

F3A R.C. AEROBATICS JUDGES' GUIDE

- 5B.1. **Purpose:** The purpose of the FAI F3A Judges' Guide is to furnish an accurate description of the major classes of aerobatic manoeuvres and their judging criteria as reference for use in developing a uniformly high, accurate, and consistent standard of judging.
- 5B.2. **Principles:** The principles of judging the performance of a competitor in a R/C Aerobatic competition is based on the perfection with which the competitor's model aircraft executes the aerobatic manoeuvres as described in Annex 5A. The main principles used to judge the degree of perfection are:
1. Precision of the manoeuvre.
 2. Smoothness and gracefulness of the manoeuvre.
 3. Positioning or display of the manoeuvre.
 4. Size of the manoeuvre, relative to the manoeuvring area and other manoeuvres in the flight.

The above requirements are listed in order of importance. However, all of them must be met for a manoeuvre to receive a high score.

5B.3. ACCURATE AND CONSISTENT JUDGING

The most important aspect of consistent judging is for each judge to establish his standard and then maintain that standard throughout the competition. It is advisable for the jury president, in conjunction with the contest director and the championship organiser to hold a conference prior to the start of the competition, in order to discuss judging and make the standards as uniform as possible. This is followed by some practice flights which all judges score simultaneously and privately. After these flights, the defects in each manoeuvre should be discussed by all judges and agreement reached about the severity of the defects. Once the contest is started, the individual judge must not alter his standard under any influence.

An accurate standard of judging is also very important. Being a consistent judge, whether high or low, is not good if the scores awarded are not a fair reflection of the manoeuvre performed.

5B.4. CRITERIA FOR JUDGING MANOEUVRES

In Annex 5A, a description of each manoeuvre is given, with judging notes with some manoeuvres. Each manoeuvre must be downgraded according to:

1. The type of defect.
2. The severity of the defect.
3. The number of times any one defect occurs, as well as the total number of defects.
4. The positioning of the manoeuvre.
5. The size of the manoeuvre, relative to the manoeuvring area and relative to other manoeuvres being flown.

A high score should be given only if no major defects are found and the manoeuvre is well positioned. When in doubt, give the lower score.

5B.4.1. ATTITUDE AND FLIGHT PATH

The flight path of a model aircraft is the trajectory of its centre of gravity. The attitude is the direction of the fuselage centre-line in relation to the flight path.

If not otherwise stated, all judging is based on flight path.

5B.4.2. THE 1 POINT/15 DEGREE RULE

This basic rule provides a general guide for downgrading deviations from defined manoeuvre geometry. One point must be subtracted for each approximate 15 degrees deviation. In general, lines can and must be judged more critically than deviations in yaw or roll.

5B.4.3. GRADING CRITERIA FOR THE INDIVIDUAL MANOEUVRES

These criteria are furnished to provide the judge with a guide for downgrading deviations from the defined manoeuvre geometry. The manoeuvres are divided into their different components; lines, loops, rolls, stall-turns, snap-rolls, spins and loop/roll combinations.

5B.4.3.1 LINES

All aerobatic manoeuvres are started and ended by a horizontal line. When no line is flown between two manoeuvres, the just-completed manoeuvre must be downgraded by 1 point, and the upcoming manoeuvre must be downgraded by 1 point.

The total length of a vertical or climbing line, as dictated by the performance of the model aircraft, is not a grading criterion. The performance of the model aircraft must not be allowed to influence a judge's mark.

All lines within a manoeuvre have a beginning and an end which define their length. They are preceded and followed by part loops. The length of a line should only be graded when a manoeuvre contains several lines with a given relationship, as in a square loop. If there is a minor mis-relation, 1 point is subtracted, and more points are subtracted for greater defects.

Whenever a type of roll is placed on a line, the length of the line before and after the roll must be equal. One point is subtracted for a reasonable difference, and two points for a greater difference. If there is a complete absence of a line before or after the roll, 3 points are subtracted.

5B.4.3.2. LOOPS

A loop must have, by definition, a constant radius, and must be flown in the vertical plane throughout. It starts and ends by a well defined line which, for a complete loop, is horizontal. For a part-loop, however, such lines may be in any other plane of flight as required by the particular manoeuvre being flown.

