Precision Aerobatics Judging and Flying Questions – with Answers Explained
Set B

Andrew Palmer

With thanks to Russell Edwards and Peter Uhlig

What Will We Cover?

About myself, my interest in judging and F3A rules
Where to find information on judging
The manoeuvre execution guide and objective judging
NZ Clubman Schedule Walk (Fly) Through
Tonight's ten questions
Tools to help with judging (and flight training!)
Any questions

But first, lets get ready with Poll Everywhere

Its anonymous and free!

Poll Everywhere

Please remember!

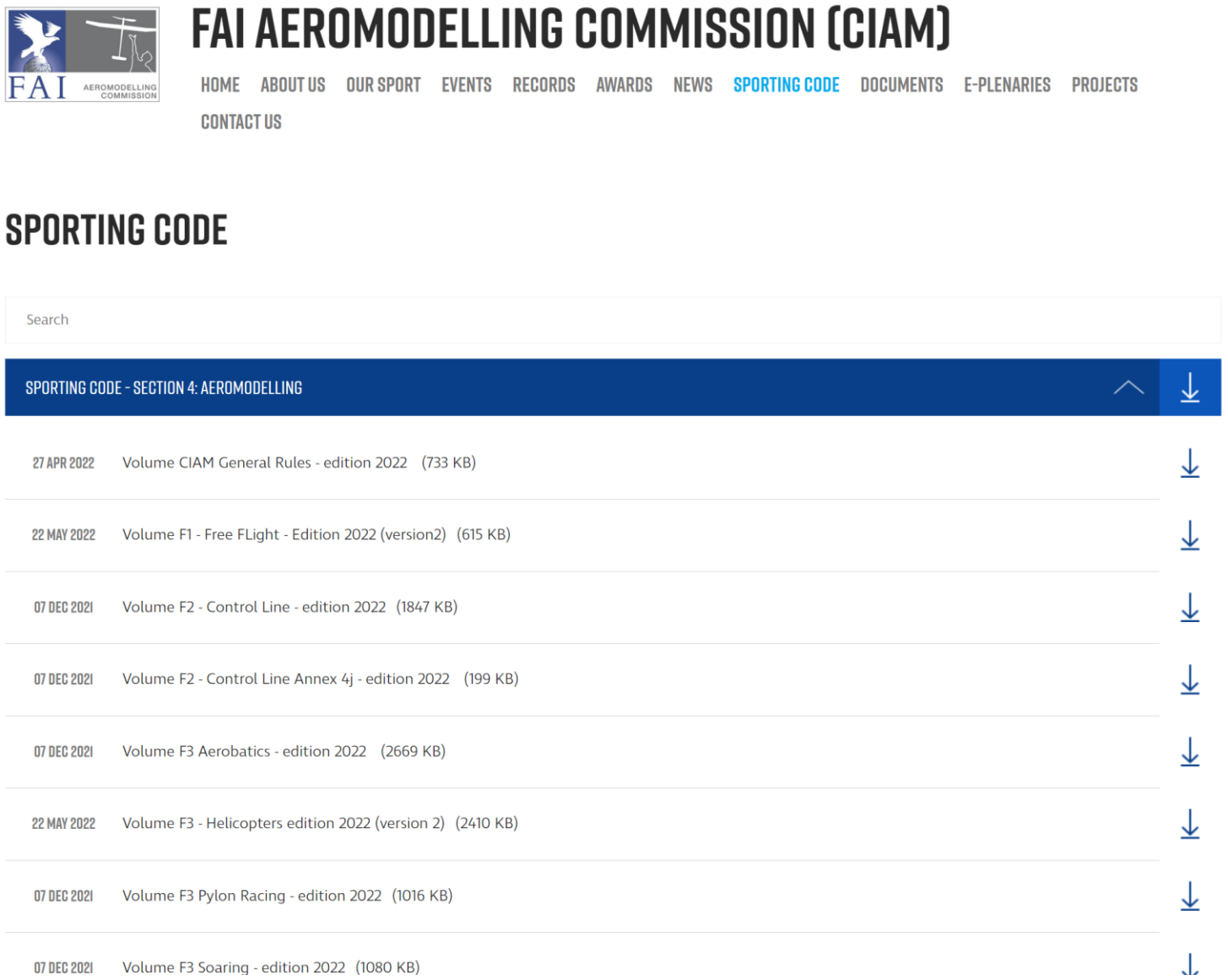
- The rule book is not perfect
- It does not have all the answers (but almost)
- I don’t have all the answers
- But I will try and be a good navigator!

