



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 ✓

Minor defect on manoeuvre 12 = score ✗

Major defect on manoeuvre 15 = score ✗

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



# 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







# 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 the 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.



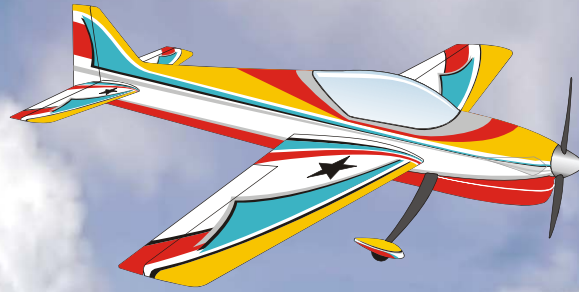
# PRINCIPLES

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.



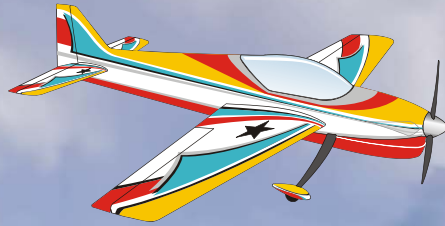


# **Geometrical accuracy of the manoeuvre**



**Smoothness  
and gracefulness  
of the manoeuvre**





# **Positioning of the manoeuvre within the manoeuvring zone**



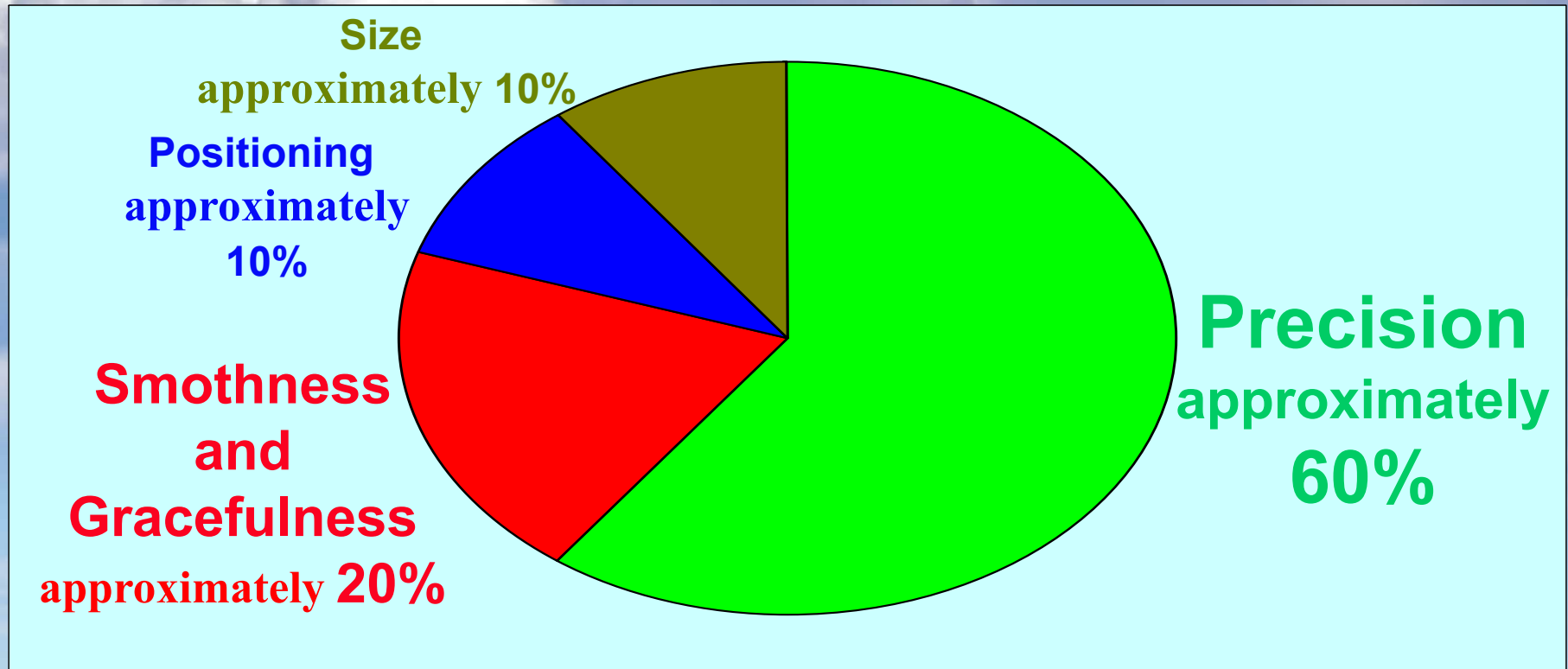


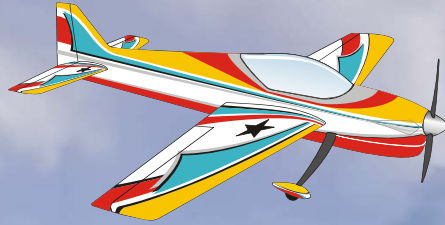


# Size of the manoeuvre



# WEIGHTING





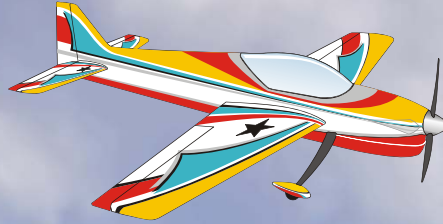
**Proportion of the manoeuvre  
outside of the manoeuvring zone**





# **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**

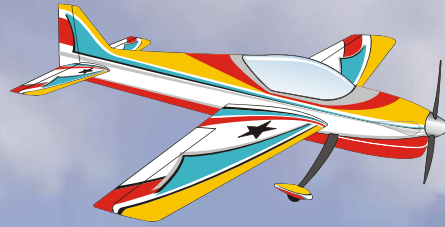
**Entry, exit poor**

**Wrong angles**

**Misrelation between line lengths**

**Different roll rates**

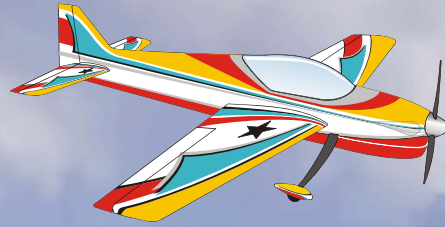
**Etc.**



2. **HOW SERIOUS** was the defect, or mistake?

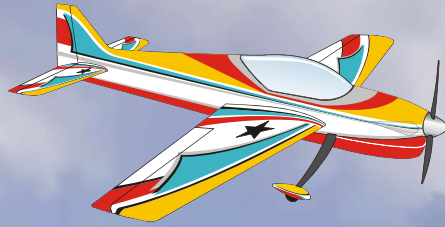
Was it big (major)?  
Or was it small (minor)?



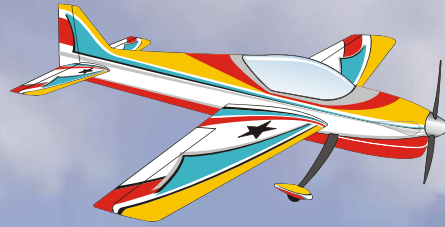


3. **HOW OFTEN** did you see the same defect,  
or mistake in a particular manoeuvre?

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

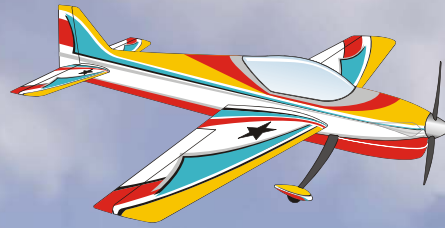


**4. WHAT WAS THE POSITIONING** of the  
manoeuvre?



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, ie. because the manoeuvre contained „something nice“!**





# Deduct/Downgrade System

Score input without scribe



**Electronic Scribe  
by Peter Vogel/USA**

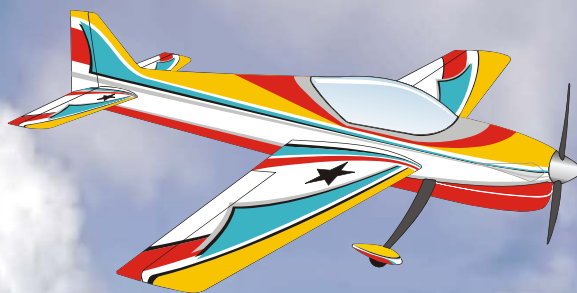


**Notaumatic/FRA**



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

- + No scribes needed.
- + Scores input directly to the computer.
- + Live scoring is possible.
- Very experienced judges needed, especially with unknown schedules.



# **CRITERIA FOR JUDGING INDIVIDUAL MANOEUVRES**

**(Method)**





# ARESTI SYSTEM

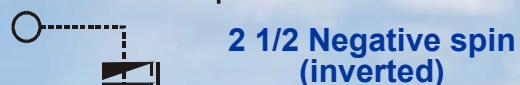
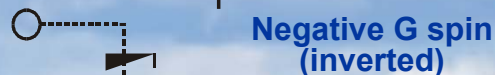
Start of manoeuvre



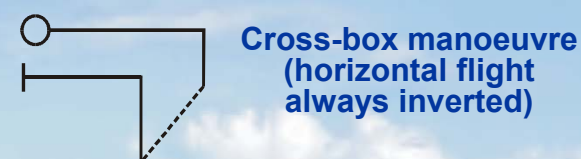
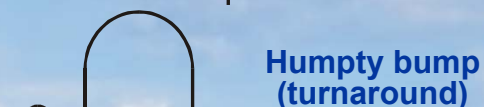
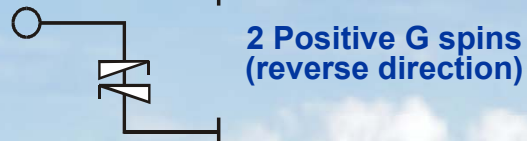
End of manoeuvre



Upright, positive G



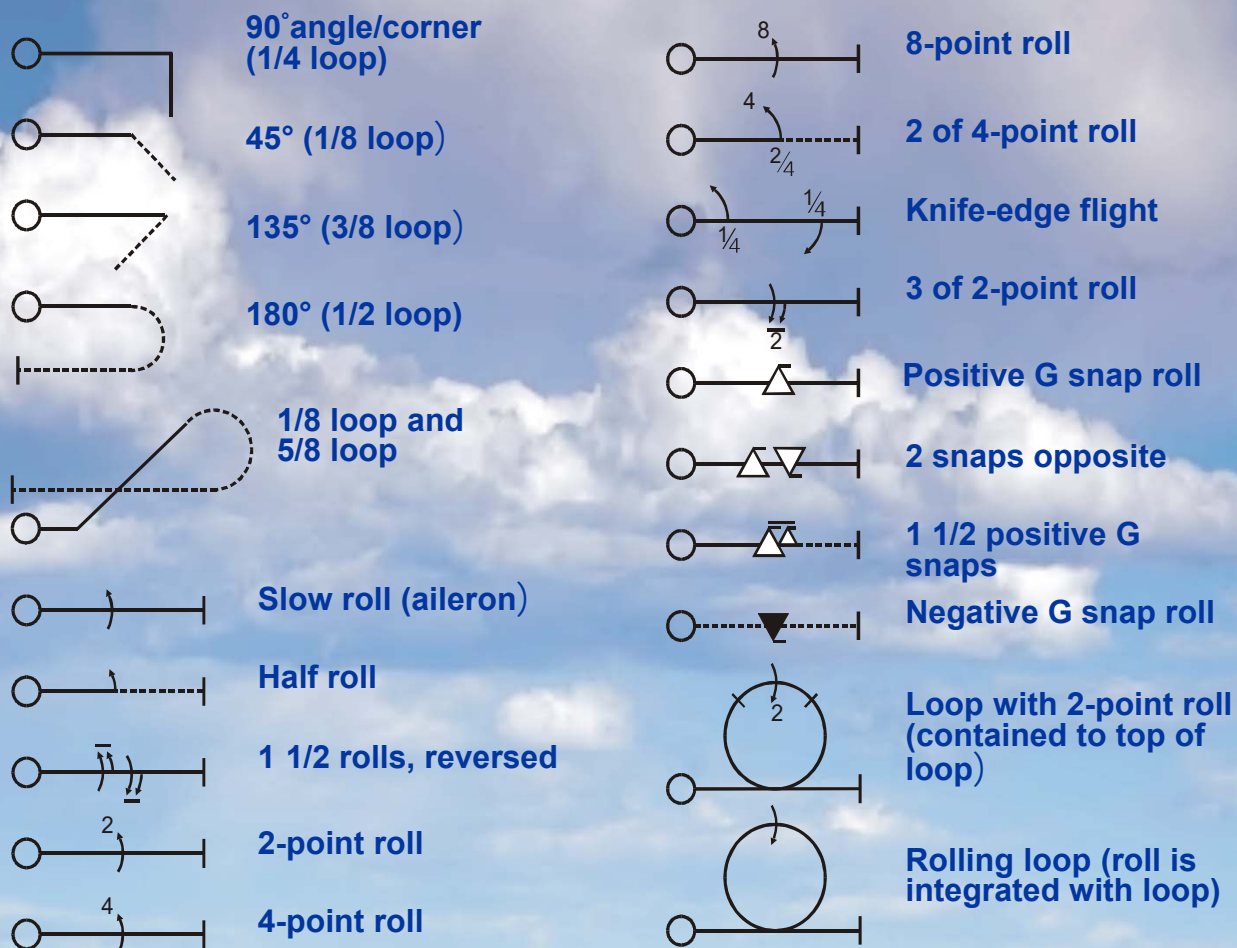
Inverted, negative G



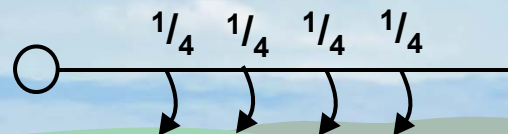




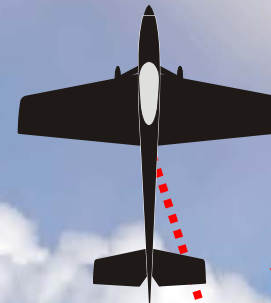
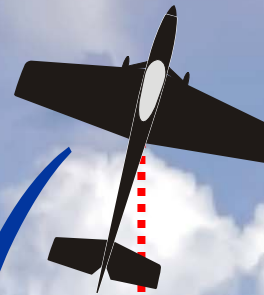
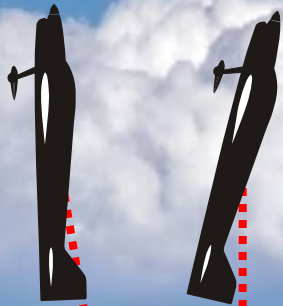
# ARESTI SYSTEM



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



# ATTITUDE vs. 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 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)



