

Flying and Judging F3P
Precision Aerobatics

**Supplementary Explanations
to the**

**F3 RC Aerobatic 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 aerobic 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

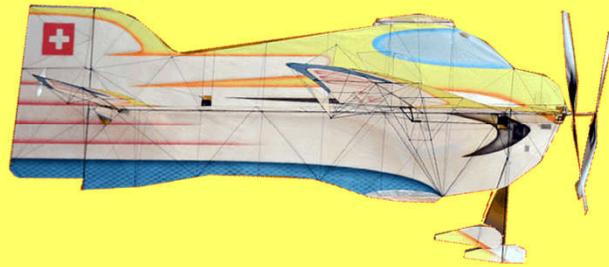
Centre manoeuvres start and finish on the same heading, while turn-around manoeuvres finish on a track 180 degrees to entry.

When appropriate, entry and exit of centre manoeuvres must be at the same altitude, unless specified otherwise.

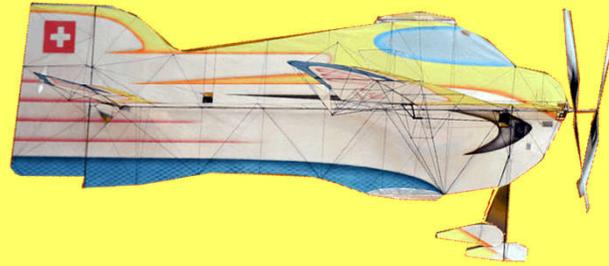
Positioning adjustments in altitude are allowed in turn-around manoeuvres.

PRINCIPLES

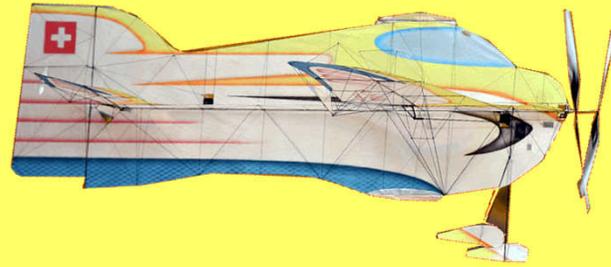
THE PRINCIPLES of flying and judging the performance of a competitor in an R/C Aerobatic competition, is based on the **PERFECTION** with which the competitor's model aircraft executes the aerobatic manoeuvres as described in Annex 5A.



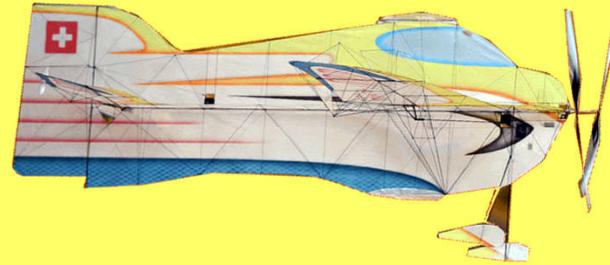
Geometrical accuracy of the manoeuvre



Constant Flying Speed



Correct Positioning within the Manoeuvring Zone



Size Matching to the Size 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. Was the Flying Speed constant in climbing and descending parts of the manoeuvre?

4. WHAT WAS THE POSITIONING of the manoeuvre?

5. WHAT WAS THE SIZE of the manoeuvre?

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“!

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 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)*

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”

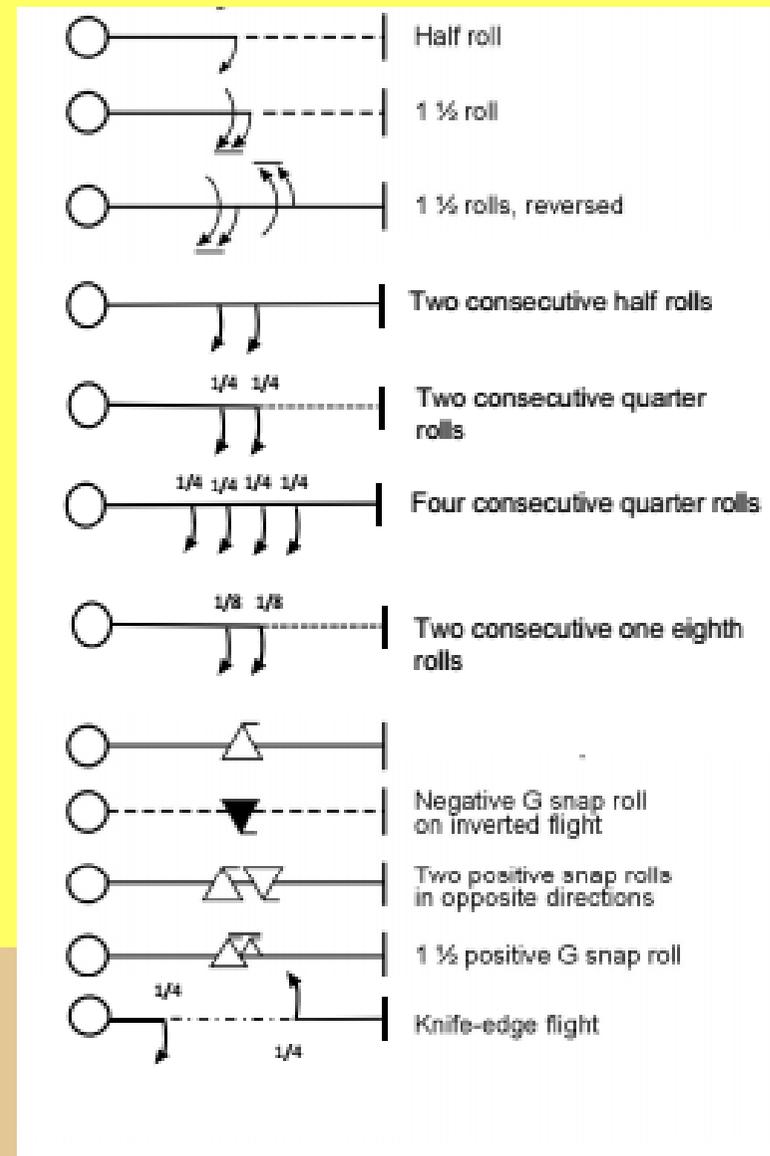
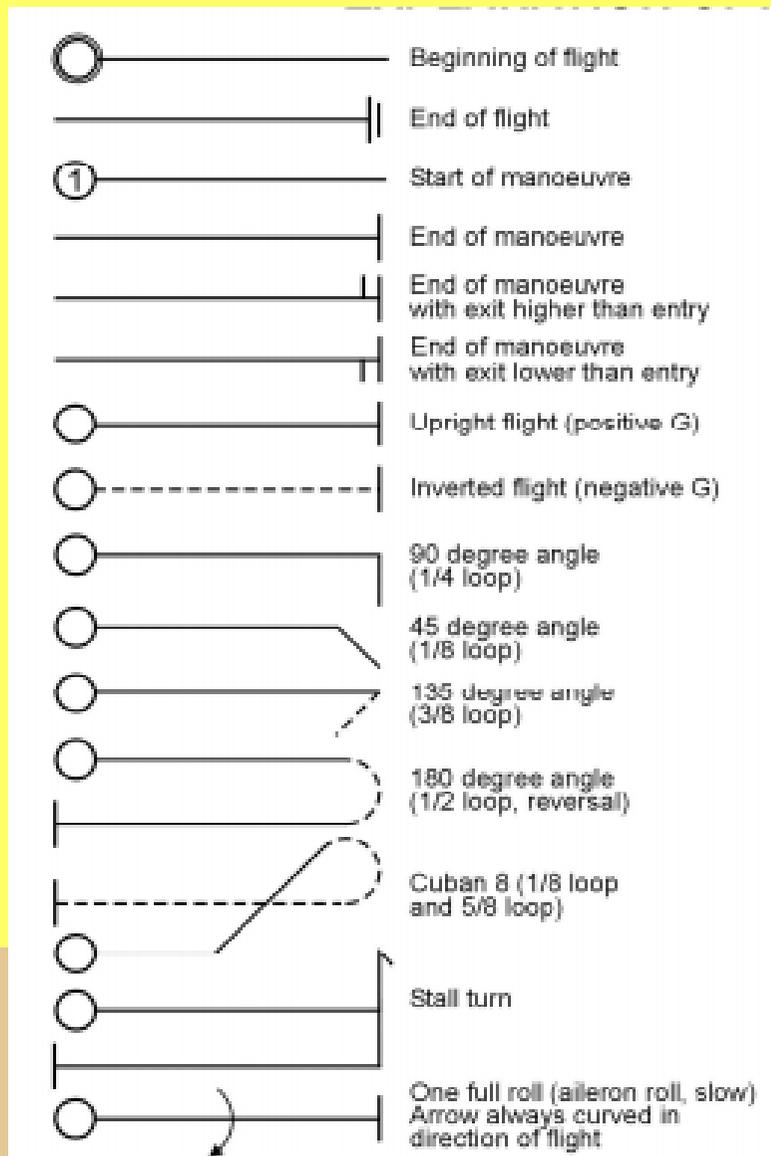
Judges must only look at the lines of manoeuvres described in the “sky”.

IMPARTIALITY

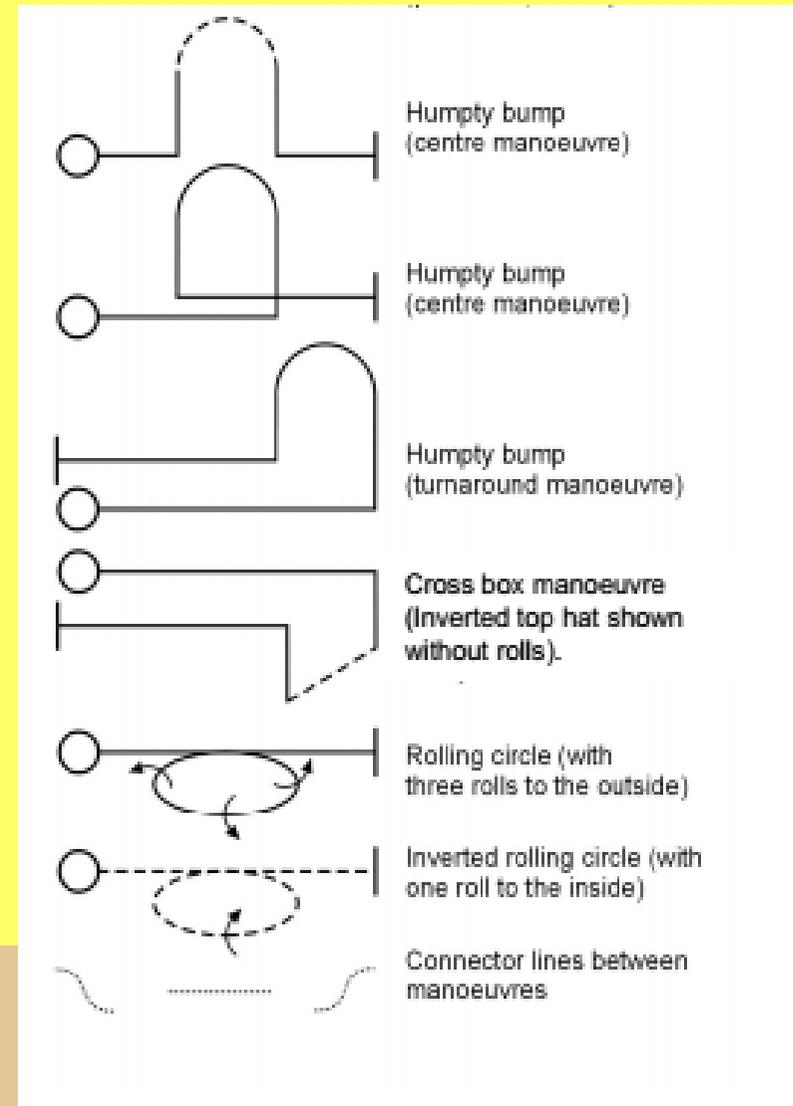
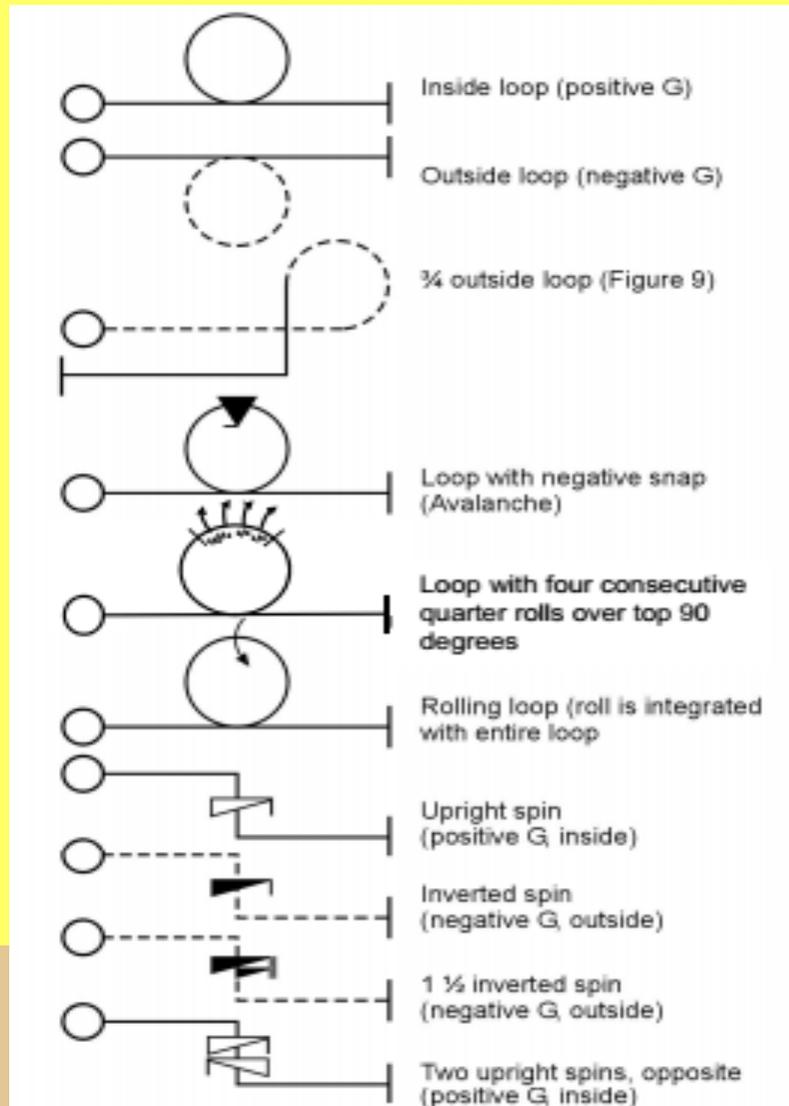
Conversely, acts of negative bias towards a competitor, or a national team, or a flying style, or brand of equipment, or a propulsion method, must be viewed in a serious light, and corrective action may be necessary.

