sub-family 7.8.21 - 7.8.22 is composed of one loop above and one loop below the entry altitude. In case, the entry and exit altitude must be the same.

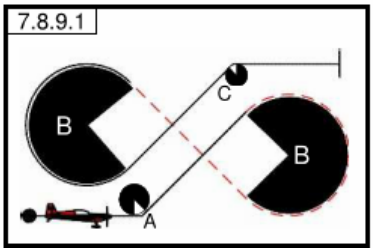


Fig. 43

Horizontal Super 8: Both ¾ Loops A must have the same radii. All 3 lines can be of different length. Radii A,B,C may be different

These figures may be combined with various types of half rolls. When a half roll is performed between the loops, there is no line before or after the half roll. However, the half roll is flown on a horizontal line that begins as soon as the first loop is finished. As soon as the half roll is finished, the next loop must begin immediately. Adding a line at either of these points is at least a two (2) point deduction depending on the length of the line. These figures are to be graded using the same criteria as full loops. Additionally, both loops must be of the same size. Unless there is a half roll between the loops, they must be directly above one another. Here as well, the beginning and the end point of the manoeuvre will not be in the same vertical plane if a half roll is flown between the loops (Fig. 45). This should not be a reason for downgrade.

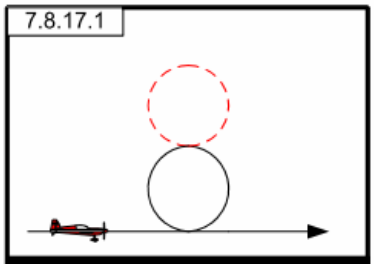


Fig. 44

Vertical 8

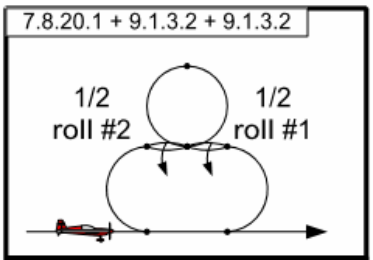


Fig. 45

Half rolls in a vertical 8 must be done on a horizontal line and will separate entry and exit points.

5C.8.8: Family 8: Combination of Lines, Loops, and Rolls

5C.8.8.1 – General Principles:
Family 8 figures are covered in the following sections. Each section provides the manoeuvre description and the overall judging criteria for the group. Each section also provides, for the most part, the downgrades to be applied for deviations. However, some downgrades in some of the sections are not completely specified and, as such, are described here.

a. The size of a loop or part loop is not a grading criterion. It will vary according to the flight characteristics of the aircraft. A large loop is not graded any higher or lower than a small loop, but any variation to the radius will downgrade these figures.

b. All radii are to be constant. Each visible variation in the radii in a loop or part loop is to be downgraded by one (1) point.

c. Where radii of part loops within these figures are required to be the same and they are not, a downgrade of one (1) point should be applied for each mismatch. The standard is the first part loop flown within the figure.

d. Roll elements that are to be done on lines must be centered and are to define two equal length line segments either side of the roll element. Refer to rule 5C.7.1 for downgrades.

e. Where a roll element is to be done entering or exiting a part loop there is to be no line shown between the part loop and the roll element. The downgrade for showing a line in these situations is a minimum of two points. This criterion is not meant to imply that one element (roll or loop) must start before the preceding element is completely finished. A brief hesitation between elements (similar to opposite rolls) should not be downgraded.

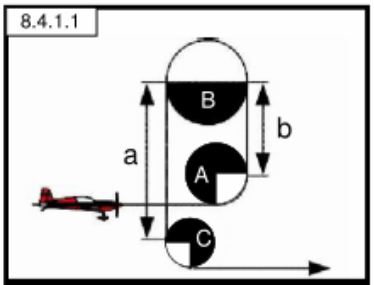


Fig . 46
Lengths of lines a and b may be different
Radii A,B,C may be different

5C.Sections 8.8.1 to 8.8.3: Not in Use.

5C.8.8.4.1: Family 8.4.1 - 8.4.28: Humpty Bumps and Diagonal Humpty Bumps.
These figures, whether vertical or performed with 45-degree lines, are judged as combination of lines and loops. Half loop must still have a constant radius from the time they depart the vertical or 45-degree line. This requires a change in angular velocity during the half loop.
The lines in these figures may be of different lengths, and therefore the entry and exit altitudes of these figures can be different. Rolls on any of these lines must be centered (Fig.46).

5C.8.8.5: Family 8.5.1-8.5.24: Half Cubans and Vertical 5/8ths Loops.
In these figures, when the looping portion of the figure is immediately preceded or followed by a roll or rolls, there must be no visible line between the roll and loop elements. The rolls on vertical and 45-degree lines must be centered, except for roll(s) following a spin. Angles drawn in the “ARESTI Aerobatic Catalogue (Condensed)” (Fig. 47), are to be flown as partial loops. No such part-loop is required to match the radius of any other part loop depicted in the same figure.

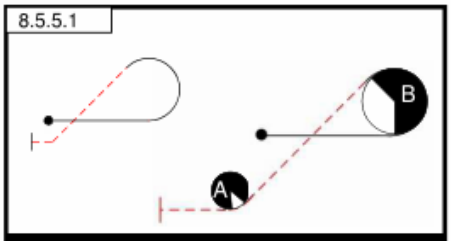


Fig . 47
Radii partial loops may be different

5C.8.8.6: Family 8.6: "P" Loops and Reversing "P" Loops

When ¼, ½ or ¾ loops **join** each other in these sub-families, the radii must be equal and there is no line between the loops. Inserting a line between joined loop segments requires a minimum two (2) point deduction depending on the length of line (Fig. 49).

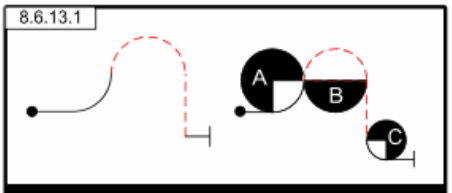


Fig. 49

When partial loops are joined, their radii must be equal (A=B) with no line between them.
Last 1/4 loop radius (C) can be different from A and B.

Roll elements on the vertical line must be centered.