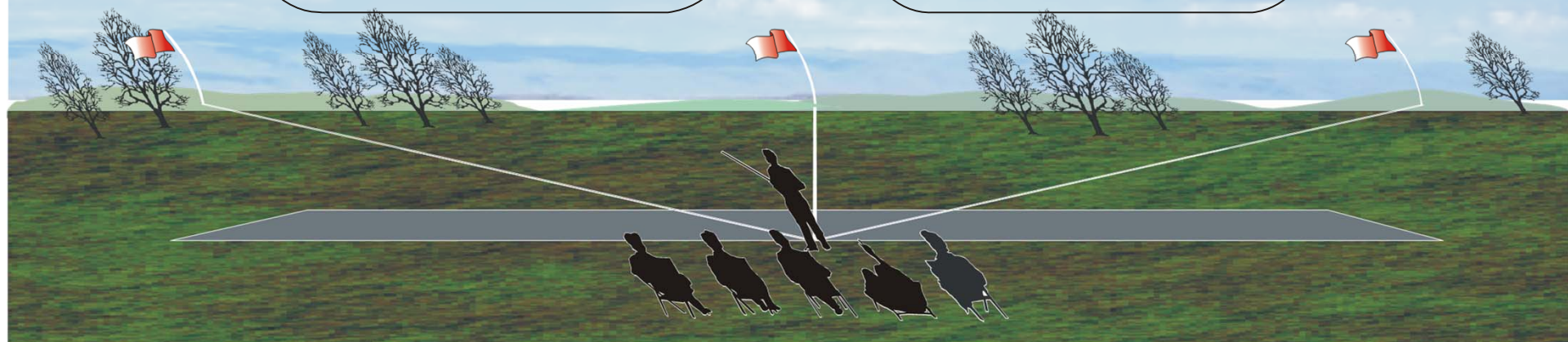
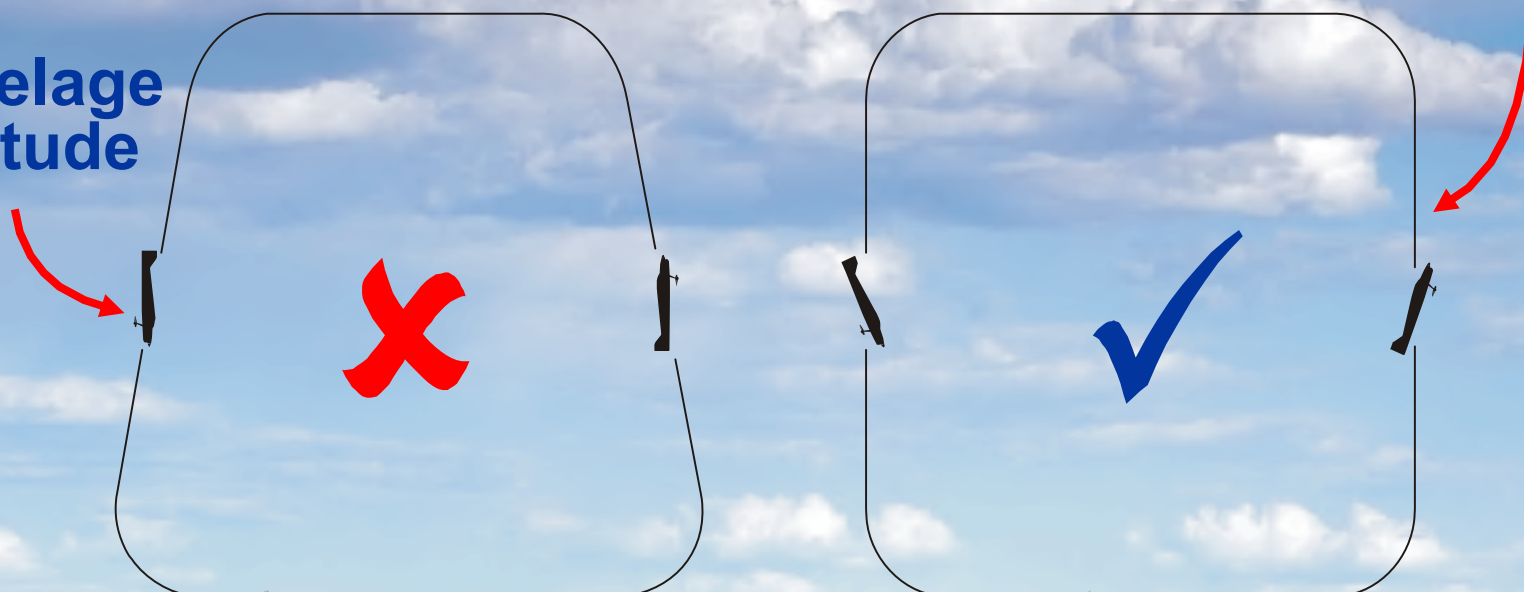


# Wind Correction

Flight path of model aircraft  
must describe correct geometric shape

Flight  
path

Fuselage  
attitude





# GEOMETRICAL ACCURACY OF THE MANOEUVRE

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

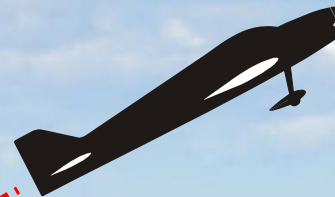
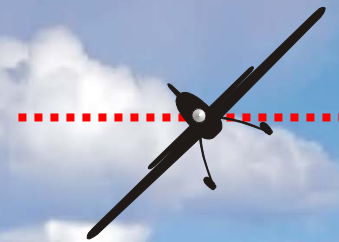
Up to 30° error =  
2 point downgrade

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

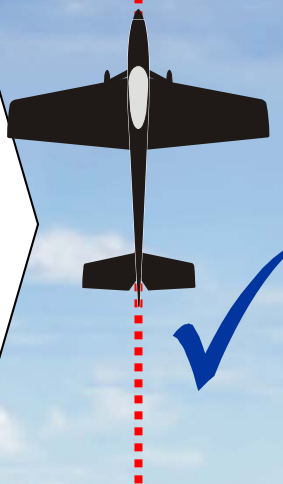
Up to 30° error =  
2 point downgrade

Up to 45° error =  
3 point downgrade

Vertical  
lines -  
pitch  
axis



Vertical  
lines -  
yaw  
axis





# 1 POINT PER 15° DEVIATION

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



# LINES

Horizontal



90°



60°



45°

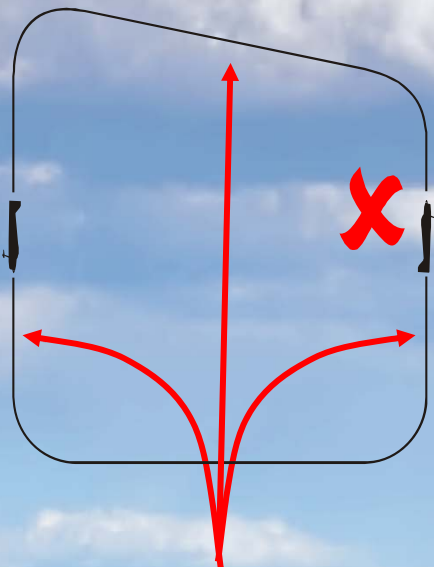






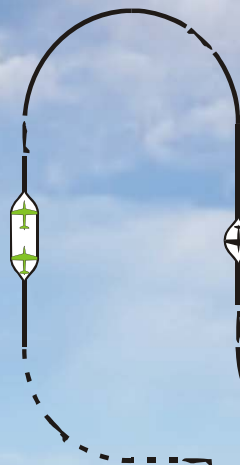
# LINES

**Minor** mis-relation  
between line lengths  
= minus 0,5 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...  
up to minus  
2 points!

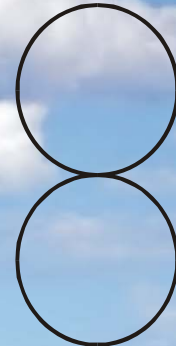
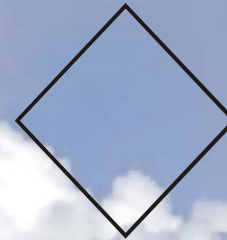
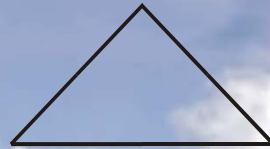
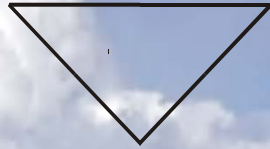


No line  
after roll... =  
minus  
3 points!





# LOOPS



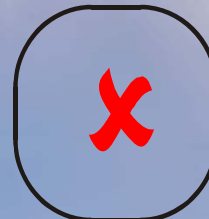


# LOOPS

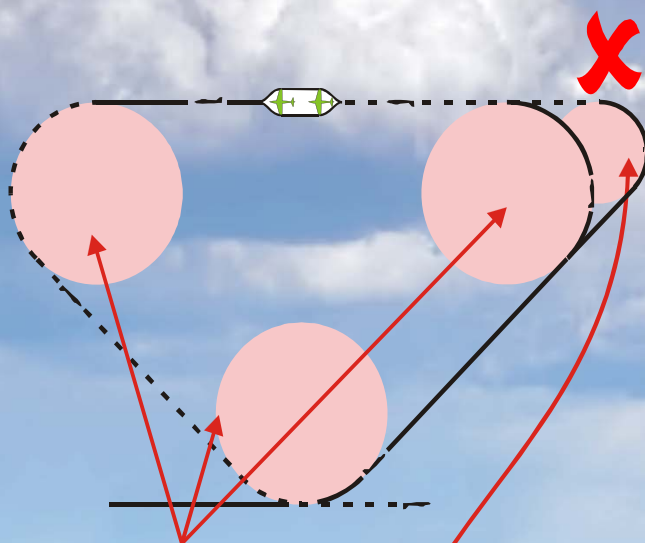
Radii too tight...



...too open/loose...

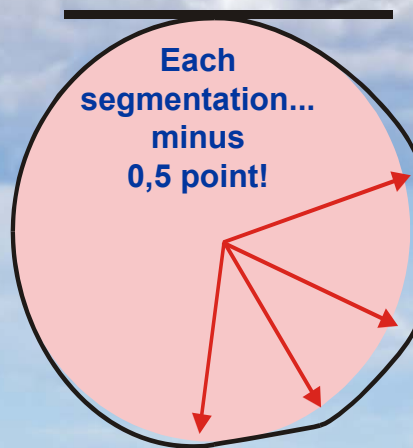


Good compromise!

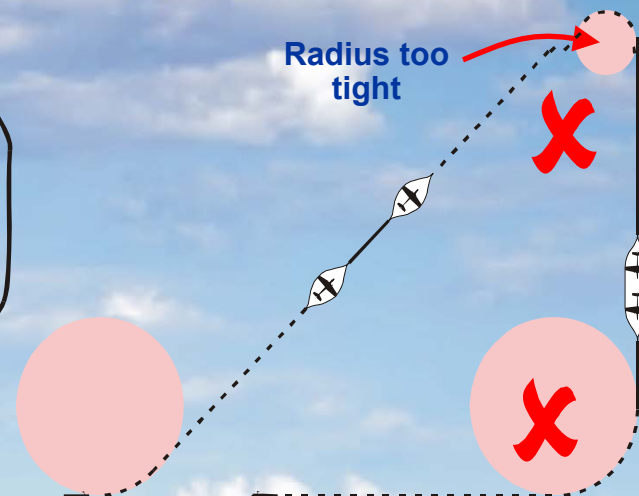


All part-loop  
radii equal.  
Minor mis-relation...  
to minus 0,5 point!

This = minus 2 points!



Radius too  
tight

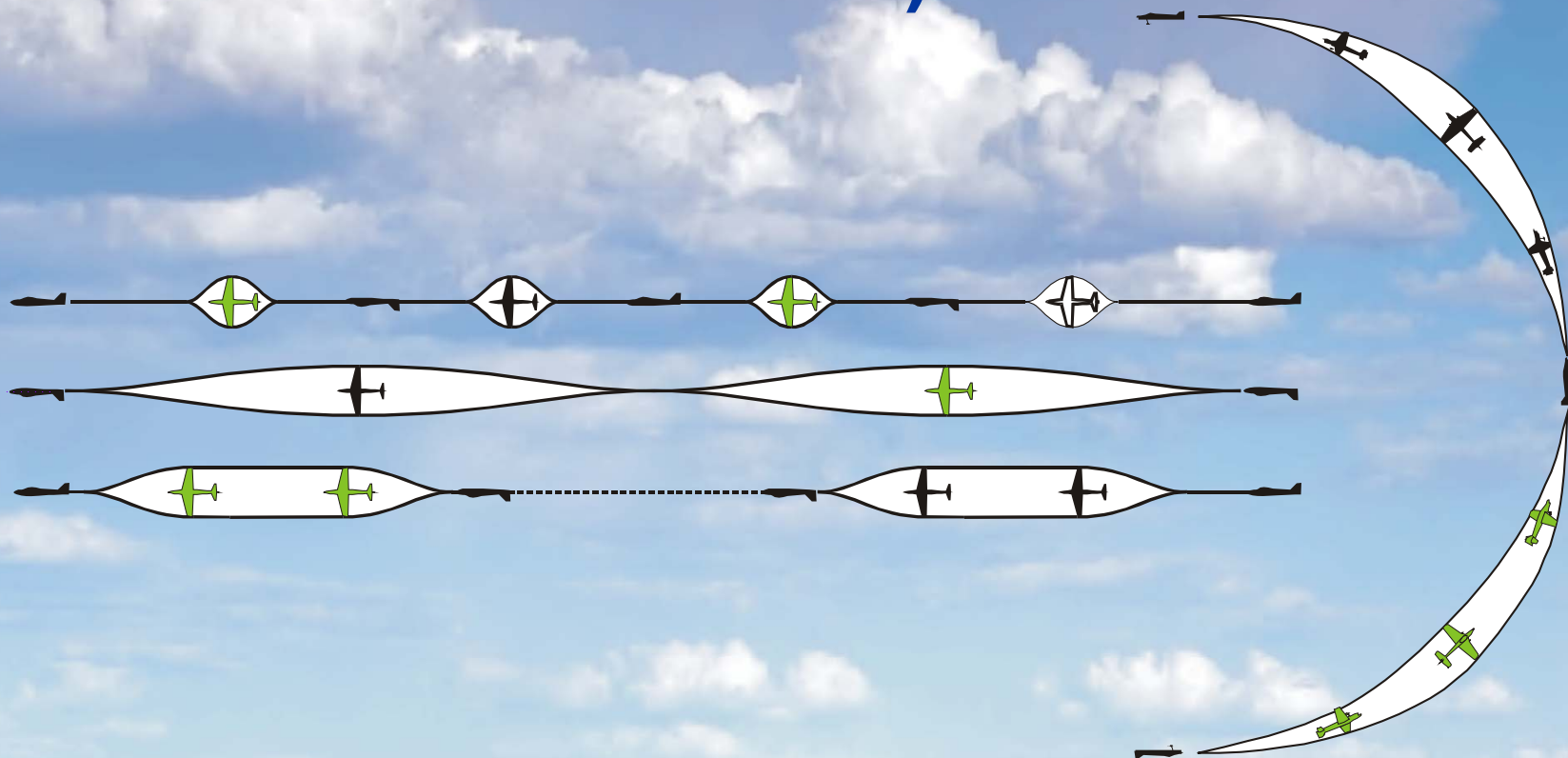


The first radius of a manoeuvre does not define the radii for the remaining radii of a manoeuvre but it is a starting point. As the manoeuvre progresses, the judge will compare each radius that was just flown to the last radius flown and if there is a difference, then a downgrade will be given based on the severity of the difference.