- We all hope to fly well, be judged fairly and judge fairly ourselves

(And IMAC is judged differently)

About Myself

Where to find Judging Information?



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?

5. WHAT WAS THE POSITIONING of the manoeuvre?

6. WHAT WAS THE SIZE of the manoeuvre?

7. Was the manoeuvre partially or completely outside of the manoeuvring zone?

All manoeuvres should be executed with:

Geometrical Accuracy
Constant Flying Speed
Correct positioning within the manoeuvring zone
Size matching to the size of the manoeuvring zone

Judging is based on the trajectory of the aircraft's centre of gravity rather than its attitude. Manoeuvres must be wind corrected except where the aircraft is in a stalled condition (Spins, Stalls and Snaps).

Criteria for judging:

1. Type of defect
2. Severity of defect
3. The number of times any one defect occurs, as well as the total number of defects.
4. Positioning of manoeuvre and size relative to other manoeuvres in the flight

Basic rule is to deduct 1 point for 15 degrees variation from defined manoeuvre geometry, but 0.5 points only for half of this. Lines should be judged more harshly than deviations in yaw or roll.

Defect	Downgrade
For significant differences in Constant Flying Speed	0.5 - 1
Sizing different relative to other manoeuvres in the flight	0.5 - 1
Positioning - *Appropriate distance out should be based on visibility of aircraft*	
Manoeuvre not centred (per 15 degrees)	0.5 - 4
More than 175m out (visibility is the criterion)	1
Greater than 200m out	2 - 3
Outside 60 degree markers, further out is worse (based on % out of box)	1 - 10
Lines	
Length of lines not graded	No deduction
Manoeuvre doesn't start and end with a horizontal line	1 per manoeuvre
Mis-relationship between lines	0.5 or more
Rolls not centred on lines (except Split S and Immelmann)	0.5 - 2
No line before/after roll (except Split S and Immelmann)	3
Loops	
Radius (Compare each radius that was just flown to the last radius flown) (e.g. All loops or part loops within a manoeuvre must have the same radius)	0.5 – 2 or more for each occurrence
Segmentation (Every segmentation must be down graded)	0.5 or more
Departure from vertical plane	0.5 or more
Part loops must not be too tight or too loose (Too tight or too loose must be downgraded)	0.5 - 1
Turn-arounds are positioning manoeuvres. Entry/exit altitude can be different heights	No deduction
Rolls	
Variation in roll rate	0.5 or more
Slowing down / speeding up at end of roll	1 per 15 degrees
Start or stop not crisp (Each occurrence)	0.5 or more
Not centred on lines (except Split S and Immelmann)	0.5 - 2
No line before/after roll (except Split S and Immelmann)	3

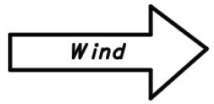
Change in pause length within point rolls	0.5 or more per occurrence
Missed or extra point in point roll(s)	1 per 15 degrees
Roll or part-roll in wrong direction	Zero scored
Roll/Loop Combinations	
For Immelmann & Split S, roll not immediately before/after loop or part loop	0.5 - 2
For Immelmann, roll starts before loop or part loop completed	1 per 15 degrees
On Cuban 8's or half Cubans, rolls must be centred on lines	0.5 - 3
Humpty Bumps must have consistent radii in all part loops	0.5 - 3
Integrated rolls or part rolls not smooth and continuous and correctly integrated	1 per 15 degrees
Snap Rolls - *Use same basic judging criteria as axial rolls above. If it's not an axial or barrel roll, it's a snap roll*	
Attitude (positive or negative) at pilot's discretion	No deduction
Stall/break from line of flight not observed and barrel rolls	Severe (5+)
Axial roll disguised as a snap	Severe (5+)
Aircraft un-stalls during snap	1 per 15 degrees
Spins - *Nose up attitude, nose drops as aircraft stalls. Simultaneously, wing drops in direction of spin*	
Gain in altitude prior to spin	1 per 15 degrees
Severe yawing/weathercocking when near stalled	1 per 15 degrees
Drift when stalled or near stalled (not outside aerobatic zone)	No deduction
No stall, snap rolled, or spiral-dived into spin	Zero scored
Slides into spin	1 per 15 degrees
Forcing spin in opposite direction on initial rotation	Severe (5+)
Forcing spin from high angle of attack with down or up elevator	4 - 5
Conditions (e.g., no wind) may mean aircraft does not completely stop	No deduction
Rotation errors judged in same manner as rolls	1 per 15 degrees
Reversal of rotation not immediate (e.g., becomes un-stalled)	Severe (5+)
Roll rate in reversal significant (slight difference ok)	1
Unloading spin (e.g., finishing spin with ailerons)	1 per 15 degrees
Specific attitude of aircraft during spin not judged as long as it remains stalled	No deduction
No visible vertical line following rotation(s)	1

