Supplementary Explanations
to the

F3 RC Aerobatic Power Model Aircraft Manoeuvre Execution Guide

The purpose
of the

Manoeuvre Execution Guide

is to give

accurate guidelines

for the proper execution of aerobatic manoeuvres

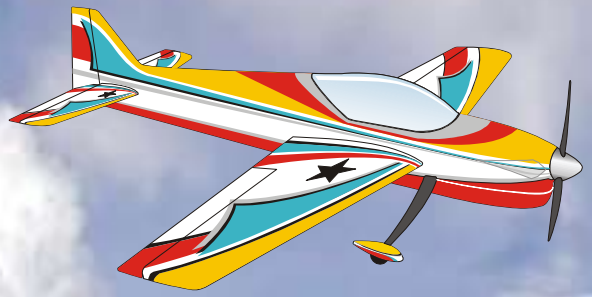
to both, judges and competitors

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



JUDGING STANDARDS. . .

QUALITIES OF A GOOD JUDGE…

CONSISTENCY
JUDGING ACCURACY
IMPARTIALITY

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 4 ✓

Minor defect on manoeuvre 12 = score 6 ✗

Major defect on manoeuvre 15 = score 9 ✗

(Scores must be in the same range, for similar defects)

Santa Claus...

Or Scrooge!

Judging ACCURACY

Downgrade by 1 point for a minor defect
Downgrade by 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

IMPARTIALITY

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 sam same way as with "Average-Competitors"

Judges must only look at the lines of manoeuvres described in the sky.

IMPARTIALITY

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.

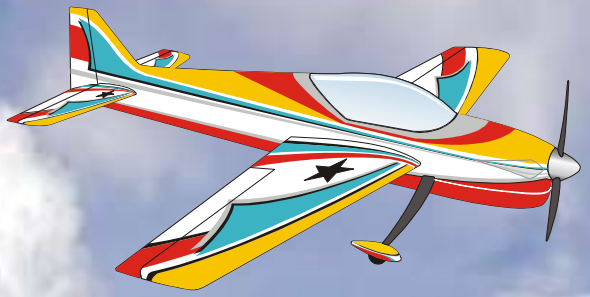
MAINTAIN YOUR STANDARD!

PILOT 1	480	- 1,2	495	+8,8	477	-4,2	484	+2,8	470	- 11,2
PILOT 2	364	- 14,8	385	+6,2	416	+37,2	374	- 4,8	355	- 23,8
PILOT 3	491	- 2,6	513	+19,4	486	- 7,6	496	+2,4	482	- 11,6
PILOT 4	505	+9,4	502	+6,4	461	-34,6	511	+15,4	491	- 4,6
PILOT 5	460	- 3,0	477	+14,0	432	-31,0	464	+1,0	482	+19

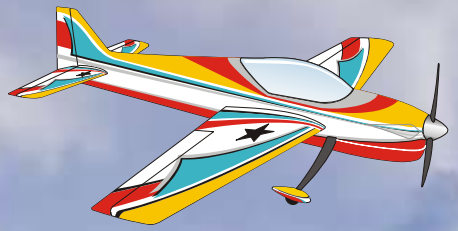
PRINCIPLES

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.

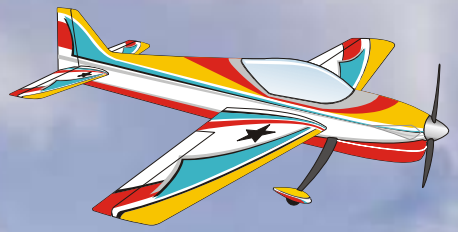
Geometrical accuracy of the manoeuvre



Smoothness and gracefulness of the manoeuvre

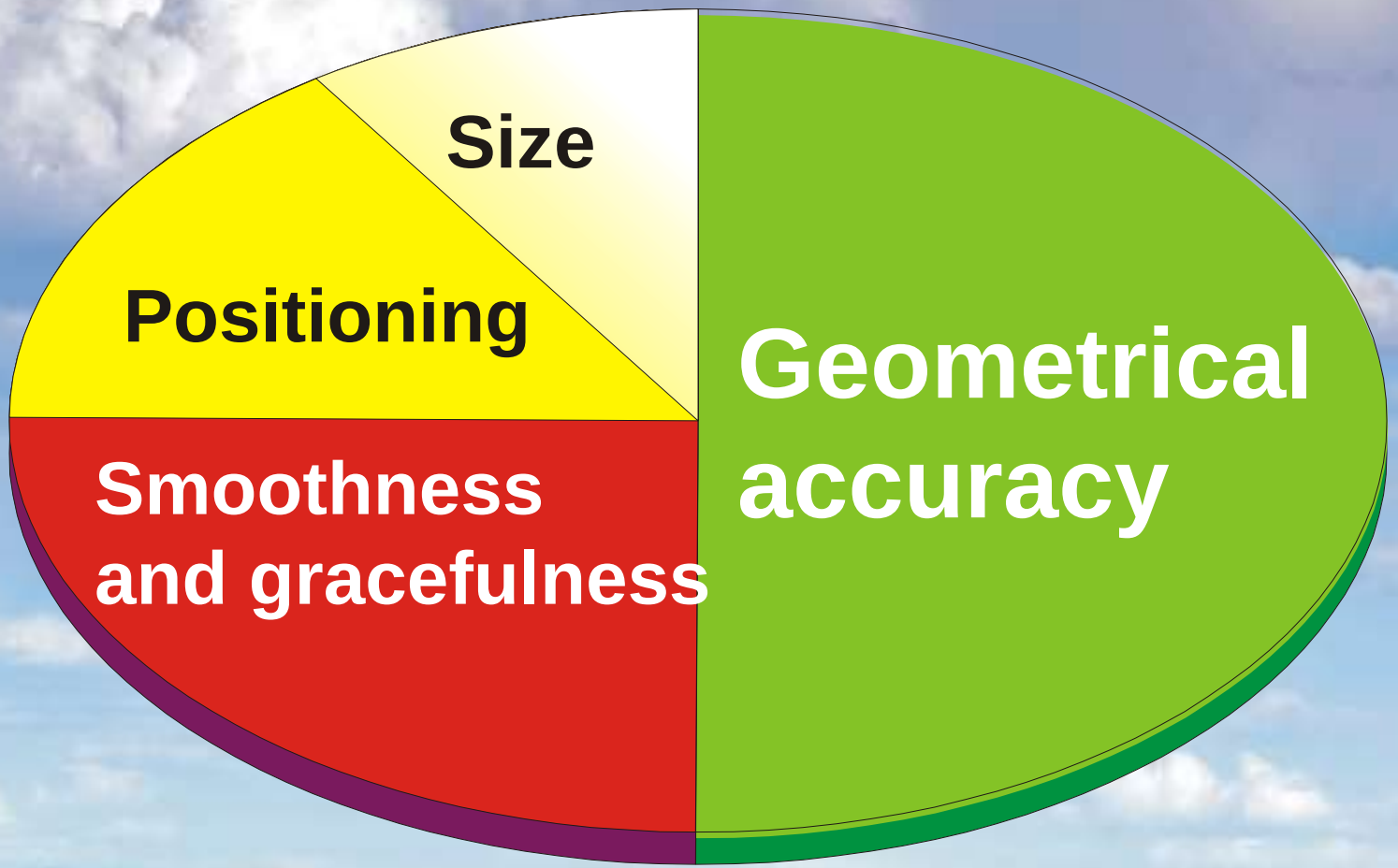


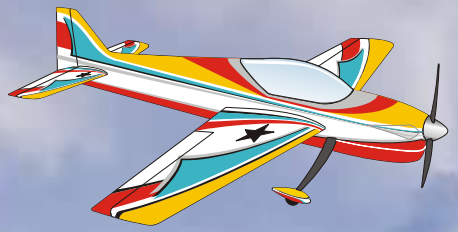
Positioning of the manoeuvre within the manoeuvring zone



Size
of the manoeuvre

WEIGHTING

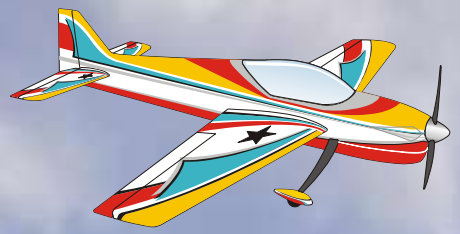

Size
Positioning
Geometrical accuracy
Smoothness and gracefulness



Proportion of the manoeuvres outside of the manoeuvring zone

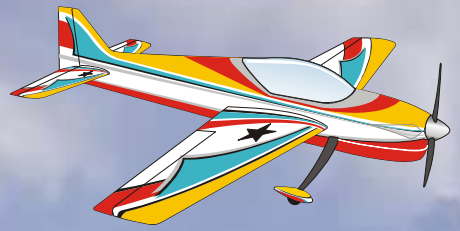
GENERAL CRITERIA FOR DOWNGRADING MANOEUVRES

“Criteria…are standards by which something can be judged”



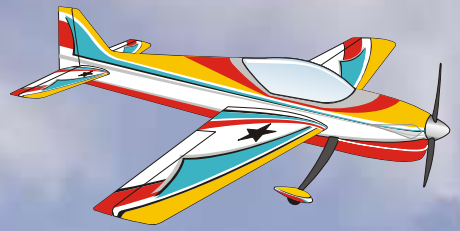
1. WHAT WAS THE DEFECT, or mistake?

- 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.



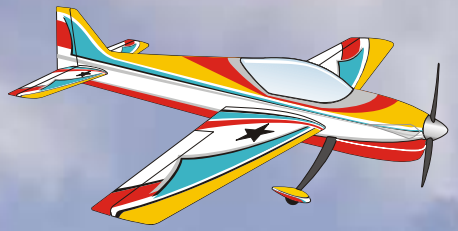
2. HOW SERIOUS was the defect, or mistake?

- Was it big (major)?
- Or was it small (minor)?

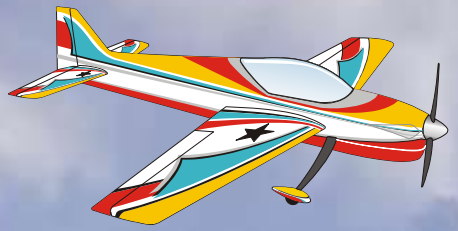


3. **HOW OFTEN** did you see the same defect, or mistake in a particular manoeuvre?

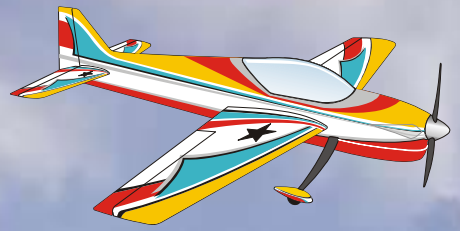
How many defects were there in **TOTAL**?



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!

Now translate these
DEFECTS… or MISTAKES
into

DEDUCTS… or DOWNGRADES

ALWAYS

START WITH PERFECT 10 …

Then 9…8…7…6…5…4…etc.

Or 10…7…6…2…etc.

As the pilot starts!

IMPRESSION ONLY

DEDUCT/ DOWNGRADE SYSTEM

Forget WHO is flying

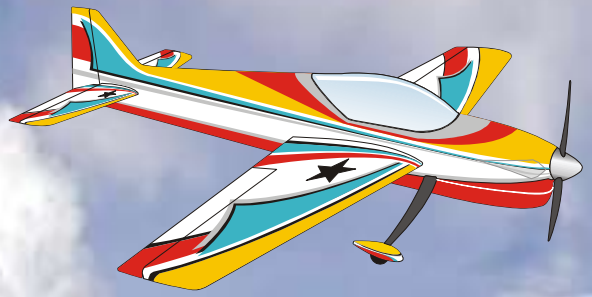
(friend, rival, countryman, flier from other nation)

Forget WHAT is flying

(2-stroke, 4-stroke, electric, turbine, rubber-power)

LOOK ONLY AT LINES DESCRIBED IN THE SKY!

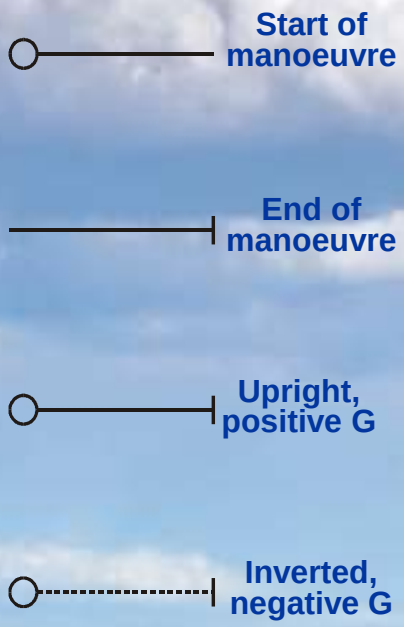
(and the precision, smoothness, positioning, and size)

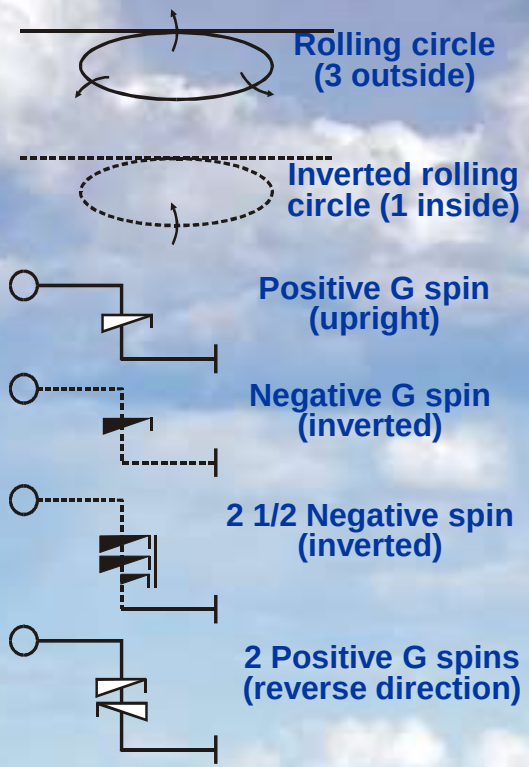


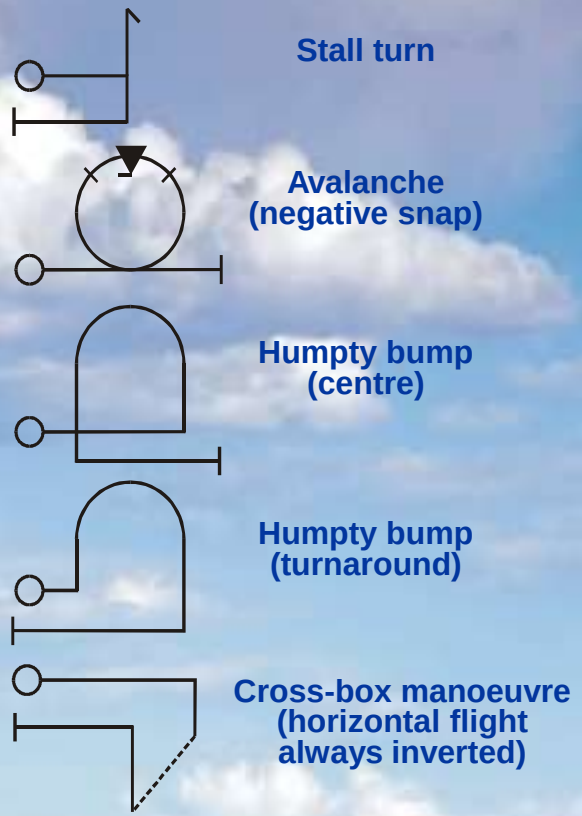
CRITERIA FOR JUDGING INDIVIDUAL MANOEUVRES

(Method)