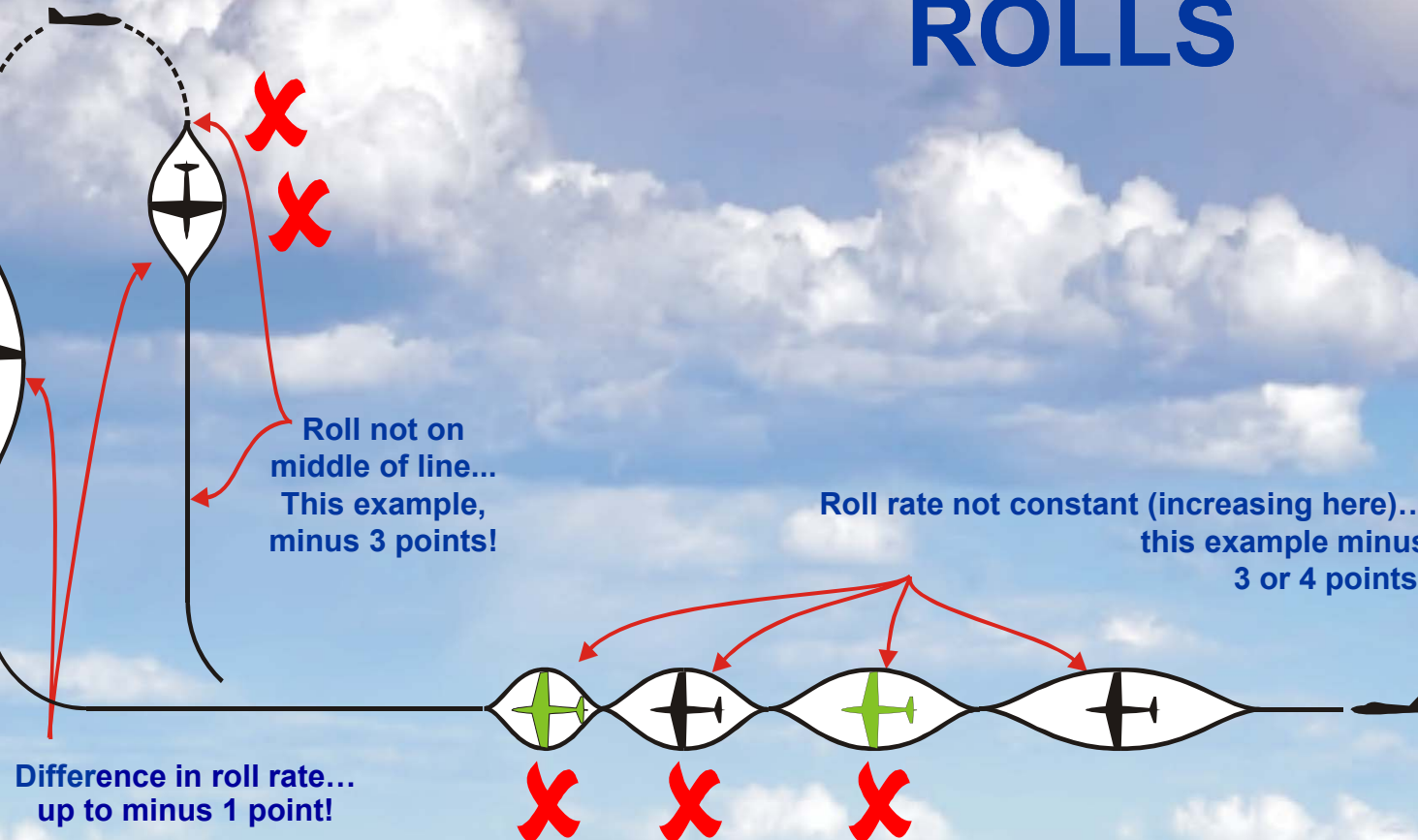




# Rolls (Continuous Rolls and Part-Rolls)

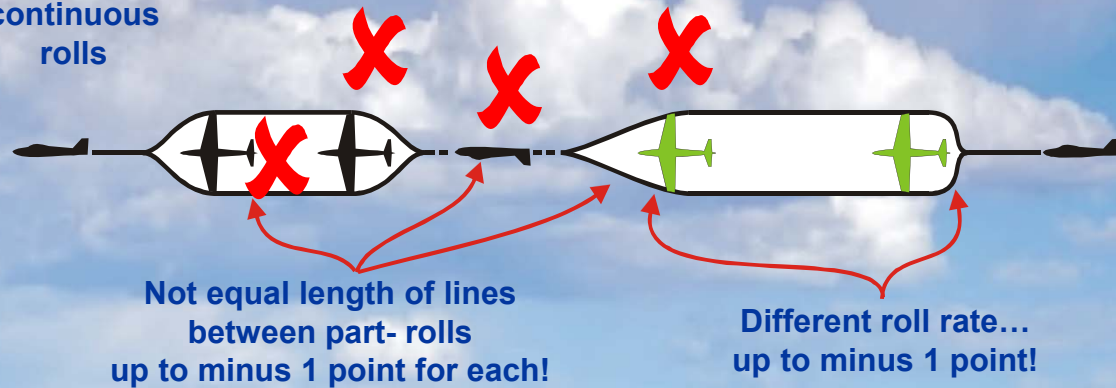
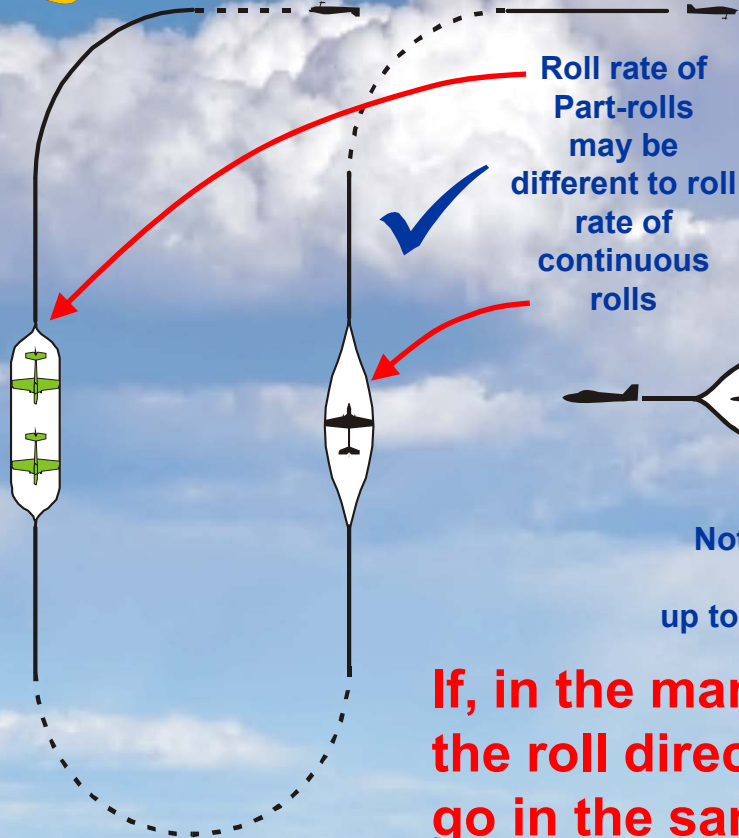


# ROLLS



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.

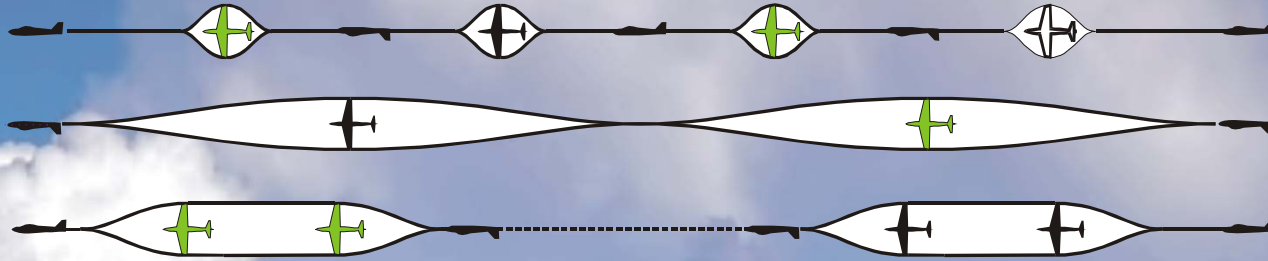
# ROLLS



**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!**





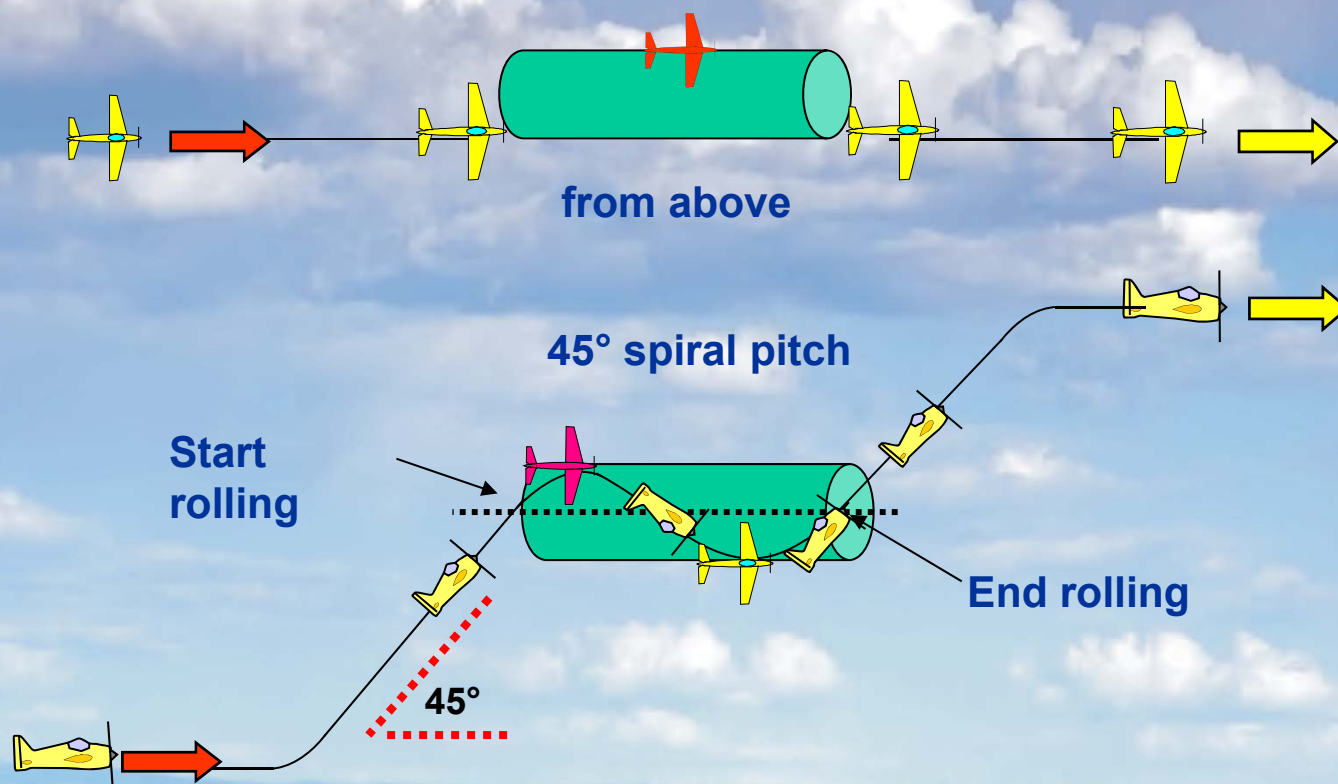
## Missing or additional Part-Rolls: Use the 1 point per 15° rule

- 1 missing  $\frac{1}{2}$  roll: (180 degrees) = **Zero points**
- 1 missing  $\frac{1}{4}$  roll : (90 degress) = - **6 points**
- 1 missing  $\frac{1}{8}$  roll : (45 degrees) = - **3 points**
- the same deductions apply with additional part-rolls



# Barrel Rolls

You first pull into a  $45^\circ$  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  $45^\circ$  pitch).





# SNAP ROLLS

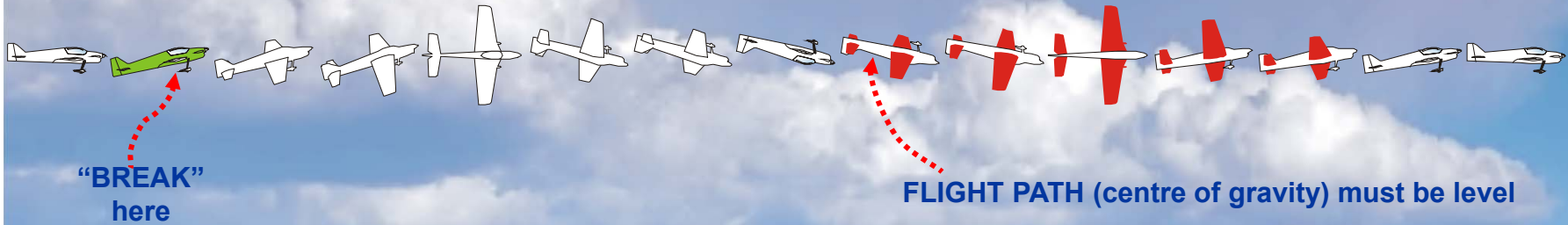
A **SNAP ROLL** is basically a spin in the horizontal axis.

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

The tail should describe a corkscrew path.



## A vibrant, stylized illustration of a biplane. The aircraft features a white base paint with bold, horizontal stripes of red and yellow. The upper wing has a blue stripe near the tip, and the lower wing also has a blue stripe. A black star is visible on the side of the fuselage. The tail section is decorated with red and yellow stripes. The biplane is shown in a three-quarter view, flying towards the right against a clear blue sky with a few wispy white clouds.



## 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!**

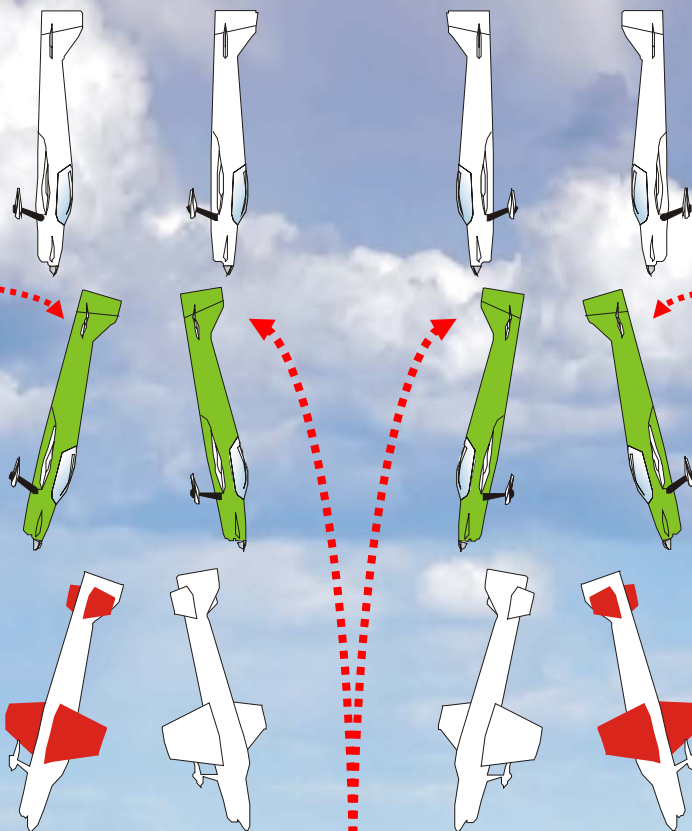


# SNAP ROLLS, DOWN (and UP)

**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**





**Bad guys say:**

If it is not a BARREL ROLL... **X**



...and it's not an an AXIAL ROLL... **X**

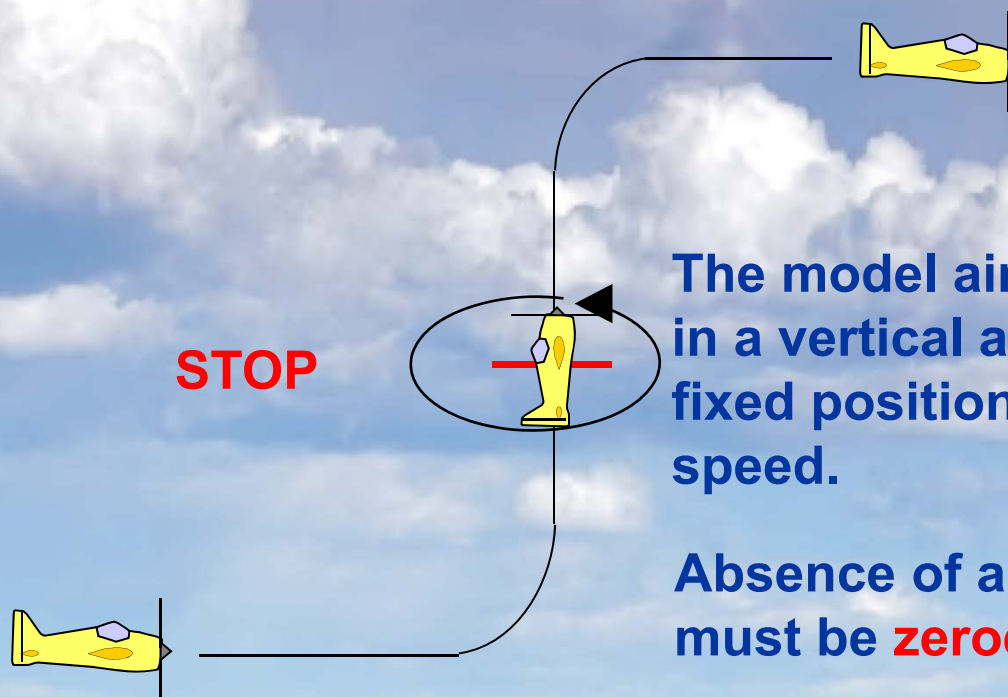


...then it's probably...