Roll elements at the apex of the loop must be centered in the loop and flown on the arc of the loop. Flying the roll on a line at the apex of the loop is at least a two (2) point downgrade. If the roll is not centered, it must be downgraded 0.5 points for every five degrees that it is off center.

When a loop portion is preceded or followed by a roll element, there must be no visible line between the roll element and the loop portion. Inserting a line between the roll element and loop portion requires a minimum downgrade of 2 points.

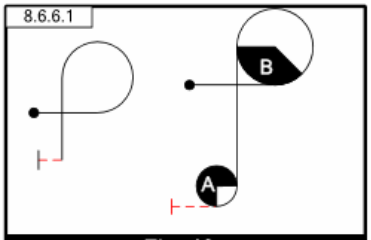


Fig. 48a

P loops: *BOTH radii may be different.*

The 1/4 loop to or from horizontal flight should have a reasonable radius, but need not match the other looping radii (fig.48a).

5C.8.8.7: Family 8.7: 7/8ths loops

Sometimes called "Q Loops", these figures consist of a 7/8ths loop with either a 45 degree entry or exit line. The 1/8th loop to or from the 45 degree line should have a reasonable radius, but need not match the radius of the 7/8ths loop. (fig.49b)

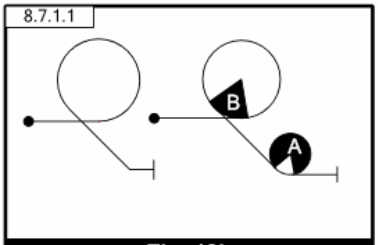
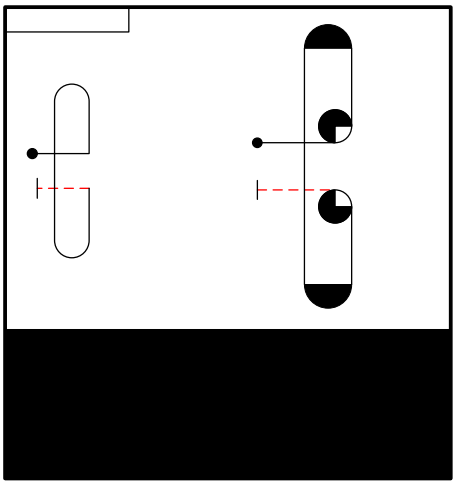


Fig. 49b

Q loops: *BOTH radii may be different.*

Roll elements on the 45 degree line must be centered. Roll elements at the apex of the 7/8ths loop must be centered on the loop and flown in the arc of the loop. Flying the roll on a line at the apex of the loop is at least a two (2) point downgrade. If the roll is not centered, it must be downgraded 0.5 points for every five degrees that it is off center.

When the 7/8ths loop is preceded or followed by a roll element, there must be no visible line between the roll element and the loop. Inserting a line between the roll element and 7/8ths loop requires a minimum downgrade of 2 points.



Note: for certain types of "Q" Loops in this family, rolls are not allowed at the apex of the 7/8th loop (for example, figures 8.7.x.3 and 8.7.x.4).

5C.8.8.8: Family 8.8: Double Humpty Bumps

These figures are generally judged using the same criteria as Single Humpty Bumps (see section 5C.8.8.4.1). The two half-loops are not required to match each other, nor are they required to match the entry/exit loop radii. As with Single Humpty Bumps, the entry and exit altitudes need not be equal (Fig.49a).

5C.8.8.9: Not in Use

5C.8.8.10: Family 8.10: Reversing 1 ¼ Loops

The ¾ and ½ loops in these sub-families must be the same size and are flown as continuous segments with no line between the loops. Inserting a line between joined loop segments requires a minimum two (2) point deduction depending on the length of the line.

Roll elements on the vertical line must be centered.

When the ¾ loop is preceded by a roll element, there must be no visible line between the roll element and the loop portion. Inserting a line between the roll element and loop portion requires a minimum downgrade of 2 points.

The final ¼ loop to horizontal flight should have a reasonable radius, but need not match the other looping radii.

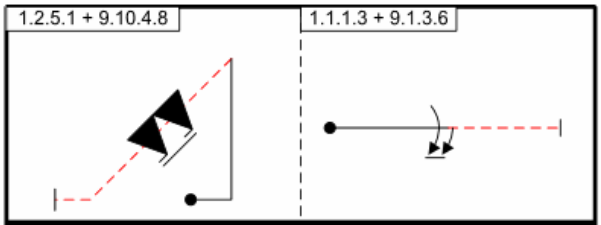


Fig. 50

Two (720 deg.) linked negative snap rolls. One and half (540 deg.) linked rolls.

5C.8.9: Family 9: Rotational Elements

Rolls (9.1 - 9.10) may be performed on horizontal, 45-degree or 90-degree lines, on complete loops, between part-loops, between part-loops and line, and following spin elements. They may be ¼, ½, ¾, or a full 360 degrees in their rotation, up to two consecutive full rolls. Additionally, rolls may be flown in combination with turns as prescribed in Family 2 (Rolling Turns). In all cases, the same criteria apply: The rate of roll must be constant throughout the roll(s). The aircraft should continue to project, during the rolling portion, the prescribed plane and direction of flight.

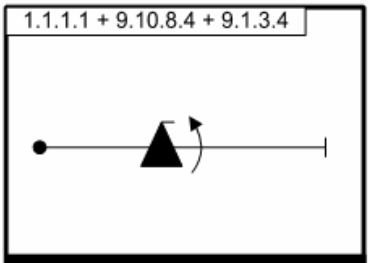


Fig. 51

Unlinked negative snap and roll, same direction.

Multiple rolls may be linked, unlinked or opposite:

a: When rolls are in continuous rotation, the tips of the symbols are linked by a small line. When flying linked rolls, there is no pause between them (Fig. 50). Should there be one; the figure should then be marked zero (0).

b: Unlinked rolls must be of different types, the two types being defined as follows:

Type I: Aileron rolls (rolls and point rolls)

Type II: Snap rolls (positive and negative) – also referred to as “Flick Rolls”.