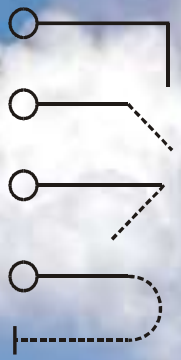
ARESTI SYSTEM







ARESTI SYSTEM



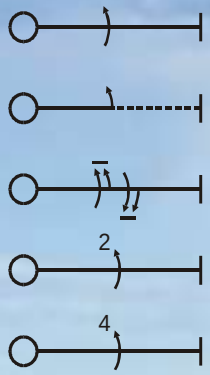
90⁰ angle/corner (1/4 loop)

450 (1/8 loop)

1350 (3/8 loop)

1800 (1/2 loop)

1/8 loop and 5/8 loop



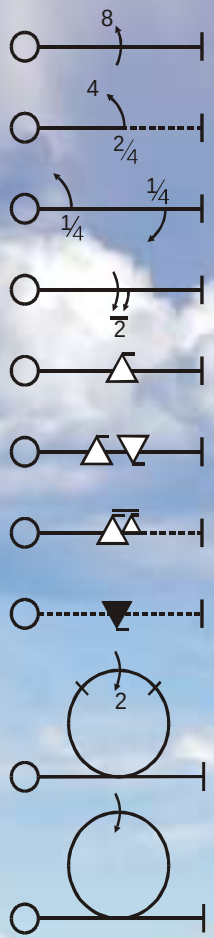
Slow roll (aileron)

Half roll

1 1/2 rolls, reversed

2-point roll

4-point roll



8-point roll

2 of 4-point roll

Knife-edge flight

3 of 2-point roll

Positive G snap roll

2 snaps opposite

1 1/2 positive G snaps

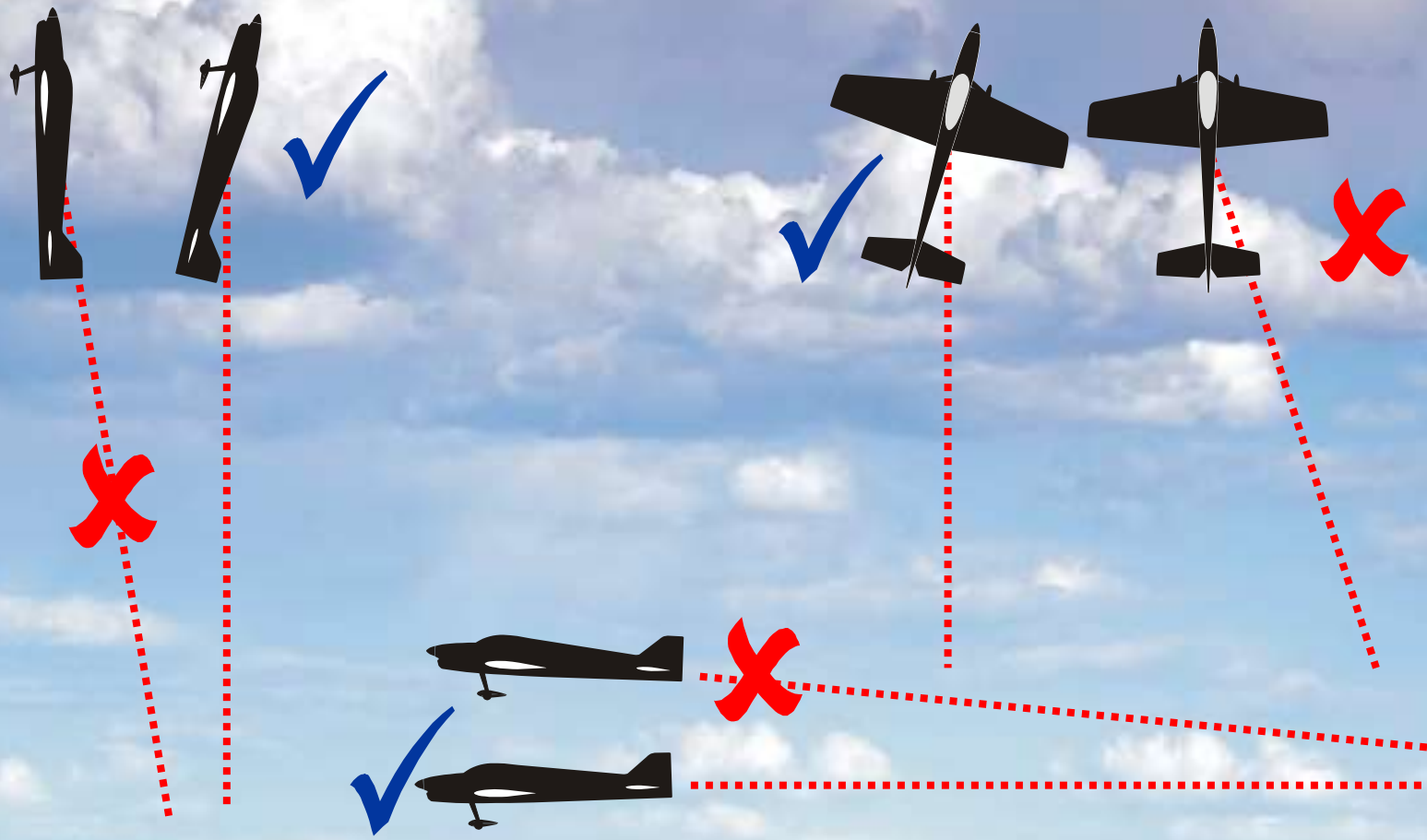
Negative G snap roll

Loop with 2-point roll (contained to top of loop)

Rolling loop (roll is integrated with loop)

Point rolls were „buried“ in 2009. Since 2012 we have consecutive part rolls.

ATTITUDE vs. FLIGHT PATH



Windcorrection

Alle manoeuvres are required to be windcorrected,

except SNAPROLLS, SPINS, and STALL TURNS

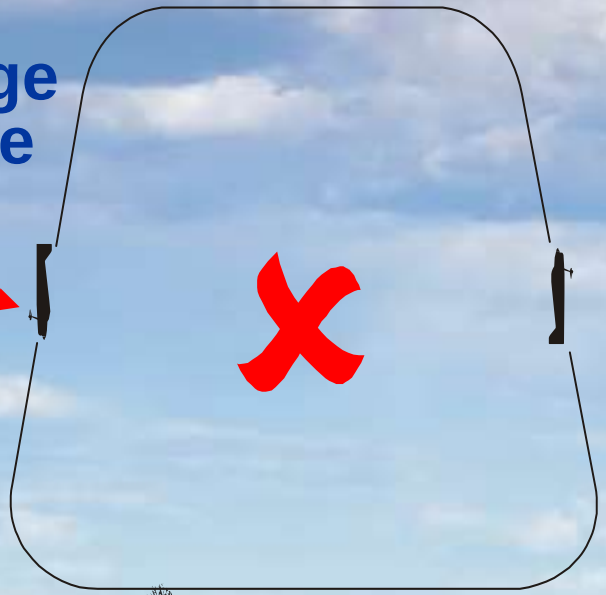
(the model aircraft is in stalled condition)

Wind Correction

Flight path of model aircraft must describe correct geometric shape

Flight path

Fuselage attitude



1 POINT PER 15^0 DEVIATION

Perfect geometry = No downgrade

Up to 15^0 error = 1 point downgrade

Up to 30^0 error = 2 point downgrade

Up to 45^0 error = 3 point downgrade

Wings level - roll axis

Horizontal lines - pitch axis

1 POINT PER 15^0 DEVIATION

Perfect geometry = No downgrade

Up to 15^0 error = 1 point downgrade

Up to 30^0 error = 2 point downgrade

Vertical lines - pitch axis

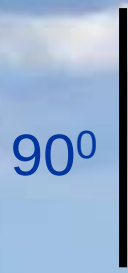
Vertical lines - yaw axis

1 POINT PER 15^0 DEVIATION

In general, lines must be judged more critically than deviations in yaw and roll.

LINES

Horizontal



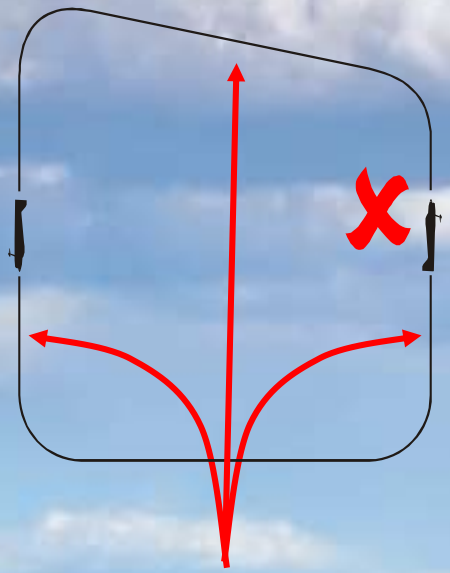
90^0

60^0

45^0

LINES

Minor mis-relation between line lengths = minus 1 point!

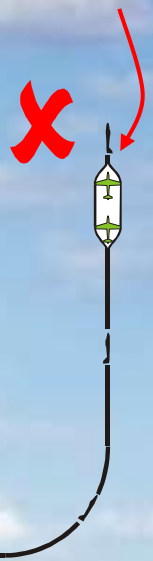


(This example maybe minus 2 or 3!)

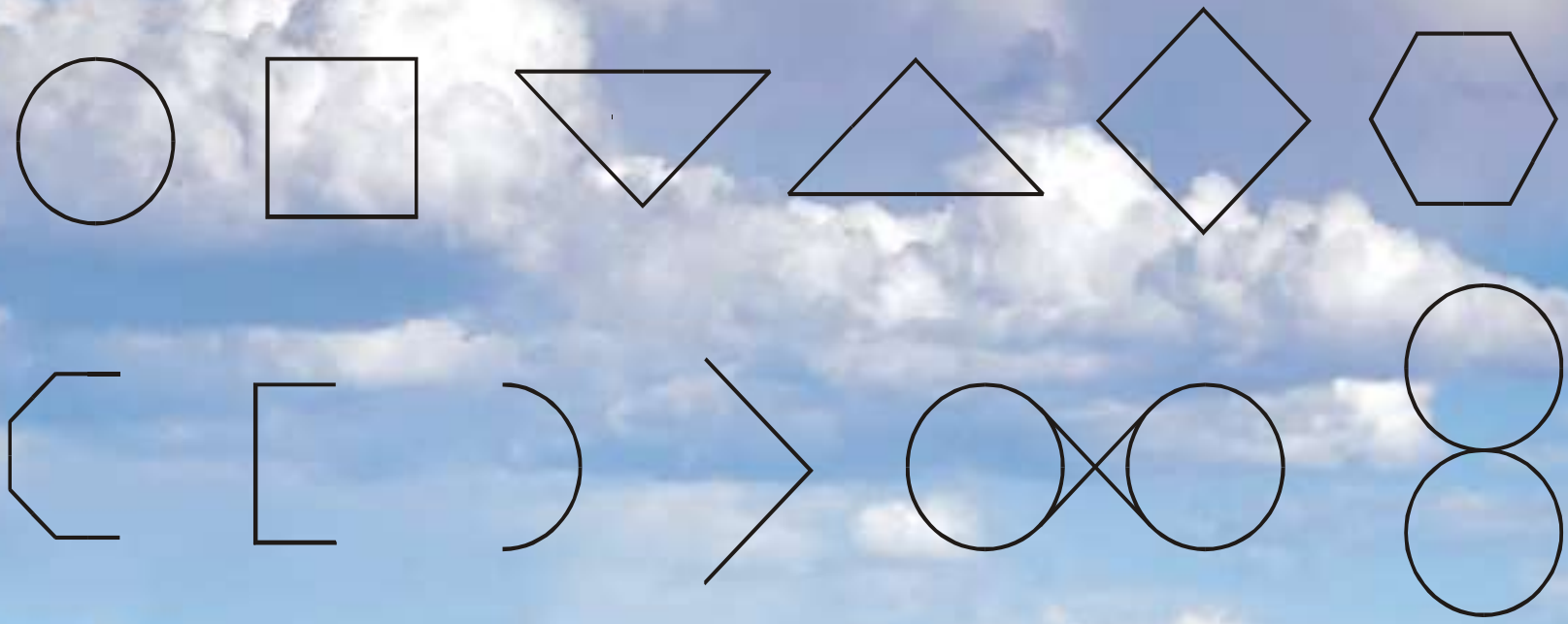
No line between manoeuvres… = minus 1 point here… and minus 1 point here!

Line after and Before roll = not equal… minus 2 points!

No line after roll… = minus 3 points!



LOOPS

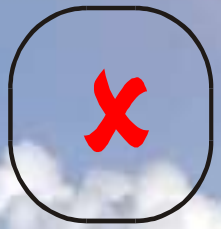


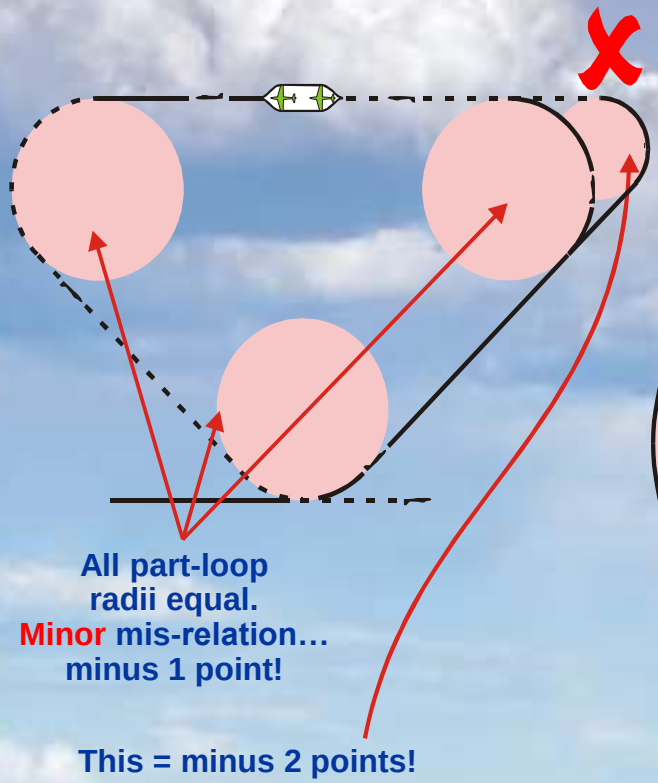
LOOPS

Radii too tight...

…too open/loose...

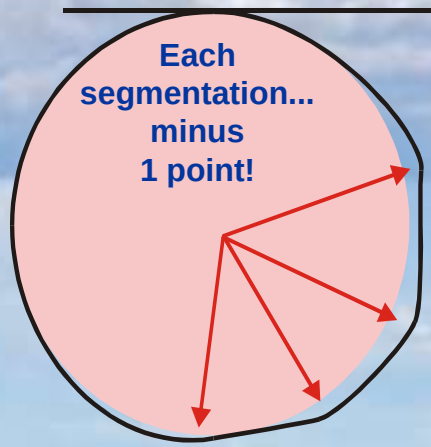
Good compromise!



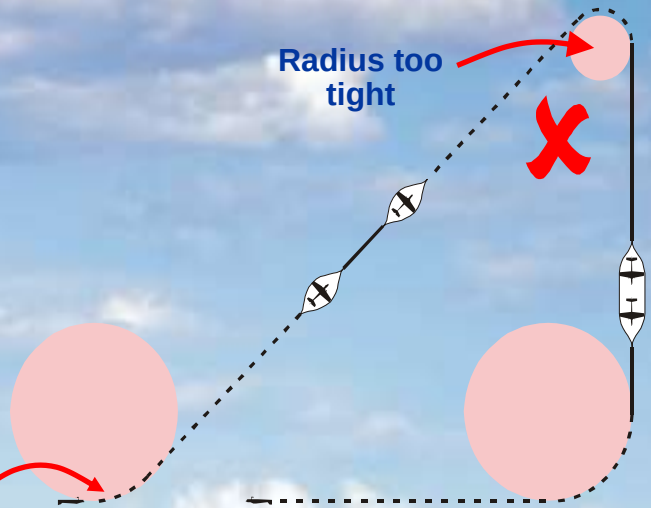


All part-loop radii equal.
Minor mis-relation…
minus 1 point!