ARESTI SYSTEM

Please become familiar with Aresti symbols used in F3 Aerobatics.



ARESTI SYSTEM



Deduct/Downgrade System

Score input without scribe



**Electronic Scribe
by Peter Vogel/USA**



Notaumatic/FRA



**Escribe from
Switzerland**



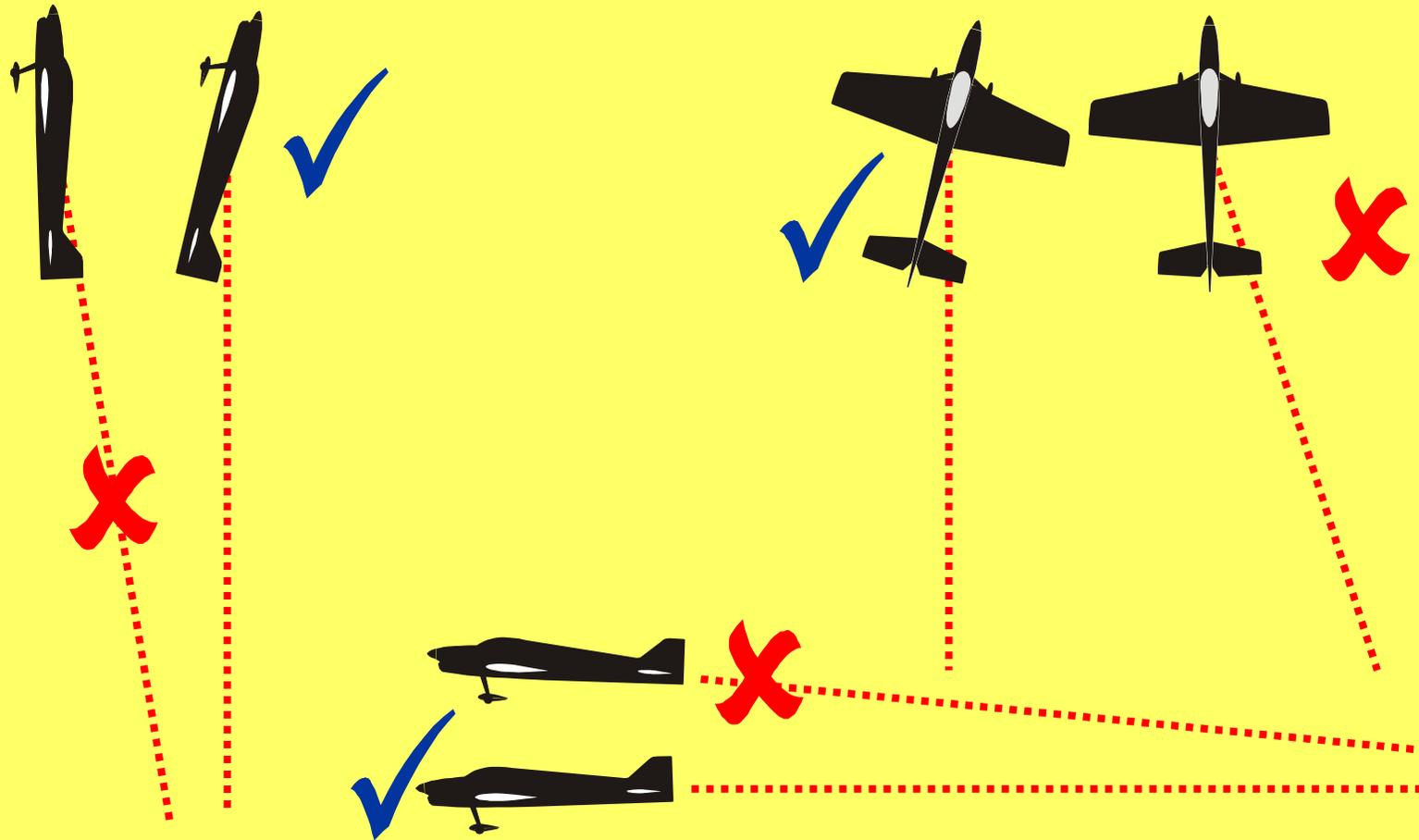
**Bartovsky
System/CZE,
similar to
Kraiwiesen
system by
O.Hajek/AUT**

- + No scribes needed.
- + Scores input directly to the computer.
- + Live scoring is possible.
- Very experienced judges needed

CRITERIA FOR JUDGING INDIVIDUAL MANOEUVRES

(Method)

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.

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



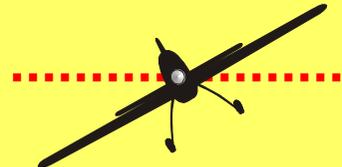
Horizontal lines -
pitch axis



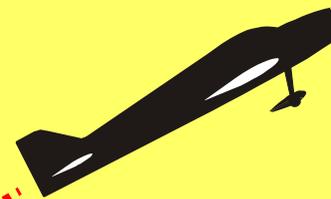
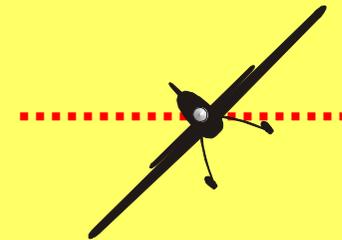
Up to 15° error =
1 point downgrade



Up to 30° error =
2 point downgrade



Up to 45° error =
3 point downgrade



1 point must be subtracted for each approximate 15 degrees deviation, but 0.5 points only for half of this.

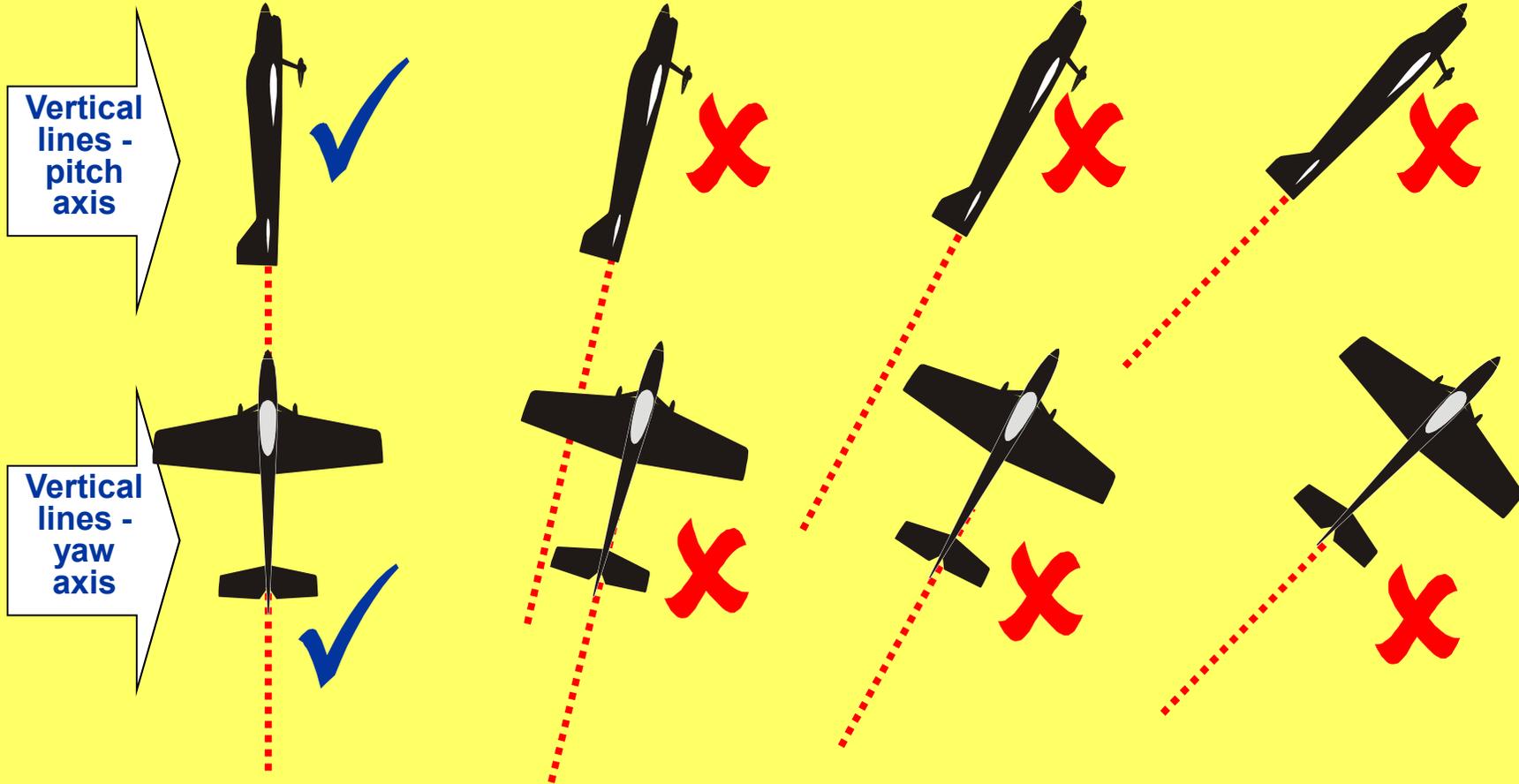
1 POINT PER 15° DEVIATION

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



0.5 point downgrade for approximated 7.5 deviation,
1.5 points downgrade for approximate 22.5 deviation, ...

1 POINT PER 15° DEVIATION

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

Reason: Lines can be evaluated easier than roll and yaw.

LINES

Horizontal



90°



60°



45°



LINES

5B.8.3 All aerobic manoeuvres are entered and exited by a horizontal line of recognisable length.

When no horizontal 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.

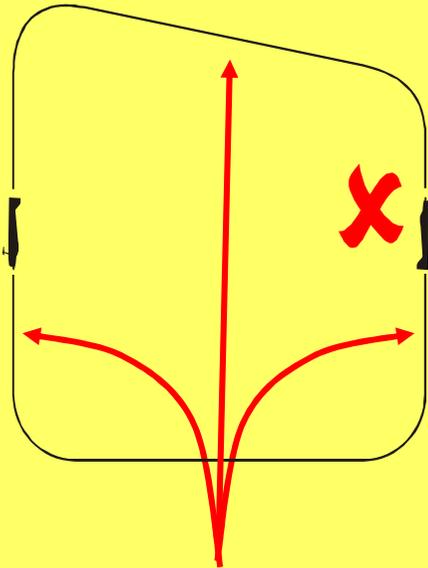
All lines within a manoeuvre have a start and an end which define their length. They are preceded and followed by part loops.

The length of a line should only be graded when a manoeuvre contains more than one line with a given relationship to each other ie as in a square loop.

If there is a minor deviation in the relationship then 0.5 point is subtracted, and more points are subtracted for greater deviations.

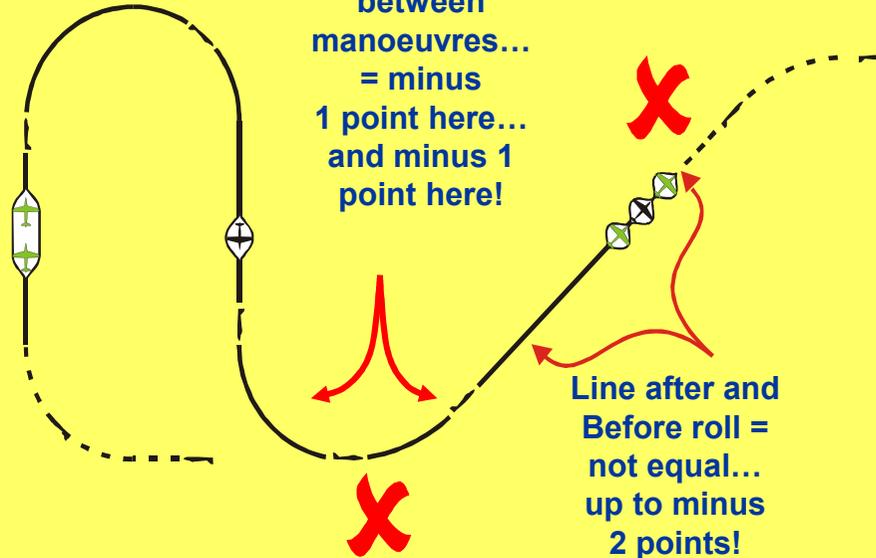
LINES

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



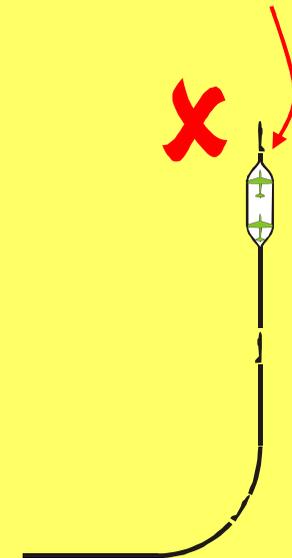
(This example maybe
minus 2 or 3!)