The loops and part-loops within one manoeuvre must have the same radius. Each occurrence of a slight difference in radius must downgrade the manoeuvre by 1 point, while more severe differences may downgrade it by 2 or 3 points for each occurrence.

Every loop or part-loop must be flown without interruption to the circular flight path. Every clearly seen segmentation must be downgraded by 1 point.

If the loop is not flown entirely in the vertical plane, i.e. it drifts closer or further from the judges, minor drift must be downgraded by 1 point, while more severe drift must be downgraded by several points.

In three-, four-, six-, and eight-sided loops, higher marks must not be awarded for flying tight, high G corners. The main criteria is that the loop must have the sides at the correct angles for the defined number of times, and all part-loops must have the same radius.

5B.4.3.3. ROLLS

Rolls may be flown as individual manoeuvres, or as parts of other manoeuvres. The following criteria apply to all rolls:

- a) The rate of roll must be constant. Small variations in roll-rate must be downgraded by 1 point, while more severe variations must receive heavier downgrades. Slowing down the roll rate towards the end of a roll must be downgraded using the 1 point/15 degree rule.
- b) The roll must have a crisp and well-defined start and stop. If a start or stop is badly defined, 1 point is subtracted for each.
- c) All rolls flown on lines between part-loops must be placed on the middle of that line. For downgrading, see 4.3.1.
- d) Point-rolls must have the same roll rate, and the points must be of equal duration on each point. One point is subtracted for slight variations, while more severe mis-timing is further downgraded. If one or more point is not visible, or there are more than the required number of points, the manoeuvre is severely downgraded by 5 or more points.

5B.4.3.4. STALL-TURNS

The criteria in this manoeuvre are mainly about lines. The lines must have exactly vertical and horizontal flight paths.

The model aircraft must pivot around its centre of gravity, in the yaw axis, for the manoeuvre to receive a high score. If the model aircraft does not pivot on the CG, but within a radius of 1/2 wingspan, one point is subtracted. For a radius of pivot up to one wingspan, 2 points are subtracted, and if the radius exceeds 1 1/2 wingspan, the manoeuvre is severely downgraded. A radius of pivot of 2 wingspans or more is considered a wing-over and a zero score must be awarded. If the model aircraft should "torque-off" during the stall turn, a downgrade must be applied using the 1-point/15 degree rule. If the model aircraft flops forward or backward in a stall turn, a zero score must be awarded.

If the model aircraft shows a pendulum movement after the pivot, the manoeuvre is downgraded by one point. Drift of the model aircraft during the stalled condition must be ignored, provided the model aircraft does not drift outside the aerobatic zone.

The entry and exit must consist of part-loops with constant and equal radius.

Any types of rolls must be placed on the middle of the lines. The length of the vertical lines is not a judging criteria.

5B.4.3.5. **SNAP-ROLLS**

A snap-roll (or rudder roll) is a rapid autorotative roll where the model aircraft is in a stalled attitude.

Snap-rolls have the same judging criteria as axial rolls as far as start and stop of the rotation, and constant flight path through the manoeuvre is concerned.

At the start of a snap-roll, the fuselage attitude must show a definite break and separation from the flight path, before the rotation is started, since the model aircraft is supposed to be in a stalled condition throughout the manoeuvre. If the stall/break does not occur and the model aircraft barrel-rolls around, the manoeuvre must be zeroed. Similarly, axial rolls disguised as snap-rolls must be zeroed.

Snap-rolls can be flown both positive and negative, and the same criteria apply. If the model aircraft returns to an unstalled condition during the snap-roll, the manoeuvre is severely downgraded.

5B.4.3.6. **SPINS**

All spins begin and end with horizontal lines. In order to spin, the model aircraft must be stalled. The entry is flown in a horizontal flight path with the nose-up attitude increasing as the speed decreases. Drift of the model aircraft from the flight path at this point should not be downgraded, since it is in a near-stalled condition. However, severe yawing is cause for downgrading. A climbing flight path just prior to the spin must be downgraded, using the 1-point/15 degree rule. The nose then drops as the model aircraft stalls. Simultaneously as the nose drops, the wing also drops in the direction of the spin. Drift during the rotation of the spin should not be downgraded since the model aircraft is in a stalled condition, provided the model aircraft does not drift outside the aerobatic zone.