This = minus 2 points!



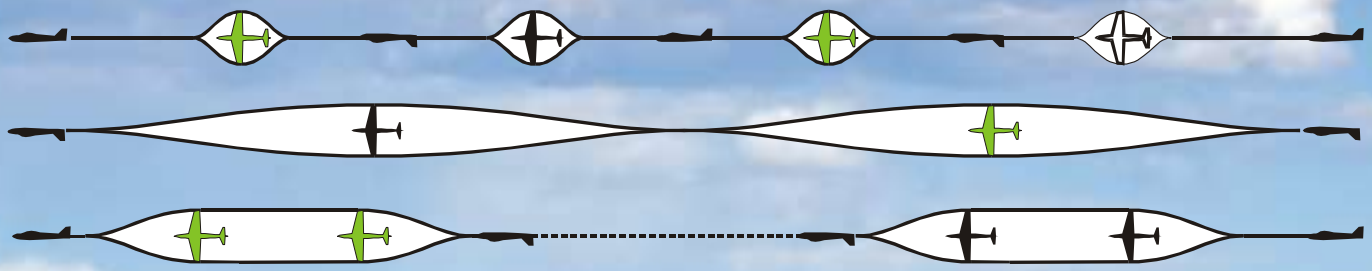
Each segmentation...
minus
1 point!

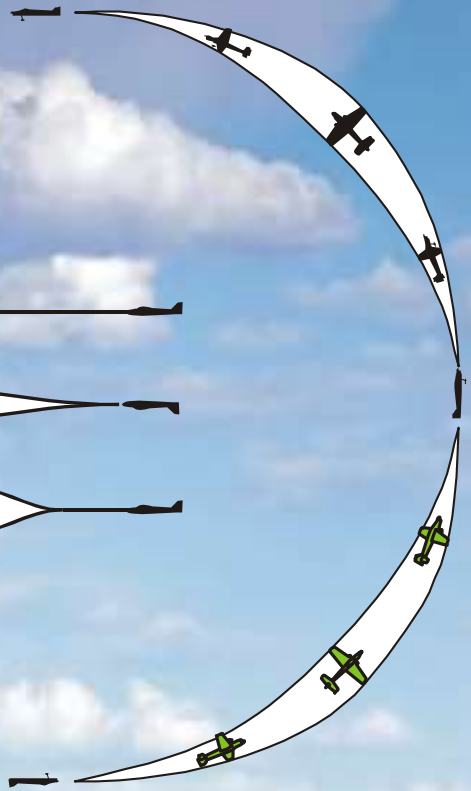


Radius too tight

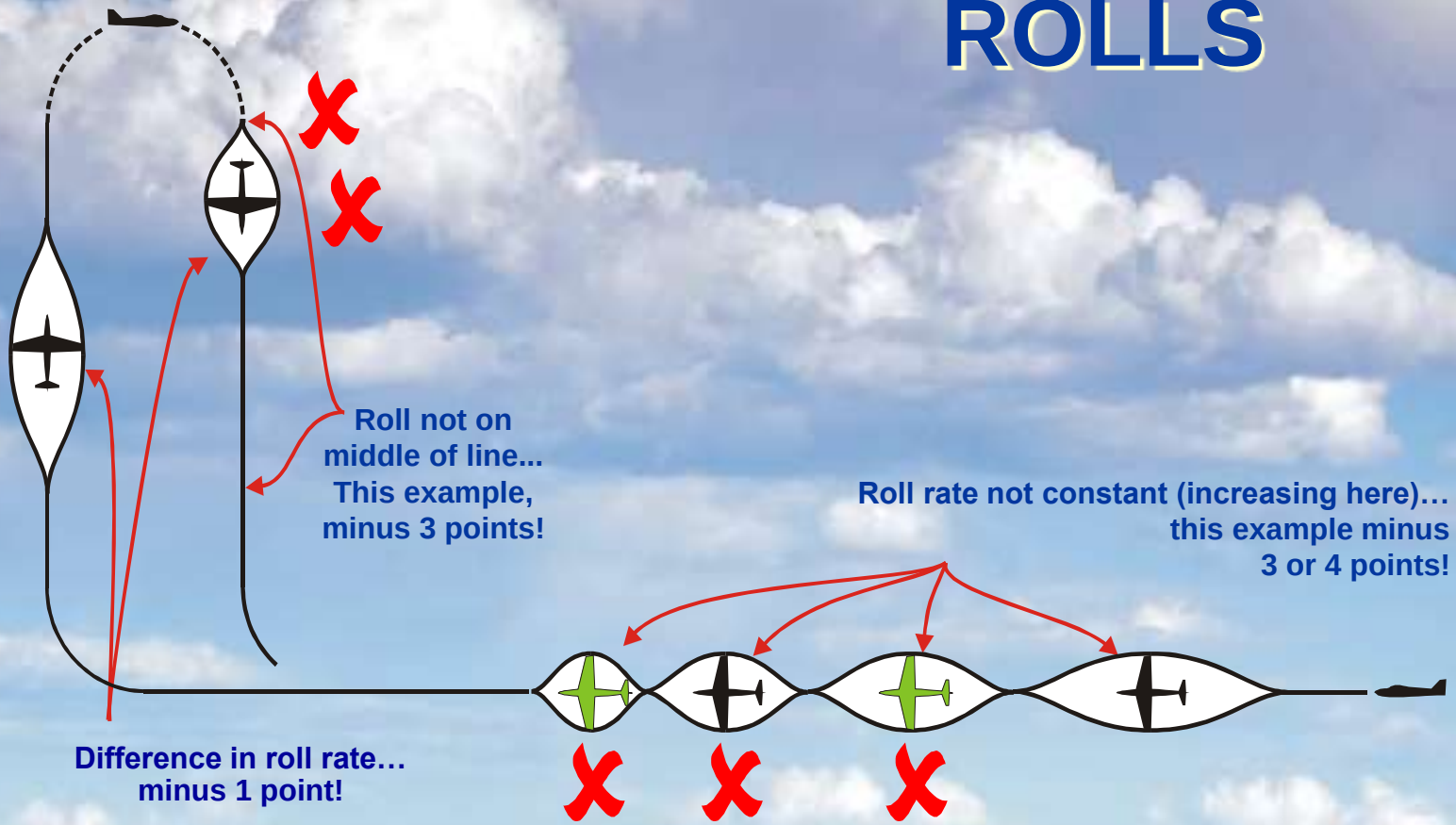
Radius of first loop determines rest

Rolls (Continous Rolls and Part-Rolls)

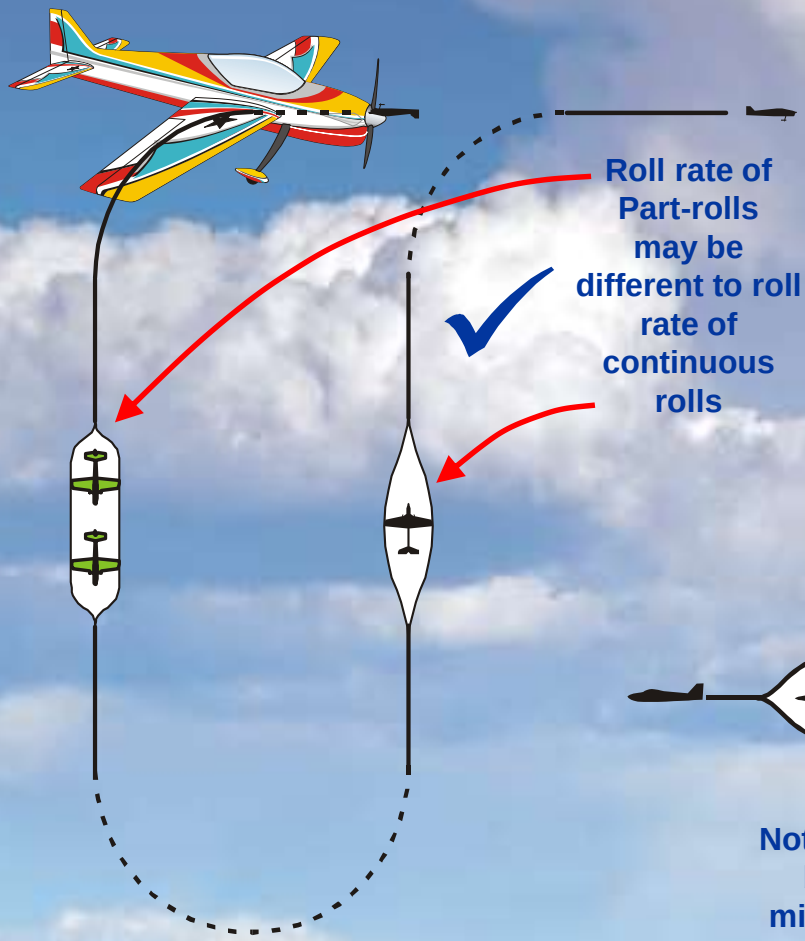




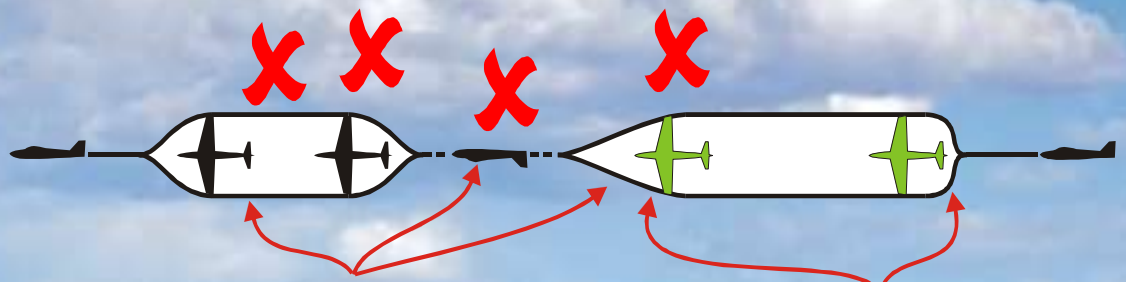
ROLLS


Roll not on middle of line... This example, minus 3 points!
Roll rate not constant (increasing here)… this example minus 3 or 4 points!
Difference in roll rate… minus 1 point!

ROLLS



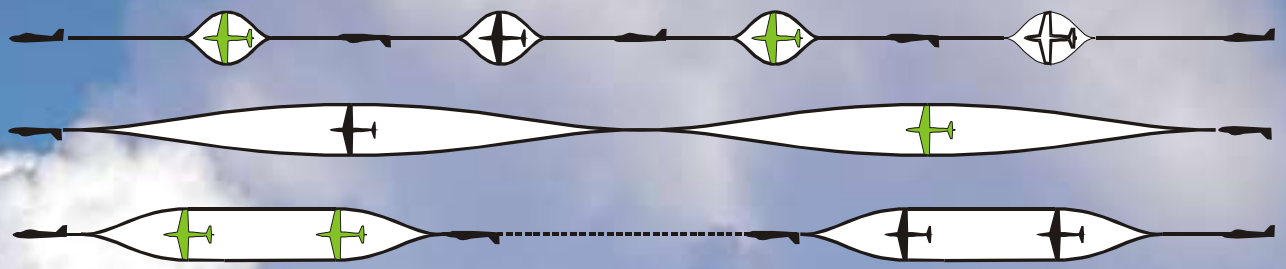
Roll rate of Part-rolls may be different to roll rate of continuous rolls



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

Different roll rate… minus 1 point!

Between consecutive continous rolls and part-rolls in opposite direction there must be no line!



Missing or additional Part-Rolls:
Use the 1 point for 15° rule

- 1 missing ½ roll: (180 degrees) = Zero points
- 1 missing ¼ roll : (90 degress) = - 6 points
- 1 missing 1/8 roll : (45 degrees) = - 3 points
- analogue with additional part-rolls

SNAP ROLLS

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

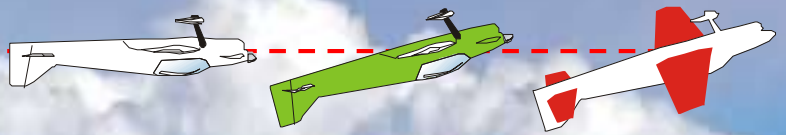
FLIGHT PATH (centre of gravity) must be level

Separation of fuselage attitude from flight path

SNAP ROLLS

NEGATIVE SNAP ROLL

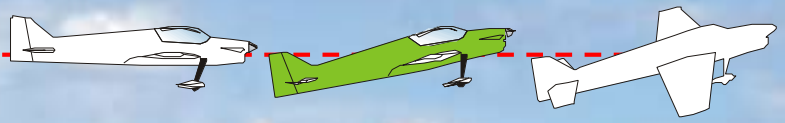
–



DOWN elevator

POSITIVE SNAP ROLL

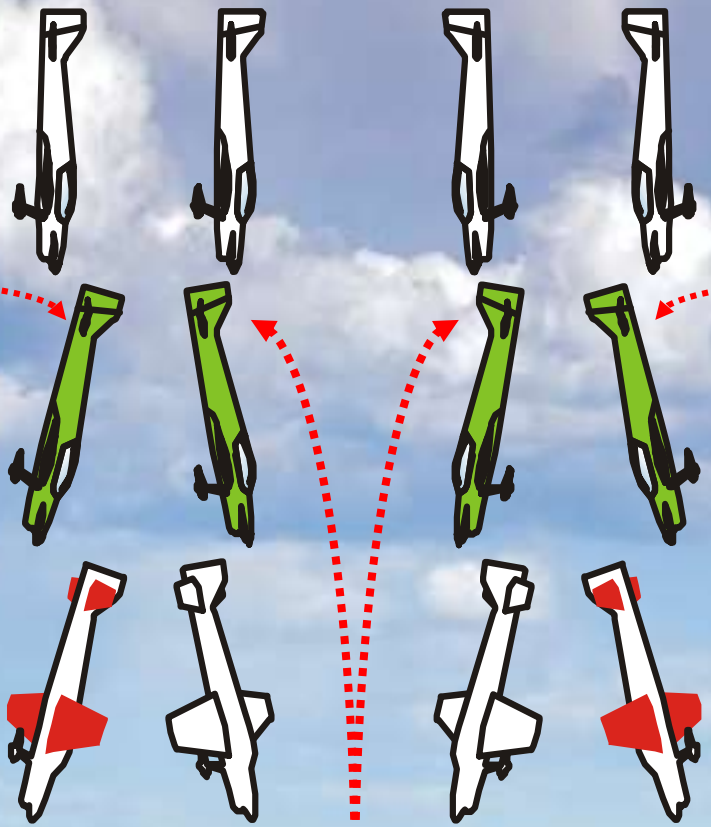
+



UP elevator

In the F3A schedules snap rolls may be positive or negative!

SNAP ROLLS, DOWN (and UP)



NEGATIVE SNAP
= DOWN elevator

NEGATIVE SNAP
= DOWN elevator

POSITIVE SNAP
= UP elevator

Barrel roll or axial roll instead of snap roll:

downgrade more than - 5 points

“SPOTTER’S GUIDE TO SNAP ROLLS”

If it is not a BARREL ROLL...