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

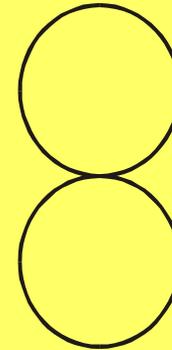
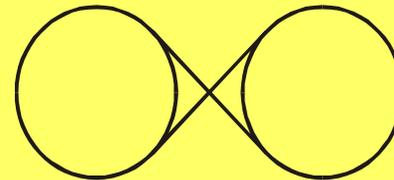
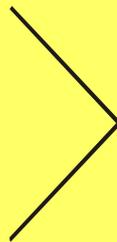
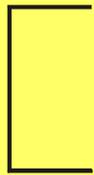
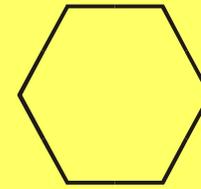
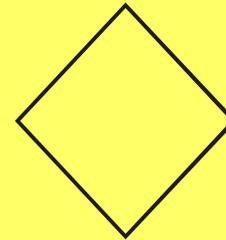
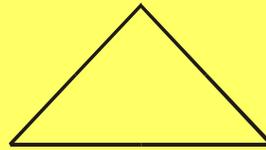
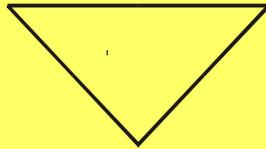
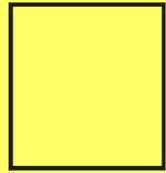
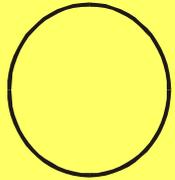


Line after and
Before roll =
not equal...
up to minus
2 points!

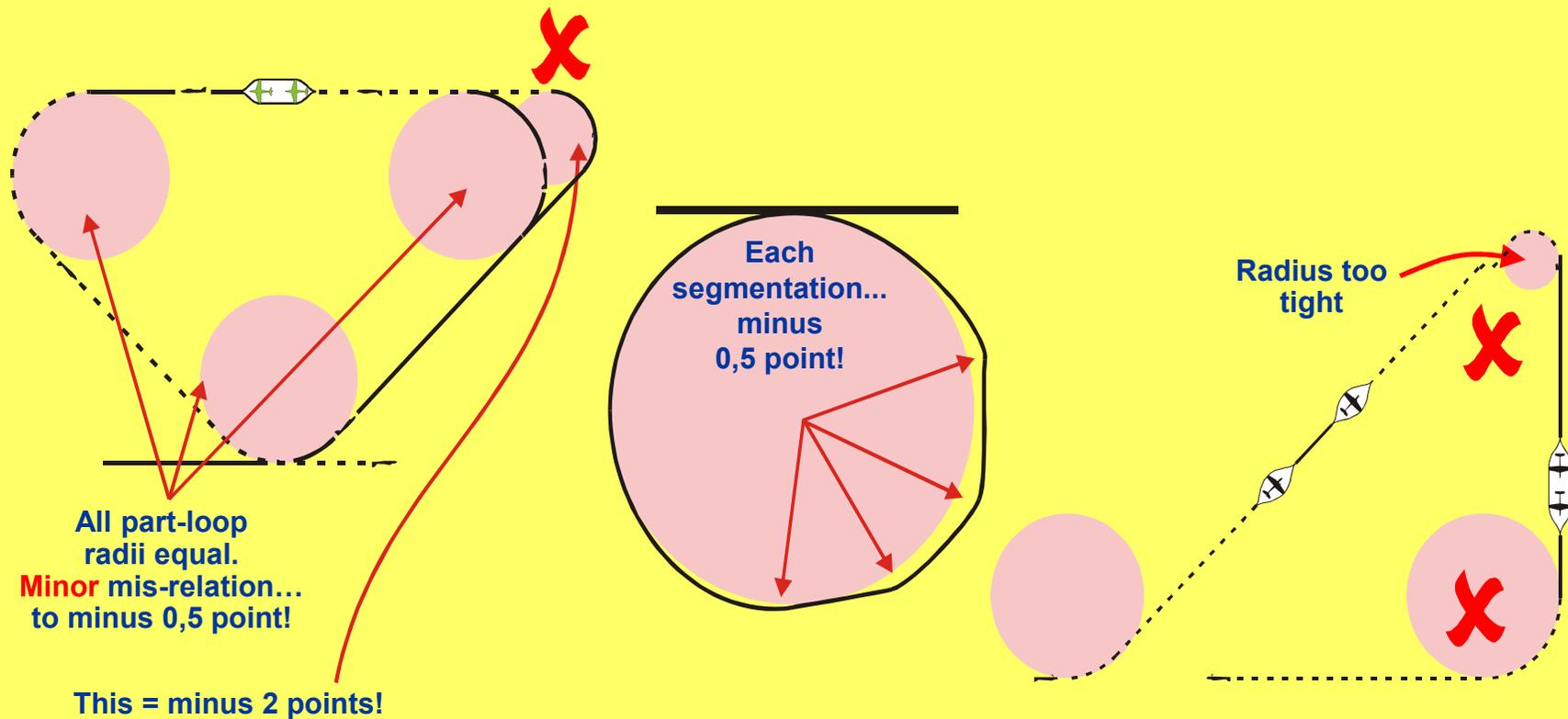
No line
after roll... =
minus
3 points!



LOOPS

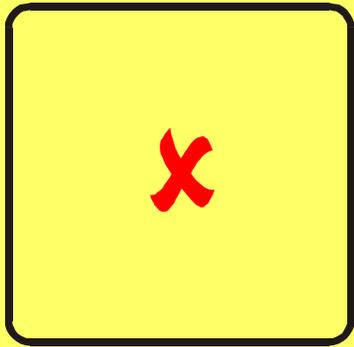


LOOPS

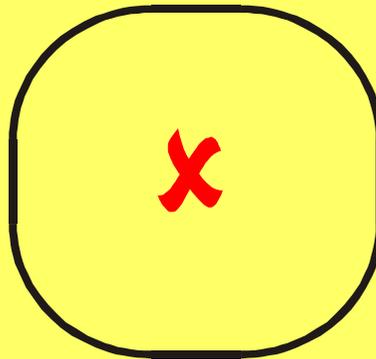


The first radius of a manoeuvre does not define the radii for the remaining radii of a manoeuvre but it is a starting point. As the manoeuvre progresses, the judge will compare each radius that was just flown to the last radius flown and if there is a difference, then a downgrade will be given based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

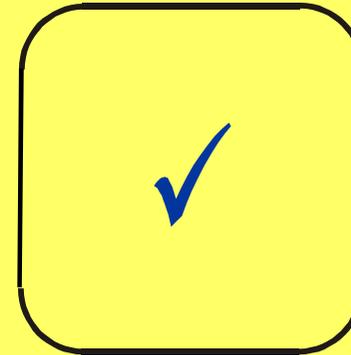
LOOPS



Radii too tight...



...too open/loose...



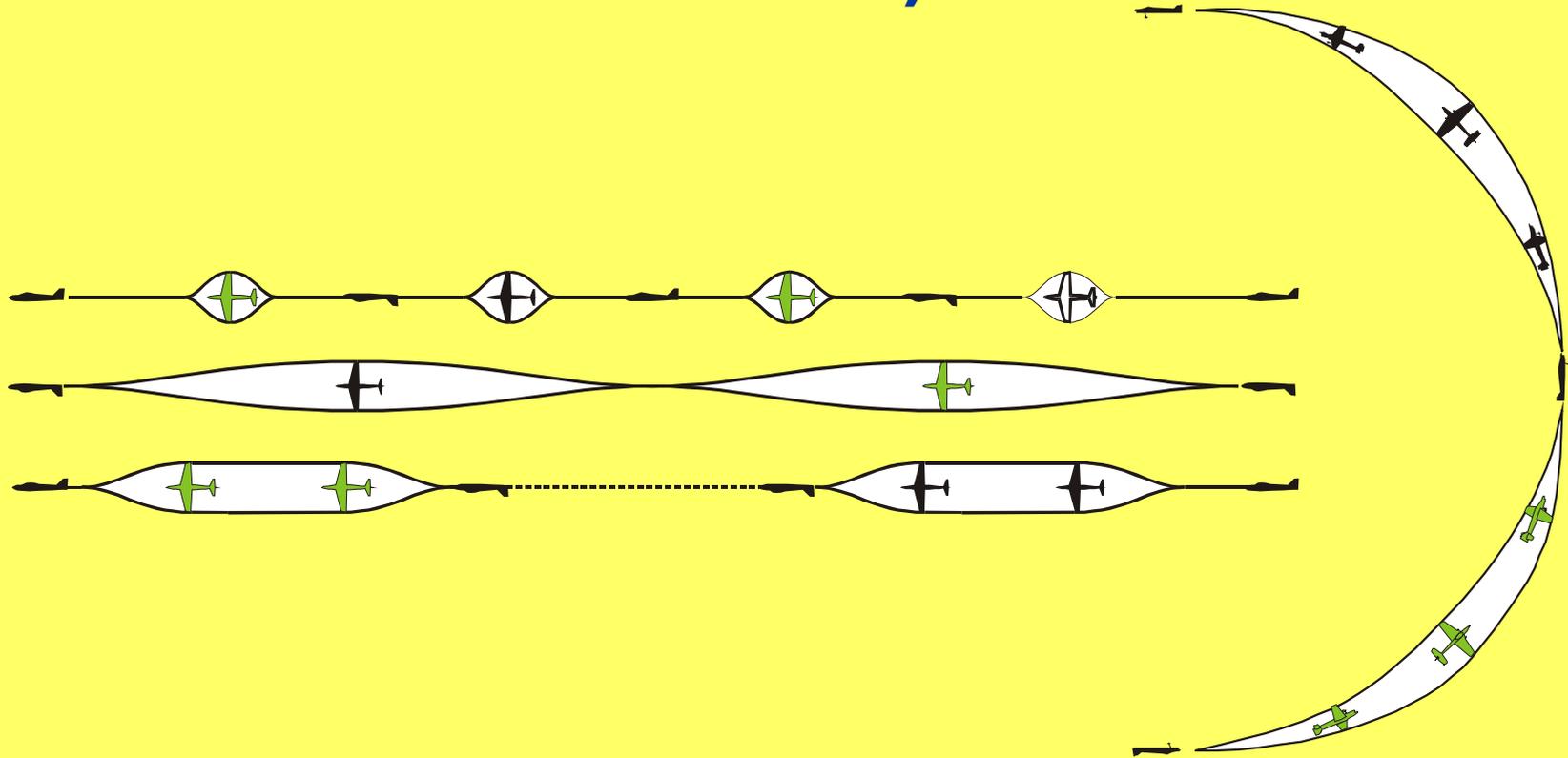
Good compromise!

up to minus 1 point

Part loops must have a recognisable radius which must not be too tight (very high G-load) or too loose (a well-defined line between the part loops is not clearly recognisable). If part loops are performed too tight or too loose, up to one point must be deducted.

Rolls

(Continuous Rolls and Part-Rolls)



Rolls

(Continuous Rolls and Part-Rolls)

Continuous Rolls:

Continuous rolling 360 degrees and more.

Part-Rolls:

Rolling less than 360 degrees.

The roll-rate must be constant. Minor variations in roll-rate must be downgraded by 0.5 point, while more severe variations must receive a downgrade of 1 or more points. Slowing down (or speeding up) the roll-rate towards the end of a roll must be downgraded using the 1 point per 15 degree rule

Rolls

In all manoeuvres which have more than one continuous roll, the continuous rolls must have the same roll-rate. In all manoeuvres which have more than one part-roll, the part-rolls must have the same roll rate.

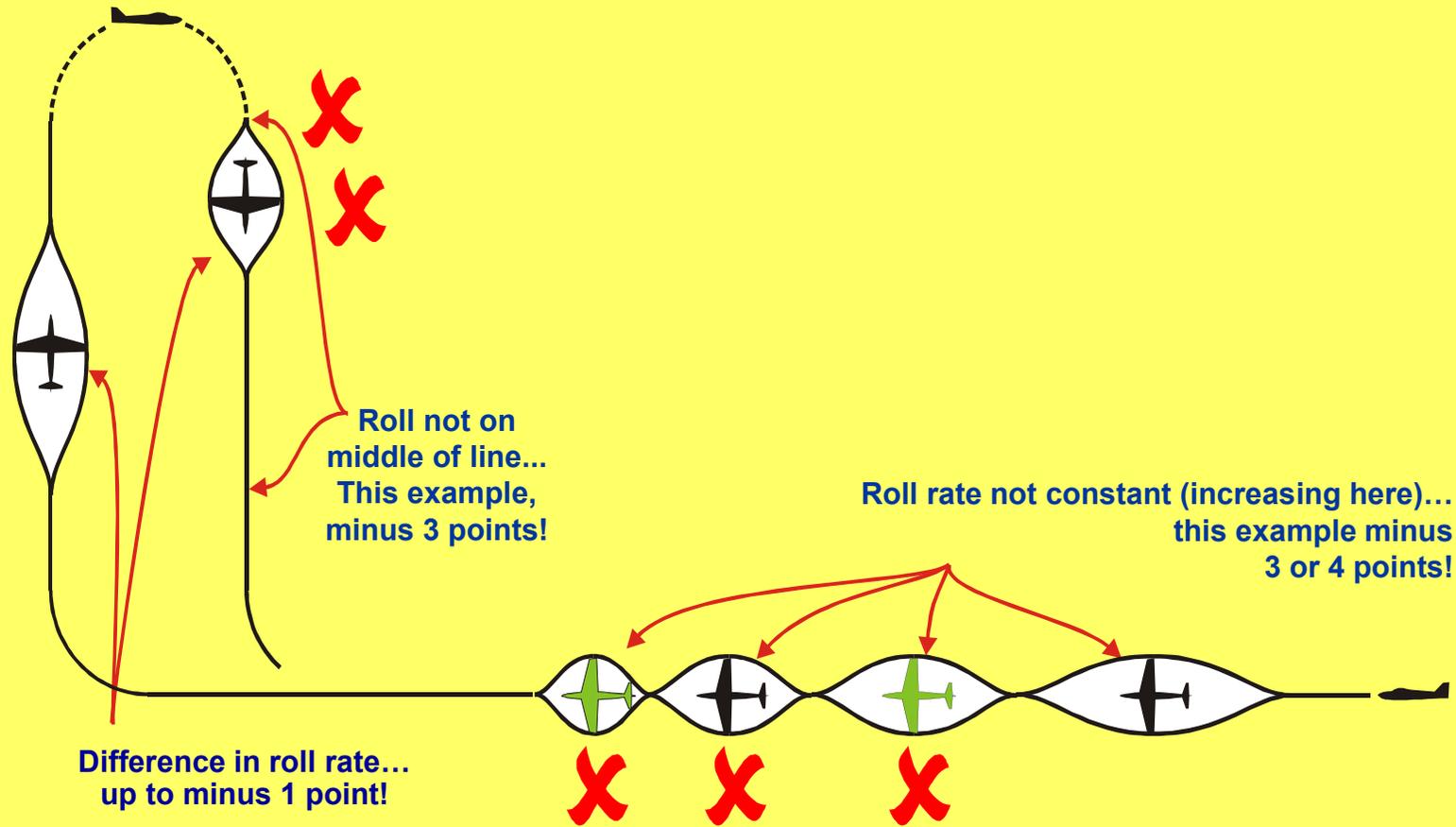
Where there are continuous rolls and part-rolls within one manoeuvre, the roll-rate for the part-rolls does not necessarily have to be the same as the roll-rate for the continuous rolls.