**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.





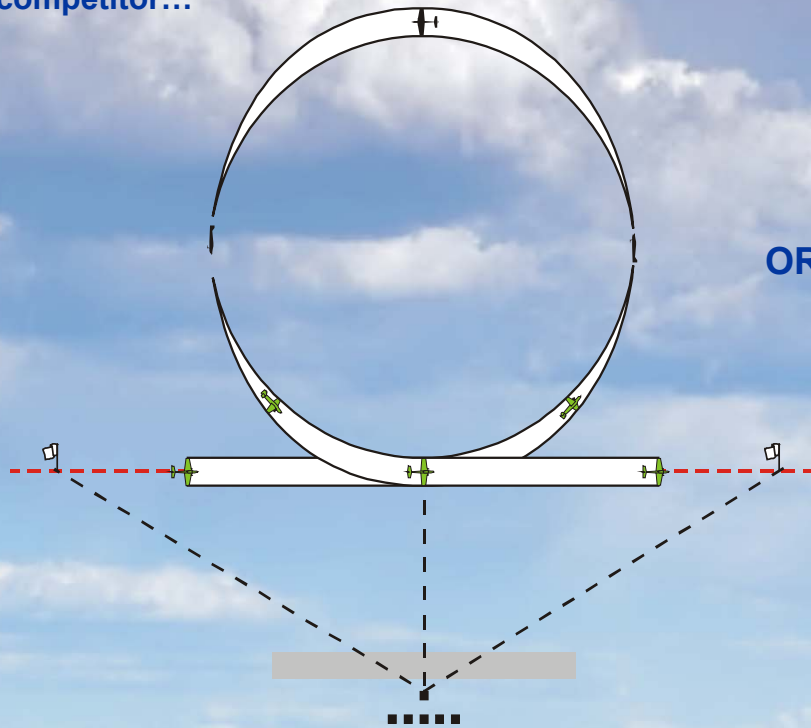
# Horizontal Circles

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

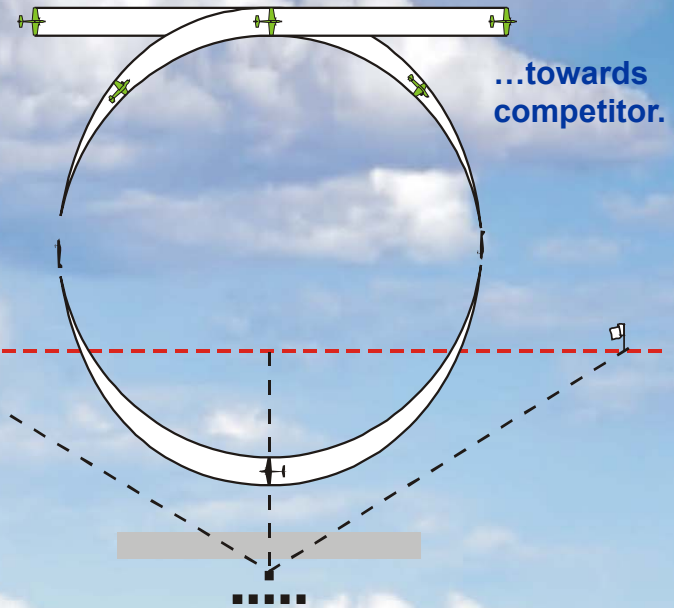


# Horizontal Circles (Rolling Circles)

May be AWAY from  
competitor...



OR...



...towards  
competitor.



# Horizontal Circles (Rolling Circles)

Second roll to inside

Reversal is immediate

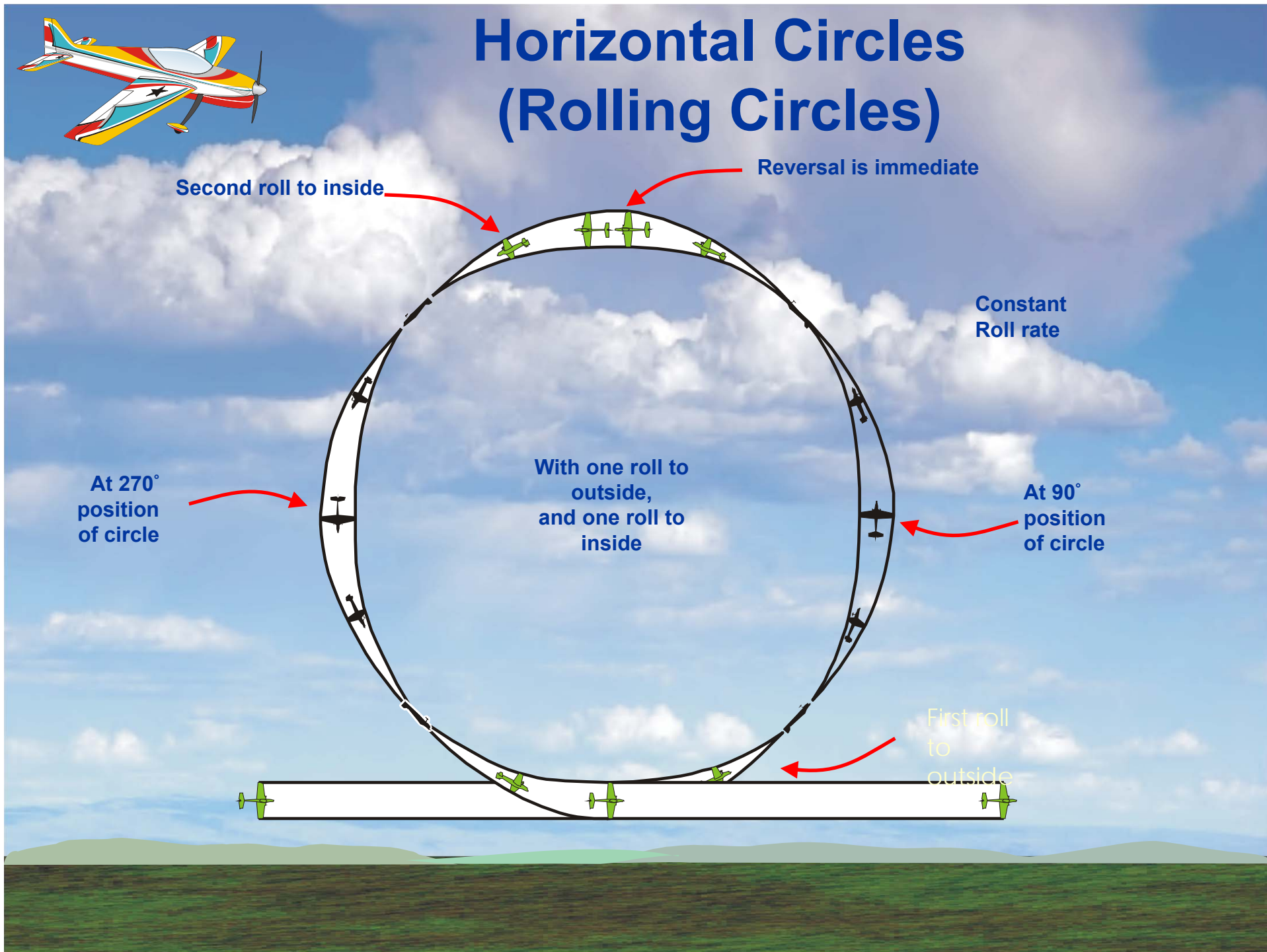
Constant  
Roll rate

At 270°  
position  
of circle

With one roll to  
outside,  
and one roll to  
inside

At 90°  
position  
of circle

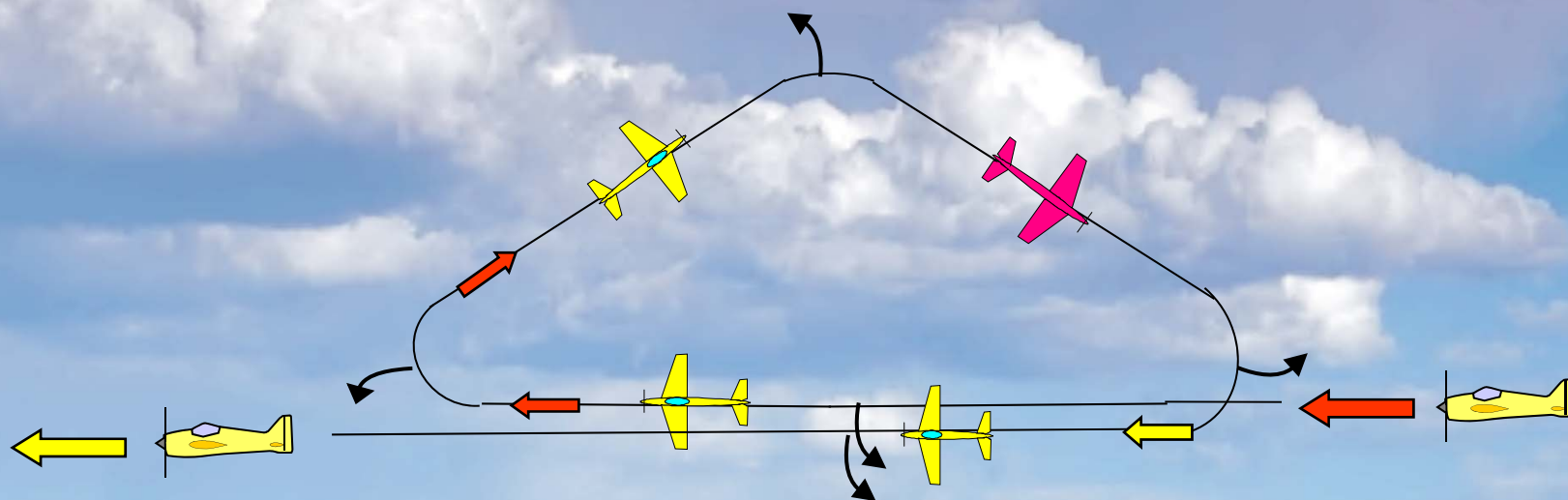
First roll  
to  
outside





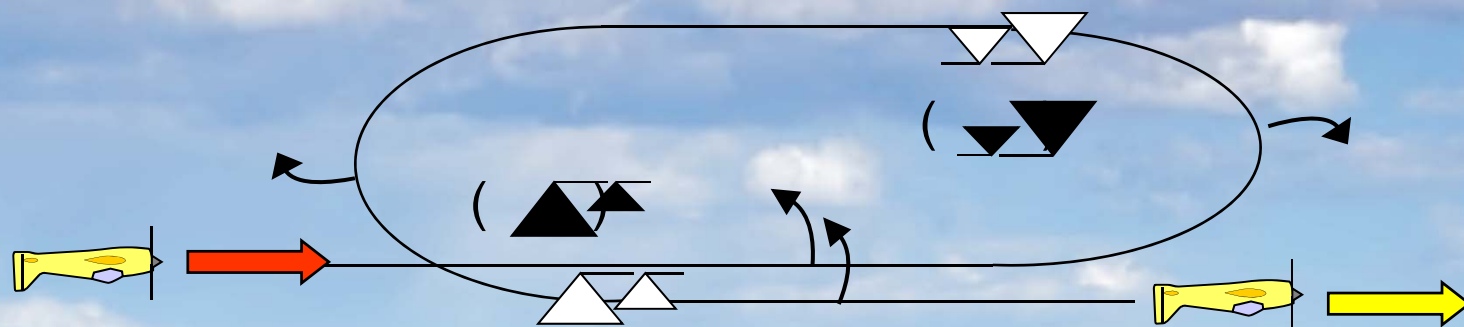


# Horizontal Circles (Triangle)



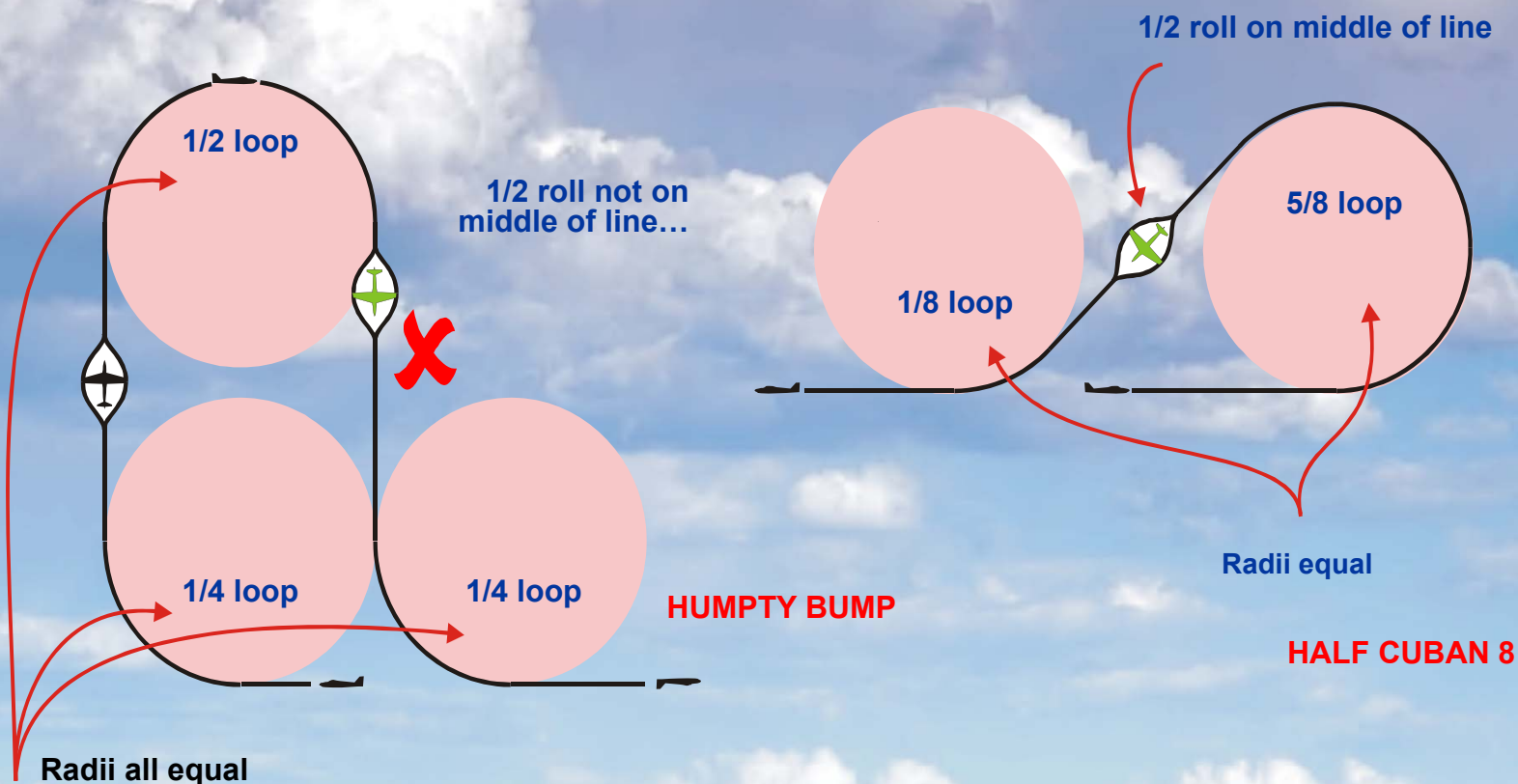


# Horizontal Circles (Double Immelmann)





# Line/Loop/Roll/Horizontal Circle COMBINATIONS

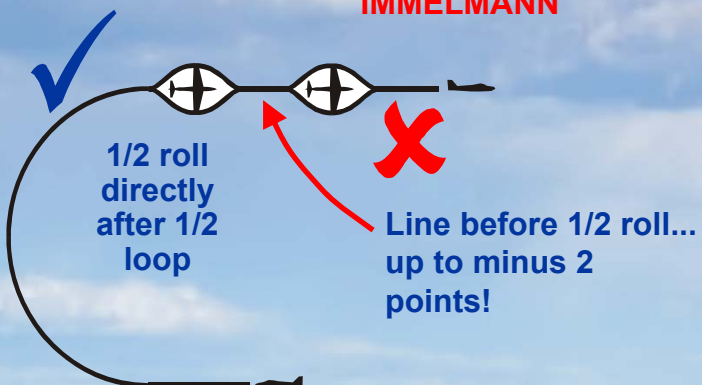
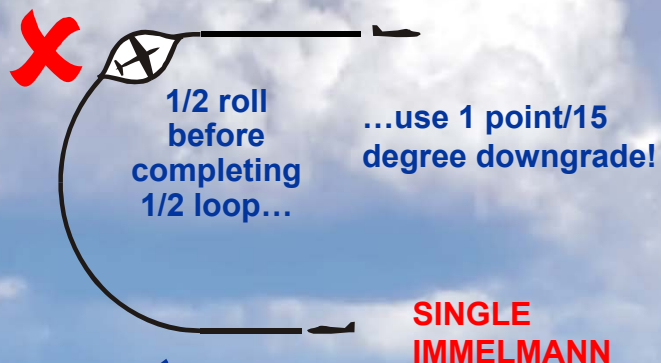


Whenever a continuous roll, part-roll, snap roll, or a consecutive combination of these is placed on a line, the length of the line before and after the roll or the combination of consecutive rolls must be equal. 0.5 point is subtracted for a minor difference, and 1 or more points for a major difference. If there is a complete absence of a line before or after the roll, 3 points are subtracted.