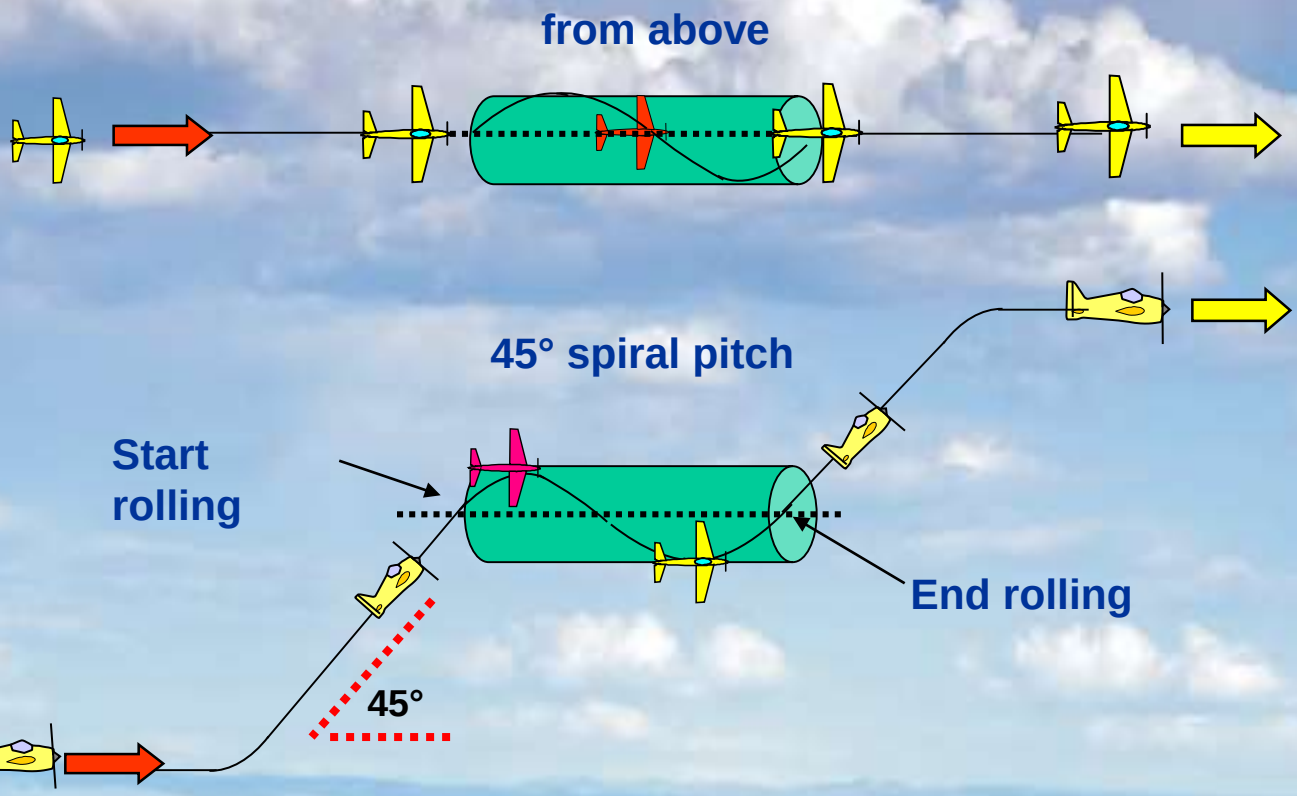
…and it’s not an an AXIAL ROLL...

…then it’s probably...

A SNAP ROLL!

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).

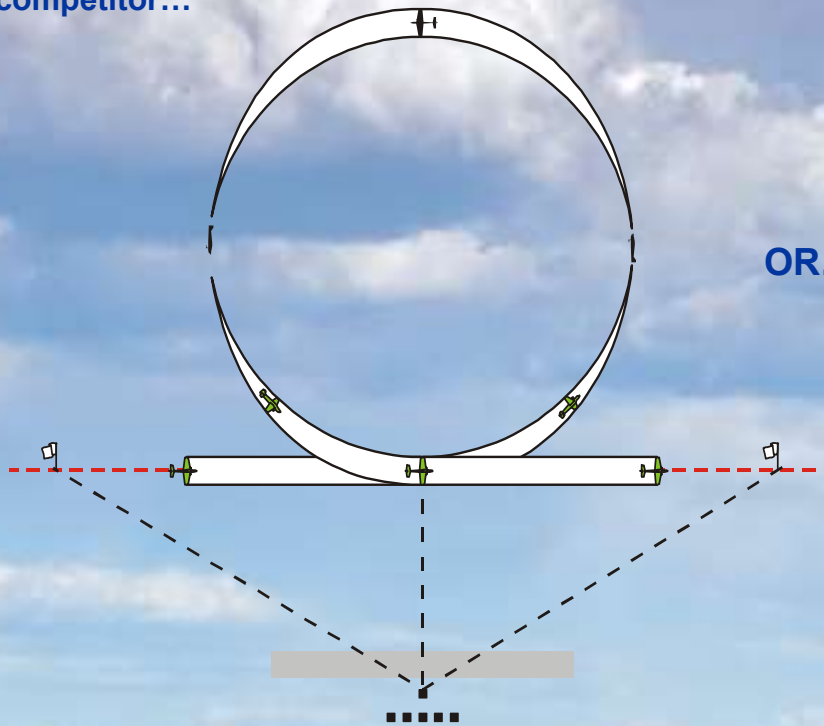


Horizontal Circles

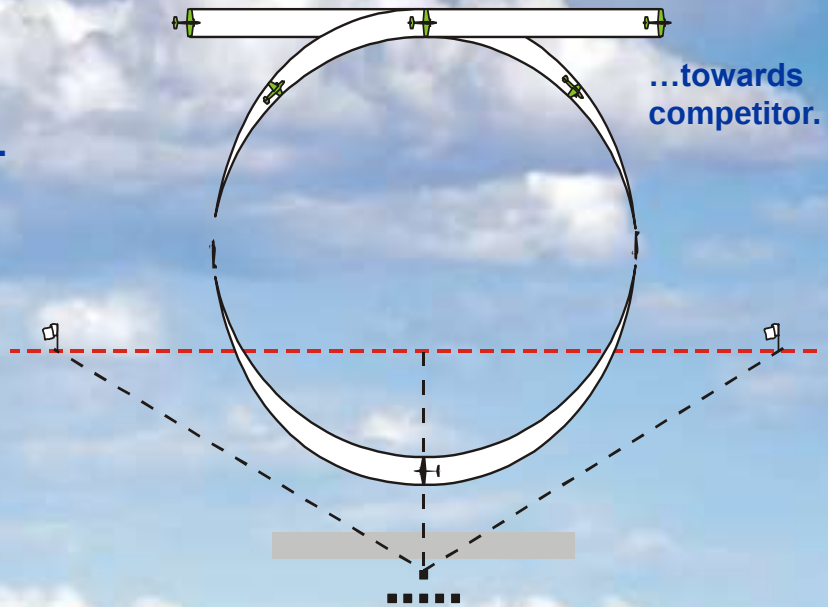
- Constant high or low altitude
- Circular flight path maintained
- Continuous rolling, at constant rate
- Rolls positioned correctly
- Any reversals to be immediate

Horizontal Circles (Rolling Circles)

May be AWAY from competitor…

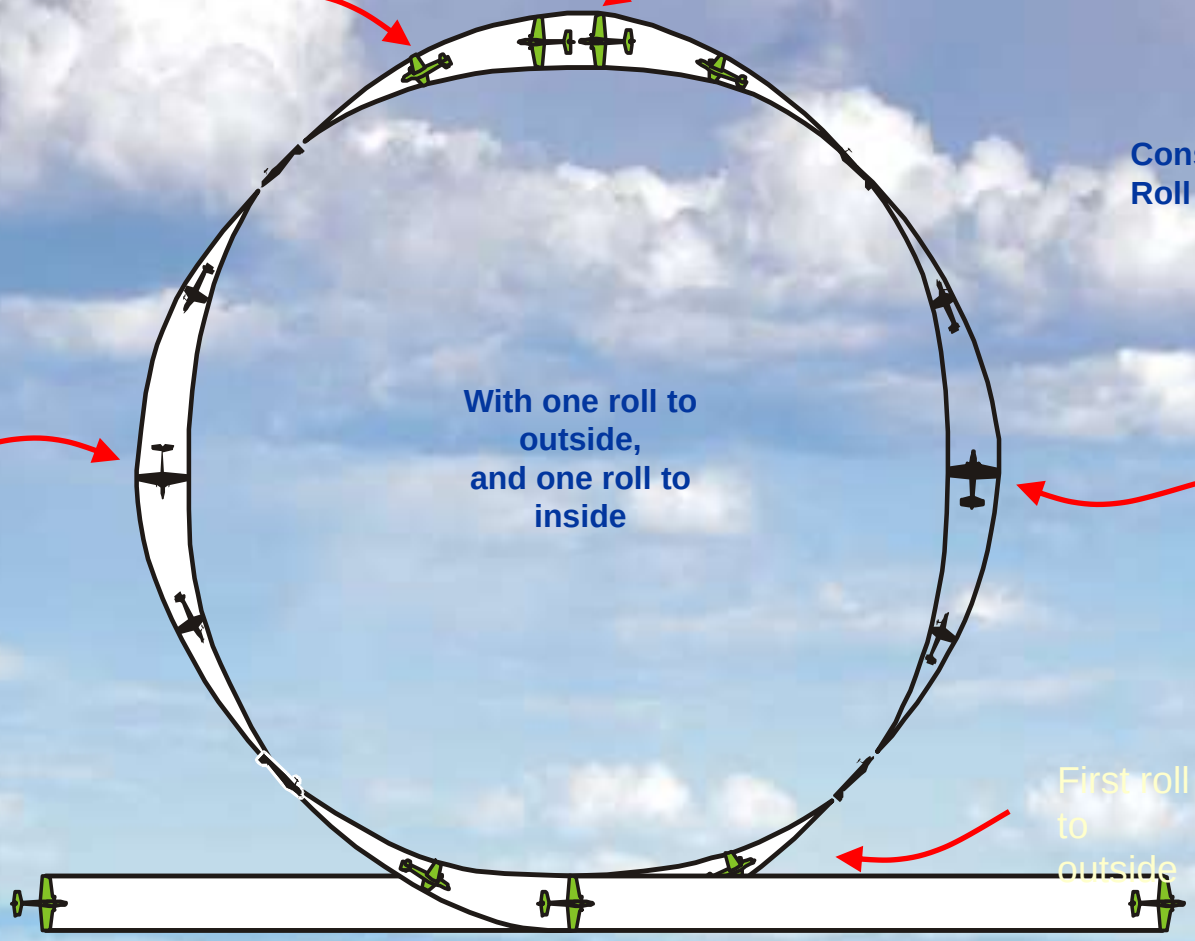


OR…

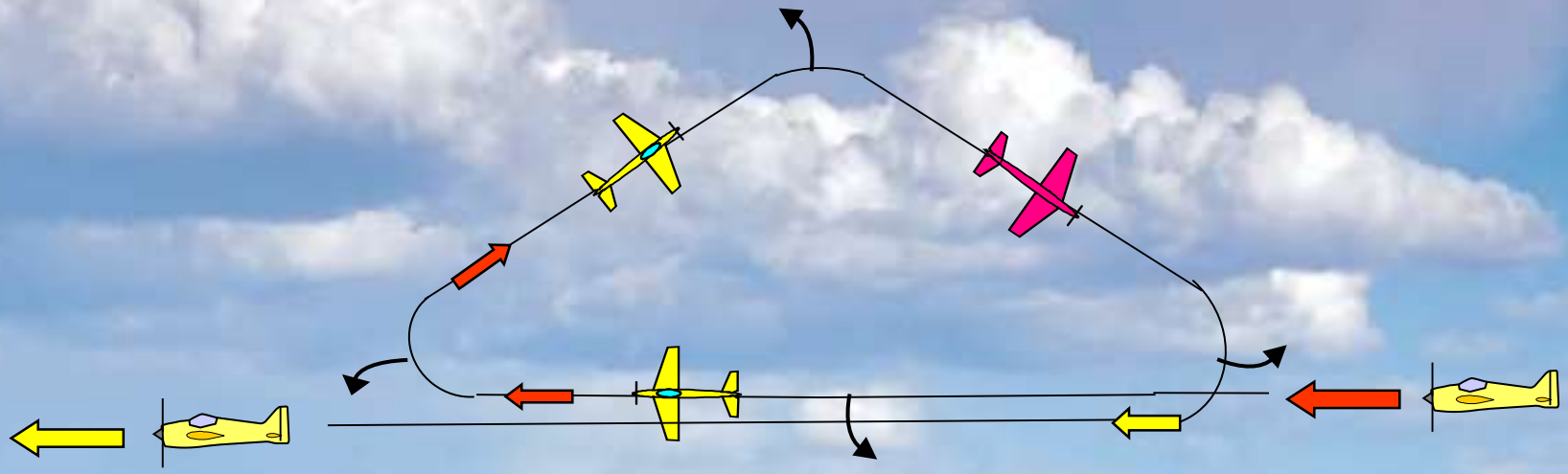


…towards competitor.

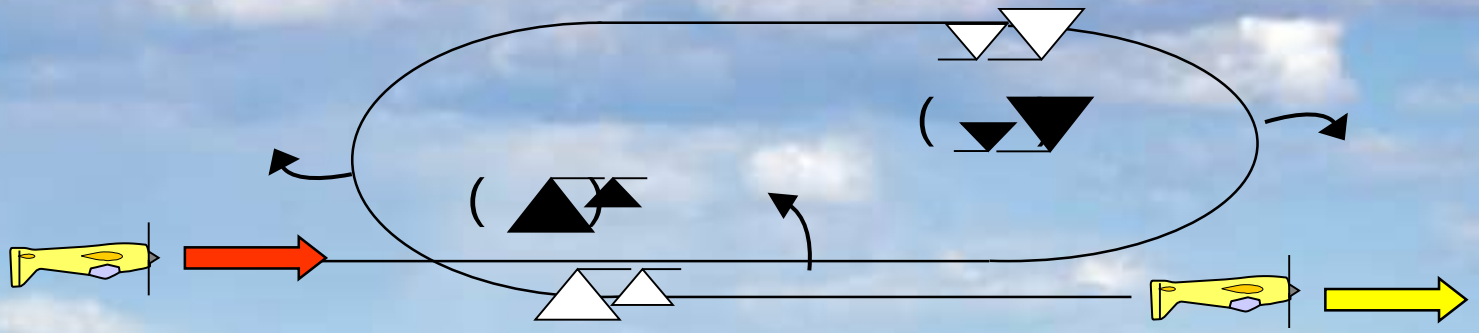
Horizontal Circles (Rolling Circles)



Horizontal Circles (Triangle)



Horizontal Circles (Double Immelmann)



Line/Loop/Roll/Horizontal Circle COMBINATIONS

Tight radius… minus 3 points for this example!

1/2 loop

1/2 roll not on middle of line… minus 1 point!

1/4 loop

1/4 loop

HUMPTY BUMP

Radii all equal

1/2 roll on middle of line

1/8 loop

5/8 loop

Radii equal

HALF CUBAN 8

Line/Loop/Roll/Horizontal Circle COMBINATIONS

1/2 roll before completing 1/2 loop…

…use 1 point/15 degree downgrade!

SINGLE IMMELMANN

1/2 roll directly after 1/2 loop

Line before 1/2 roll... minus 2 points!

Radii are equal

DOUBLE IMMELMANN (note shape…two loops are joining!

1/2 loop

1/2 loop

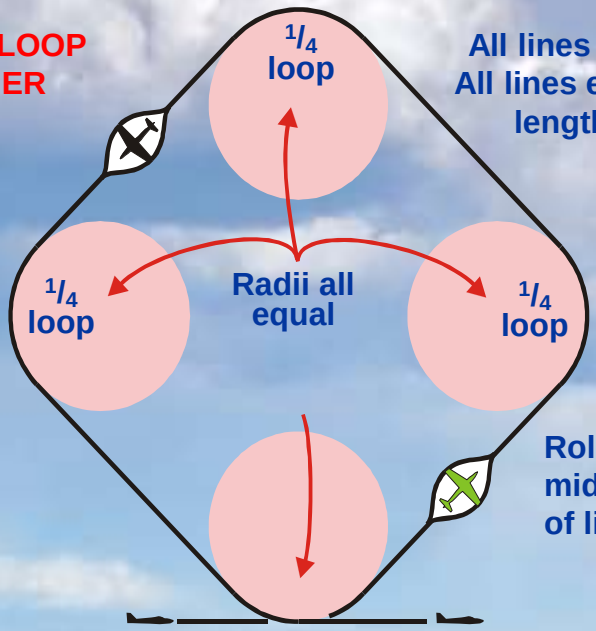
Line before 1/2 roll... minus 2 points!

