Supplementary Explanations to the

F3 RC Aerobatic Power Model Aircraft Manoeuvre Execution Guide

FAI Sporting Code Section 4 – Aeromodelling
Volume F3 Radio Control Aerobatics, Annex 5B
The purpose of the Manoeuvre Execution Guide is to give accurate guidelines for the proper execution of aerobatic manoeuvres to both, judges and competitors.
The flight path of a model aircraft is used to judge the shape of all manoeuvres.

Every manoeuvre must be entered and exited with a straight level upright or inverted flight of recognisable length.
Centre manoeuvres start and finish on the same heading, while turn-around manoeuvres finish on a track 180 degrees to entry. When appropriate, entry and exit of centre manoeuvres must be at the same altitude, unless specified otherwise.

Positioning adjustments in altitude are allowed in turn-around manoeuvres.
QUALITIES OF A GOOD JUDGE...

CONSISTENCY
JUDGING ACCURACY
IMPARTIALITY
Judging ACCURACY

Downgrade by up to 1 point for a **minor** defect
Downgrade by up to 2 points for a **larger** defect
Downgrade by 3, 4, 5, more points for **major** defect

Do **NOT** downgrade 4 points for a **minor** defect
Do **NOT** downgrade 1 point for a **major** defect
CONSISTENCY

Minor defect on manoeuvre 3 = score 9
Minor defect on manoeuvre 7 = score 9
Major defect on manoeuvre 9 = score 4
Major defect on manoeuvre 11 = score 6
Minor defect on manoeuvre 12 = score 3
Major defect on manoeuvre 15 = score 8

(Scores must be in the same range, for similar defects)
<table>
<thead>
<tr>
<th>PILOT</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
<th>Value 4</th>
<th>Value 5</th>
<th>Value 6</th>
<th>Value 7</th>
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<td>464</td>
<td>+1,0</td>
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MAINTAIN YOUR STANDARD!
A judge must not, under any circumstances, favour a competitor, or a national team, or a particular flying style, or brand of equipment, or propulsion method.

Defects by “Celebrity-Competitors” must be downgraded the same way as with “Average-Competitors”

Judges must only look at the lines of manoeuvres described in the sky.
Conversely, acts of negative bias towards a competitor, or a national team, or a flying style, or brand of equipment, or a propulsion method, must be viewed in a serious light, and corrective action may be necessary.
THE PRINCIPLES of flying and judging the performance of a competitor in an 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.
Geometrical accuracy of the manoeuvre
Smoothness and gracefulness of the manoeuvre
Positioning of the manoeuvre within the manoeuvring zone
Size of the manoeuvre
WEIGHTING

- Precision: approximately 60%
- Smothness and Gracefulness: approximately 20%
- Positioning: approximately 10%
- Size: approximately 10%
Proportion of the manoeuvre outside of the manoeuvring zone
GENERAL CRITERIA FOR DOWNGRADING MANOEUVRES

“Criteria...are standards by which something can be judged”
1. WHAT WAS THE DEFECT, or mistake?
Over, or under-rolling (or spin, or snap)
Poor shape or geometry
Rolls not on middle of lines
Absence of lines
Entry, exit poor
Wrong angles
Misrelation between line lengths
Different roll rates
Etc.
2. **HOW SERIOUS** was the defect, or mistake?

Was it big (major)?
Or was it small (minor)?
3. **HOW OFTEN** did you see the same defect, or mistake in a particular manoeuvre?

How many defects were there in **TOTAL**?
4. WHAT WAS THE POSITIONING of the manoeuvre?
5. WHAT WAS THE SIZE of the manoeuvre?
6. Was the manoeuvre partially or completely outside of the manoeuvring zone?
100% PRECISION
+
SMOOTHNESS &
GRACEFULNESS
+
CORRECT
POSITIONING
+
CORRECT SIZE
=
NO DOWNGRADE
=
10 POINTS!
Deduct/Downgrade System

Use the deduction/downgrade system not impression!

ALWAYS START WITH PERFECT 10 ...

As the pilot starts!

Then

9.5...9...8.5...8...7.5...7...6.5...6...5.5...5... etc..

A mark resulting from downgrading steps must not be upgraded again in any case, i.e. because the manoeuvre contained „something nice“!
Deduct/Downgrade System

Score input without scribe

Electronic Scribe
by Peter Vogel/USA

+ No scribes needed.
+ Scores input directly to the computer.
+ Live scoring is possible.