# Line/Loop/Roll/Horizontal Circle COMBINATIONS



Radii are equal

**Double IMMELMANN**

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

**✓** 1/2 roll directly after 1/2 loop

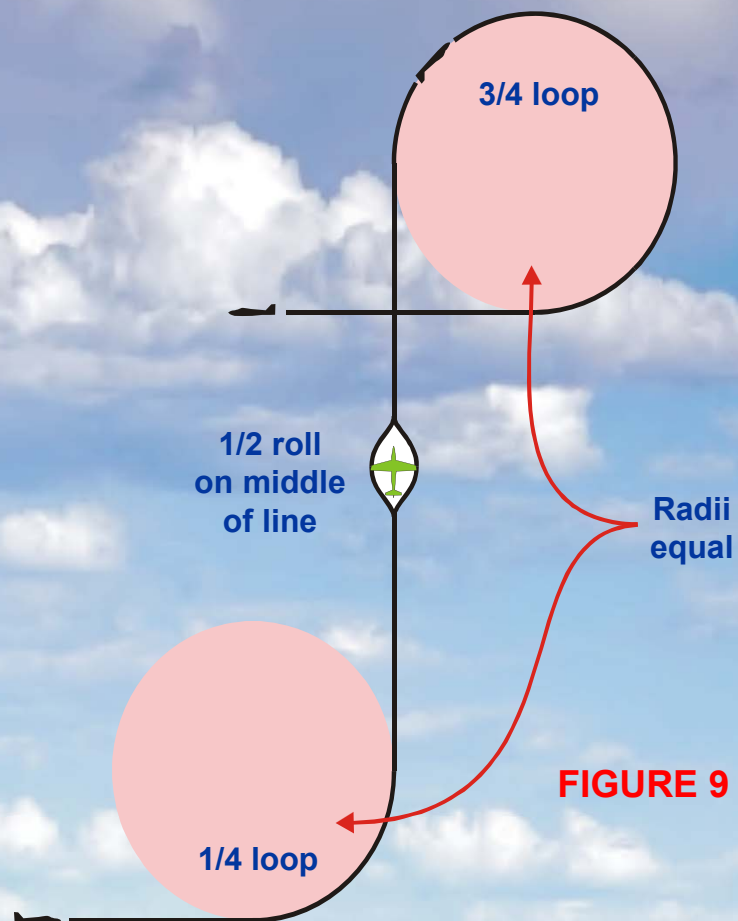
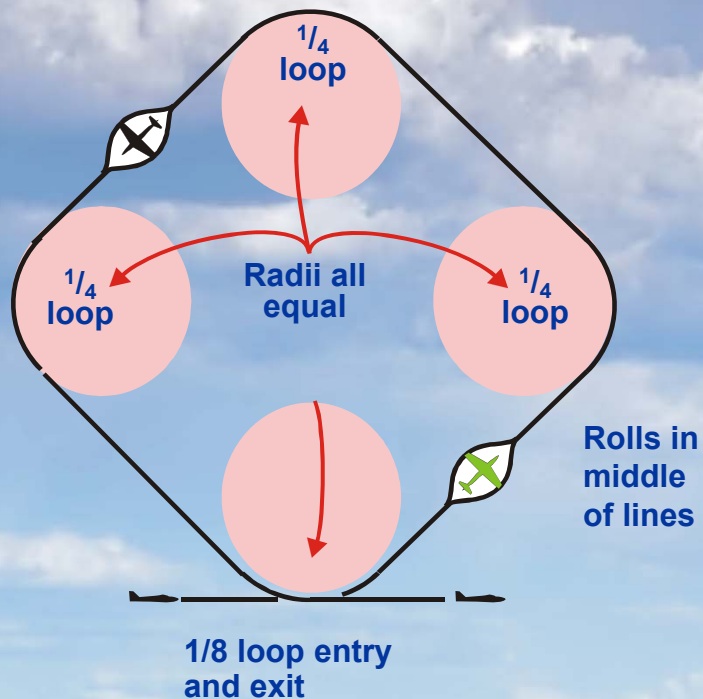
There is nothing about the length of the lines between the part loops in the Sporting Code!



# Line/Loop/Roll/Horizontal Circle COMBINATIONS

**SQUARE LOOP  
ON CORNER**

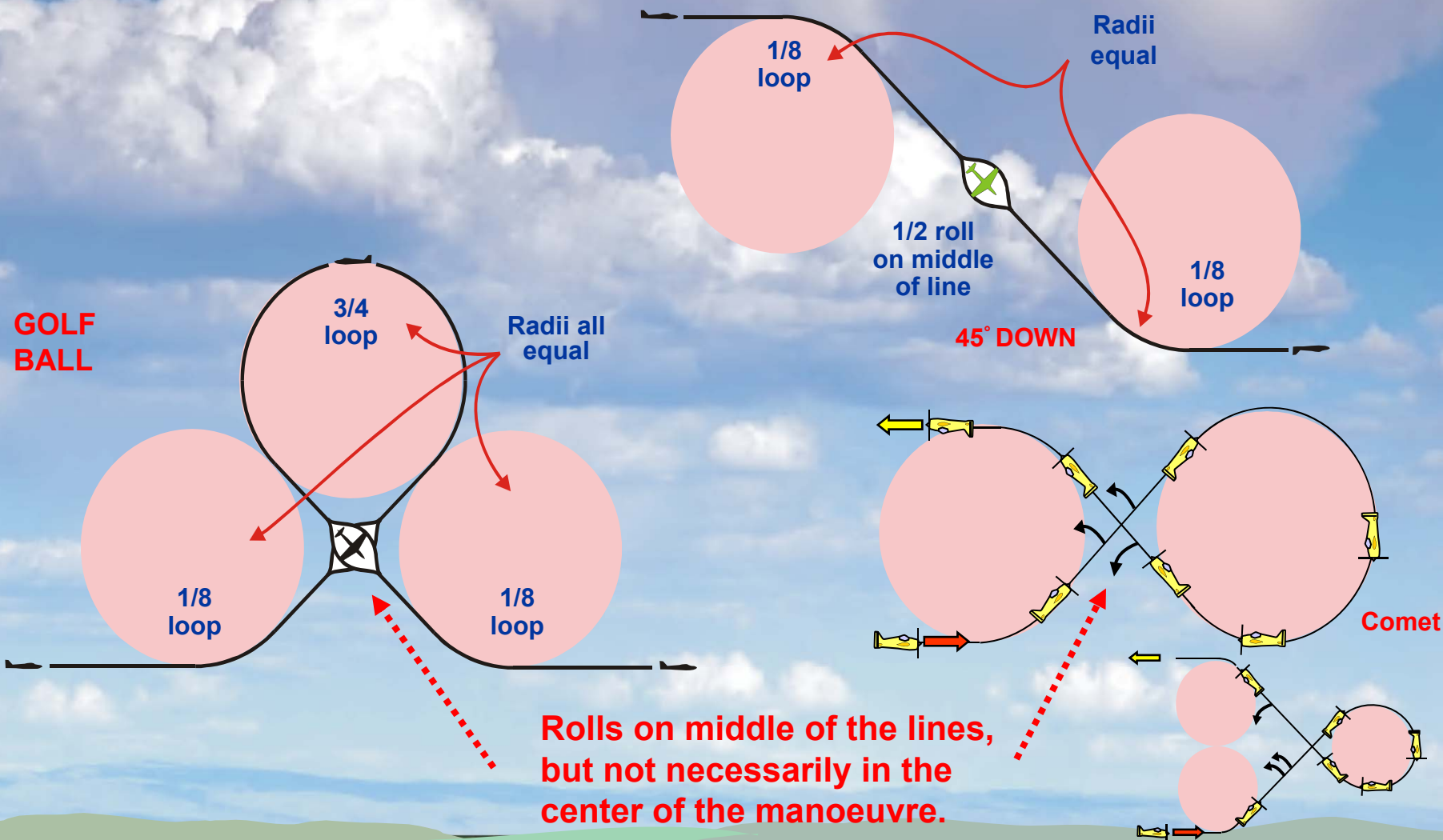
All lines 45°.  
All lines equal  
length



**FIGURE 9**



# Line/Loop/Roll/Horizontal Circle COMBINATIONS

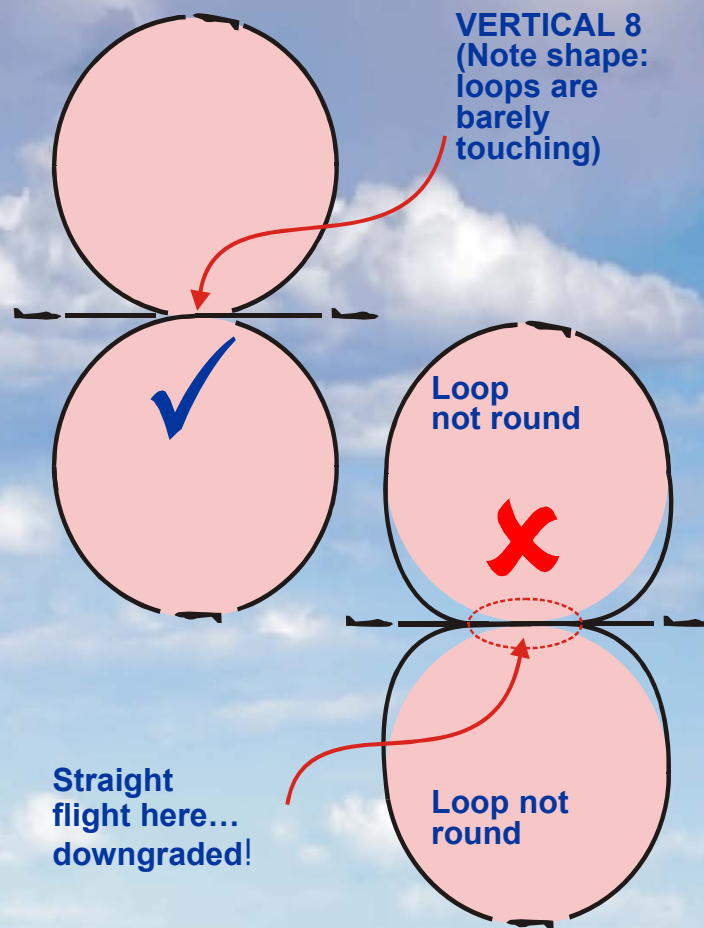
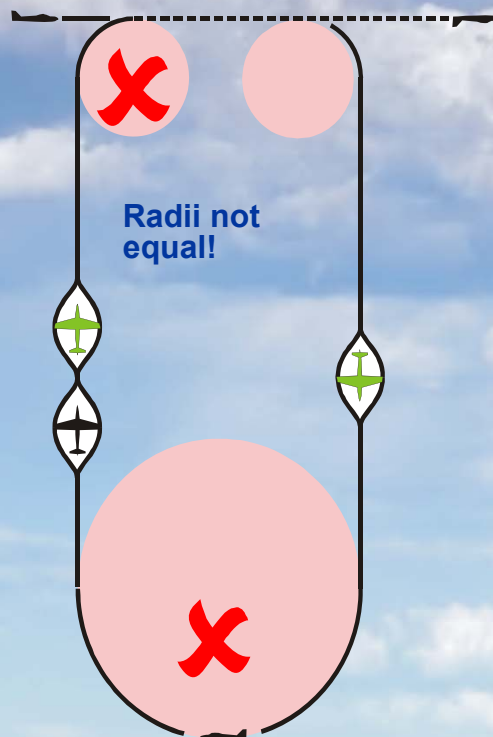
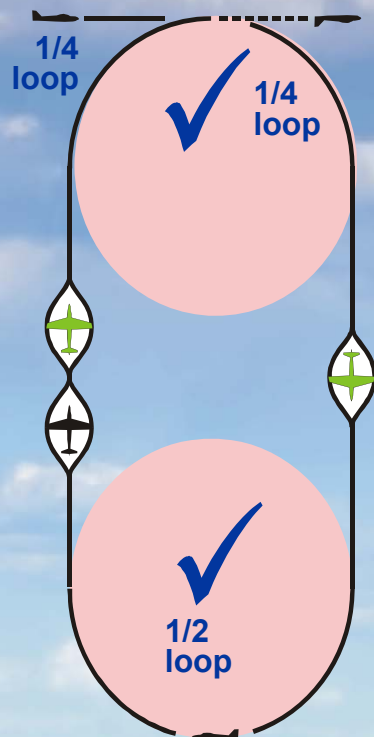






# Line/Loop/Roll/Horizontal Circle COMBINATIONS

HUMPTY BUMP

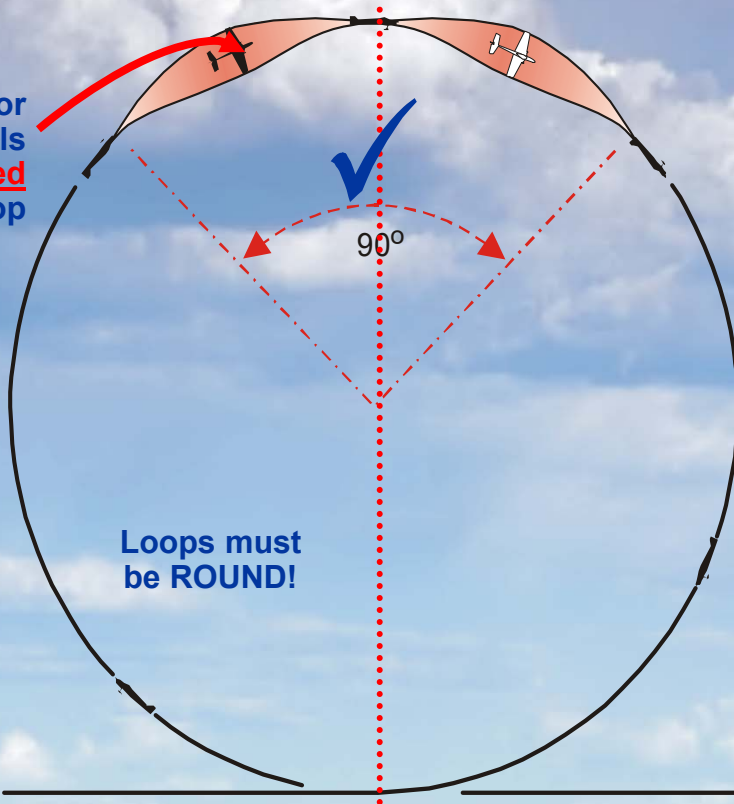




# Line/Loop/Roll/Horizontal Circle COMBINATIONS

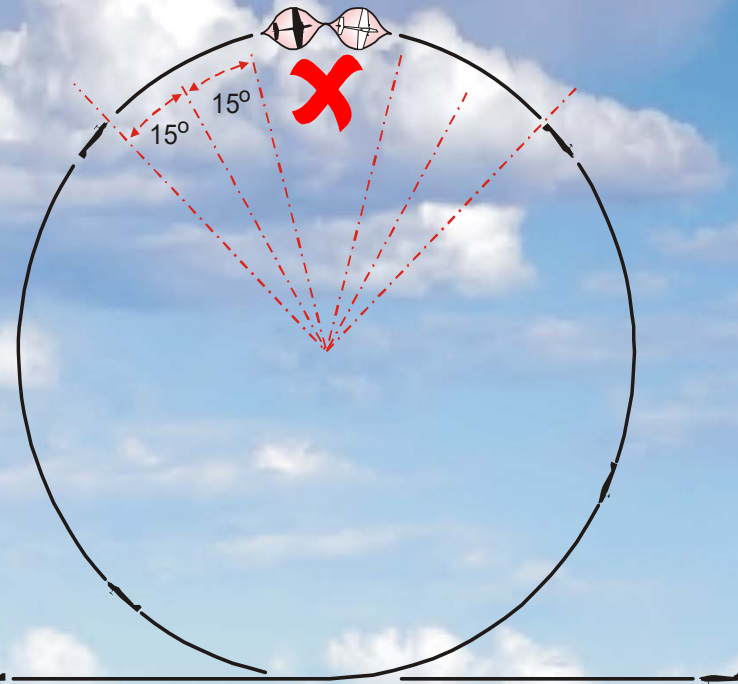
## LOOPS WITH INTEGRATED ROLLS

Rolls or part rolls integrated with loop



Loops must be ROUND!

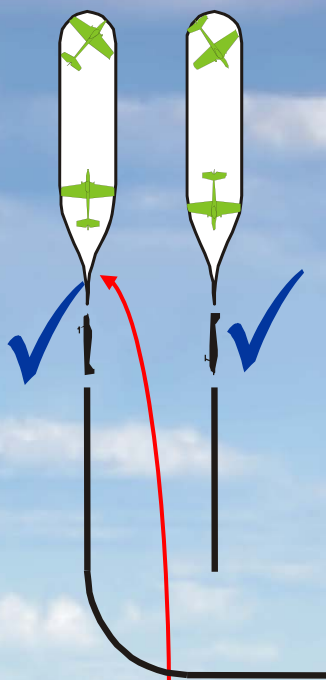
Rapid rolls MUST score less. This example = minus 4 for non-integration of roll





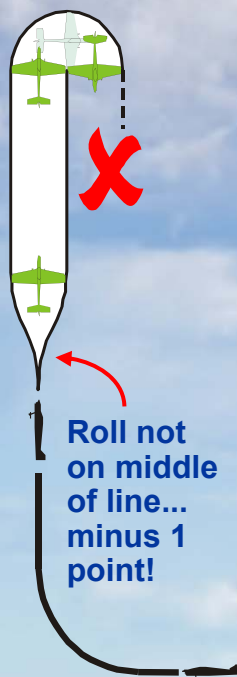
# STALL TURNS

Pivot on CG...  
no downgrade!