No line links the symbols, though their tips are drawn pointing in the same direction (i.e. on the same side of the line). Unlinked rolling elements must show a brief but perceptible pause between the elements that comprise the rolling combination. Absence of a perceptible pause between elements of the combination shall be downgraded by 1 point. This downgrade applies if the direction of rotation is required to be the same or opposite. (Fig. 51)

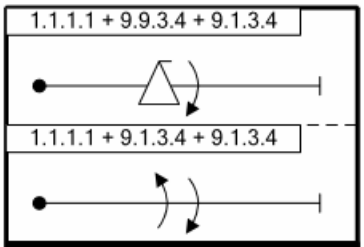


Fig. 52

Two examples of legal opposite rolls.

c: Opposite rolls may be either of the same or different type. In opposite rolls, the tips of the symbols are drawn on opposite sides of the line, indicating they are to be flown in opposite directions of rotation. The pilot may elect to fly the first roll in either direction, but the second roll must be the opposite direction to the first. Opposite rolls, including those in rolling turns should be flown as one continuous manoeuvre - the brief pause between opposite rotations should be minimal (Fig. 52). If the two rolls are of the same type, they must be flown in opposite direction if they are not linked.

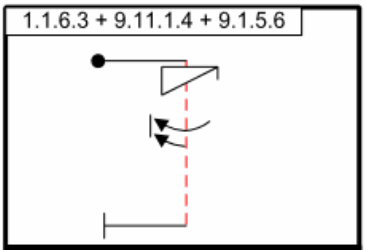


Fig. 53

Legal - a spin element is followed by a single rotational element.

d: Either aileron rolls or snap rolls may follow spin elements (Family 9.11 or 9.12). A spin and a roll combined on the same vertical downline will always be unlinked. They may be flown either in the same or opposite direction, as shown by the position of the tips of the symbols on the ARESTI diagram. The spin will always be the first element with a maximum of two (2) turns. It can be followed by a second rotational element like a roll or a snap roll also limited to a maximum of two (2) turns (Fig. 53). Adding a third rotational element will make the manoeuvre illegal, i.e. a one turn spin combined with one opposite roll and one opposite half roll (Fig. 54).

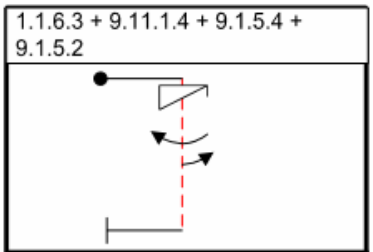


Fig. 54

Illegal - more than 2 rotational elements (spin, roll, 1/2 roll).

5C.8.9.1: Family 9.1: Rolls
The penalty for varying the rate of roll is one (1) point per variation. Any stoppage in the roll that could result its being considered a point roll would grade the figure zero (0).

The finish of the roll must be as crisp and precise as possible. Coming to a slow finish in fact represents a change in the rate of roll and should be penalized accordingly.

The wing must stop precisely after the desired degree of rotation and not go past the stop point and then return. This is referred to as “bumping the point” and a deduction of 0.5 points per 5 degrees shall be given in this case.

5C.8.9.2: Family 9.2 - 9.8: Point Rolls. Point Rolls
These rolls are judged on the same criteria as the standard roll, only the aircraft stops rotation during the roll for a pre-stated number of times, i.e. 2, 4, or 8. The rate of the roll and the rhythm of the points must be constant throughout with the aircraft projecting the pre-stated plane and direction of flight.

The pauses will be of identical duration and the degree of rotation between each pause shall be 180 degrees, 90 degrees, or 45 degrees, as depicted by the Aresti diagram. Each visible variation in the duration of the pause segments is downgraded by one (1) point. Errors in degrees of rotation (under / over rotating the points) are downgraded at a half (.5) point per five (5) degrees.

The roll rate of the rolling segments must be constant with each roll segment matching that of the preceding segment. Any visible deviation in roll rate from one segment to the next, or within a segment, is to be downgraded by one (1) point per occurrence.

The duration of the rolling segments as compared to the pause segments need not be equal. Each pause of a point roll must be clearly recognizable in every case. If a pause is not recognizable or is omitted, the figure is graded a zero (0).

5C.8.9.3: Family 9.9: Snap Rolls (“Flick Rolls”)
Snap rolls may be positive (pitch to the canopy) or negative (pitch to the wheels). Other than this difference, all judging criteria are the same for either type of snap.

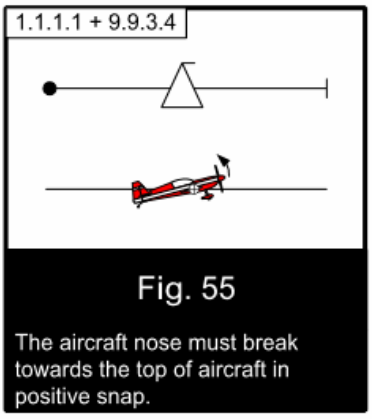


Fig. 55
The aircraft nose must break towards the top of aircraft in positive snap.

Snap rolls are difficult to judge due to the speed of the snaps and the variation in the manner in which different aircraft perform snaps. However, two things must be present in order that a judge can decide that a snap roll has occurred. They are:

- The nose must pitch in the correct direction as indicated by the ARESTI figure (Fig. 55 & 56).
- Autorotation must be initiated.

Given the high energy nature of the snap, it is very difficult to tell if these two items are occurring simultaneously or sequentially. Therefore, there is no requirement that these two movements start simultaneously. They may occur simultaneously or sequentially in the order presented.

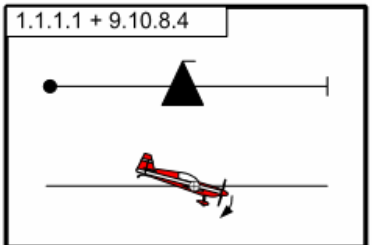


Fig. 56
The aircraft nose must break flight path away from the top of aircraft in negative snap.