Notaumatic/FRA

Bartovsky System/CZE,
similar to Kraiwiesen system by Oswald Hajek/AUT

- Very experienced judges needed, especially with unknown schedules.
CRITERIA FOR JUDGING INDIVIDUAL MANOEUVRES

(Method)
ARESTI SYSTEM

- Start of manoeuvre
- Rolling circle (3 outside)
- Inverted rolling circle (1 inside)
- Positive G spin (upright)
- Negative G spin (inverted)
- 2 1/2 Negative spin (inverted)
- 2 Positive G spins (reverse direction)
- End of manoeuvre
- Stall turn
- Avalanche (negative snap)
- Humpty bump (centre)
- Humpty bump (turnaround)
- Cross-box manoeuvre (horizontal flight always inverted)
- Upright, positive G
- Inverted, negative G
Point rolls were "buried" in 2009. Since 2012 we have consecutive part rolls.
The flight path of a model aircraft is the trajectory of its centre of gravity. The attitude is the direction of the fuselage centreline in relation to the flight path. If not otherwise stated, all judging is based on flight path.
Wind Correction

All manoeuvres are required to be wind corrected, except SNAP ROLLS, SPINS, and STALL TURNS (the model aircraft is in a stalled condition)
Wind Correction

Flight path of model aircraft must describe correct geometric shape.
As a guide for downgrading deviations from the defined manoeuvre geometry, the manoeuvres are divided into their different components:

Lines, loops, rolls, snap-rolls, horizontal circles,
Line/loop/roll/horizontal circle combinations,
Stall turns, and spins.
1 POINT PER 15° DEVIATION

Perfect geometry = No downgrade

Up to 15° error = 1 point downgrade

Up to 30° error = 2 point downgrade

Up to 45° error = 3 point downgrade

Wings level - roll axis

Horizontal lines - pitch axis
1 POINT PER 15° DEVIATION

Perfect geometry = No downgrade

Up to 15° error = 1 point downgrade

Up to 30° error = 2 point downgrade

Up to 45° error = 3 point downgrade

Vertical lines - pitch axis

Vertical lines - yaw axis
In general, lines must be judged more critically than deviations in yaw and roll.
Minor mis-relation between line lengths = minus 0.5 point!

No line between manoeuvres... = minus 1 point here... and minus 1 point here!

Line after and Before roll = not equal... up to minus 2 points!

No line after roll... = minus 3 points!

(This example maybe minus 2 or 3!)
Each segmentation... minus 0,5 point!

This = minus 2 points!

All part-loop radii equal. Minor mis-relation... to minus 0,5 point!

Radius too tight

LOOPS

Radii too tight... ...too open/loose... Good compromise!

The first radius of a manoeuvre does not define the radii for the remaining radii of a manoeuvre but it is a starting point. As the manoeuvre progresses, the judge will compare each radius that was just flown to the last radius flown and if there is a difference, then a downgrade will be given based on the severity of the difference.
Rolls
(Continuous Rolls and Part-Rolls)
The start and stop of the rotation must be crisp and well-defined. If a start or stop is badly defined, 0.5 or more points are to be subtracted for each.
Between consecutive continuous rolls and part-rolls in opposite direction there must be no line!

Roll rate of Part-rolls may be different to roll rate of continuous rolls

Not equal length of lines between part-rolls up to minus 1 point for each!

Different roll rate... up to minus 1 point!

If, in the manoeuvre description of a roll combination, the roll direction is not specified, then the rolls must go in the same direction.

Between consecutive continuous rolls and part-rolls in opposite direction there must be no line!
Missing or additional Part-Rolls:
Use the 1 point per 15° rule

- 1 missing ½ roll: (180 degrees) = Zero points
- 1 missing ¼ roll: (90 degrees) = -6 points
- 1 missing 1/8 roll: (45 degrees) = -3 points
- the same deductions apply with additional part-rolls
Barrel Rolls

You first pull into a 45° upline, then at mid level you start to perform a full roll with the flight path going around a horizontal cylinder in a spiral (as the thread of a screw in a 45° pitch).
A SNAP ROLL is basically a spin in the horizontal axis.

The model aircraft rolls rapidly, with a continuous high angle of attack (positive or negative).