If the model aircraft does not stall or if the model aircraft is snap-rolled into the spin, the manoeuvre is zeroed. If the model aircraft slides into the spin (is loathe to spin), the manoeuvre must be downgraded by using the 1/point per 15 degree rule. Forcing the model aircraft to spin in the opposite direction as the initial rotation must be severely downgraded.

After the defined number of turns, the stop of rotation is judged in the same manner as for a roll, i.e. one point downgrade for each 15 degree deviation of heading.

A vertical downward line of visible length must be held after the rotation stops. The pull- or push-out is judged like a part-loop and if followed by a part-roll, should be separated by a well-defined segment of straight flight. Remember that different models spin in different attitudes, and that the attitude is not to be taken into consideration, as long as the model aircraft is stalled. Any reversals in direction must be immediate, and if the model aircraft returns to an unstalled condition during the spin, the manoeuvre is severely downgraded.

5B.4.3.7. **LOOP/ROLL COMBINATIONS**

These combinations are used extensively in centre manoeuvres turn-around manoeuvres. They are very diversified, but all are combinations of loops, part-loops, rolls, point-rolls, part rolls, snap-rolls and lines. All judging criteria for these apply.

There are, however, some judging criteria which should be explained further. In the Immelmann turn and split S manoeuvres and variations, the half roll, snap-roll, point-roll, or full roll should be performed immediately after or before the half loop as required by the particular manoeuvre. A visible line in between the two components must downgrade the manoeuvre by 2 points.

On half Cuban eights and half reverse Cuban eights, the roll, point-roll, or snap roll should be placed on the middle of the line. The radii of the part-loops must all be the same.

In humpty-bumps, the radius of the part-loop on the top (or bottom) and the exit part-loop must be constant, and be the same as that of the entry part-loop. Falling forward (or tight radius) must be downgraded.

5B.4.4. **WIND CORRECTION**

All manoeuvres are required to be wind corrected in such a way that the shape of the manoeuvre as described in Annex 5A is preserved in the model aircraft's flight path. The exceptions to this grading criteria are in the stall turns, and spins, where the model aircraft is in a stalled condition.

5B.4.5. POSITIONING

The entire flight must be within the aerobatic zone to avoid being penalised. A centre manoeuvre must be flown with its centre 90 degrees in front of the judges line. If the manoeuvre is flown off-centre, it must be downgraded according to the misplacement. This may be in the range of 1 to 4 points subtracted.

If an entire manoeuvre including entry and exit is flown out of the aerobatic zone, it must be zeroed. Downgrades for flying a manoeuvre partially out of the zone should be in proportion to the degree of infraction, i.e. a small part of the manoeuvre (10%) flown past the 60 degree line would call for a minor downgrade (10%), perhaps one point, while more of the manoeuvre (say 30% or 40%) flown past the 60 degree line must be downgraded more severely (30% or 40%), say three or more points. Also, violations of the 60 degree line that occur near the 150 metre line (i.e. approximately over the 60 degree flags) should be downgraded much less severely than violations along a line further out and more distant from the judges.

Vertical height should not exceed 60 degrees and downgrades for flying a manoeuvre partially out of the zone should be in proportion to the degree of infraction as stated above.

Flying so far out as to make evaluation of a manoeuvre difficult should be severely downgraded. The main criteria here is *visibility*. For a large, highly visible model aircraft, a line of flight approximately 175m in front of the pilot may be appropriate, while a smaller less visible model aircraft might have to be flown at say 140 to 150m. Manoeuvres performed on a line greater than approximately 175m in front of the competitor must be downgraded under any circumstances as even the keenest eye begins to lose perspective at this distance. Manoeuvres performed on a line greater than 200m in front of the competitor must be downgraded severely.

In general, turn-around manoeuvres are positioning manoeuvres. Therefore, entry and exit altitude need not be the same if the pilot wishes to make an altitude adjustment.

5B.4.6. EXAMPLES

An avalanche is entered in a slight climb, the flight path turns 15 degrees to one side after the snap and a wing is 15 degrees low during the exit. $10 - 1 - 1 - 1 = 7$ points.