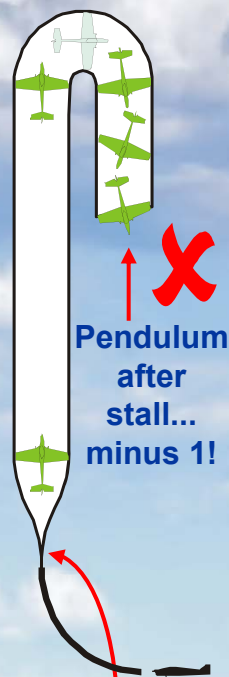
Roll on middle of line...  
no downgrade!

Up to  $\frac{1}{2}$  span  
radius of pivot...  
minus 1 point!



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

Up to one wing  
span radius...  
minus  $\frac{2}{3}$  points!



Pendulum  
after  
stall...  
minus 1!

No line before roll...  
minus 3 points!

Up to  $1\frac{1}{2}$  span  
radius  
minus  $\frac{4}{5}$  points!



Over  $15^\circ$   
off vertical...  
minus 2 points!

Roll not on  
middle...  
minus 1 point!

**The model must stop before pivot. If not downgrade.**





# STALL TURNS

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



Minus  
1 point!

Wing-over...  
**ZERO!**

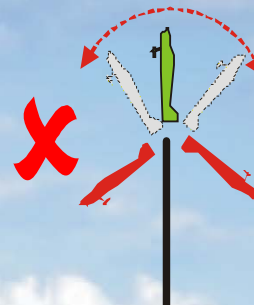


Wing-over =  
2 wing spans  
or more.

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

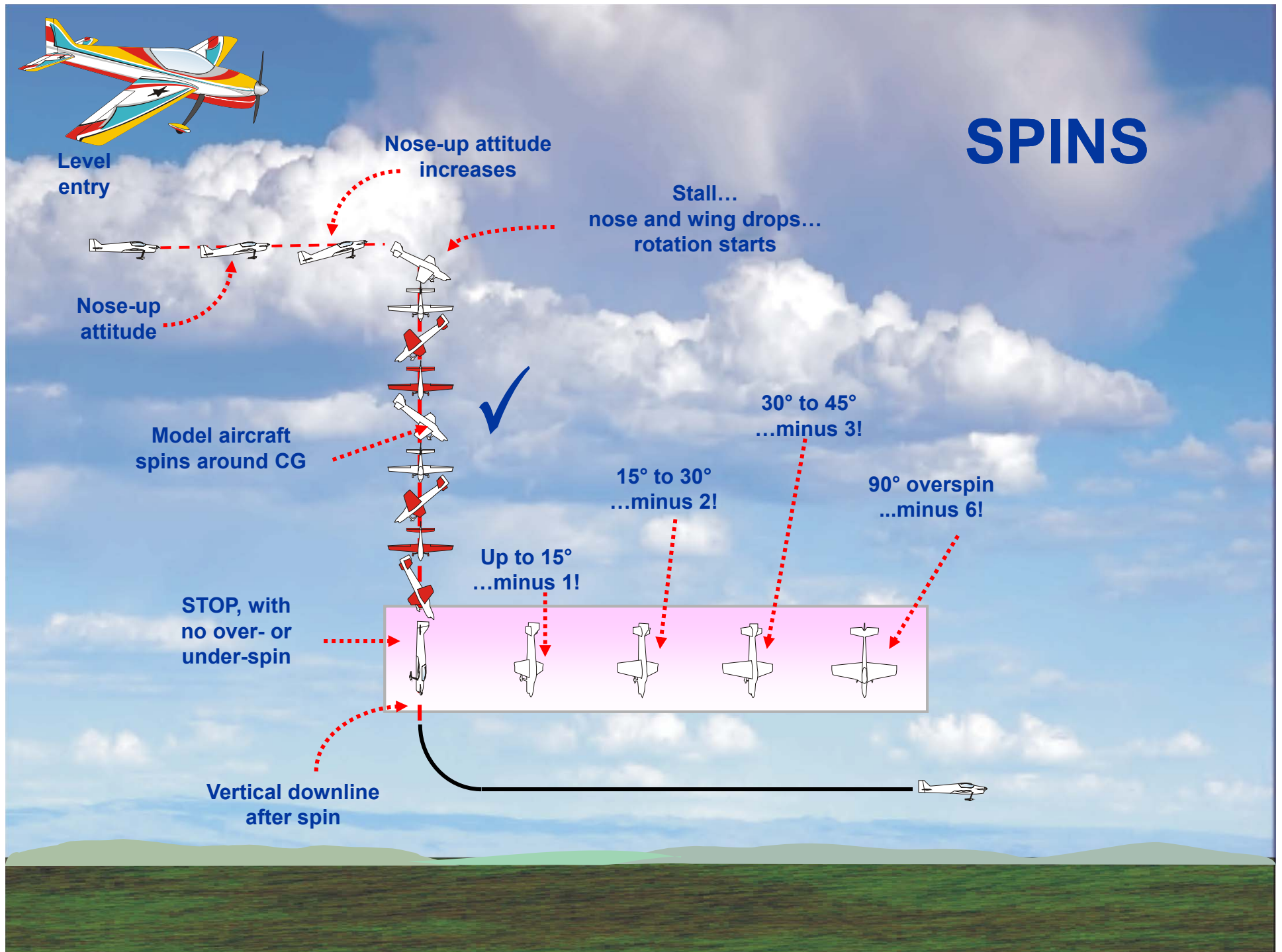


Flop forwards,  
or backwards... **ZERO!**



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

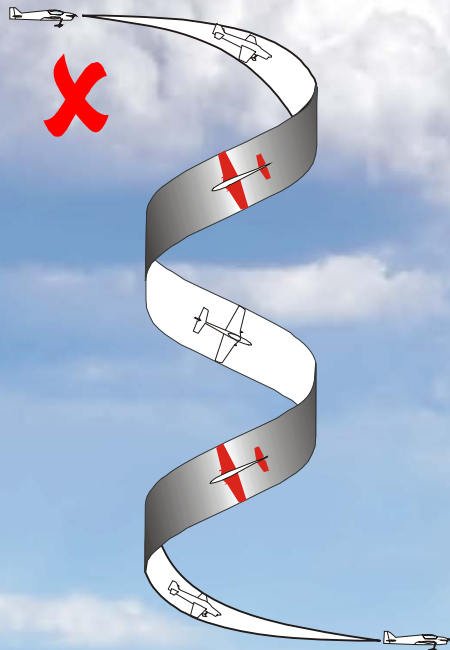
# SPINS





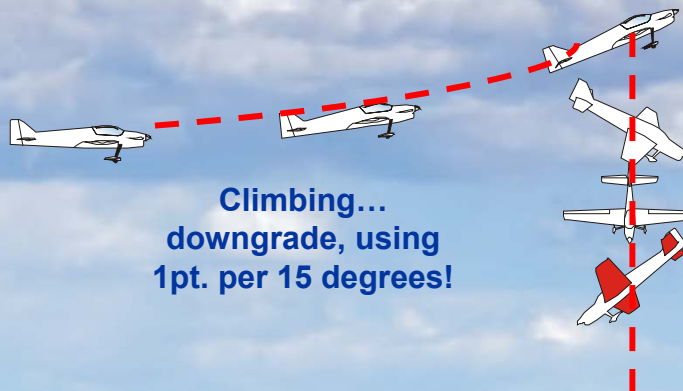
# SPINS

Wing lift (snap entry)...ZERO!



Spiral dive...scores ZERO!

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

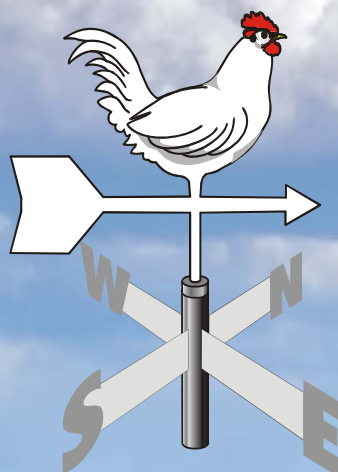


Climbing...  
downgrade, using  
1pt. per 15 degrees!



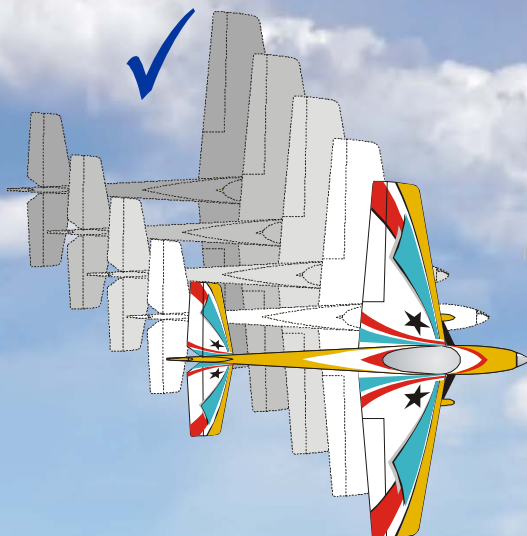


# SPIN: DRIFT, OR WEATHERCOCK?



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!



Up to 15° off...  
minus 1 point!

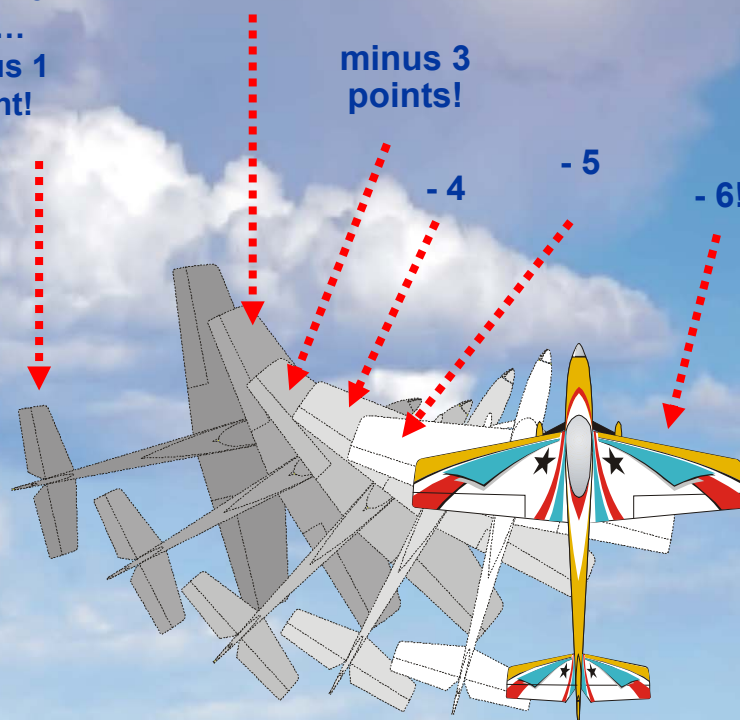
Up to 30° off...  
minus 2 points!

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**

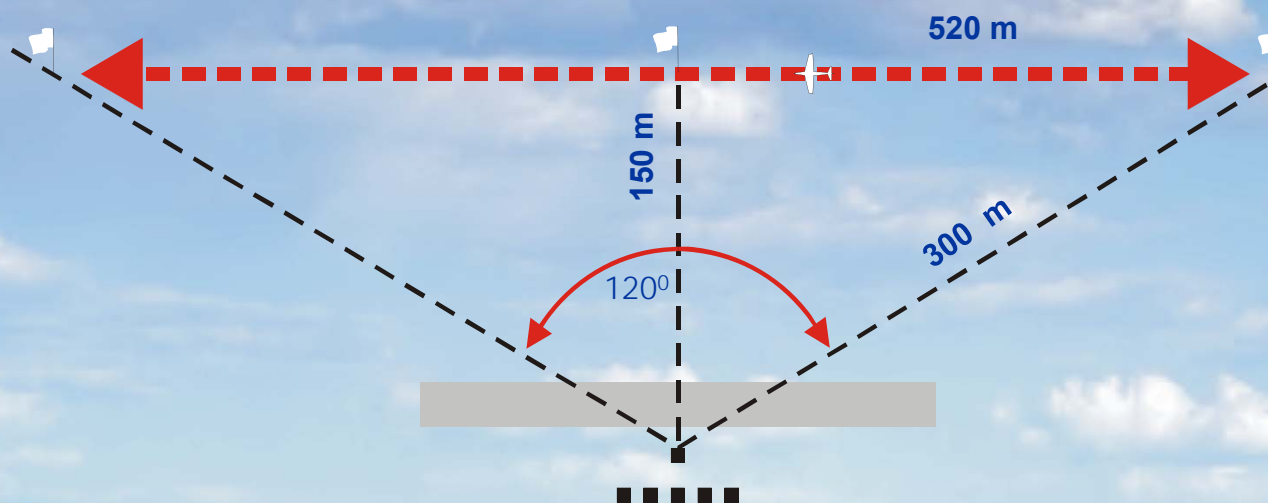
**Rolling speed not too low or too high**