The tail should describe a corkscrew path.
SNAP ROLLS

“BREAK” here

FLIGHT PATH (centre of gravity) must be level

Separation of fuselage attitude from flight path
Snap Rolls

Negative Snap Roll

Positive Snap Roll

In the F3A schedules snap rolls may be positive or negative!
SNAP ROLLS, DOWN (and UP)

NEGATIVE SNAP = DOWN elevator

POSITIVE SNAP = UP elevator

NEGATIVE SNAP = DOWN elevator
Barrel roll or axial roll instead of snap roll:
downgrade more than -5 points
Bad guys say:

If it is not a BARREL ROLL...  X

...and it’s not an AXIAL ROLL...  X

...then it’s probably...

A SNAP ROLL!
Torque - Rolls

The model aircraft is hovering in a vertical attitude and in a fixed position at no flying speed.

Absence of a hover must be zeroed.

Otherwise torque - rolls are judged the same way as axial rolls.
Horizontal Circles

• Constant high or low altitude
• Circular flight path maintained
• Continuous rolling, at constant rate
• Rolls positioned correctly
• Any reversals to be immediate
Horizontal Circles
(Rolling Circles)

May be AWAY from competitor...

OR...

...towards competitor.
Horizontal Circles (Rolling Circles)

- Second roll to inside
- Reversal is immediate
- Constant Roll rate
- At 90° position of circle
- At 270° position of circle
- With one roll to outside, and one roll to inside
- First roll to outside

With one roll to outside, and one roll to inside.
Horizontal Circles (Triangle)
Horizontal Circles
(Double Immelmann)
Whenever a continuous roll, part-roll, snap roll, or a consecutive combination of these is placed on a line, the length of the line before and after the roll or the combination of consecutive rolls must be equal. 0.5 point is subtracted for a minor difference, and 1 or more points for a major difference. If there is a complete absence of a line before or after the roll, 3 points are subtracted.
There is nothing about the length of the lines between the part loops in the Sporting Code!
Line/Loop/Roll/Horizontal Circle COMBINATIONS

SQUARE LOOP ON CORNER

All lines 45°. All lines equal length

Radii all equal

1/4 loop entry and exit

1/4 loop

Rolls in middle of lines

1/8 loop entry and exit

3/4 loop

1/2 roll on middle of line

Radii equal

FIGURE 9

1/4 loop
Line/Loop/Roll/Horizontal Circle COMBINATIONS

GOLF BALL

3/4 loop

1/8 loop

1/8 loop

Radii all equal

1/8 loop

1/2 roll on middle of line

45° DOWN

1/8 loop

Radii equal

Comet

Rolls on middle of the lines, but not necessarily in the center of the manoeuvre.
Line/Loop/Roll/Horizontal Circle COMBINATIONS

HUMPTY BUMP

1/4 loop

1/4 loop

1/2 loop

Radii not equal!

Loop not round

Loop not round

Straight flight here... downgraded!

VERTICAL 8 (Note shape: loops are barely touching)
Line/Loop/Roll/Horizontal Circle
COMBINATIONS

LOOPS WITH INTEGRATED ROLLS

Rolls or part rolls integrated with loop

Loops must be ROUND!

Rapid rolls MUST score less. This example = minus 4 for non-integration of roll
The model must stop before pivot. If not downgrade.
STALL TURNS

“Skid” or “no stop” before reaching Stall position...

Wing-over...
ZERO!

Torque-off...
1pt/15 degree downgrade

Wing-over = 2 wing spans or more.

Flop forwards, or backwards... ZERO!

Drift of the model aircraft during the stalled condition must be ignored, provided the model aircraft does not drift outside the manoeuvring zone.

Minus 1 point!
SPINS

Level entry

Nose-up attitude

Nose-up attitude increases

Model aircraft spins around CG

Stall... nose and wing drops... rotation starts

15° to 30°... minus 2!

30° to 45°... minus 3!

15° to 30°... minus 3!

Up to 15°... minus 1!

30° to 45°... minus 3!

90° overspin... minus 6!

STOP, with no over- or under-spin

Vertical downline after spin
SPINS

Wing lift (snap entry)...ZERO!

Forced with down-elevator...
minus 4 or 5!

Climbing... downgrade, using 1pt. per 15 degrees!