The requirements and downgrades that apply to snap roll elements are:

a. The snap must be done in the correct direction, positive or negative. If done in the wrong direction the manoeuvre is to be zeroed. Judges must watch very carefully for this as, due to the speed of the snap, it is very possible to miss an incorrect direction of the pitch.

b. There must be departure in the pitch axis in the required direction of the snap. Without some displacement in pitch there can be no high speed stall and therefore, there can be no snap. Aerobatic aircraft with very high rates of roll can occasionally fool a judge and present an aileron roll in place of a true snap. The movement of the aircraft’s nose in pitch departing the flight

path is a necessary clue to the proper execution of snap rolls. As always, the competitor is given the benefit of the doubt, but if a judge is certain that a proper snap roll has not been executed, a zero (0) is to be given.

c. Autorotation must be initiated either simultaneously with the pitch departure, or immediately subsequent to it. No downgrade is to be applied if these two motions occur sequentially in the order just stated. Autorotation is difficult to discern but a definite clue is that there will be a yaw component to the rotation. Lacking any visible yaw, the aircraft will be rotating only on its roll axis and not presenting a true snap. As always, the competitor is given the benefit of the doubt, but if a judge is certain that autorotation is not present and therefore that a proper snap roll has not been executed, a zero (0) is to be given.

d. Any rotation / roll observed prior to the required pitch movement is to be downgraded 0 .5 points for each 5 degrees of such rotation.

e. In the event that the start of autorotation is delayed somewhat after the required pitch movement has been shown, it is possible that the aircraft will draw a visible line between the pitch and the start of autorotation. If this occurs, the manoeuvre should be graded zero (0).

f. Autorotation, once initiated, must be maintained to the prescribed finish point of the snap roll. Coming out of autorotation early and aileroning to the end of the snap is a common error. In this case, a downgrade of 0.5 points for each 5 degrees is to be applied for the amount of rotation remaining at the point the autorotation ends, i.e., for however much the pilot ailerons to the finish. If the autorotation ends with more than 90 degrees of rotation remaining, even if the roll is completed with aileron, the snap roll is to be graded zero (0).

g. Alignment during the snap will vary from the prescribed line of flight due to the yaw displacement that is characteristic of a proper snap. This variation may be very small. However, immediately on completion of autorotation, the aircraft must be realigned with the prescribed line of flight. This will put the aircraft on a parallel but offset line or arc from that being flown prior to entry to the snap. If the aircraft exit from the snap is a line or arc that is identical to the entry line this is a clue that a proper snap was not executed. Again, the offset of the snap exit line or arc from snap entry line or arc may be very small but should be there. No penalty is to be applied for the offset or the realignment of the aircraft immediately after autorotation is completed. Lacking that realignment the extension of the snap exit line will be misaligned and that should be downgraded at 0.5 for each 5 degrees of misalignment from the prescribed line of flight in pitch, roll and yaw. “Line of flight” as just used here includes arcs.

5C.8.9.5: Family 9.11 - 9.12: Spins

Spins may be positive (entered from upright flight) or negative (entered from inverted flight). Other than this difference all judging criteria are the same for either type of spin.

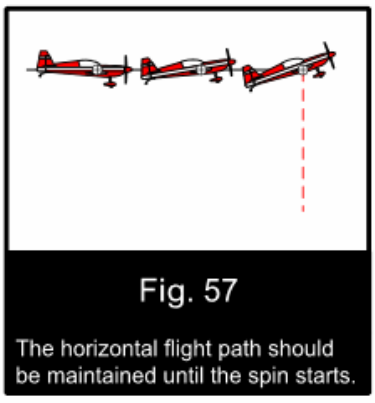


Fig. 57

The horizontal flight path should be maintained until the spin starts.

Spin elements may be included in a number of Family 1 and Family 8 figures (where so indicated by the optional spin symbol in the ARESTI catalogue). All spins begin from horizontal flight with a defined entry line. This entry line to the spin is to be judged and downgraded as required in the same manner as any other wind corrected horizontal line. The only exception to judging the entry line is if the spin entry line is also the entry to the sequence. In this instance, the entry line is not judged and judging begins at the spin stall break. It should be noted that the flight path of the spin entry line should remain constant and not be influenced by the change of pitch attitude required to achieve the stall (Fig. 57), i.e., judge the track.

When the aircraft stalls, the nose will fall and at the same time a wing tip will drop in the direction of the spin initiating autorotation. The fall of the nose and the drop of the wing are to occur simultaneously. Failure to achieve this is to be considered a “late entry” and is to be downgraded. After completion of the prescribed number of turns, the aircraft must stop rotating precisely on the prescribed heading and then a wind corrected vertical down line must be shown. If a roll element follows a spin, there should be a brief, but perceptible pause (similar to unlinked rolls) between the spin and the roll. Because there is no vertical line before the spin, there is no criterion to center a roll element that follows the spin on the vertical down line. No account is to be taken of the pitch attitude of the aircraft during autorotation, as some aircraft spin in a nearly vertical pitch attitude while others may spin in a somewhat flat attitude. Given these varying attitudes

some aircraft may require a visible downward movement in order to set the aircraft into position to fly the required vertical downline after completion of autorotation. No downgrade is to be applied for this downward nose movement. Also, the speed of autorotation is not a judging criterion.

The requirements and downgrades that apply to spin elements are:

a. The entry line to the spin is a wind corrected line and any deviation in pitch, roll or yaw is to be downgraded at 0.5 points per each 5 degrees of misalignment. However, be sure to judge the track and not the attitude.

b. At the point of stall, the wings are to be level and any deviation in roll will be downgraded at 0.5 degrees for each 5 degrees of deviation. However, at this point in the spin element, when the aircraft is stalled or near stalled, no penalty should be applied for deviation in yaw due to wind. Also, due to wind the yaw attitude of the aircraft relative to the prescribed degree of rotation may result in actually rotating more or less than prescribed (Fig. 58). No penalty is to be applied for this variation provided it results from the effect of wind on the spin entry.