# LONGITUDINAL POSITIONING

**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.



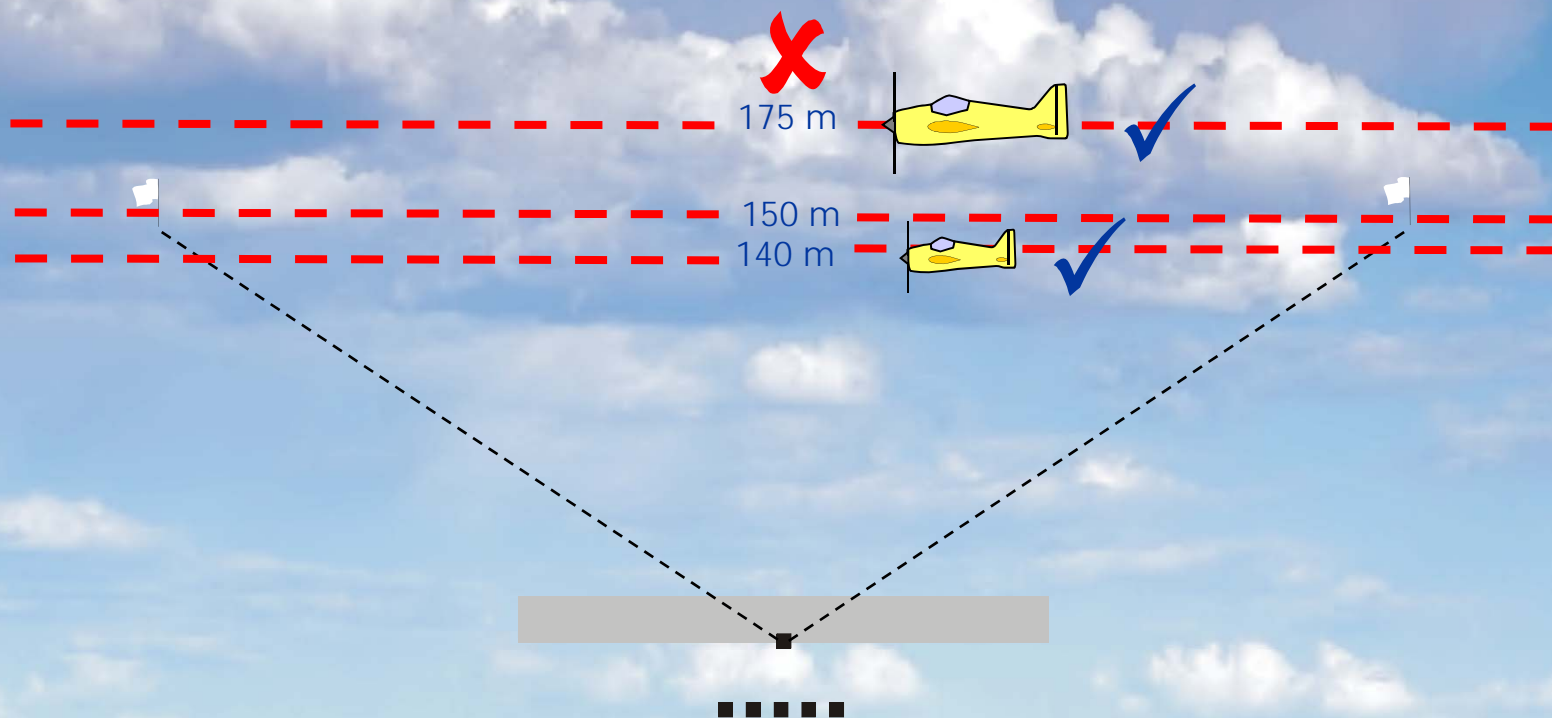




# LONGITUDINAL POSITIONING

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

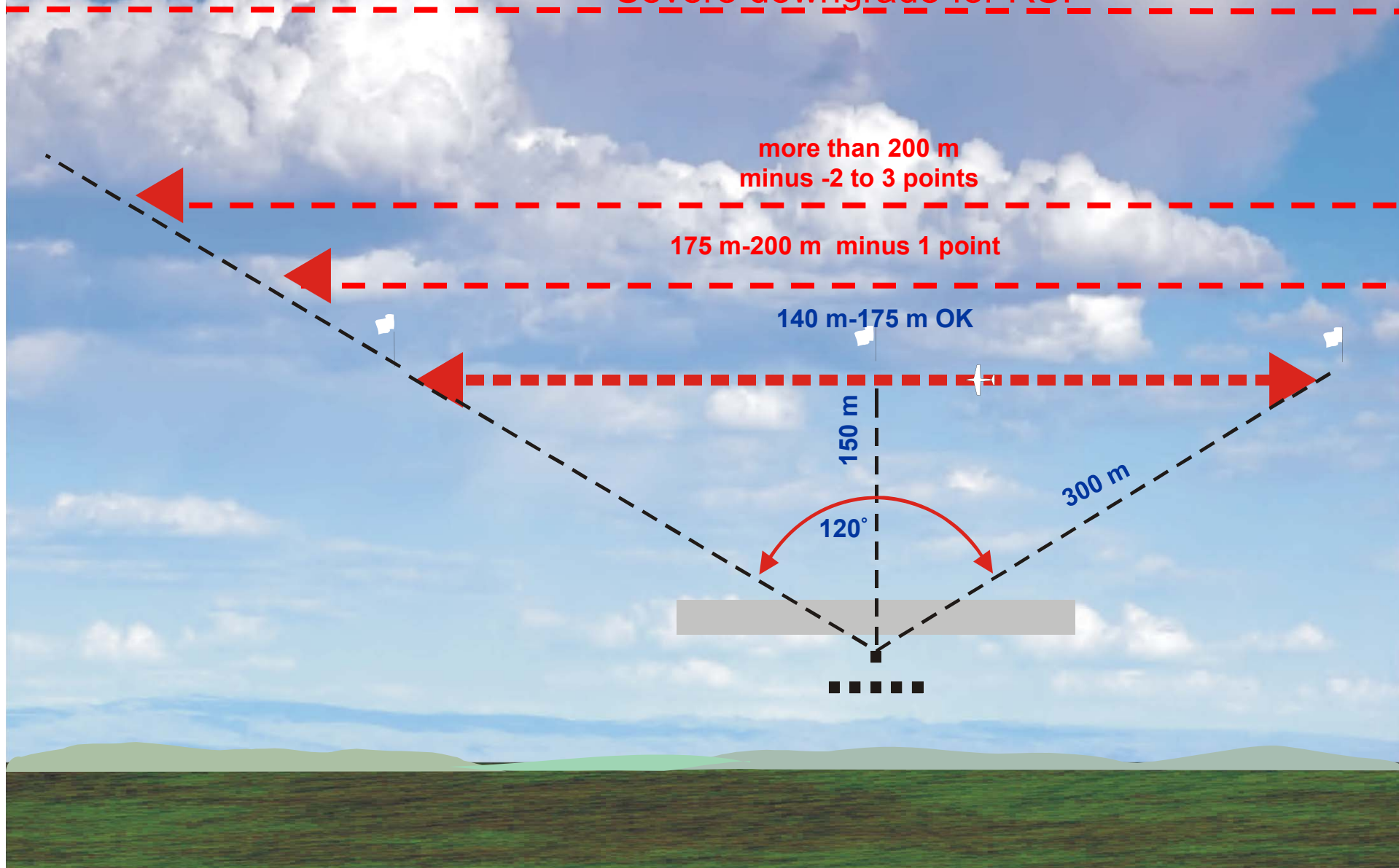
The main criterion is *visibility*!





# LONGITUDINAL POSITIONING

Severe downgrade for RS!



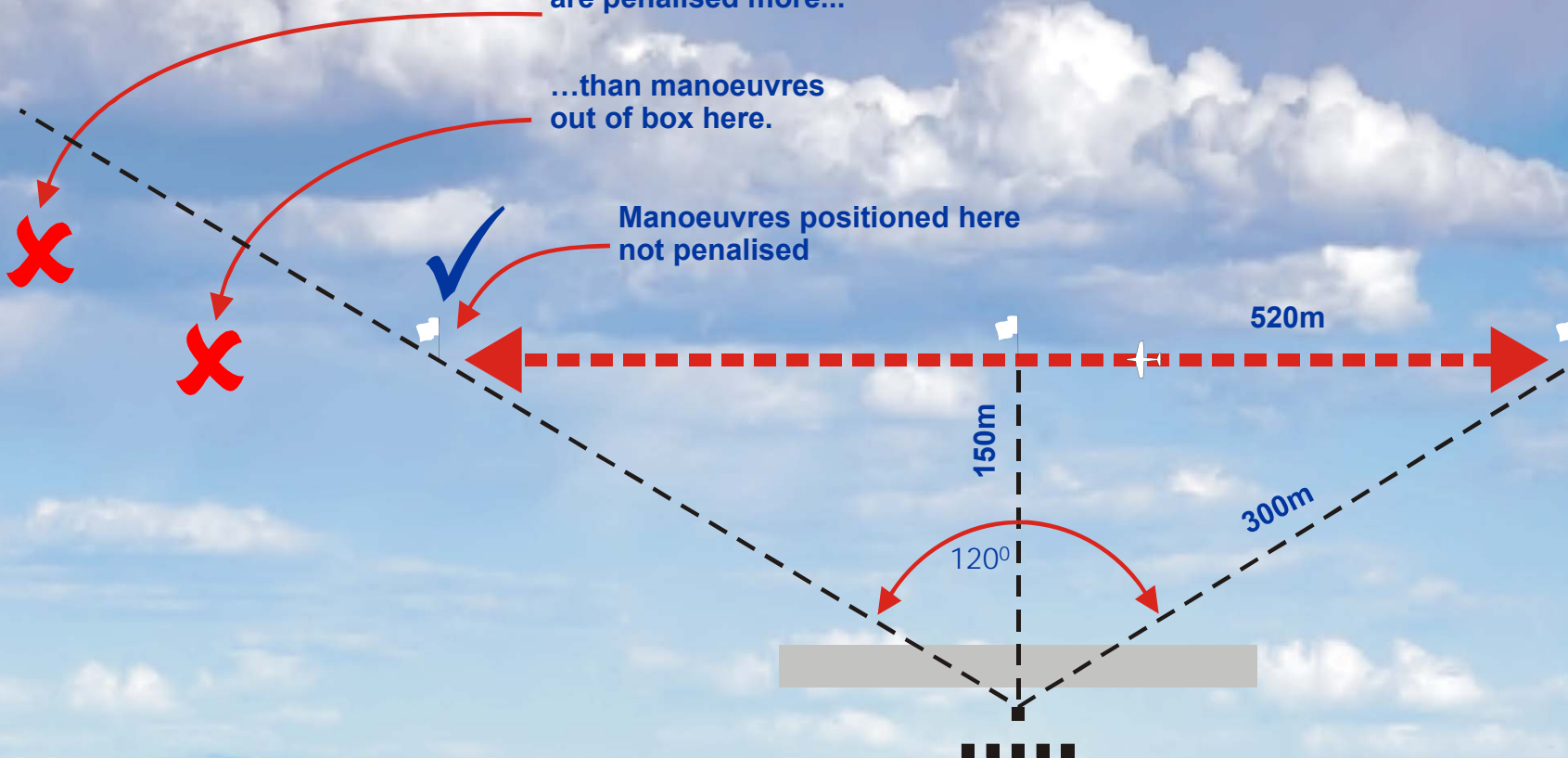


# LONGITUDINAL POSITIONING

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

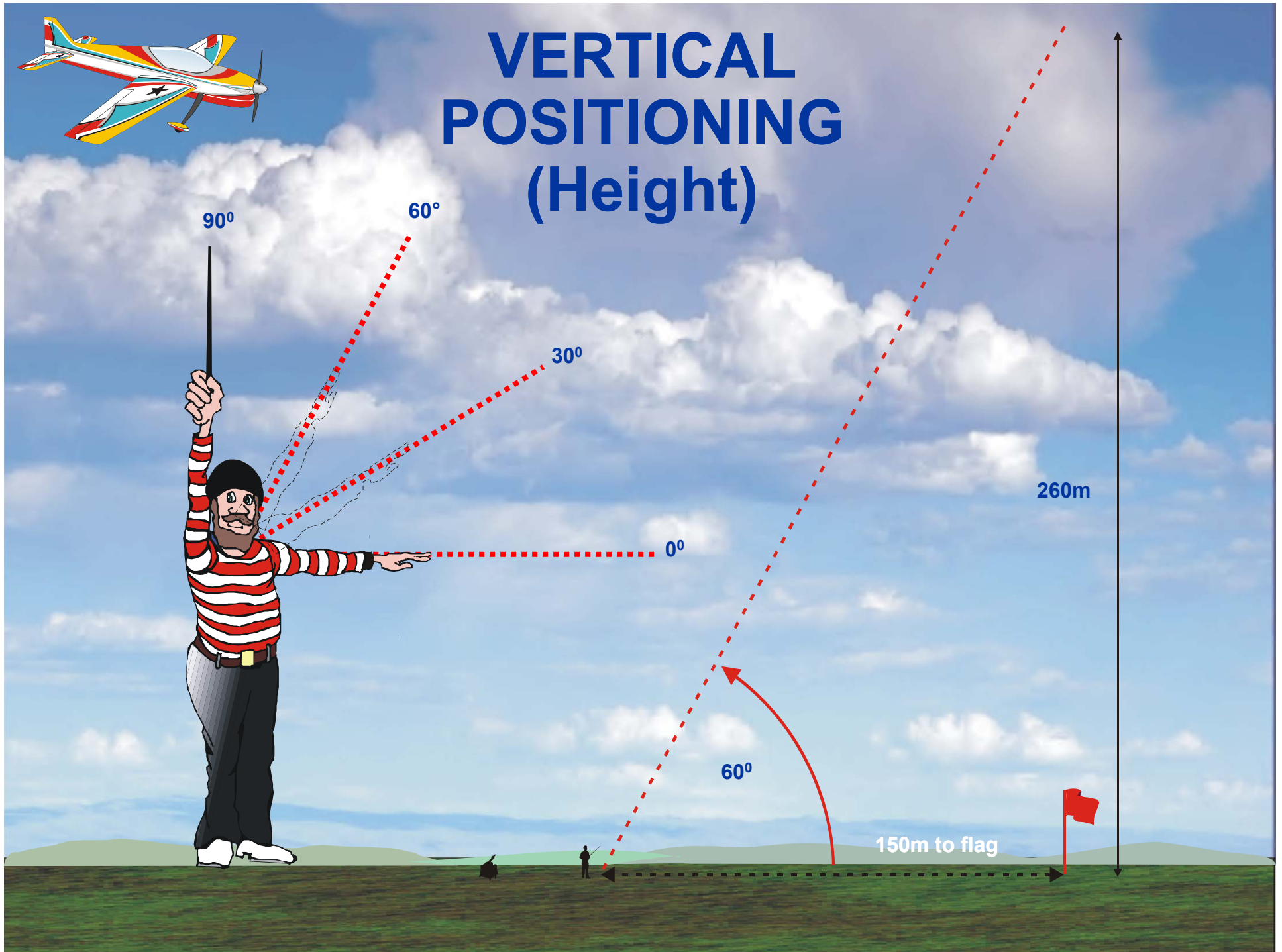
...than manoeuvres  
out of box here.

Manoeuvres positioned here  
not penalised





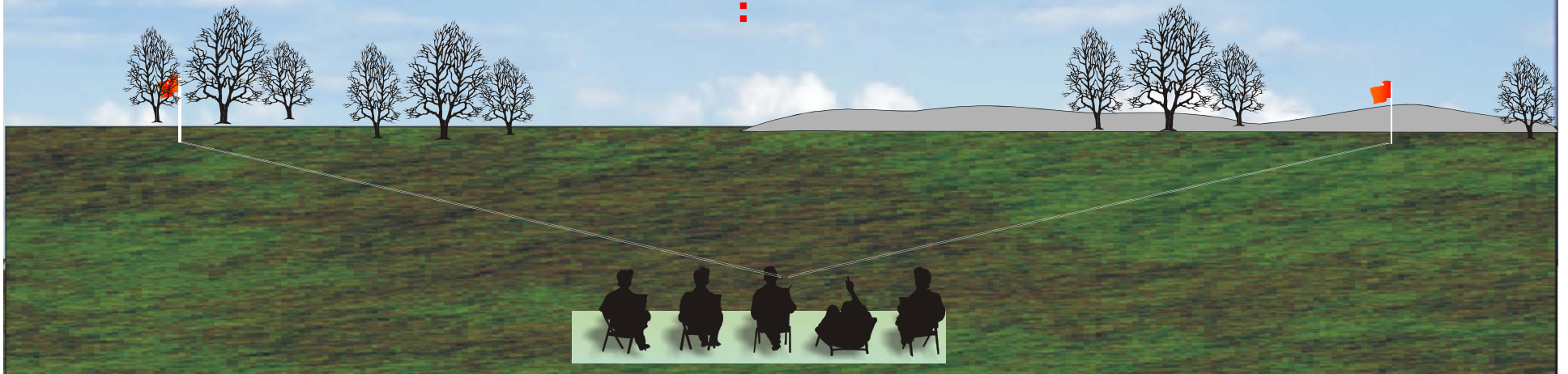
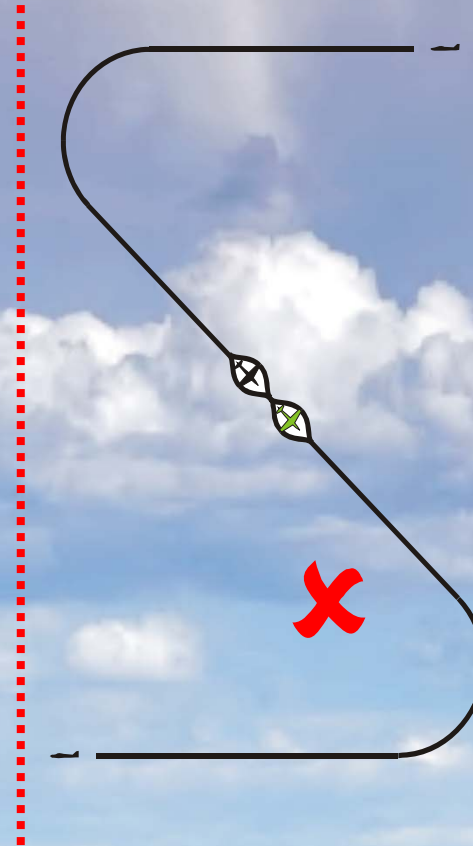
# VERTICAL POSITIONING (Height)





# CENTRE POSITIONING

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







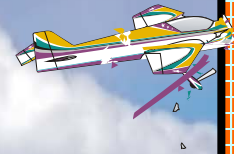
## **Size of the manoeuvres**

**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**



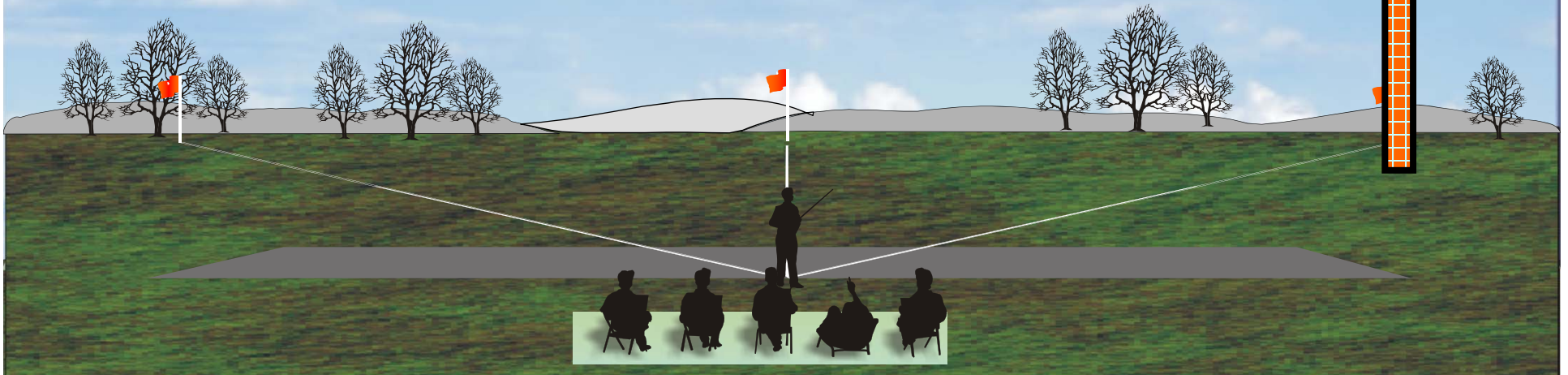


## Proportion of the manoeuvre outside of the manoeuvring zone



Box markers are indicators only.