1/2 roll directly after 1/2 loop

There is nothing about the length of the lines between the part loops in the Sporing Code!

Line/Loop/Roll/Horizontal Circle COMBINATIONS

SQUARE LOOP ON CORNER



All lines 45^0. All lines equal length

Rolls in middle of lines

1/8 loop entry and exit

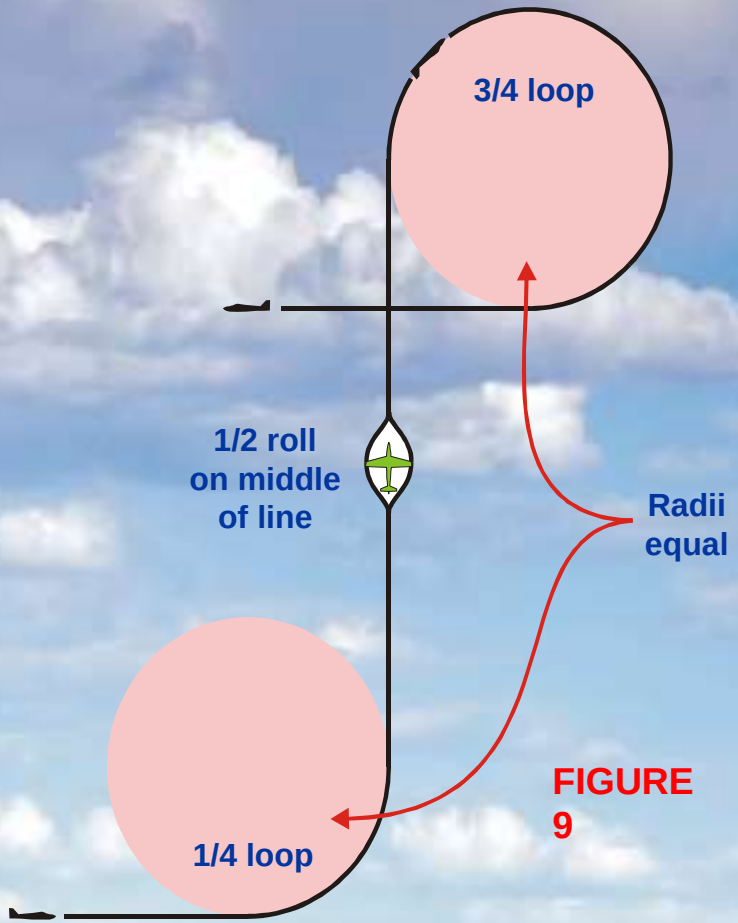
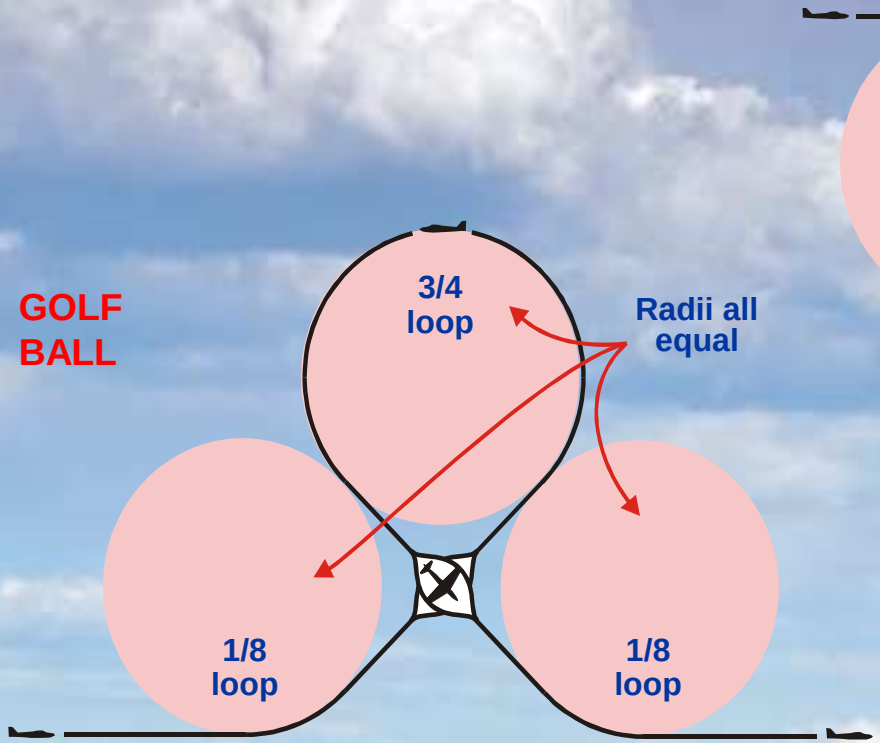
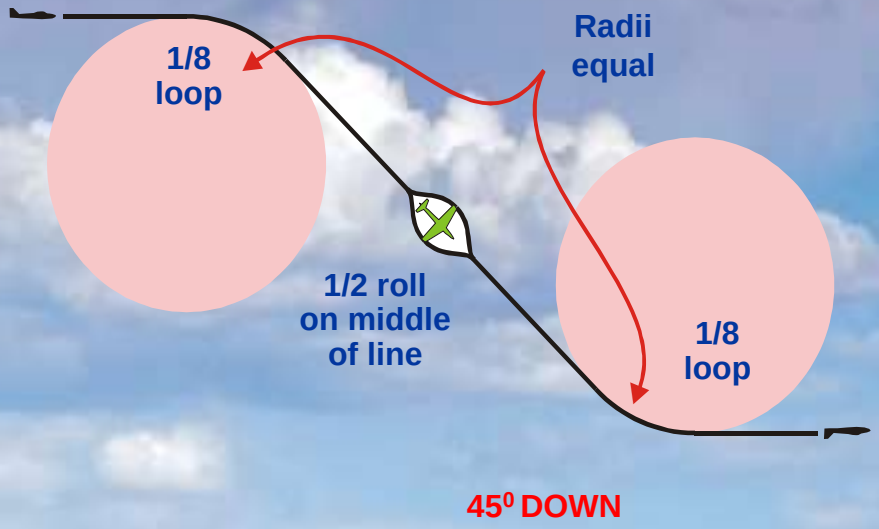


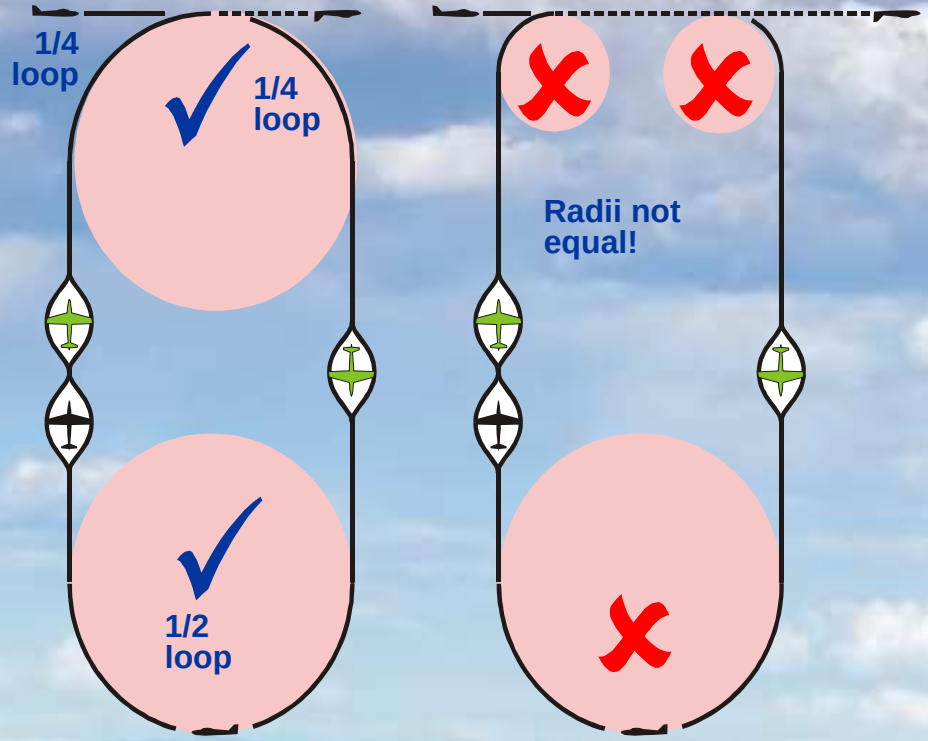
FIGURE 9

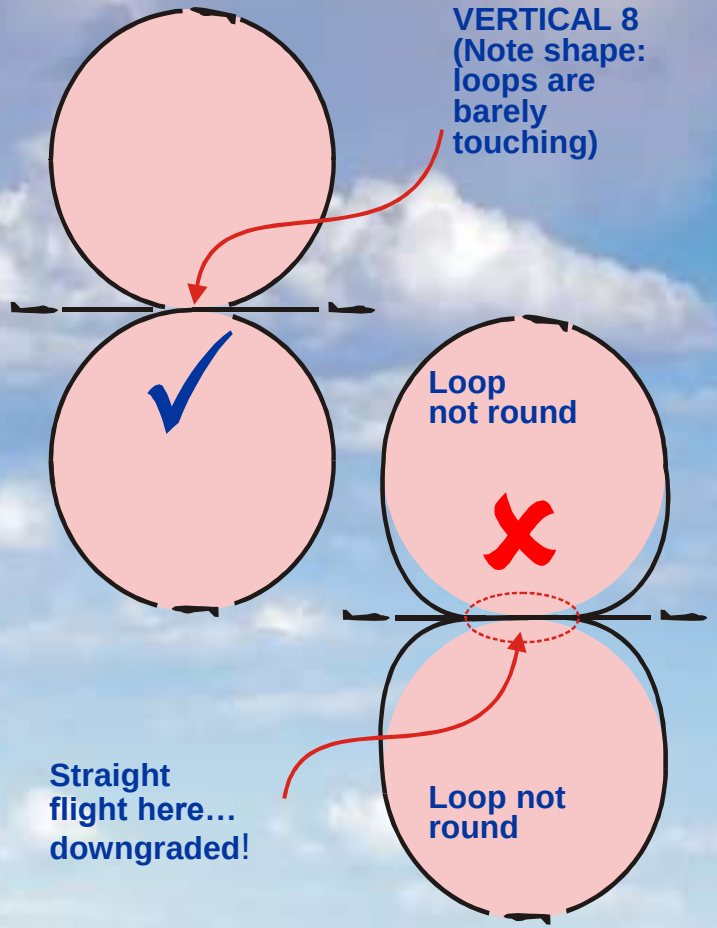
Line/Loop/Roll/Horizontal Circle COMBINATIONS





Line/Loop/Roll/Horizontal Circle COMBINATIONS





Line/Loop/Roll/Horizontal Circle COMBINATIONS

LOOPS WITH INTEGRATED ROLLS

Rolls or part rolls integrated with loop

90°

Loops must be ROUND!

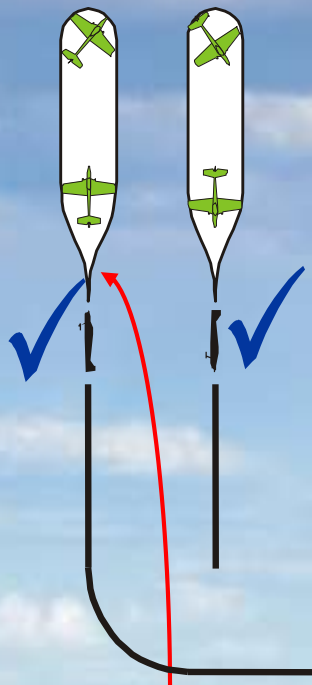
Rapid rolls MUST score less. This example = minus 4 for non-integration of roll

15°

15°

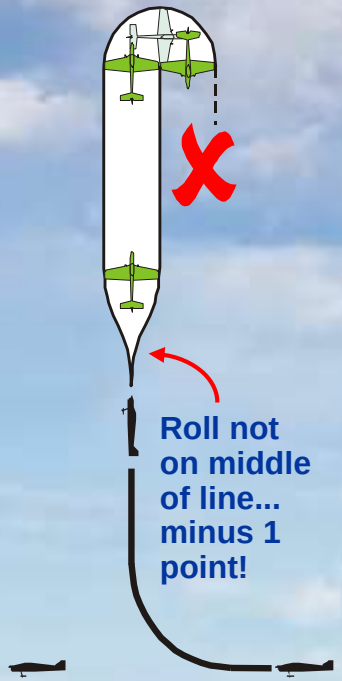
STALL TURNS

Pivot on CG…
no downgrade!



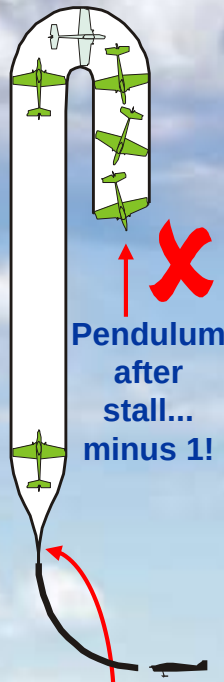
Roll on middle of line...
no downgrade!

Up to ½ span radius of pivot…
minus 1 point!



Roll not on middle of line...
minus 1 point!

Up to one wing span radius...
minus 2/3 points!



Pendulum after stall...
minus 1!

No line before roll…
minus 3 points!

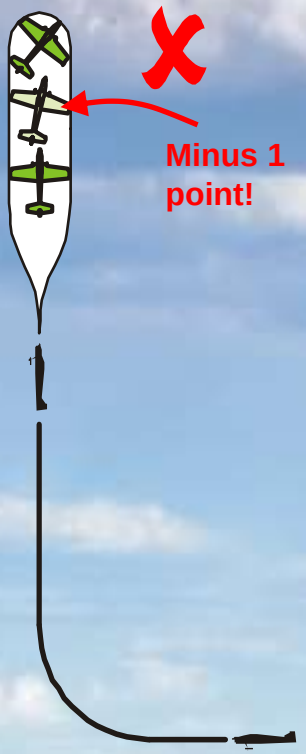
Up to 1½ span radius
minus 4/5 points!

Over 15^0 off vertical…
minus 2 points!

Roll not on middle...
minus 1 point!

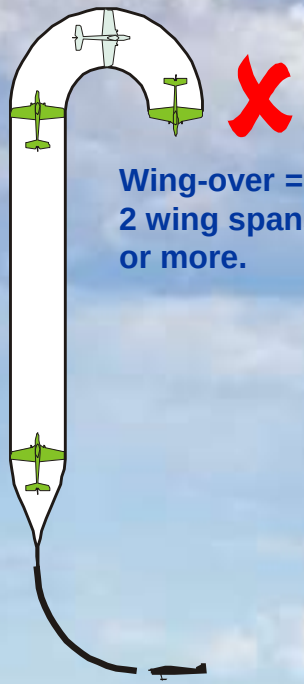
STALL TURNS

"Skid" before reaching Stall position…



Minus 1 point!

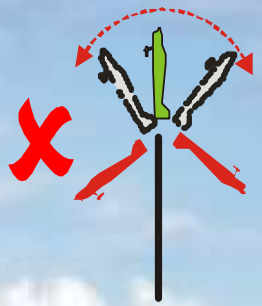
Wing-over… ZERO!



Wing-over = 2 wing spans or more.