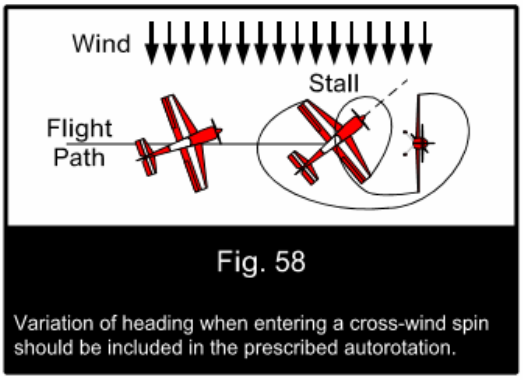


Fig. 58

Variation of heading when entering a cross-wind spin should be included in the prescribed autorotation.

c. There must be a stall in order to have a proper spin. As always, the competitor is given the benefit of the doubt, but if a judge is certain that no stall occurred, a zero (0) is to be given.

d. The stall and the wing drop that indicates the start of auto rotation are to occur simultaneously. If they do not occur simultaneously, a downgrade of 0.5 points for each 5 degrees of movement that occurs in one movement before the other movement is shown, e.g., if the nose drops 20 degrees before the wing drop is shown a 2 point penalty is applied.

e. Starting the spin rotation in the wrong direction of rotation with a subsequent correction that forces the aircraft into the proper direction of rotation is to be penalized. Rotation movement in the incorrect direction is to be downgraded at .5 point for each 5 degrees of incorrect rotation.

f. The rotation in a spin must be autorotation which can be difficult to discern. A clue to making the judgment on "autorotation or not" is that autorotation will have a visible yaw component to the rotation. Absent this yaw component, it is probable that the aircraft is in some kind of an aileron roll. If a judge is certain that no autorotation occurred, a zero (0) is to be given.

g. The spin element must complete precisely at the degree of rotation called for by the ARESTI and not be short or beyond the prescribed end point of the rotation. Any deviation is to be downgraded 0.5 points per 5 degrees that the aircraft completes the spin short or long of the prescribed stopping point. Note that autorotation must carry to completion. It is common to see a pilot come out of autorotation early and aileron to the finish of the spin. If this occurs a penalty of 0.5 points per 5 degrees is to be applied for the amount of “aileroning” used to complete the required rotation.

h. Upon completion of the prescribed degree of rotation a vertical down line is to be shown. Omission of this line is to be downgraded one (1) point. Note that roll or snap elements may be called for on this down line after a spin. If they are called for, no centering requirement applies to the placement of these elements on this down line.

ANNEX 5L
F3M LARGE R/C AEROBATIC POWER AIRCRAFT KNOWN SEQUENCES

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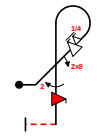
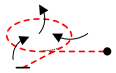
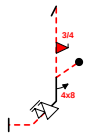
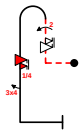
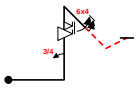
1		8.5.10.1 9.8.2.1 9.9.2.5 9.2.5.4 9.10.10.4	14 5 15 9 15	58		
2		2.3.5.2	36	36		
3		5.3.4.2 9.10.1.3 9.8.5.2 9.9.4.6	25 17 7 14	63		
4		8.4.4.2 9.9.6.6 9.2.1.4 9.10.10.5 9.4.5.3	14 22 13 17 8	74		
5		1.2.8.1 9.1.1.3 9.9.1.6 9.4.4.6	16 10 19 15	60		
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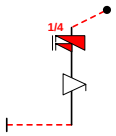
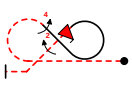
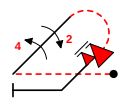
8		1.1.6.4 9.12.1.5 9.9.5.4	10 6 11	27		
9		7.8.1.2 9.4.4.4 9.10.4.4 9.2.4.4	20 11 13 9	53		
10		8.4.22.2 9.4.2.4 9.2.2.4 9.10.4.6	17 13 11 16	57		