This doesn't apply to integrated rolls and integrated part rolls because roll rate depends on the length of the flightpath in which the roll or the part roll is integrated.

Rolls

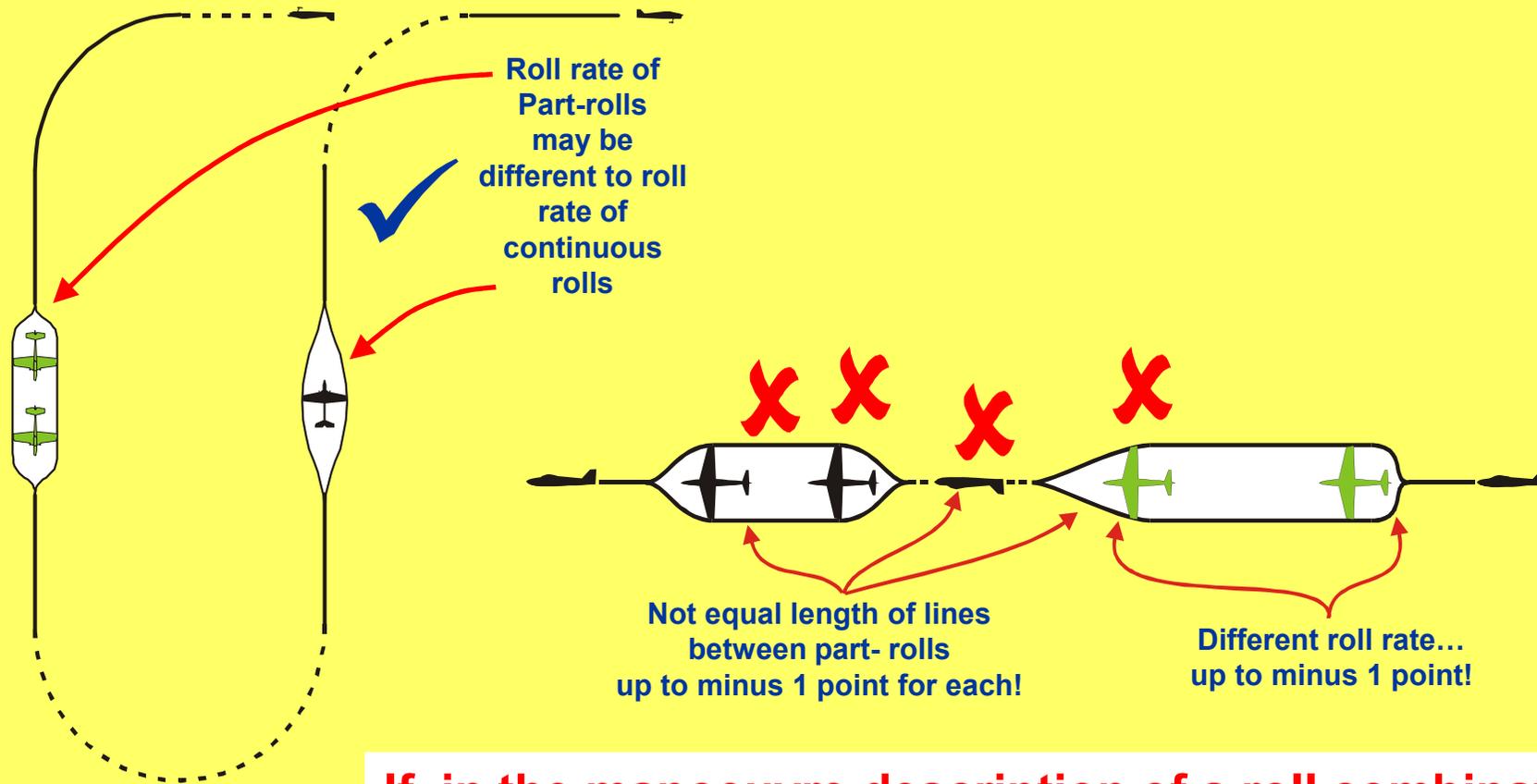
The roll-rate of the first continuous roll or part roll of a manoeuvre does not define the roll-rate for the remaining continuous rolls or part rolls of a manoeuvre but it is a starting point. As the manoeuvre progresses, the judge will compare the roll-rate of each continuous roll or part roll that was just flown to the roll-rate of the last flown continuous roll or part roll and if there is a difference, then a downgrade will be given based on the severity of the difference. In a manoeuvre with both continuous rolls and part rolls the two types of rolls must be considered separately for roll rate deviations.

ROLLS



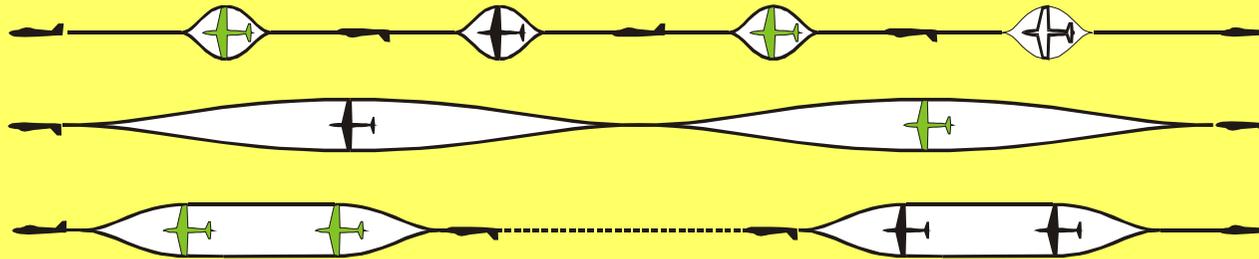
The start and stop of the rotation must be crisp and well-defined. If a start or stop is badly defined, 0.5 or more points are to be subtracted for each.

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!



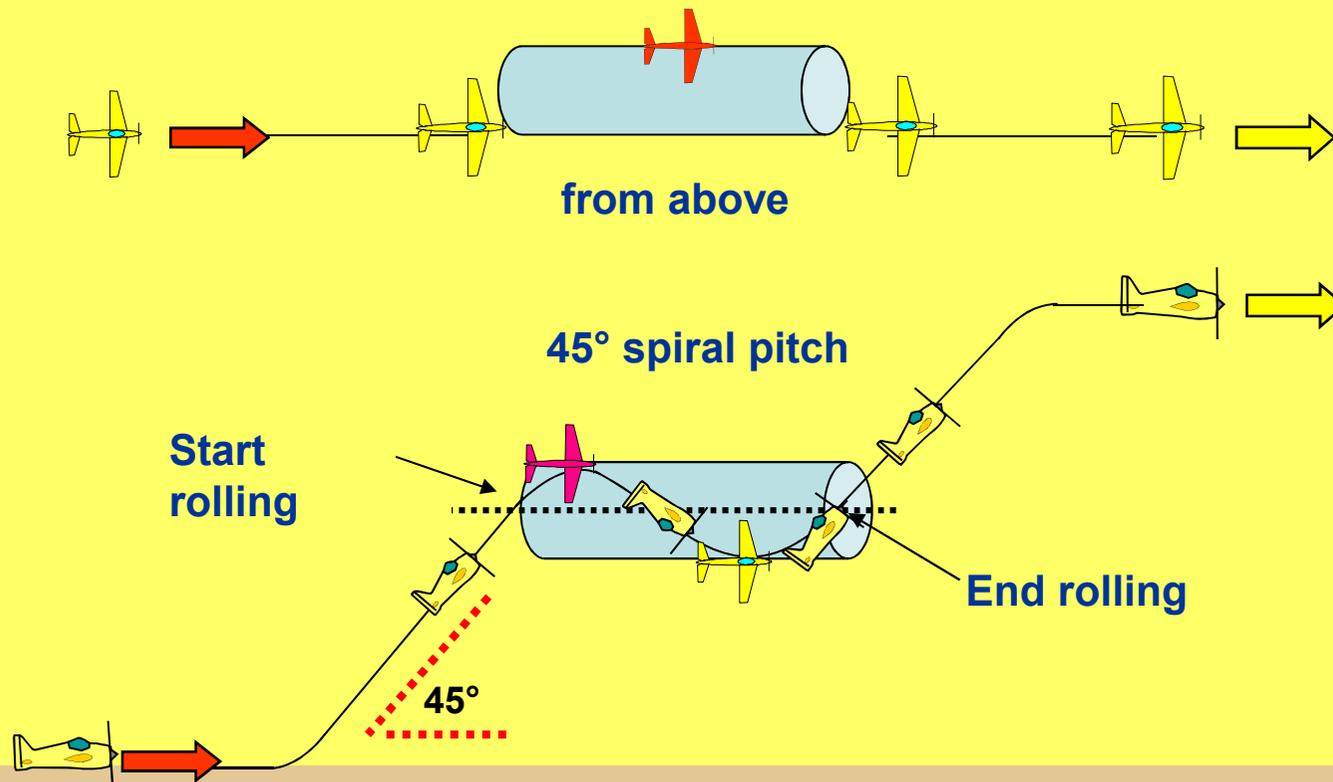
**Missing or additional Part-Rolls:
Use the 1 point per 15° rule**

- 1 missing $\frac{1}{2}$ roll: (180 degrees) = **Zero points**
- 1 missing $\frac{1}{4}$ roll : (90 degrees) = **- 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° 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).



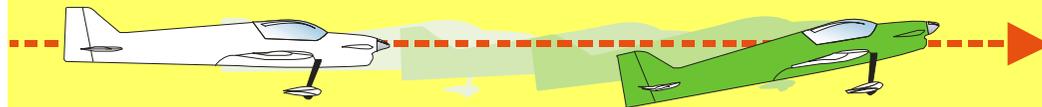
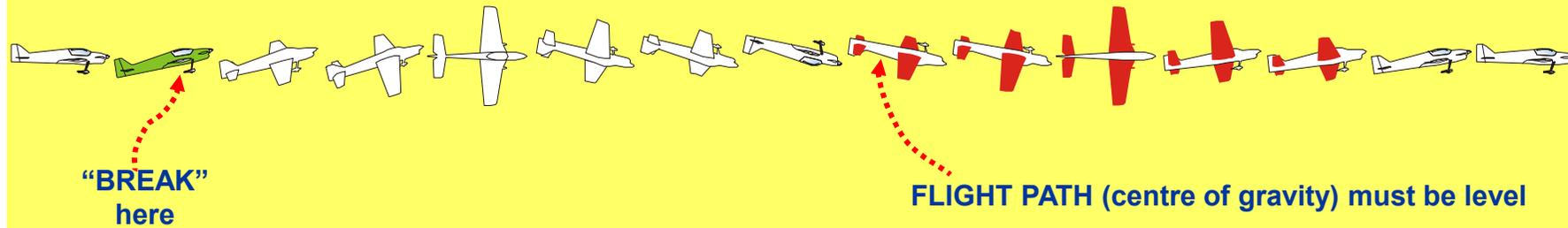
SNAP ROLLS