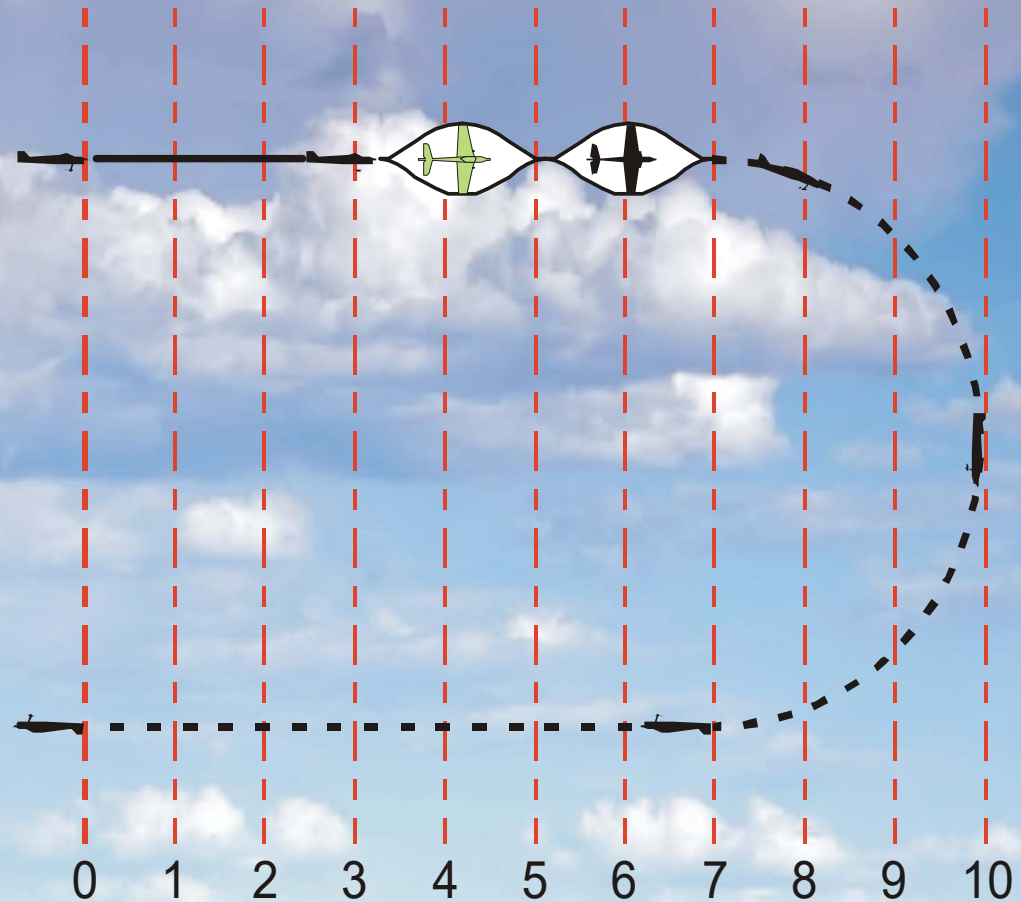
Do not downgrade unnecessarily!





## Proportion of the manoeuvre outside of the manoeuvring zone

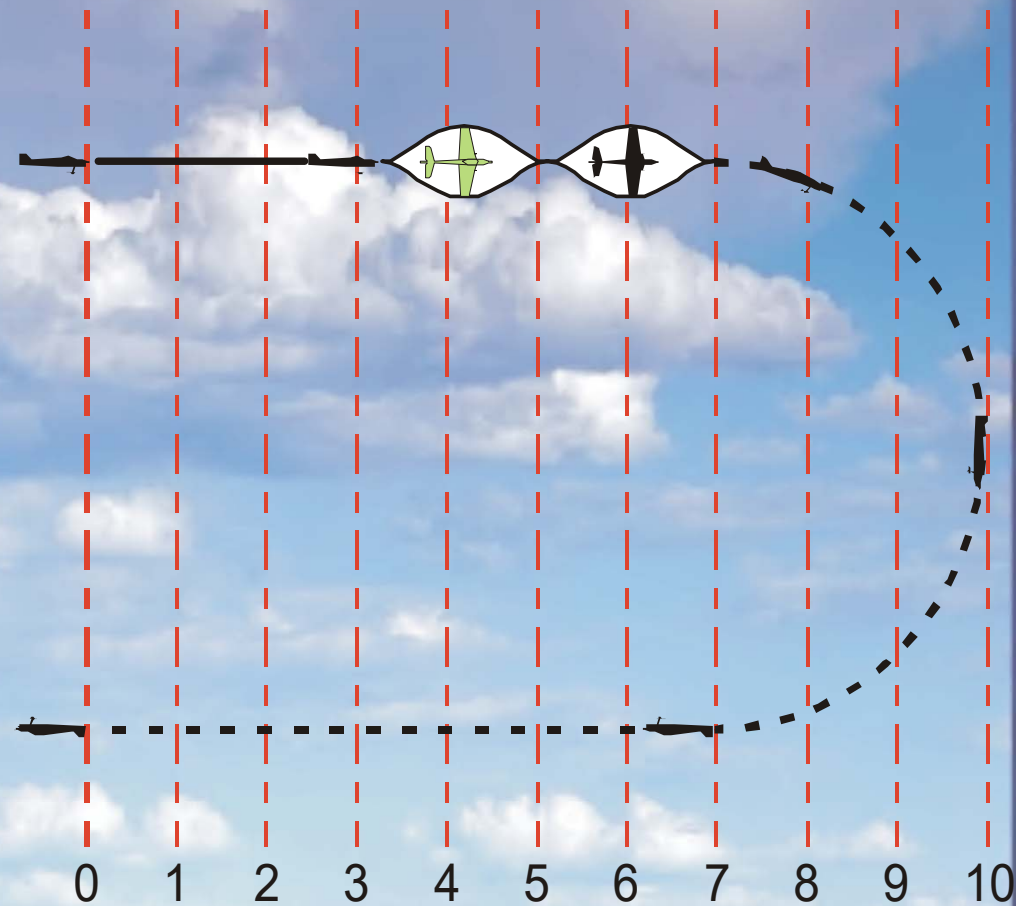
No downgrade  
(positioning only)  
(Entire manoeuvre  
= inside box marker)





## Proportion of the manoeuvre outside of the manoeuvring zone

2 points downgrade  
(20% of manoeuvre = outside)

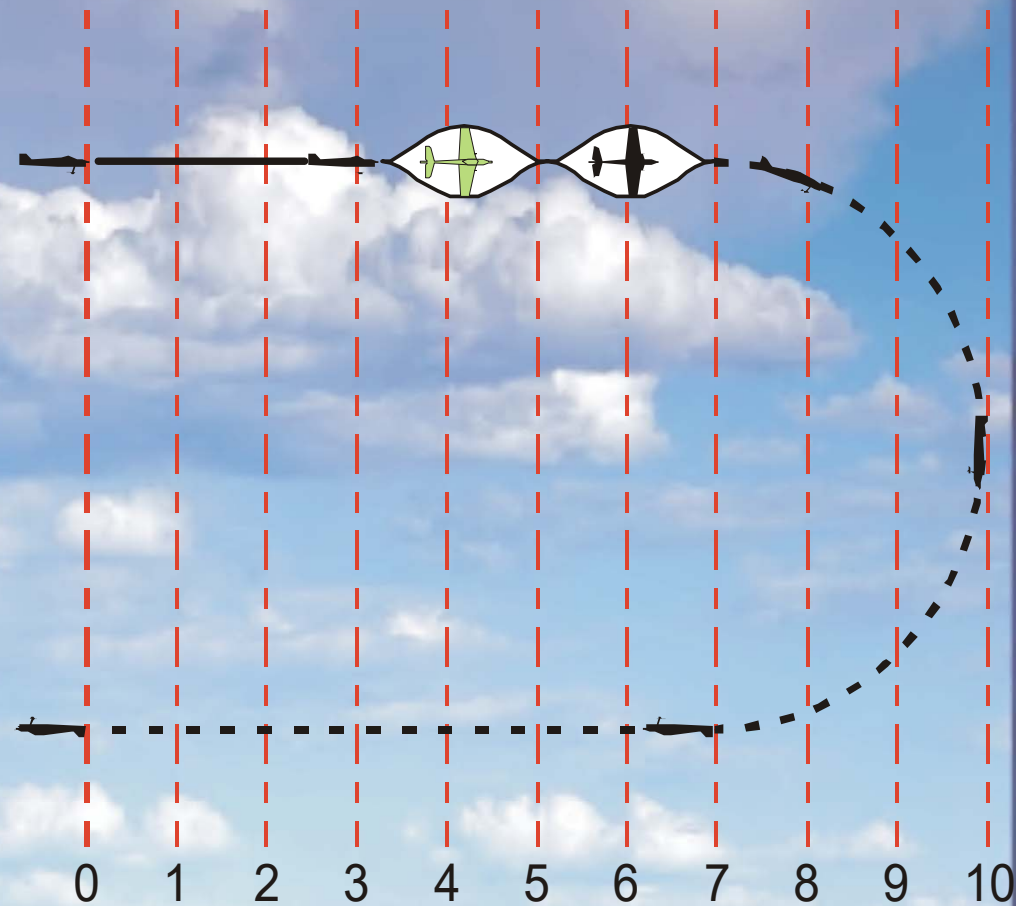






## Proportion of the manoeuvre outside of the manoeuvring zone

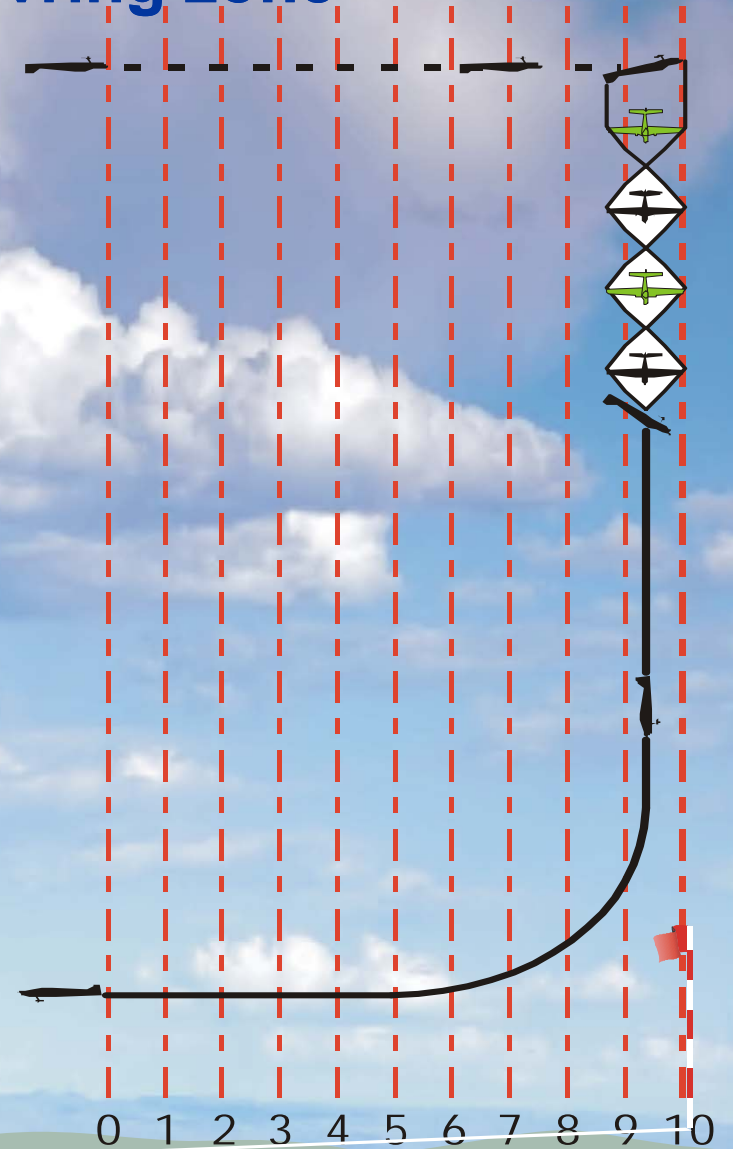
5 points downgrade  
(50% of manoeuvre = outside)



# Proportion of the manoeuvre outside of the manoeuvring zone



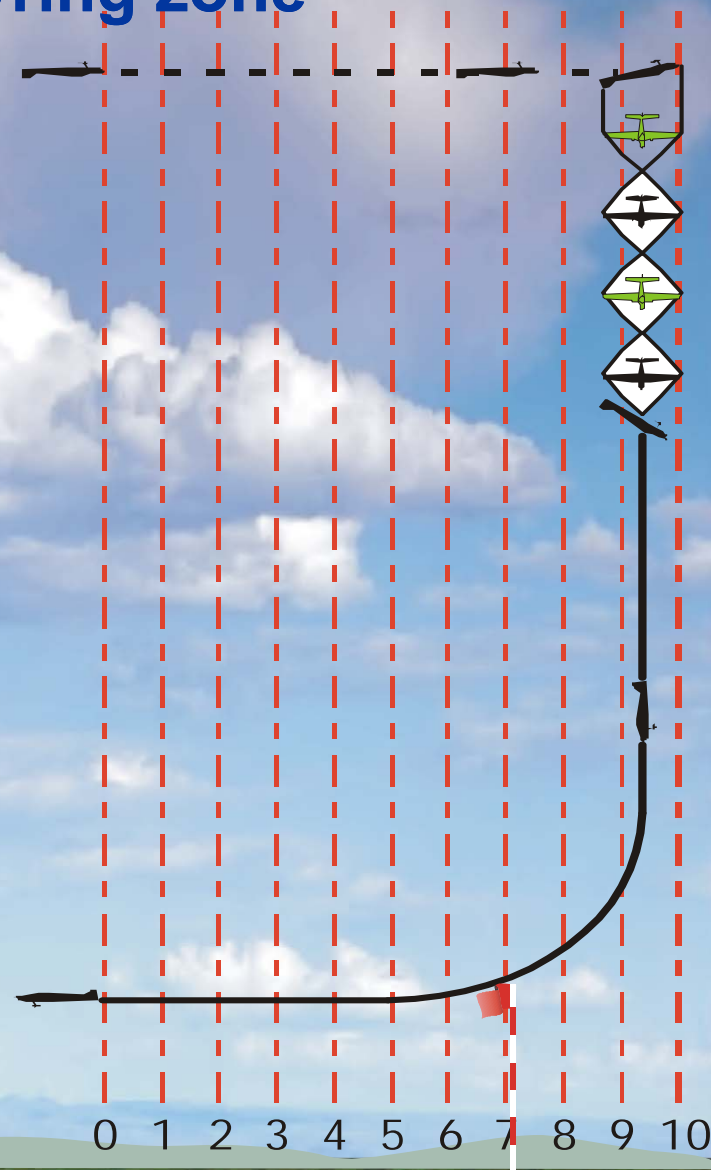
No downgrade  
(Entire manoeuvre = inside box marker)





## 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)



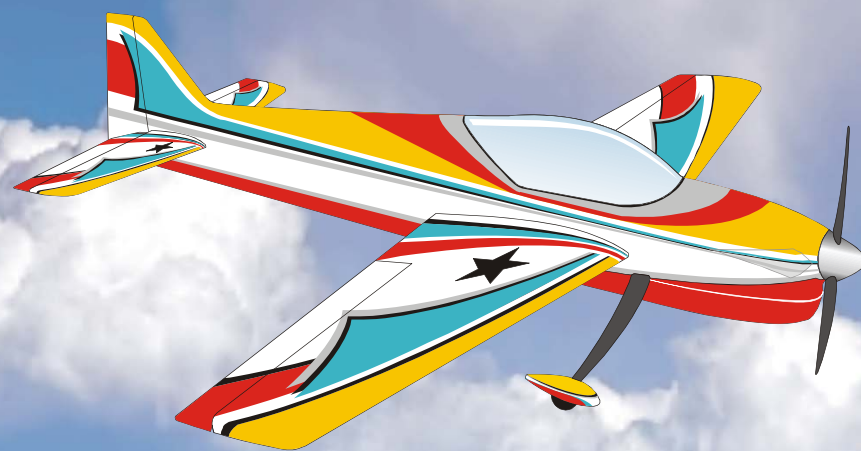
## **What is the game?**

- The pilot is too 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.

# Respect each other

- 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!**

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