FAI AEROMODELLING COMMISSION

Total K
471

Item	Mark
Air Space Control 15 K	
Sound 30 K	

Penalty	Yes/No
Break	

Judges Details
Signature
Name
Number

F3M Large R/C Power Model Aircraft	2016	FORM B
Unlimited Known		

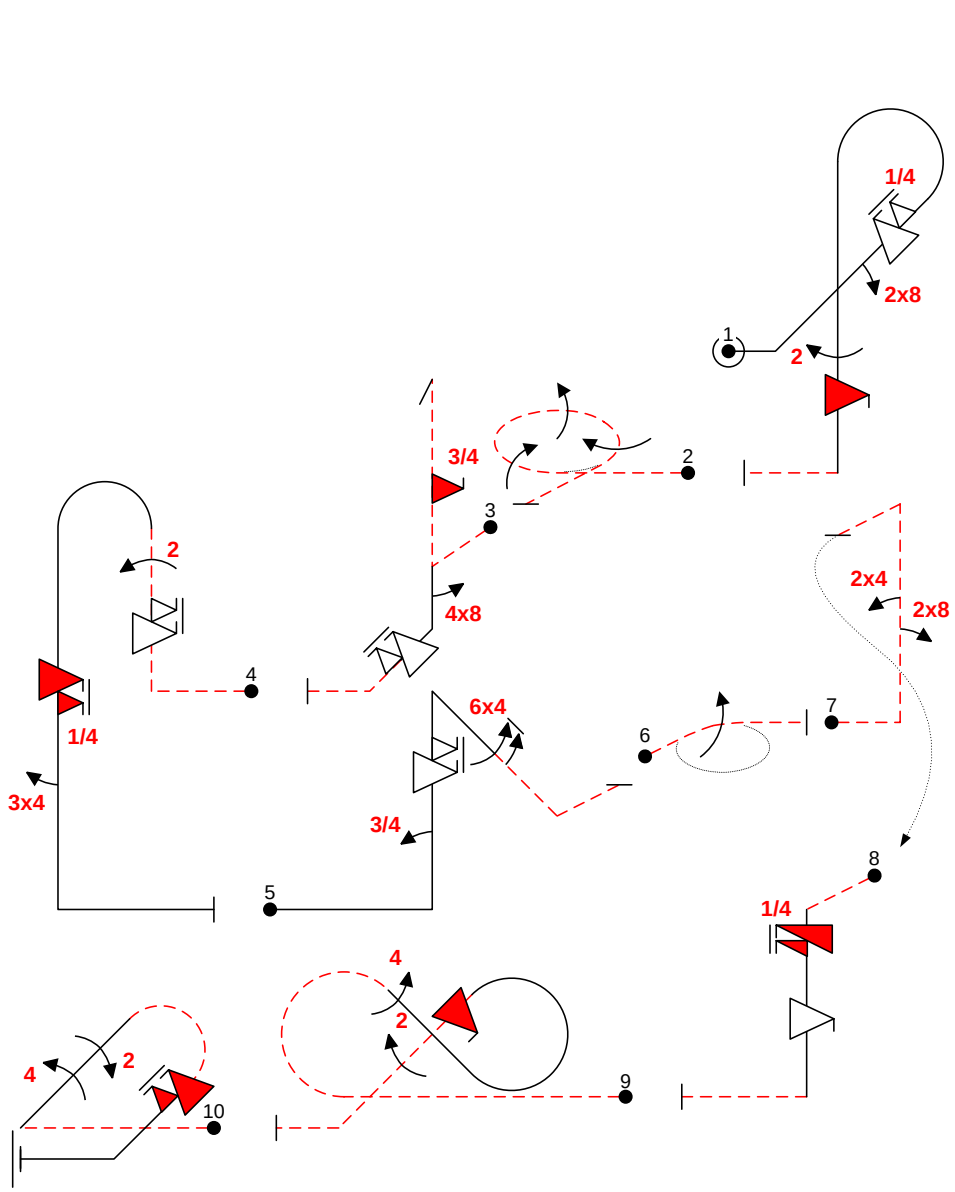


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Fig 3	5.3.4.2 9.10.1.3 9.8.5.2 9.9.4.6	25 17 7 14	63
Fig 4	8.4.4.2 9.9.6.6 9.2.1.4 9.10.10.5 9.4.5.3	14 22 13 17 8	74
Fig 5	1.2.8.1 9.1.1.3 9.9.1.6 9.4.4.6	16 10 19 15	60
Fig 6	2.1.3.4	16	16
Fig 7	1.1.6.2 9.4.1.2 9.8.1.1	11 9 7	27
Fig 8	1.1.6.4 9.12.1.5 9.9.5.4	10 6 11	27
Fig 9	7.8.1.2 9.4.4.4 9.10.4.4 9.2.4.4	20 11 13 9	53
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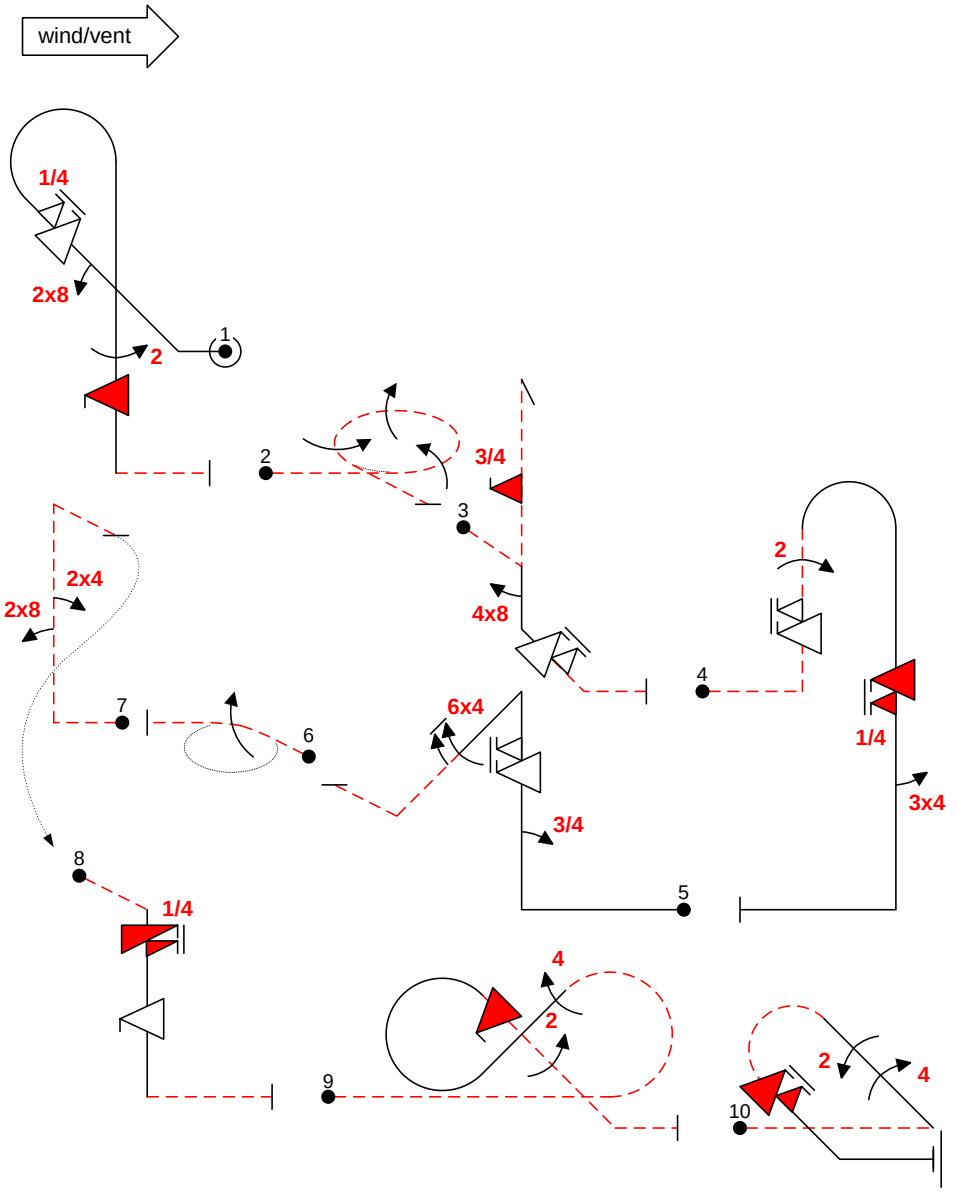