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



Separation of fuselage attitude
from flight path

SNAP ROLLS

NEGATIVE SNAP ROLL

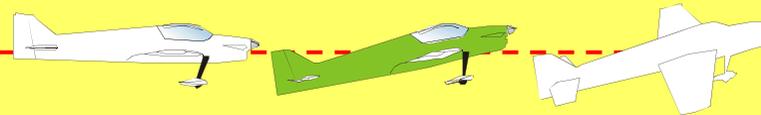
—



DOWN elevator

POSITIVE SNAP ROLL

+



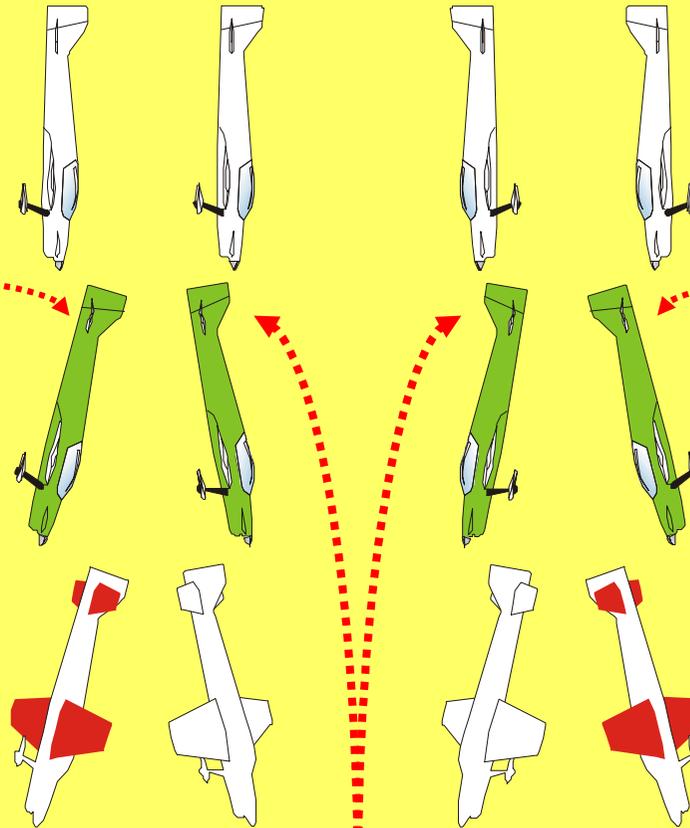
UP elevator

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

SNAP ROLLS, DOWN (and UP)

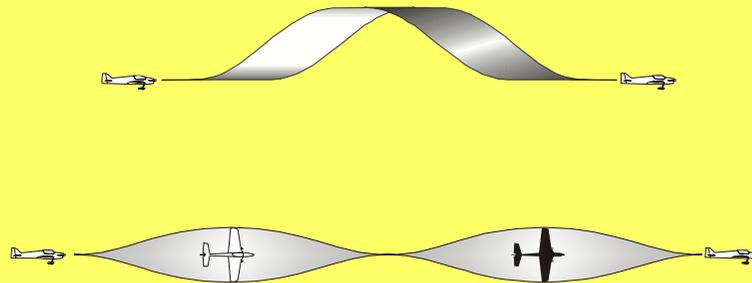
NEGATIVE SNAP
= DOWN elevator

NEGATIVE SNAP
= DOWN elevator



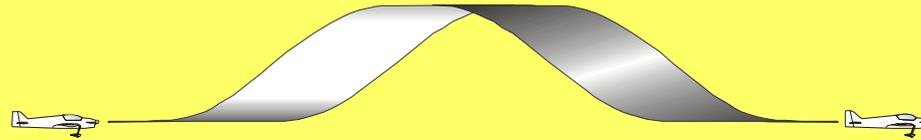
POSITIVE SNAP
= UP elevator

**Barrel roll or axial roll instead of
snap roll:
downgrade more than - 5 points**

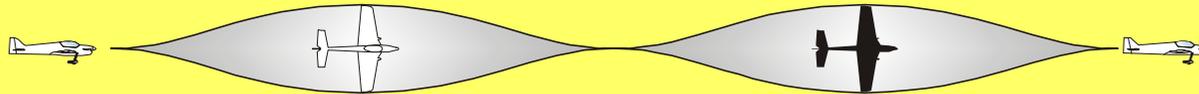


Spotters say:

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



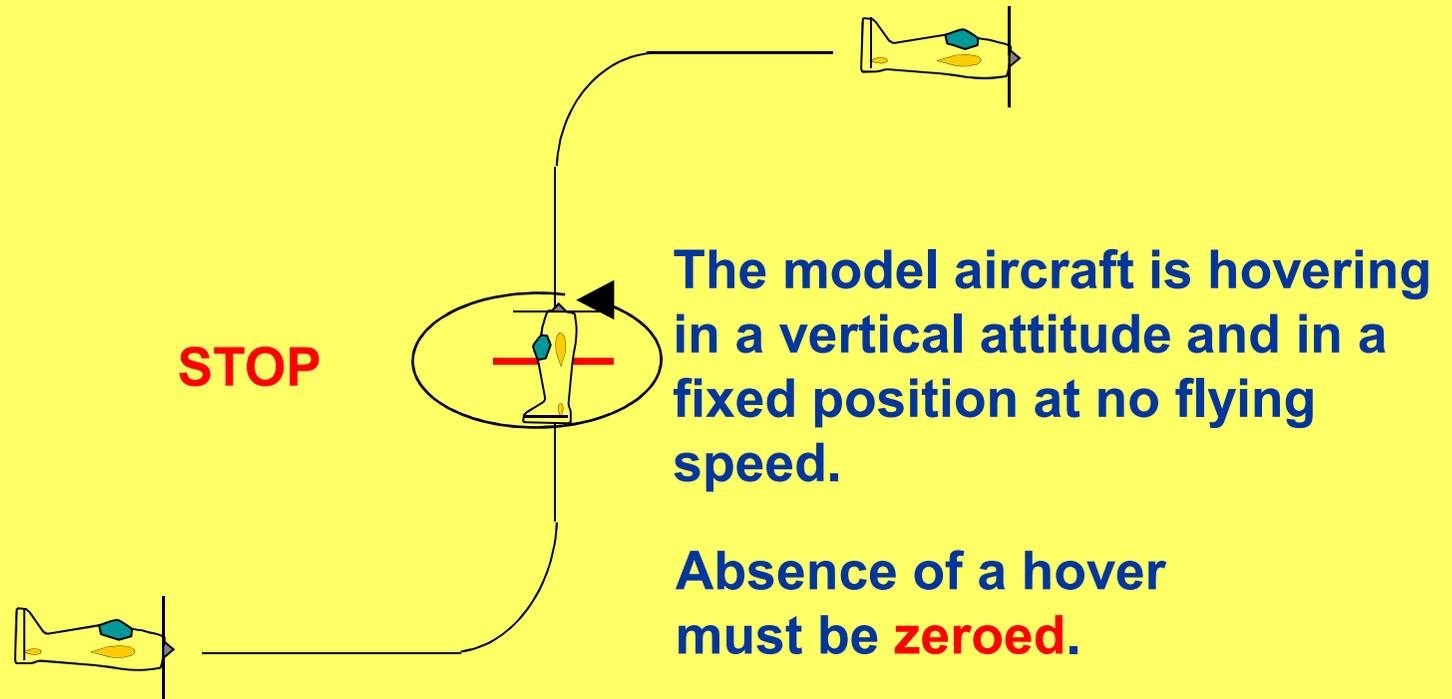
...and it's not an an AXIAL ROLL... **X**



...then it's probably...

A SNAP ROLL!

Torque - Rolls



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

Horizontal Circles and Part Circles

Horizontal circles are performed in a horizontal plane and mostly used as centre manoeuvres. Horizontal Part Circles are mostly part of a manoeuvre.

Circles and Part Circles within a manoeuvre must have the same radius.

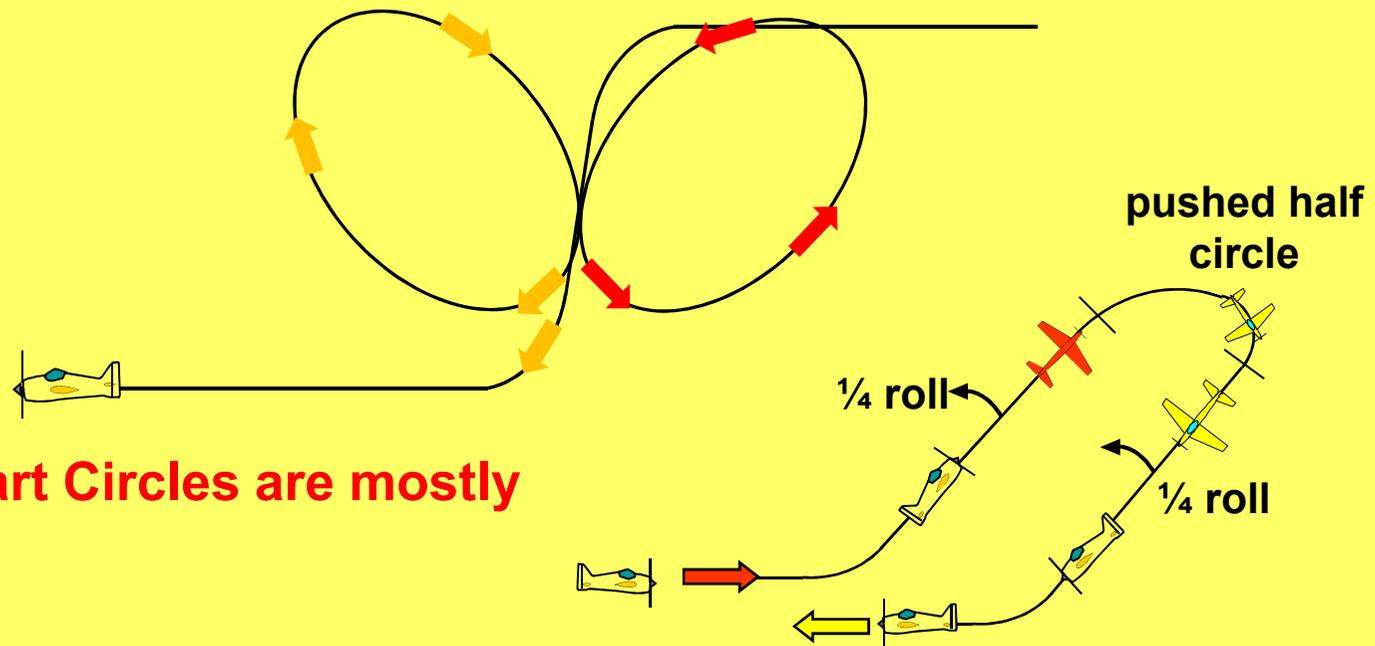
Each occurrence of a minor deviation in radius must be downgraded by 0.5 point, while more severe deviations may be downgraded by 1, 1.5, 2 or more points for each occurrence.

Horizontal Circles

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

45° Plane Circles and 45° Plane Part Circles

45° Plane circles are performed on a 45° plane and mostly used in centre manoeuvres.

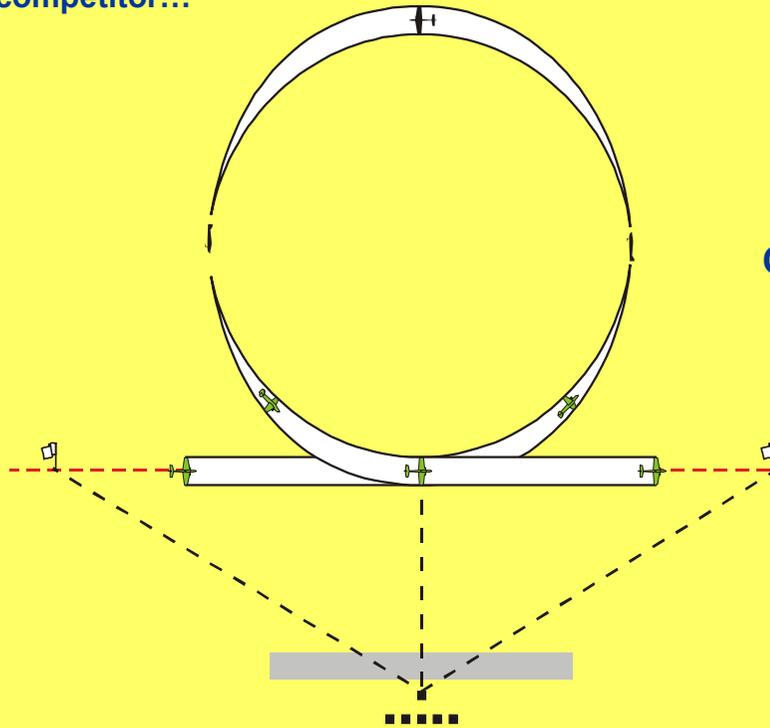


45° Plane Part Circles are mostly part of a manoeuvre.

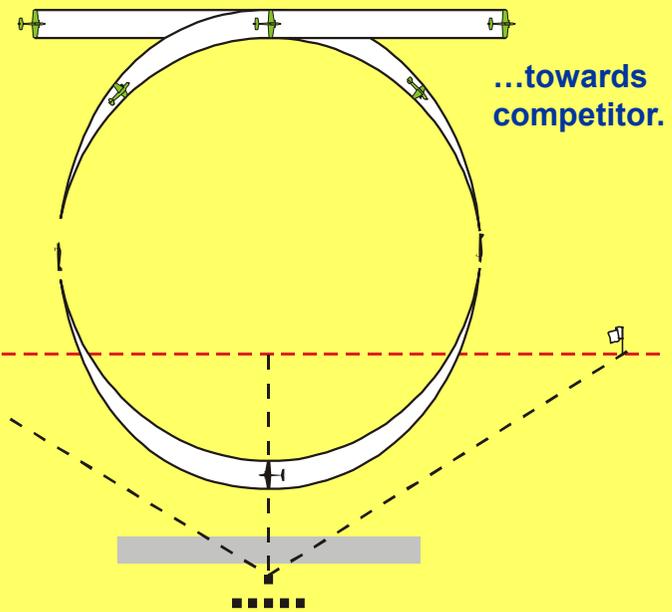
They are judged with same criteria as Horizontal Circles and Part Circles. As they are not horizontal they cannot be judged by constant altitude.

Horizontal Circles (Rolling Circles)

May be **AWAY** from competitor...