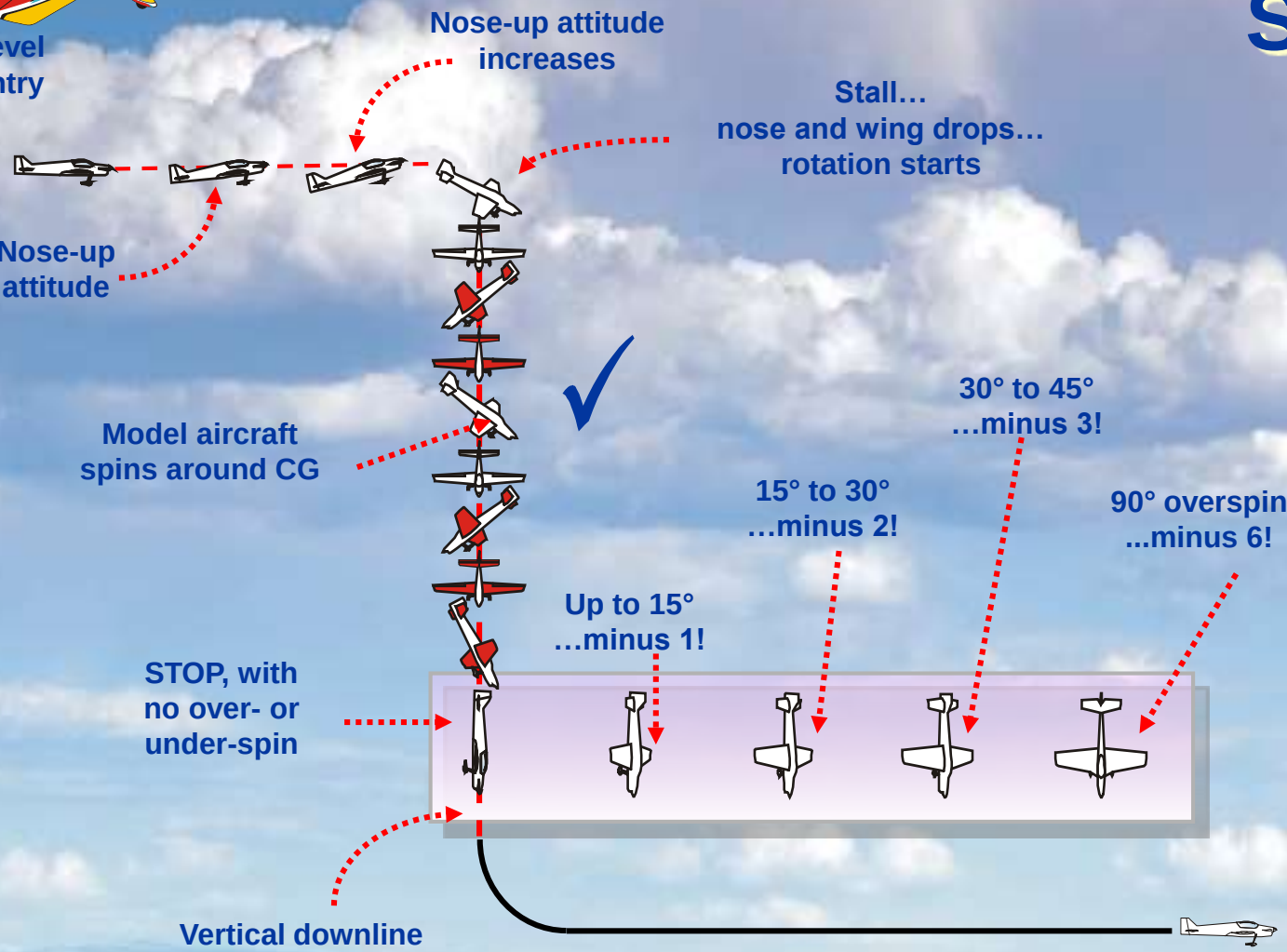
Torque-off… 1pt/15 degree downgrade

Flop forwards, or backwards… ZERO!



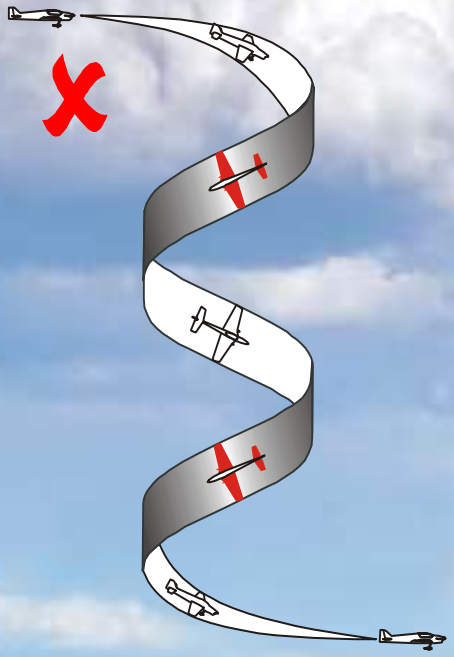
The model must stop before pivot. If not downgrade.

SPINS


Level entry
Nose-up attitude increases
Stall…
nose and wing drops…
rotation starts
Nose-up attitude
Model aircraft spins around CG
30° to 45°
…minus 3!
15° to 30°
…minus 2!
90° overspin
...minus 6!
Up to 15°
…minus 1!
STOP, with no over- or under-spin
Vertical downline after spin

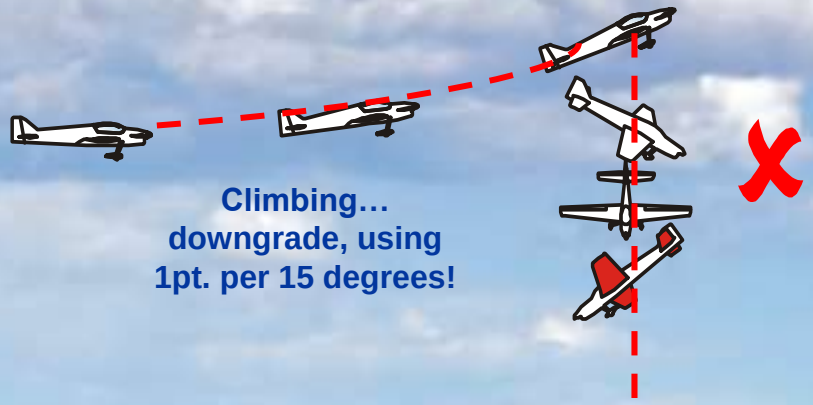
SPINS

Wing lift (snap entry)…ZERO!



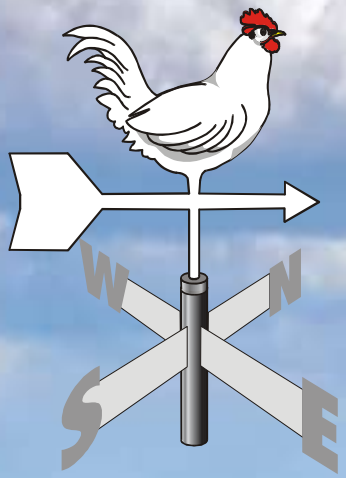
Spiral dive…scores ZERO!

Forced with
down-elevator…
minus 4 or 5!



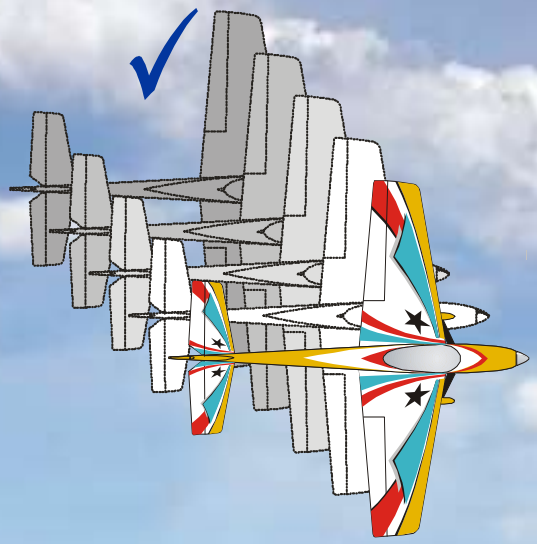
Climbing…
downgrade, using
1pt. per 15 degrees!

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!

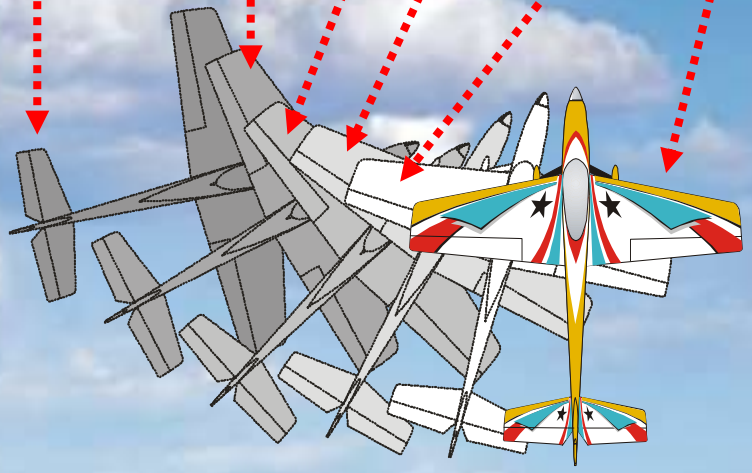
Up to 300 off… minus 2 points!

minus 3 points!

- 4

- 5

- 6!



Smoothness and Gracefulness of the Manoeuvre

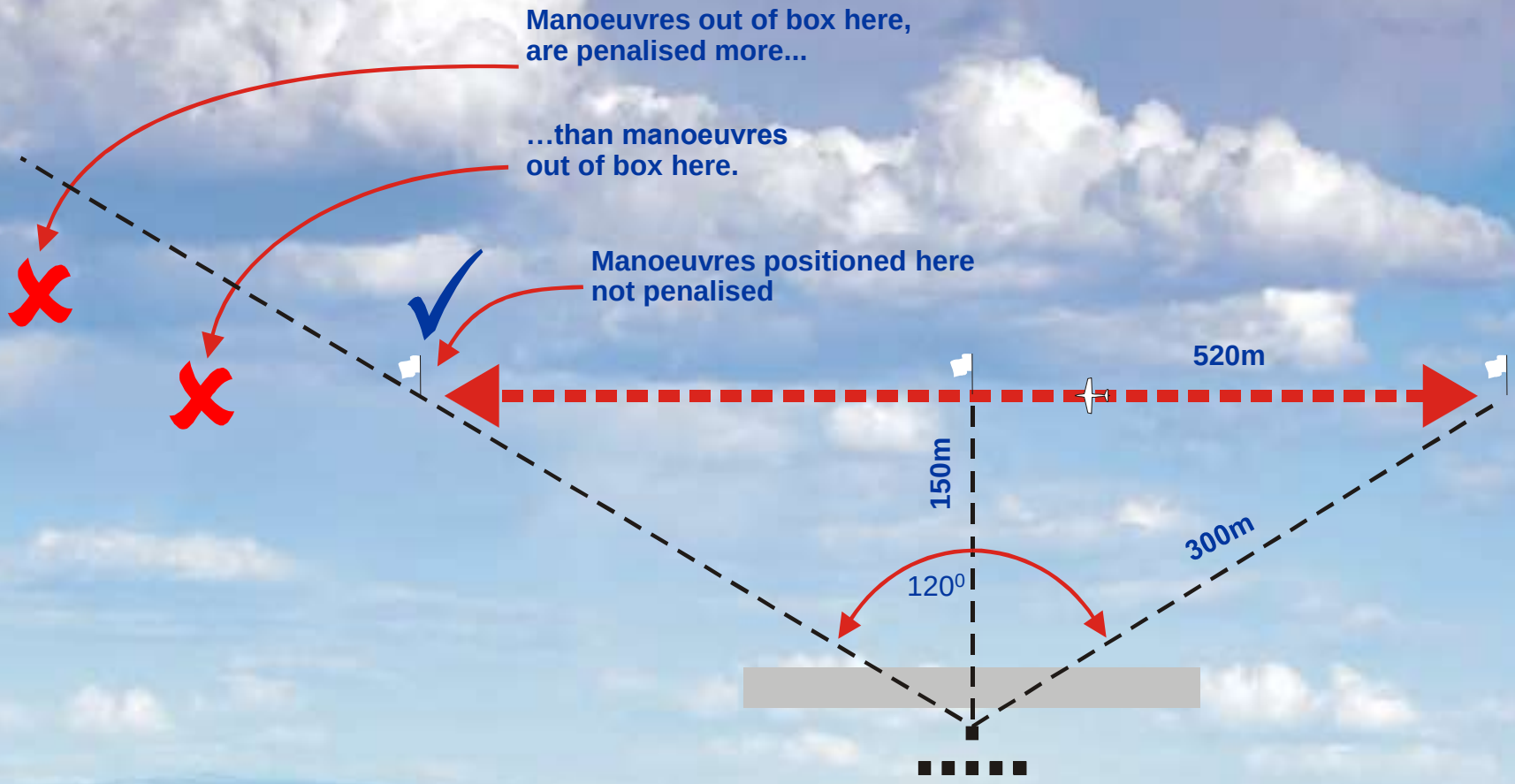
Harmonic appearance of the entire manoeuvre