Spiral dive...scores ZERO!
SPIN: DRIFT, OR WEATHERCOCK?

A weathercock is fixed to the earth, but free to swivel into the prevailing wind.

No penalty for drifting with wind.

A model aircraft is not fixed to anything!

Direction of flight

Up to 15° off... minus 1 point!

Up to 30° off... minus 2 points!

minus 3 points!

-4 -5 -6!

No penalty for drifting with wind.

Up to 15° off... minus 1 point!

Up to 30° off... minus 2 points!

minus 3 points!

-4 -5 -6!
Smoothness and Gracefulness of the Manoeuvre

Harmonic appearance of the entire manoeuvre
Constant flightspeed
Radii not too tight and not too loose
Rolling speed not too low or too high
Manoeuvres should be primarily performed along a line of flight approximately 150m.

Exceptions to this rule are cross-box manoeuvres, 3D - manoeuvres, or manoeuvres in a stalled condition, as well as the horizontal circle manoeuvres which, of necessity, may deviate from the 150m distance of flight.
LONGITUDINAL POSITIONING

5B.10: “Manoeuvres on a line greater than 175 m **MUST BE DOWNGRADED**”

The main criterion is *visibility*!

![Diagram showing visibility criterion for longitudinal positioning](image)
LONGITUDINAL POSITIONING

Severe downgrade for RS!

- More than 200 m: minus 2 to 3 points
- 175 m-200 m: minus 1 point
- 140 m-175 m: OK
- 150 m
- 300 m
- 120°
LONGITUDINAL POSITIONING

Manoeuvres out of box here, are penalised more...

...than manoeuvres out of box here.

Manoeuvres positioned here not penalised
VERTICAL POSITIONING (Height)
CENTRE POSITIONING

Off-centre positioning… minus 3 or 4 points! (for this example)
Size of the manoeuvres

The size of a manoeuvre is scored by its matching size relative to the size of manoeuvring zone and relative size of the other manoeuvres performed throughout the schedule.
Proportion of the manoeuvre outside of the manoeuvring zone

Box markers are indicators only.

Do not downgrade unnecessarily!
Proportion of the manoeuvre outside of the manoeuvring zone

No downgrade (positioning only) (Entire manoeuvre = inside box marker)
Proportion of the manoeuvre outside of the manoeuvring zone

2 points downgrade
(20% of manoeuvre = outside)
Proportion of the manoeuvre outside of the manoeuvring zone

5 points downgrade
(50% of manoeuvre = outside)
Proportion of the manoeuvre outside of the manoeuvring zone

No downgrade
(Entire manoeuvre = inside box marker)
Proportion of the manoeuvre outside of the manoeuvring zone

3 points downgrade for positioning. (30% of manoeuvre = outside box marker)
How to prepare as a judge?

- Know your schedule(s)!!
  - Like you would fly it yourself or even better
  - Know where the options are so you won’t be surprised
- Be able to read Aresti quickly as a backup reminder sheet
- Make sure you get regular breaks
- Have some protection with you:
  - Sun
  - Rain
  - Wind
- Bring your own (good) chair
SCORE BETWEEN 10 and 0!

(NOT 8,5-7,5-6,5 or 6,5-6-5,5 or 6-5-4!)

Use Deduct/Downgrade System
EVERY COMPETITOR... STARTS EVERY FLIGHT...

WITH A PERFECT SCORE!
BE CONSISTENT!
BE ACCURATE!
BE IMPARTIAL!
DON’T DISCUSS FLIGHTS WITH FELLOW JUDGES
USE N/O
(NOT OBSERVED)

Be FAIR to competitors, and yourself!
Remember

Forget **WHO** is flying
(friend, rival, countryman, flier from other nation)

Forget **WHAT** is flying
(2-stroke, 4-stroke, electric, turbine, rubber-power)

**LOOK ONLY** AT LINES DESCRIBED IN THE SKY!
(and the precision, smoothness, positioning, and size)
What is the game?

• The pilot is too do as good as a job to hide errors and as such try to fool the judges.

• The judges are there to spot the errors and judge how good the flight appears to be.
Pilots and judges are all human…
Humans make errors, pilots and judges
People who work make errors
People who work a lot make a lot of errors
I do know people who don’t make errors…..

So, judges are just humans and can have it wrong or miss sometimes something.
Enjoy flying and judging!