A 4-point roll is started late and ends up slightly off-centre and the third point is not visible. $10 - 1 - 6 = 3$ points.

An Immelmann turn is not well-rounded, the half roll is started before the model aircraft reaches the top of the loop, with the wing 15 degrees low and the flight path of the model aircraft 20 degrees off heading. $10 - 1 - 2 - 1 - 2 = 4$ points.

A snap-roll on a 45 degree downline appears to be nothing more than an axial roll with a wiggle of the tail of the model aircraft. $10 - 10 = 0$ points.

On the downwind leg of a landing sequence, a knife-edge pass is performed. This must be considered as “hot-dogging”. $10 - 10 = 0$ points.

A square loop with half rolls has the first leg climbing 100 degrees. The model aircraft gallops in elevation across the top, stops the vertical downward half roll 15 degrees too early, is corrected, and the last half roll ends up 10 degrees to one side of the centre-line. $10 - 1 - 2 - 1 - 1 = 5$ points.

On a top hat with $\frac{1}{4}$ rolls, the model aircraft is accidentally rolled in the wrong direction and the horizontal flight is performed upright instead of inverted. $10 - 10 = 0$ points.

During the take-off sequence, the model aircraft runs off the runway, is retrieved by the helper and a successful take-off is performed. $10 - 10 = 0$ points. Only one attempt at a manoeuvre is allowed and a second attempt at taking-off must be scored zero.

The competitor starts a flight by taking-off from left to right, completes the flight and discovers that the wind has changed, and lands from right to left. $10 - 10 = 0$ points. This instance would indicate that the landing sequence was not followed. In some cases the contest director may call for a landing from the other direction if there were a strong change in wind direction, and safety would be compromised with a down-wind landing. In such a case, the landing would be scored a 10.

In the middle of a double Immelmann, which is manoeuvre number 12, a competitor experiences an engine cut and the manoeuvre is not completed. $10 - 10 = 0$ points. The rest of the manoeuvres are also awarded zero points, including the landing sequence.

An otherwise flawless two-turn spin is about 45 degrees off-centre. This must be considered as a severe misplacement. $10 - 4 = 6$ points.

During a stall turn in dead-calm conditions, the flight path of the model aircraft is exactly vertical, but the model aircraft is “skidded” 15% in the upline to ensure a turn. The model aircraft shows a pendulum movement after the stall turn, and the half roll in the downline is performed directly before the part-loop exit. $10 - 1 - 1 - 3 = 5$ points.

A loop with a roll on top has the roll performed rapidly with no attempt by the competitor to integrate to roll with the top 90 degree quadrant of the loop. $10 - 3 = 7$ points.

A half reverse Cuban eight is started too late, and the pilot squeezes the manoeuvre together by flying a 60 degree upline and making no line after the half roll. The manoeuvre still gets about halfway (50%) out of the zone. $10 - 1 - 3 - 5$ (misplacement, going out of the zone) = 1 point.

During an inverted spin entered flawlessly, the model aircraft unstalls and makes the final 90 degree of rotation as a vertical axial roll. $10 - 6 = 4$ points.

A competitor flies a flawless 8-point roll. $10 - 0 = 10$ points. You will not see too many of these in a competition but a manoeuvre should be awarded a 10 if there are no detectable flaws that would otherwise downgrade it to a 9.

A competitor performs a near-perfect split-S, and the only flaw is a very slight, barely visible low wing on exit. $10 - 0 = 10$ points. In some cases, an error may be so slight that a judge may want to consider giving a score of 10, rather than wait for the perfect manoeuvre to arrive.

A competitor performs a manoeuvre other than that stated on the score sheet. $10 - 10 = 0$ points.

After this incident, the competitor performs the rest of the manoeuvres out of sequence, and no manoeuvres correspond to the manoeuvres stated on the score sheet, in the order in which they are listed. All manoeuvres affected in this way score 0 points.

During a figure M, the model aircraft disappears from view behind a low cloud, so that only one stall turn is visible. Score = N/O. The competitor will probably be awarded a reflight of the manoeuvre affected.

During an avalanche, a judge fails to notice the snap-roll at the top of the manoeuvre. Score = N/O. The score tabulators will enter the numerical average of the other judges' scores.