Constant flightspeed

Radii not too tight and not too loose

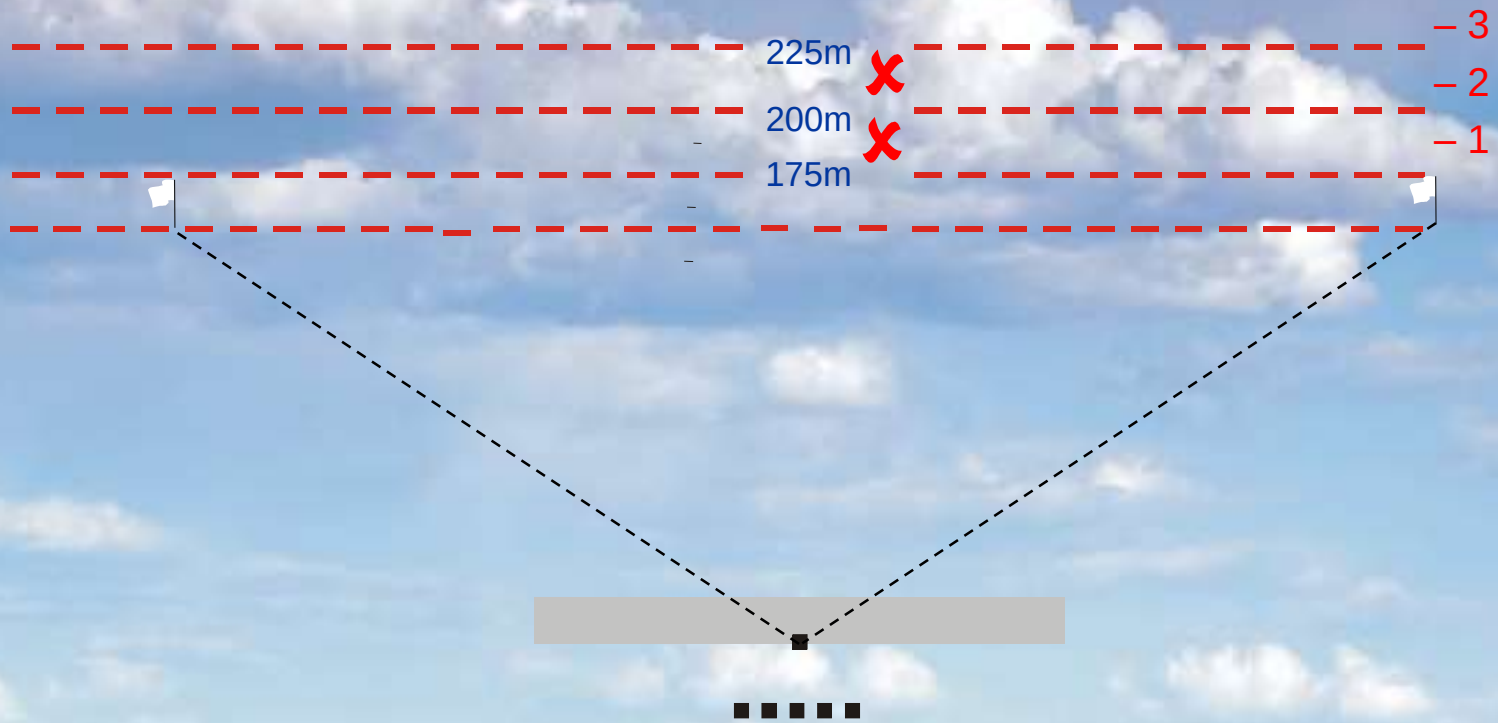
Rolling speed not to low or too high

LONGITUDINAL POSITIONING

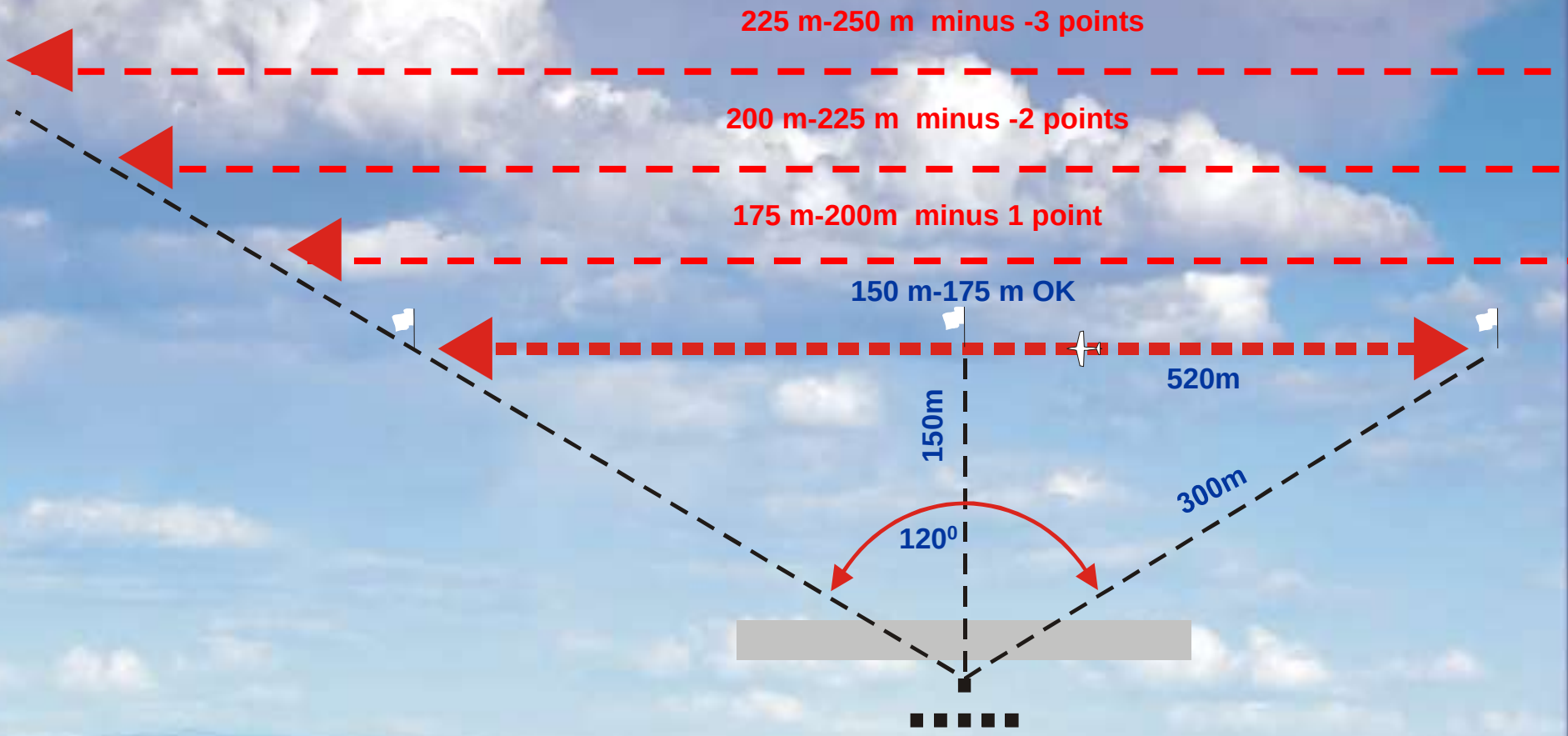


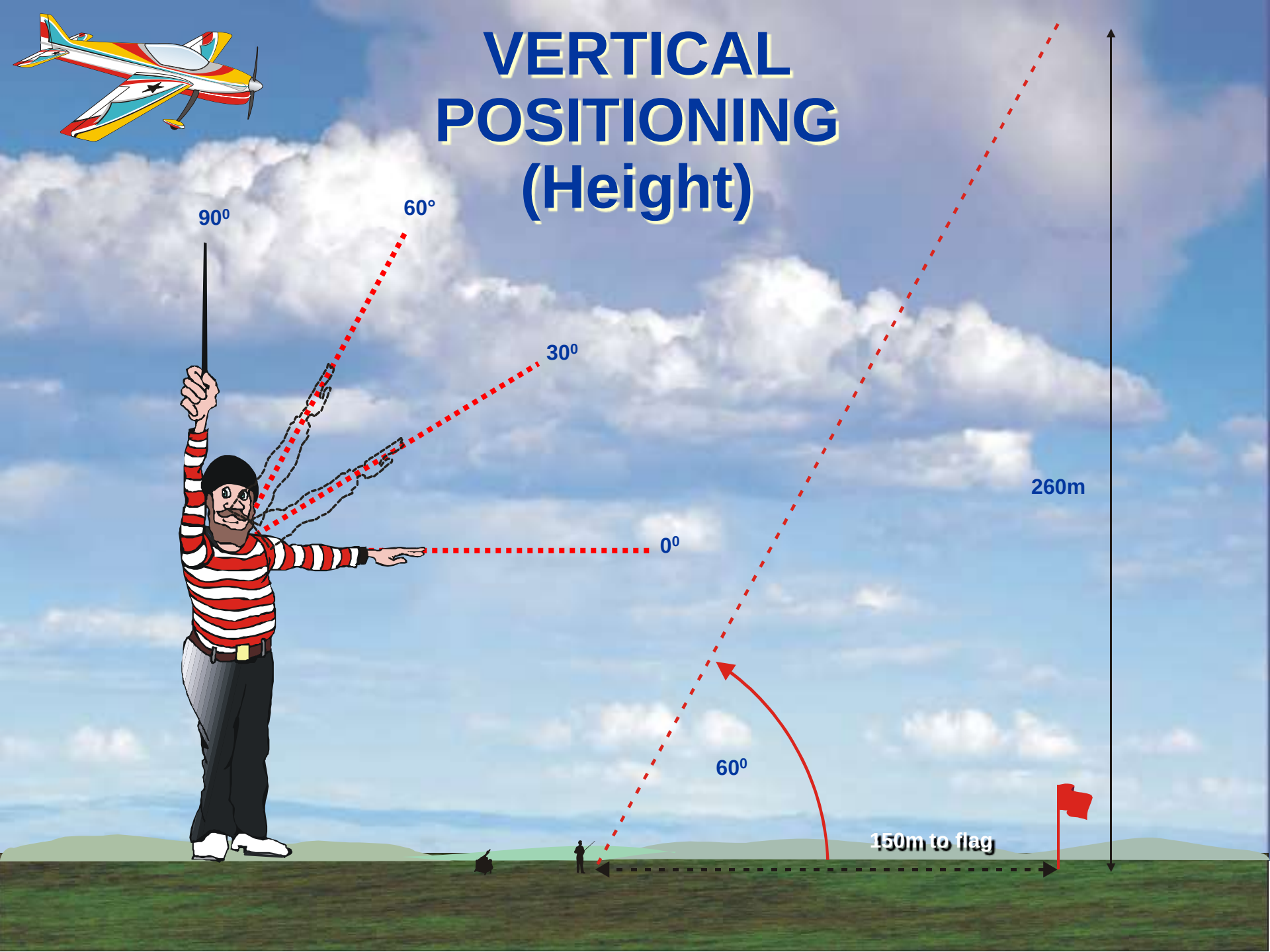
LONGITUDINAL POSITIONING

5B10: "Manoeuvres on a line greater than 175m MUST BE DOWNGRADED"



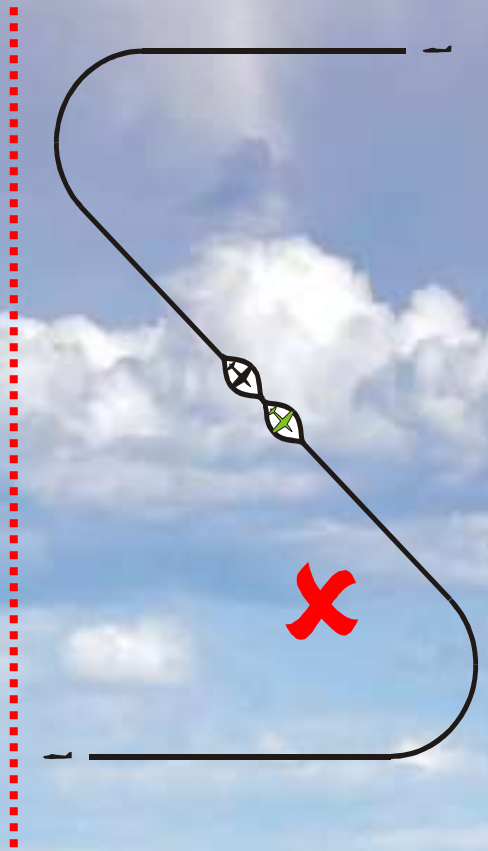
LONGITUDINAL POSITIONING




VERTICAL
POSITIONING
(Height)
90⁰
60°
30⁰
0⁰
260m
60⁰
150m to flag

CENTRE POSITIONING

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



CENTRE POSITIONING

Size of the manoeuvres

The size of a manoeuvre is scored by it‘s matching size relative to the size of manoeuv-ring zone and relative size of the other manoeuvres performed throughout the schedule

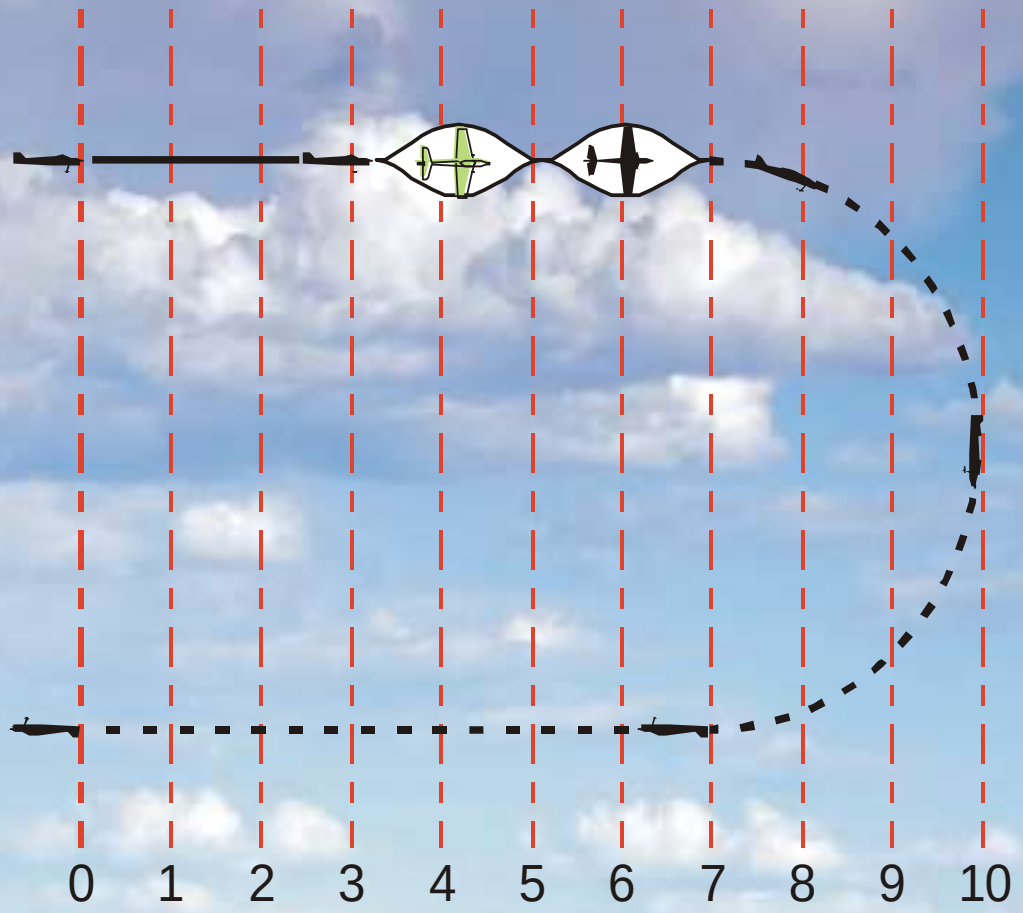
Proportion of the manoeuvre outside of the manoeuvring zone

Box markers are indicators only.

Do not downgrade unnecessarily!

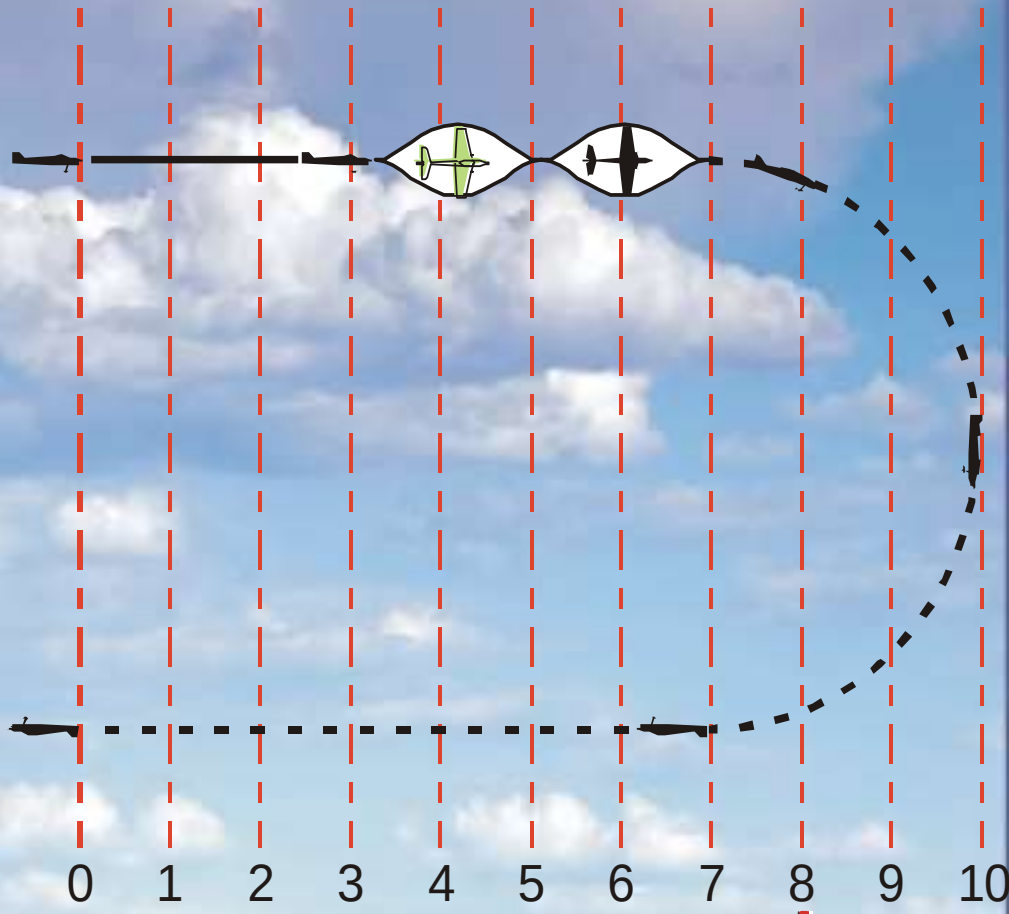
Proportion of the manoeuvre outside of the manoeuvring zone