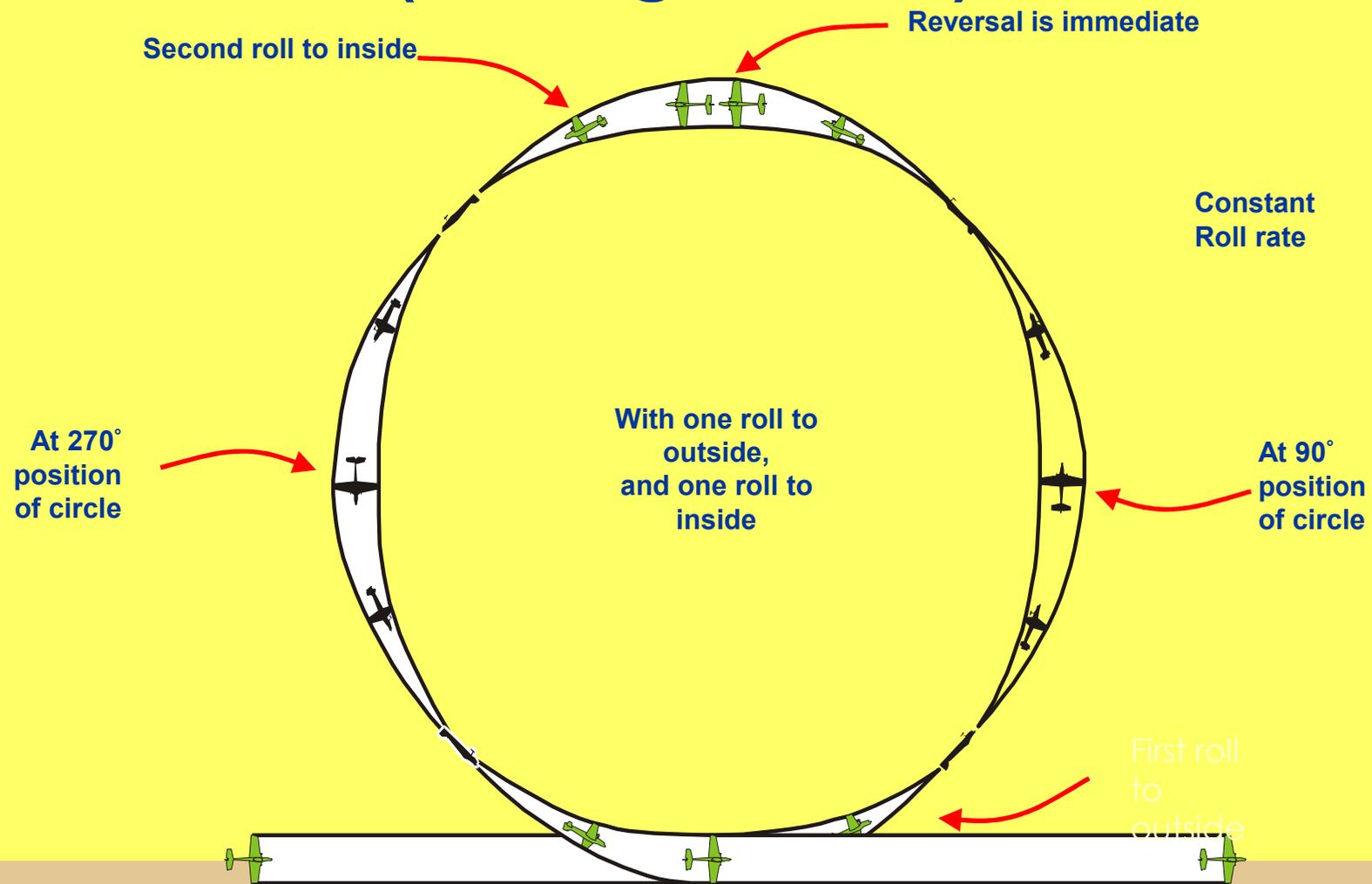


OR...

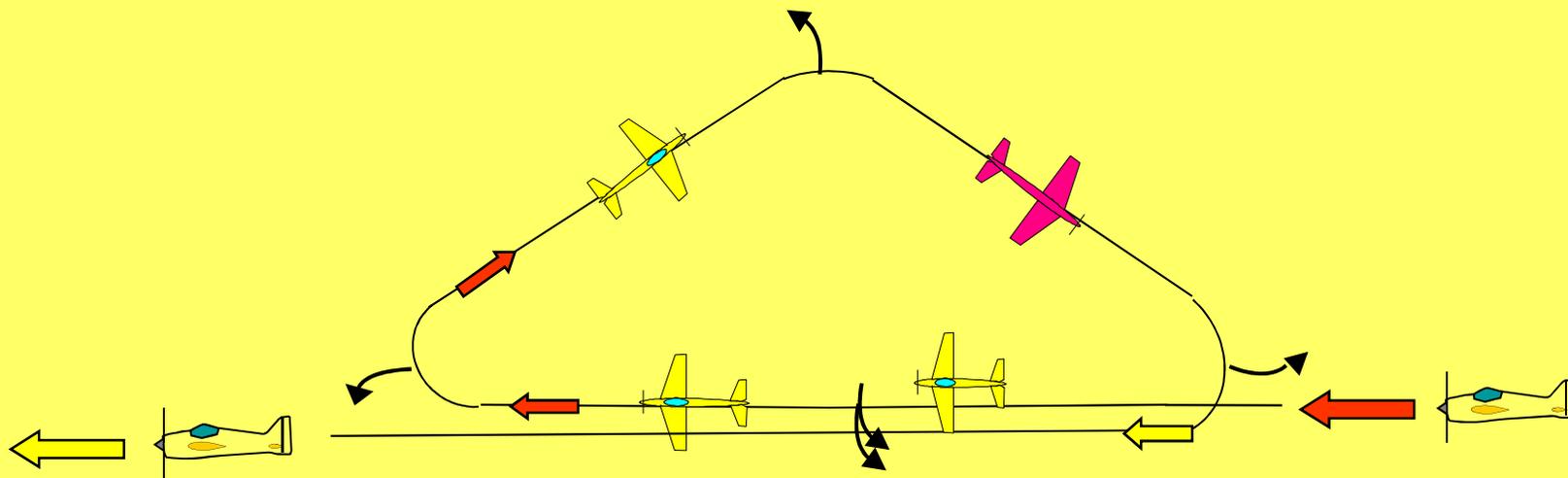


...towards competitor.

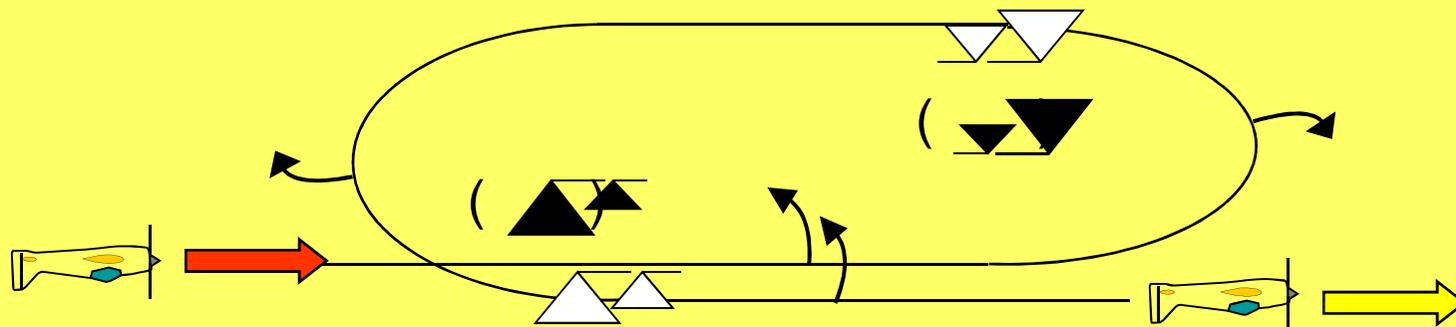
Horizontal Circles (Rolling Circles)



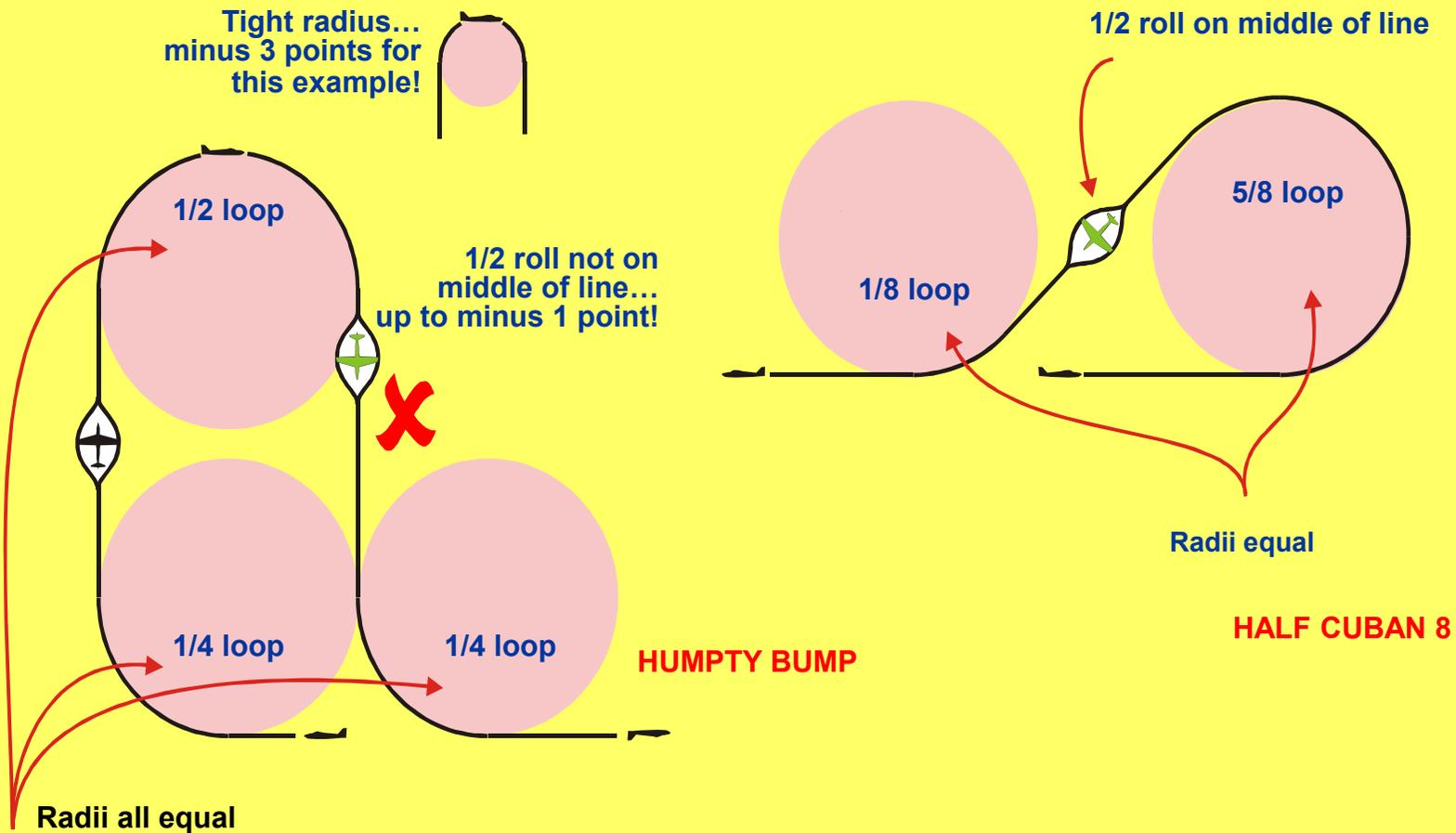
Horizontal Circles (Triangle)



Horizontal Circles (Double Immelmann)