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Fig 2	2.3.5.2	36	36
Fig 3	5.3.4.2 9.10.1.3 9.8.5.2 9.9.4.6	25 17 7 14	63
Fig 4	8.4.4.2 9.9.6.6 9.2.1.4 9.10.10.5 9.4.5.3	14 22 13 17 8	74
Fig 5	1.2.8.1 9.1.1.3 9.9.1.6 9.4.4.6	16 10 19 15	60
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Fig 8	1.1.6.4 9.12.1.5 9.9.5.4	10 6 11	27
Fig 9	7.8.1.2 9.4.4.4 9.10.4.4 9.2.4.4	20 11 13 9	53
Fig 10	8.4.22.2 9.4.2.4 9.2.2.4 9.10.4.6	17 13 11 16	57
Total K = 471			

F3M Large R/C Power Model Aircraft 2017

Form A

Pilot ID

Unlimited Known

Flight #

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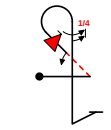
1		8.5.15.1 9.10.7.4 9.1.2.2 9.1.5.5	16 17 6 9	48		
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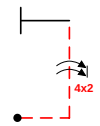
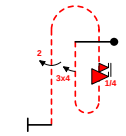
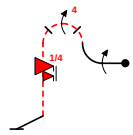
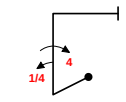
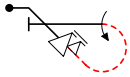
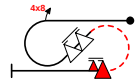
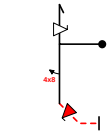
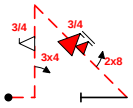
3		1.1.7.2 9.2.1.8	12 21	33		
4		8.8.2.3 9.4.5.3 9.10.1.5 9.2.5.4	24 8 20 9	61		
5		8.6.13.1 9.4.3.4 9.10.5.5 9.1.3.4	13 11 15 8	47		
6		1.1.6.1 9.4.1.4 9.1.1.1	10 15 6	31		
7		8.5.2.3 9.9.4.6 9.1.3.4	13 14 8	35		
8		7.5.6.3 9.8.3.2 9.9.2.8 9.10.3.6	16 7 20 16	59		
9		5.3.3.3 9.9.1.4 9.8.5.2 9.10.4.4	20 15 7 13	55		
10		1.2.14.2 9.4.1.3 9.9.6.3 9.10.4.7 9.8.4.1	18 12 17 18 3	68		

FAI AEROMODELLING COMMISSION

Total K
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Item	Mark
Air Space Control 15 K	
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Break	

Judges Details
Signature
Name
Number

F3M Large R/C Power Model Aircraft	2017	FORM B
Unlimited Known		

wind/vent

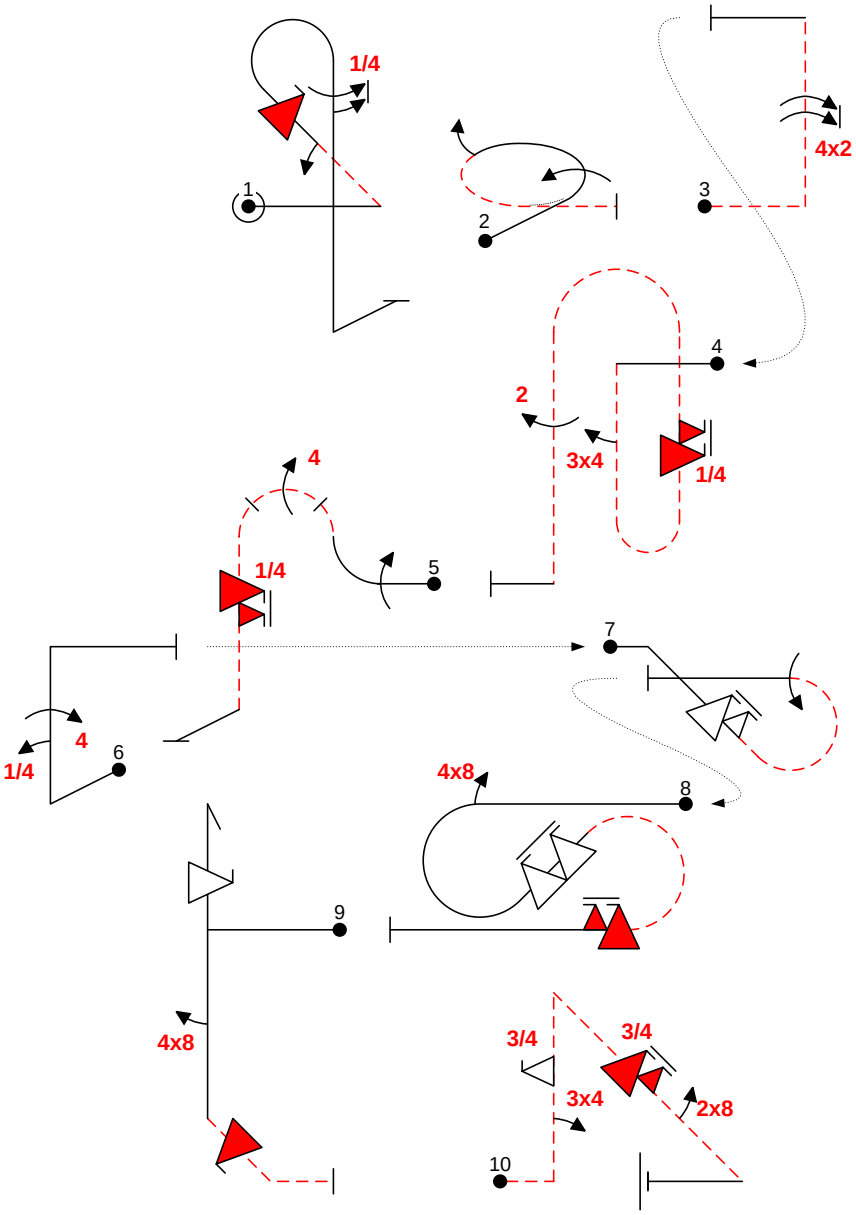

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Fig 3	1.1.7.2 9.2.1.8	12 21	33
Fig 4	8.8.2.3 9.4.5.3 9.10.1.5 9.2.5.4	24 8 20 9	61
Fig 5	8.6.13.1 9.4.3.4 9.10.5.5 9.1.3.4	13 11 15 8	47
Fig 6	1.1.6.1 9.4.1.4 9.1.1.1	10 15 6	31
Fig 7	8.5.2.3 9.9.4.6 9.1.3.4	13 14 8	35
Fig 8	7.5.6.3 9.8.3.2 9.9.2.8 9.10.3.6	16 7 20 16	59
Fig 9	5.3.3.3 9.9.1.4 9.8.5.2 9.10.4.4	20 15 7 13	55
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F3M Large R/C Power Model Aircraft	2017	FORM C
Unlimited Known		