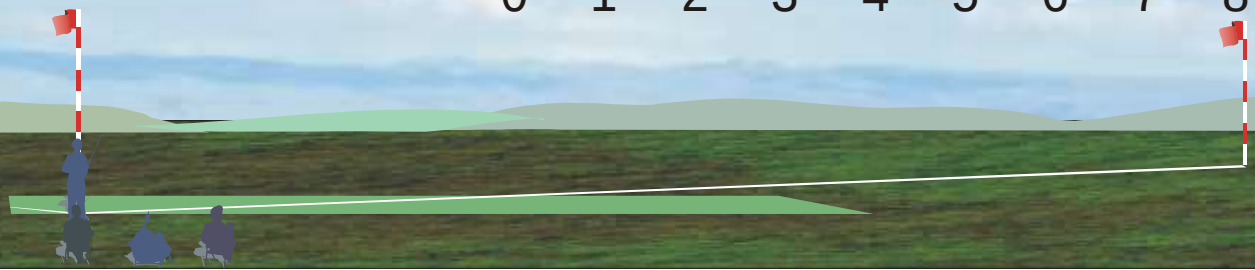
No downgrade (positioning only) (Entire manoeuvre = inside box marker)



Proportion of the manoeuvre outside of the manoeuvring zone

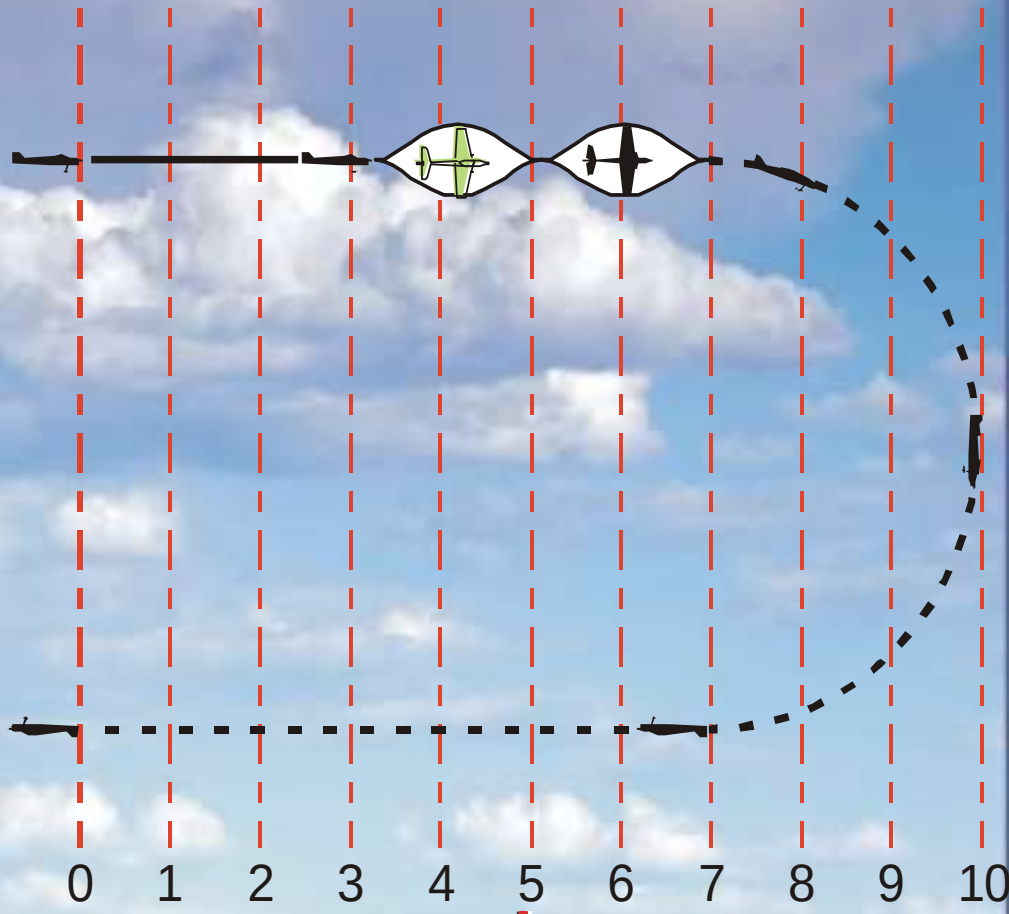
2 points downgrade
(20% of manoeuvre = outside)

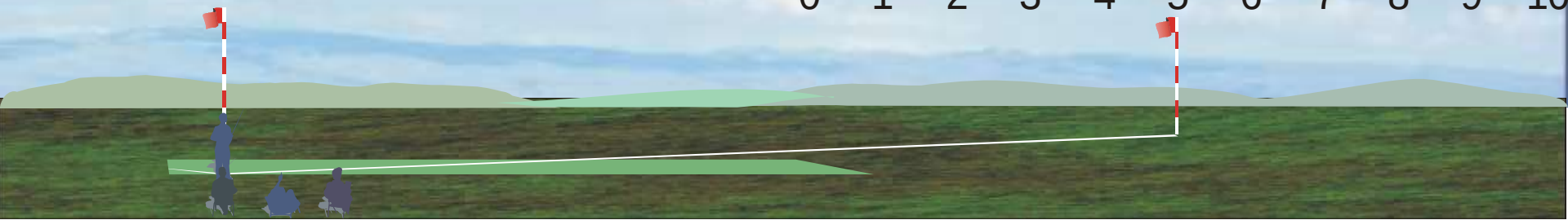




Proportion of the manoeuvre outside of the manoeuvring zone

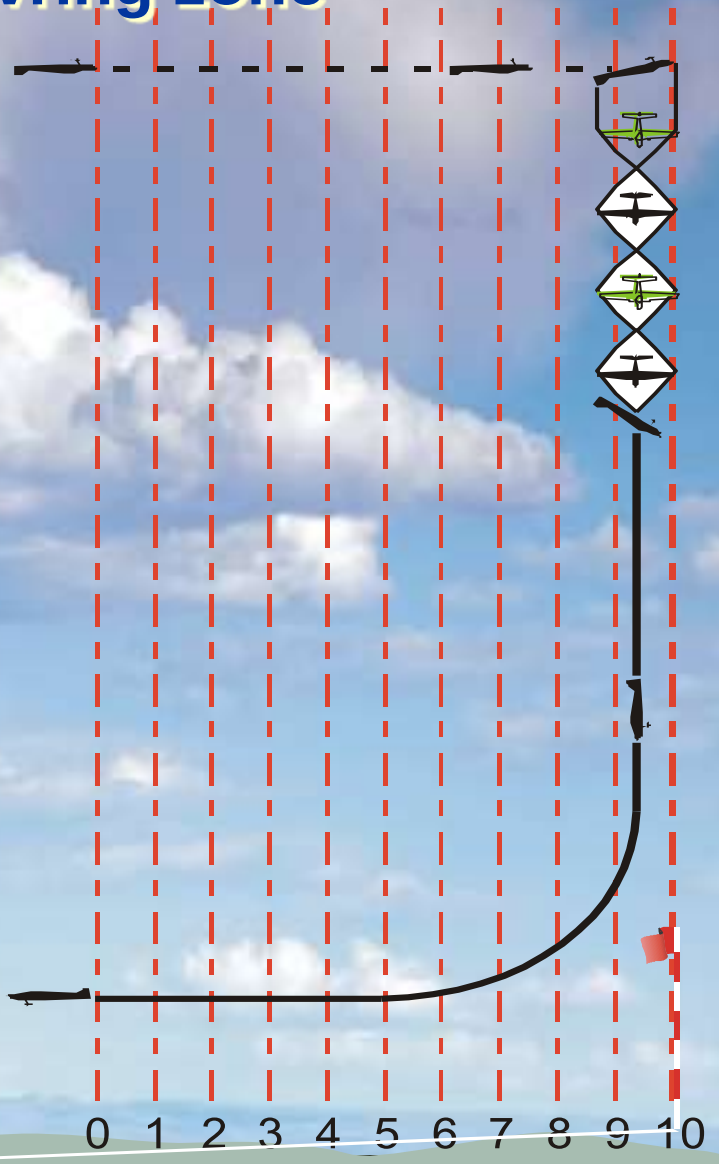
5 points downgrade
(50% of manoeuvre = outside)





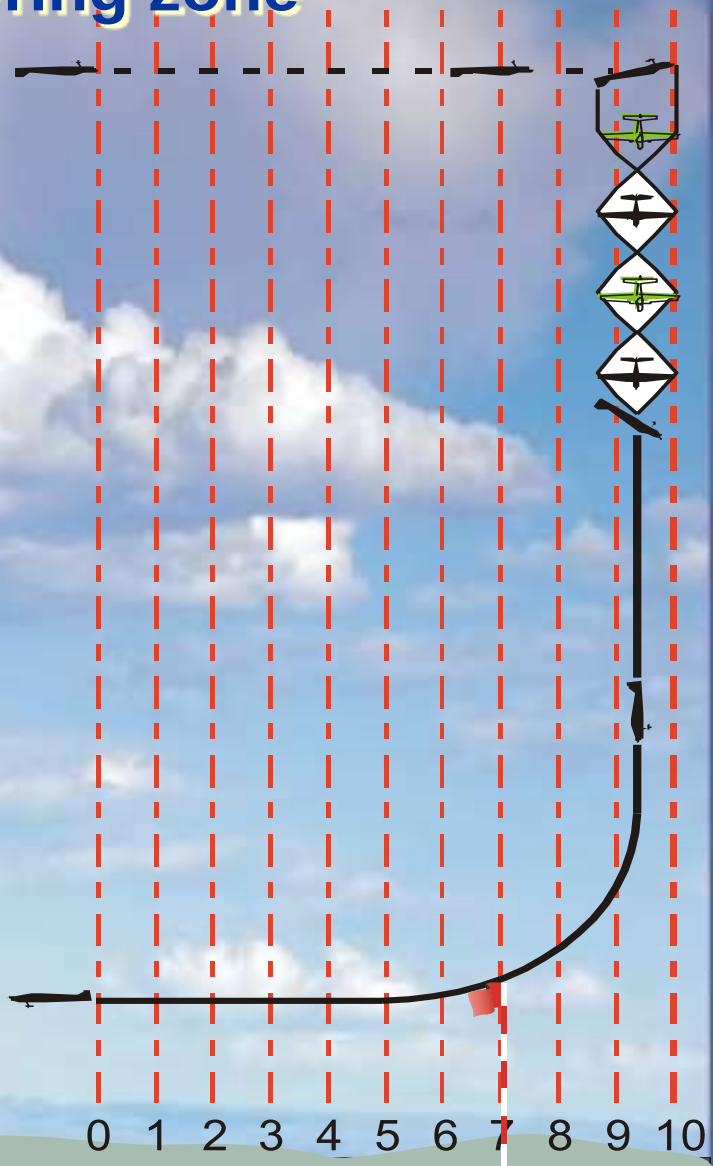
Proportion of the manoeuvre outside of the manoeuvring zone

No downgrade
(Entire manoeuvre = inside box marker)



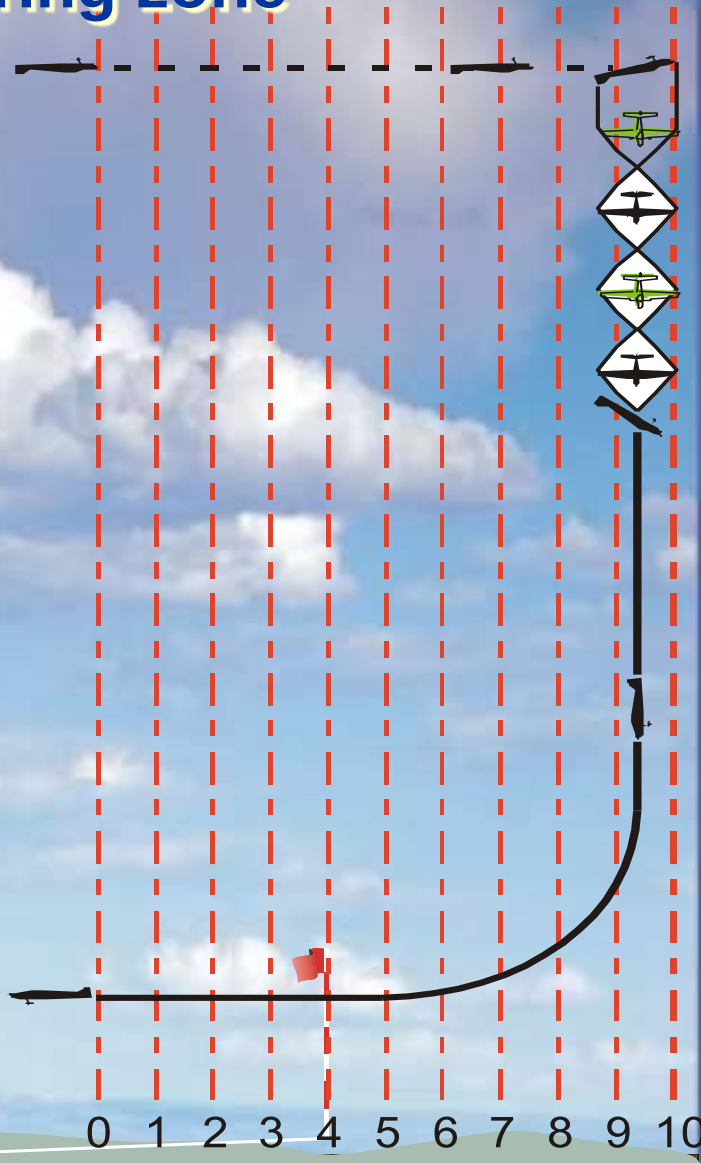
Proportion of the manoeuvre outside of the manoeuvring zone

3 points downgrade for positioning.
(30% of manoeuvre = outside box marker)



Proportion of the manoeuvre outside of the manoeuvring zone

6 points downgrade for positioning.
(60% of manoeuvre is outside box marker.
60% is still inside!)



SCORE BETWEEN 10 and 0!

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

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

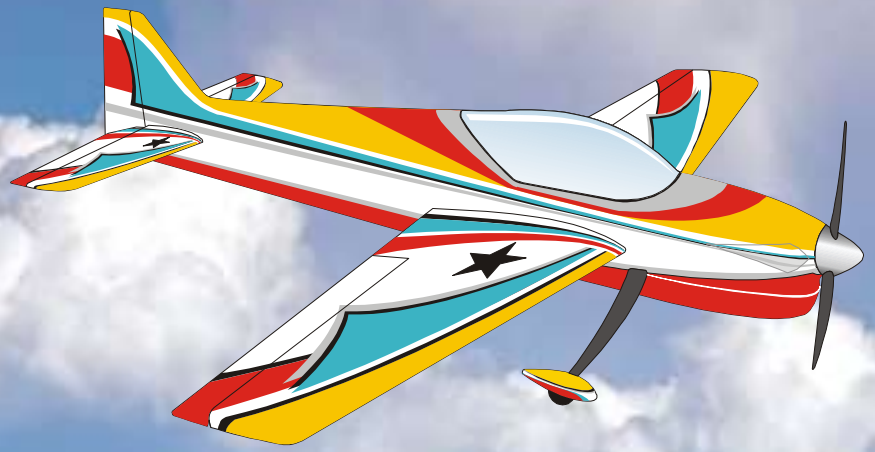
(friend, rival, countryman, flier from other nation)

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)



Enjoy flying and judging!

Drawings by Bob Skinner!

Update Michael Ramel
and Peter Uhlig

December 2015