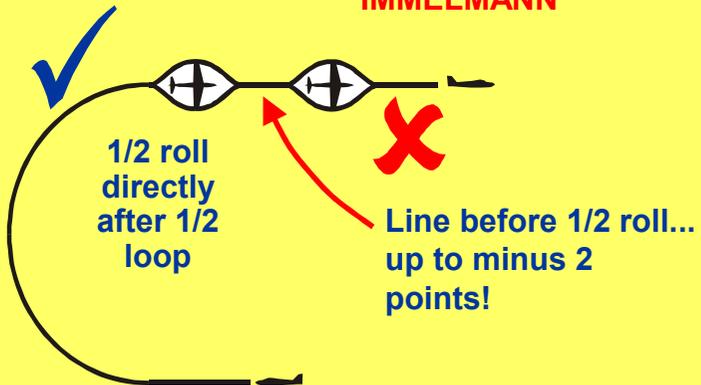


Line/Loop/Roll/Horizontal Circle COMBINATIONS



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! **X**

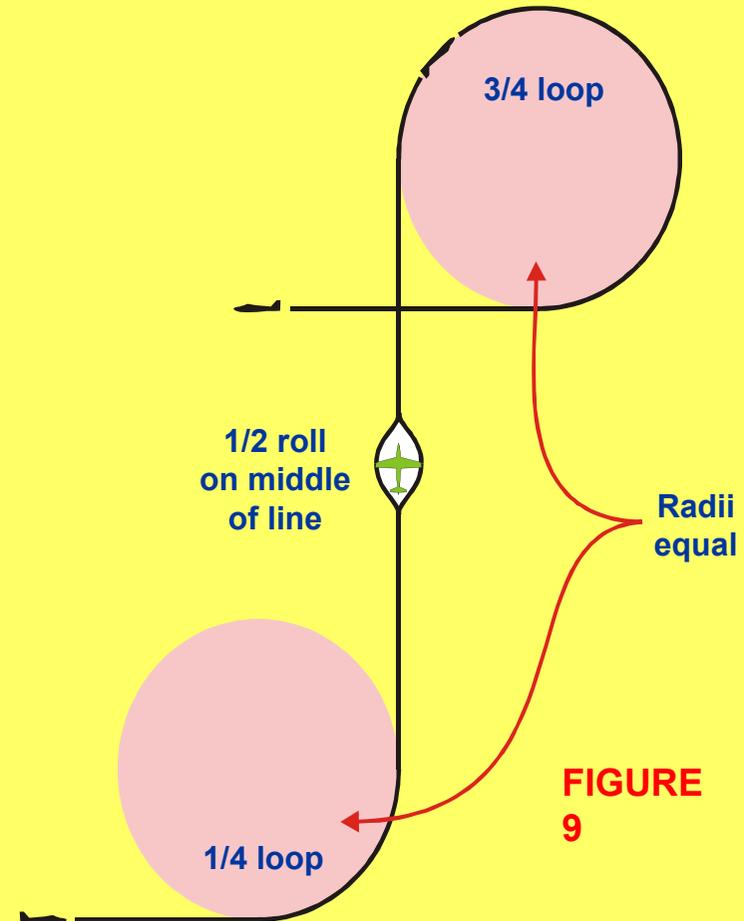
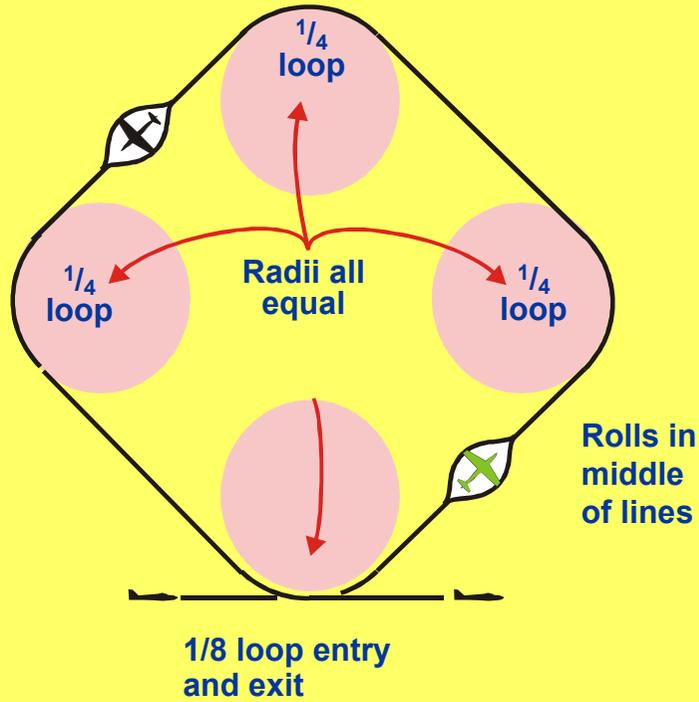
✓ 1/2 roll directly after 1/2 loop

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

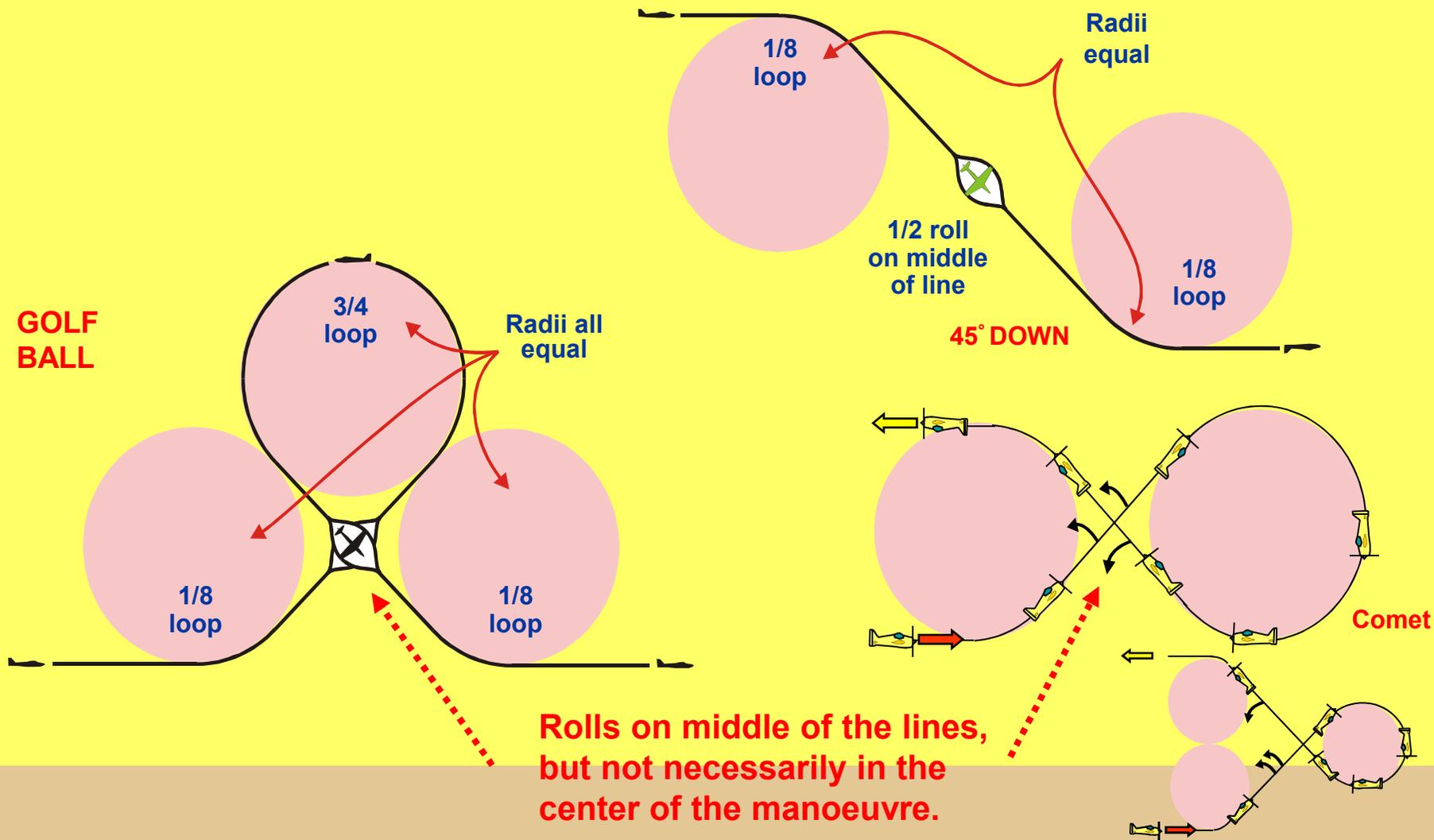
Line/Loop/Roll/Horizontal Circle COMBINATIONS

**SQUARE LOOP
ON CORNER**

All lines 45°.
All lines equal
length

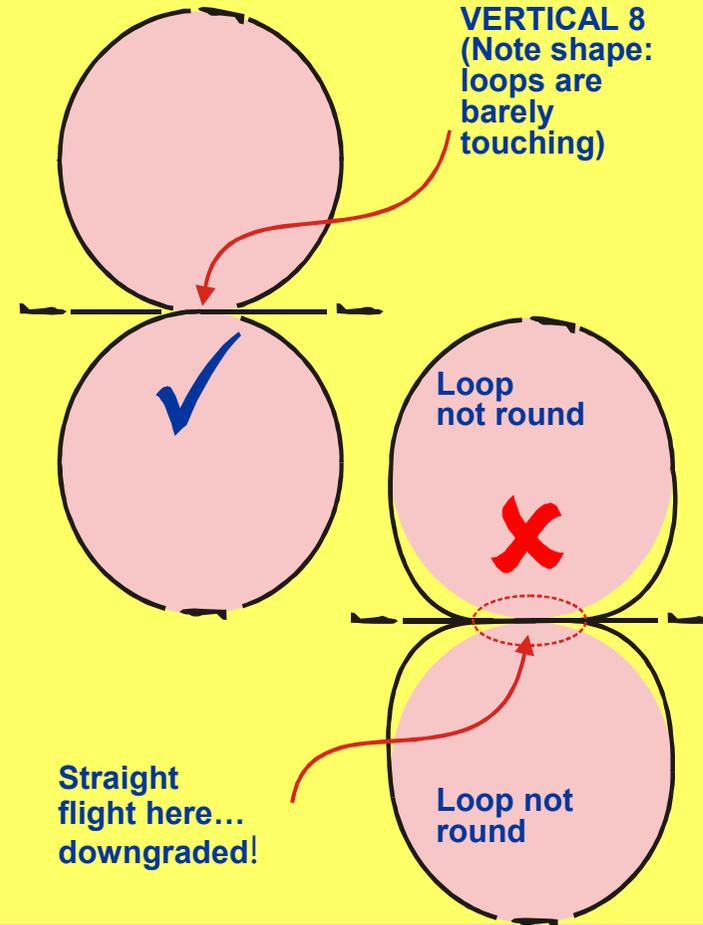
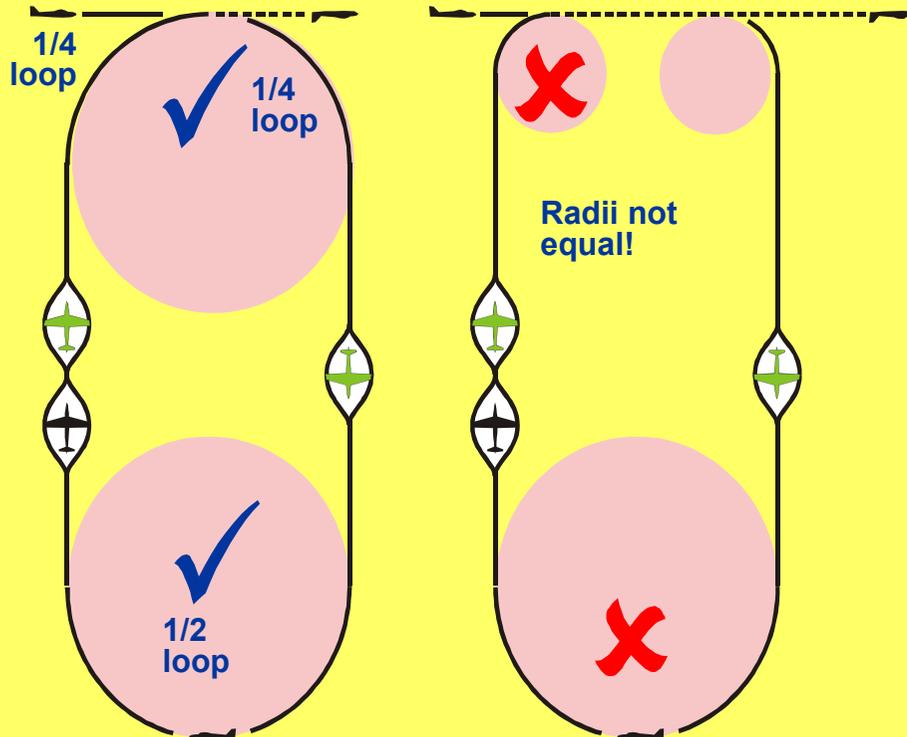