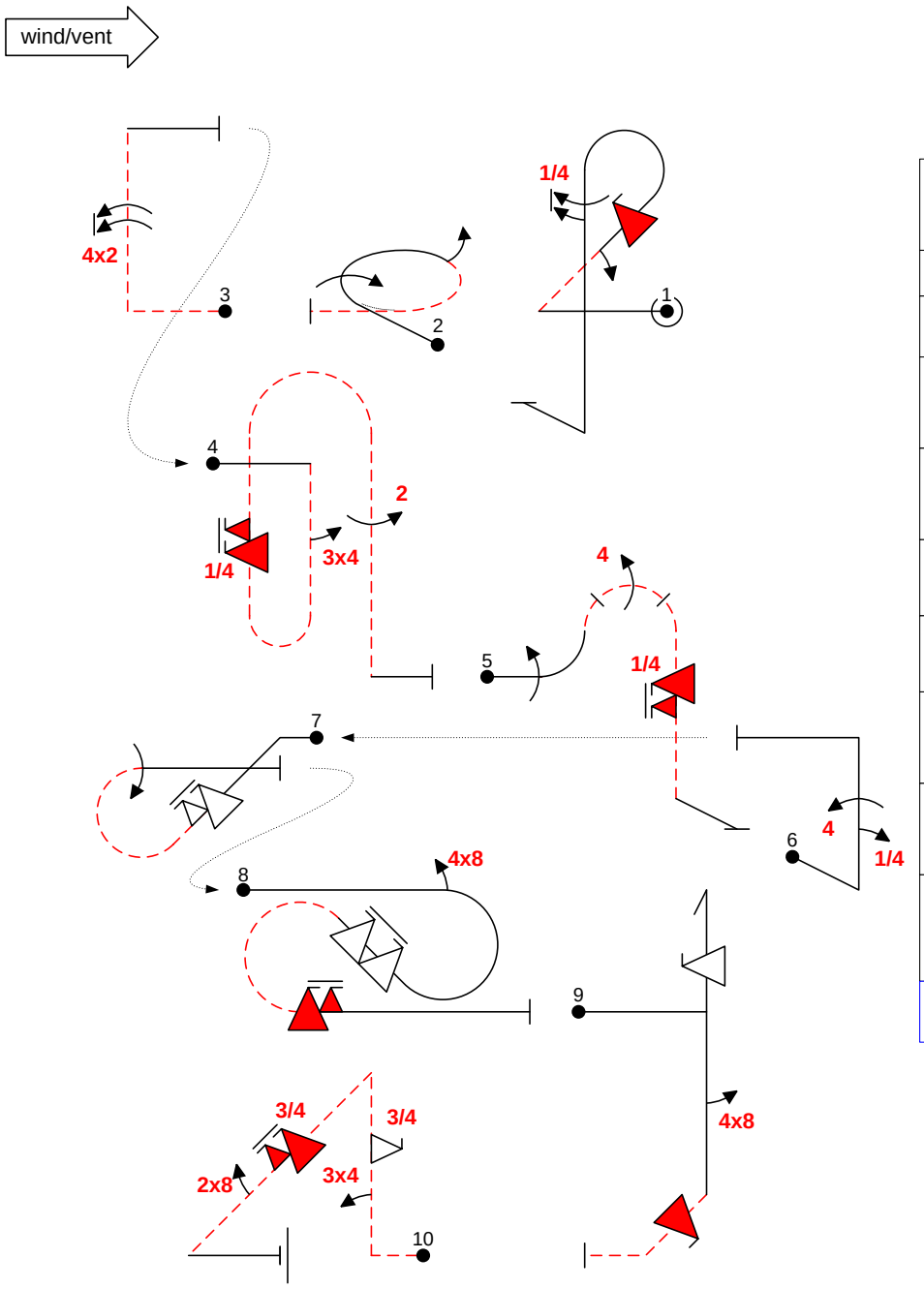

Fig 1	8.5.15.1 9.10.7.4 9.1.2.2 9.1.5.5	16 17 6 9	48
Fig 2	2.3.3.1	37	37
Fig 3	1.1.7.2 9.2.1.8	12 21	33
Fig 4	8.8.2.3 9.4.5.3 9.10.1.5 9.2.5.4	24 8 20 9	61
Fig 5	8.6.13.1 9.4.3.4 9.10.5.5 9.1.3.4	13 11 15 8	47
Fig 6	1.1.6.1 9.4.1.4 9.1.1.1	10 15 6	31
Fig 7	8.5.2.3 9.9.4.6 9.1.3.4	13 14 8	35
Fig 8	7.5.6.3 9.8.3.2 9.9.2.8 9.10.3.6	16 7 20 16	59
Fig 9	5.3.3.3 9.9.1.4 9.8.5.2 9.10.4.4	20 15 7 13	55
Fig 10	1.2.14.2 9.4.1.3 9.9.6.3 9.10.4.7 9.8.4.1	18 12 17 18 3	68
Total K = 474			

Reason: The Large R/C aerobatic power aircraft is now days practised by a large range of competitors throughout the world. There is a large international development potential for this subject, still, three different organizations coexist (CIAM F3M class, AMA RC scale aerobatics - IMAC, European Acro Cup - DMFV) and having each one

its own rules (meanwhile the specifications of the planes which are flying with those settlements are almost the same).

Because of a lack of representation of F3M class at the F3 subcommittee these last years, of inapplicable or missing rules, the current F3M rules are not suitable.

The F3M rules have to be deeply reconsidered in order to make sure that it will be compatible with the other rules in force and suitable for organisation of a World Cup, World and continental championships and World Air Games.

Almost all items are to be modified, deleted or added in comparison to the actual rules. Some explanations are to be given to facilitate the understanding of the changes.