Line/Loop/Roll/Horizontal Circle COMBINATIONS



Line/Loop/Roll/Horizontal Circle COMBINATIONS

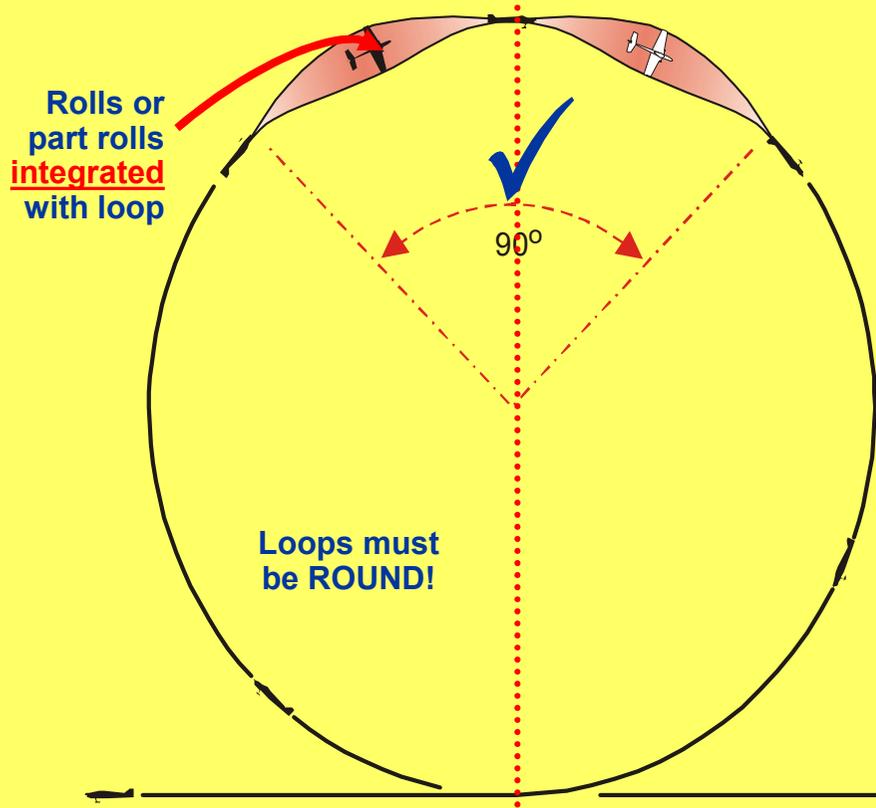
HUMPTY BUMP



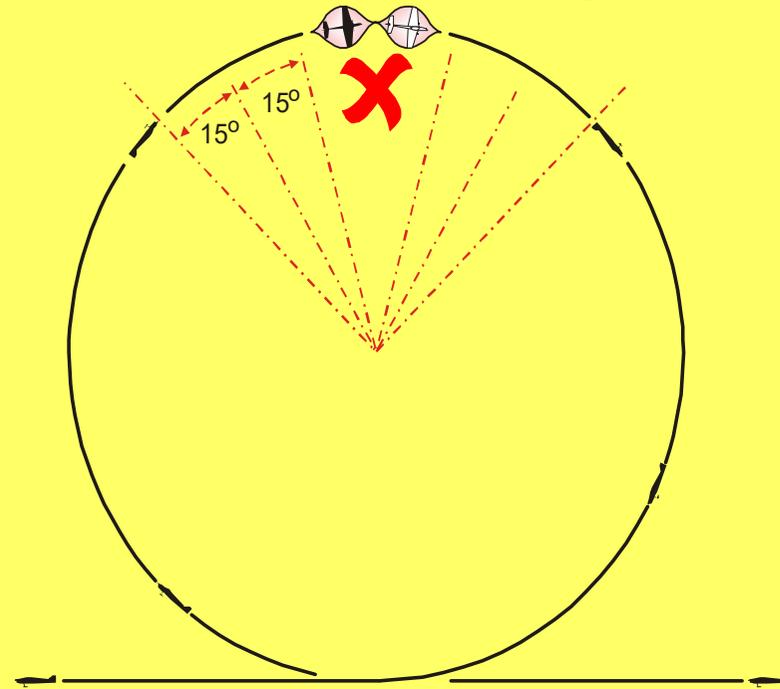
Line/Loop/Roll/Horizontal Circle

COMBINATIONS

LOOPS WITH INTEGRATED ROLLS

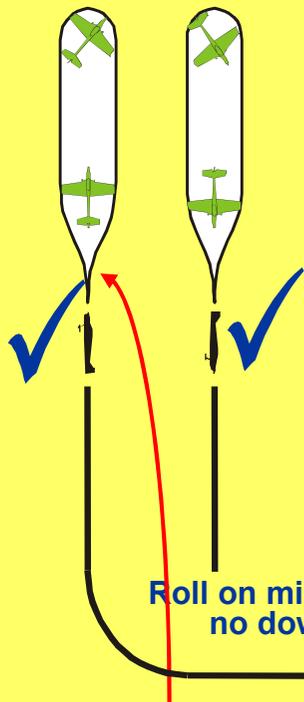


Rapid rolls MUST score less. This example = minus 4 for non-integration of roll

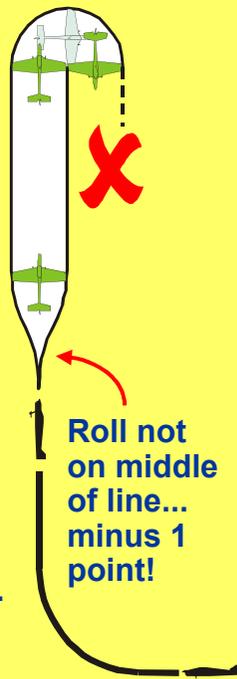


STALL TURNS

Pivot on CG...
no downgrade!



Up to 1/2 span
radius of pivot...
minus 1 point!

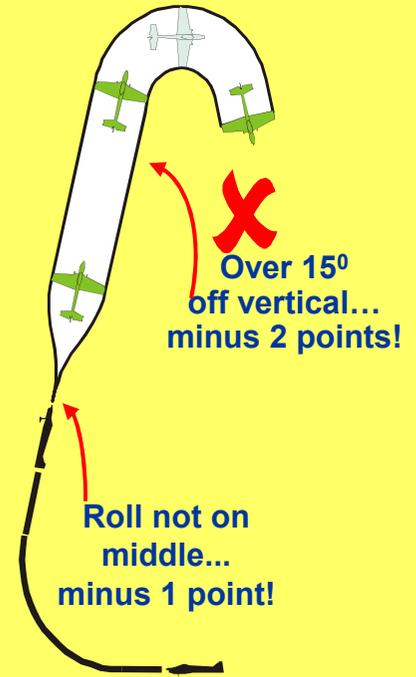


Up to one wing
span radius...
minus 2/3 points!



No line before roll...
minus 3 points!

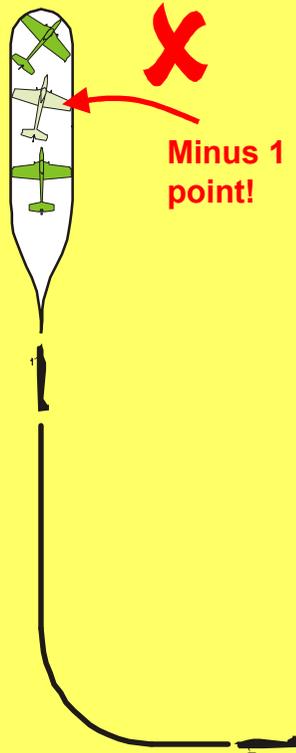
Up to 1 1/2 span
radius
minus 4/5 points!



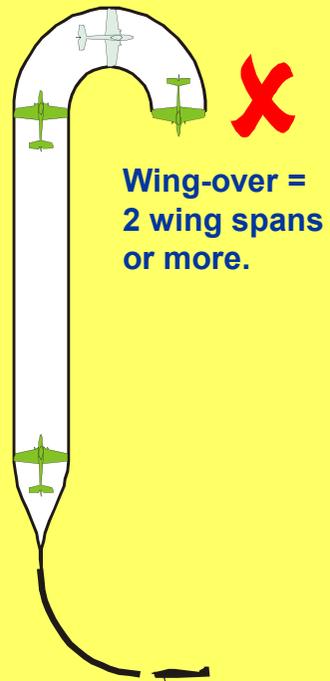
The model must stop before pivot. If not downgrade.

STALL TURNS

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



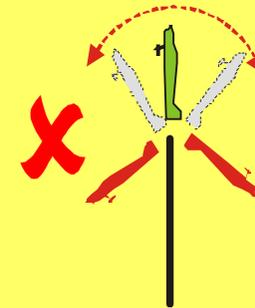
Wing-over...
ZERO!



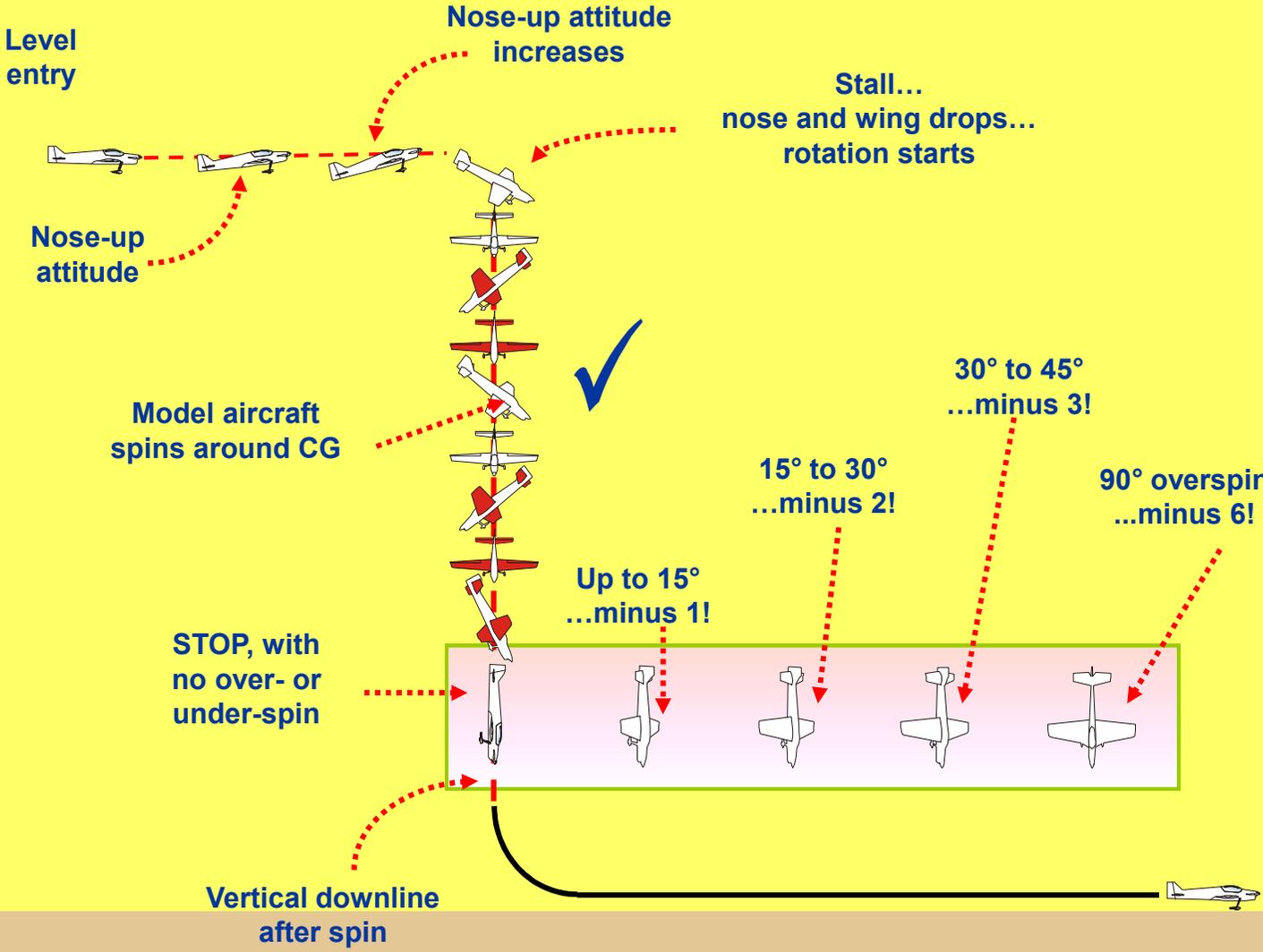
Torque-off...
1pt/15 degree
downgrade



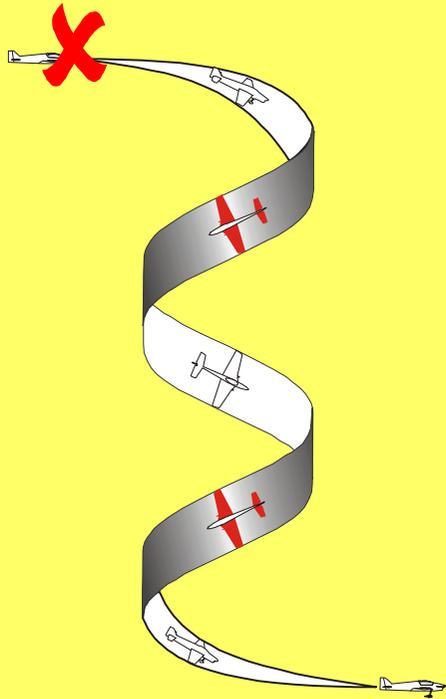
Flop forwards,
or backwards... **ZERO!**



SPINS



SPINS

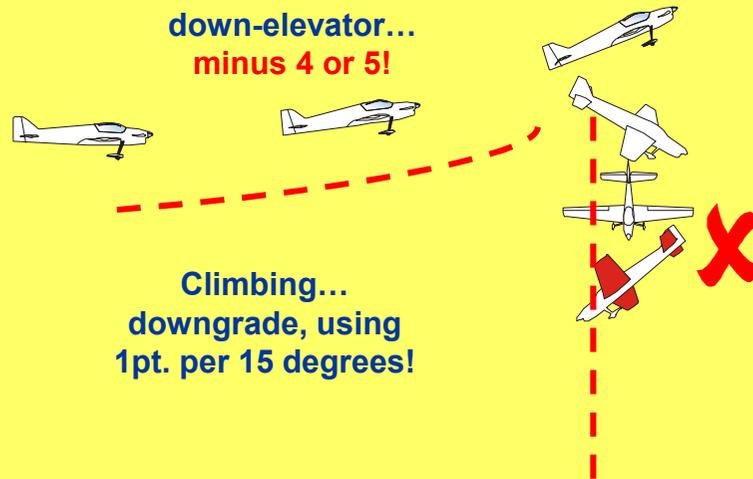


Spiral dive...scores ZERO!

Wing lift (snap entry)...ZERO!



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



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

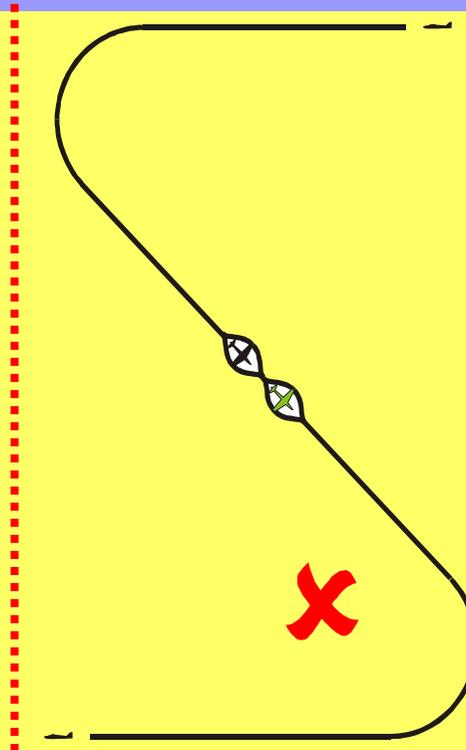
Constant Flying Speed

The model aircraft shall maintain a constant flight speed throughout the various manoeuvre components; for example, in climbing and descending sections.

For significant differences up to one point is subtracted.

CENTRE POSITIONING

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



A centre manoeuvre must be flown so that it is centred on the centre line indicated by the centre flag.

The centre of a centre manoeuvre is in the middle between vertical limits left and right.

If the manoeuvre is flown off-centre, it must be downgraded according to the misplacement. This may be in the range of 0.5 to 4 points subtracted. The centre of a centre manoeuvre is in the middle between vertical limits left and right.

Size of the manoeuvres

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

For mis-matching size up to 1 point downgrade.

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**

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
DURING THE
COMPETITION**

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

**LOOK ONLY AT LINES DESCRIBED IN THE
“SKY”!**

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.**

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 not know people who don't make errors.....
- So, judges are just humans and can get it wrong or sometimes miss something.



Enjoy flying and judging!

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