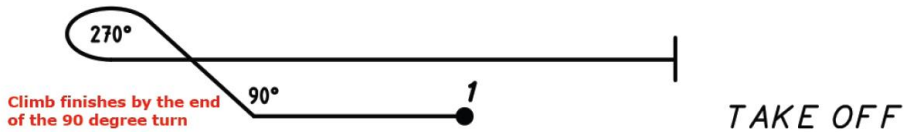
Stall Turns	
Pivot up to ½ wingspan	1
Pivot up to 1 wingspan	2 - 3
Pivot >1½ wingspans	4 - 5
Pivot >2 wingspans or flops over	Zero scored
Torques off	1 per 15 degrees
Pendulum movement after pivot	1
Skid before reaching stall turn (early rudder)	1
Drift when stalled or near stalled (not outside aerobatic zone)	No deduction
Part loops on entry/exit not constant and equal radius	0.5 - 3

Rolling Circles - *Mainly about maintaining consistent circular flight path, altitude, roll rate and roll integration (Apply same rules as per rolls)*	
150m distance requirement not applied. Deduct where >350m	1 - 3
Deviations in geometry	1 per 15 degrees
Either performed towards or away from judges	No deduction
Roll or part roll in wrong direction	Zero scored

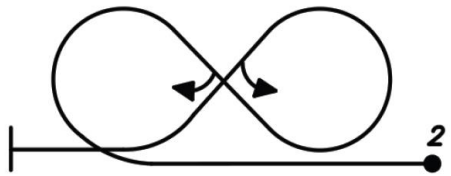
NZ Clubman Aerobatics

NEW ZEALAND RADIO CONTROLLED AEROBATICS ASSOCIATION



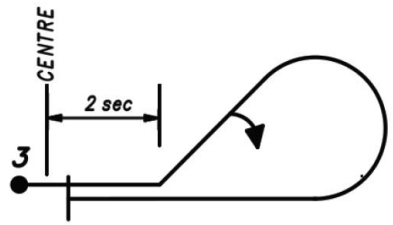


TAKE OFF

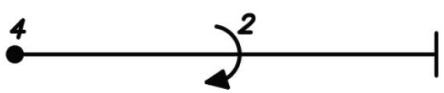


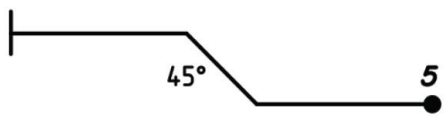
CUBAN EIGHT

HALF REVERSE CUBAN EIGHT



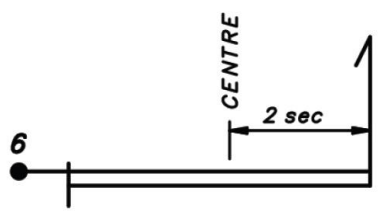
TWO POINT ROLL





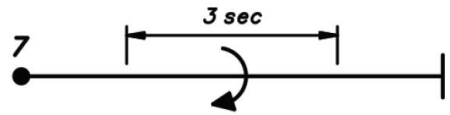
45 DEGREE UPLINE

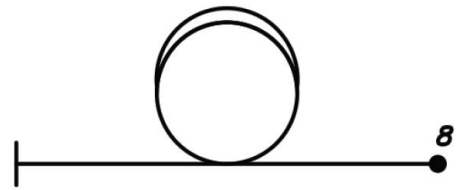
STALL TURN



CONTINUED ABOVE

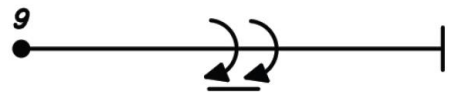
SLOW ROLL



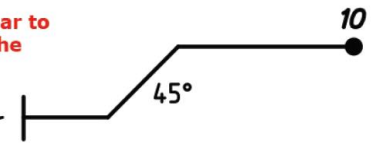


TWO LOOPS

TWO ROLLS



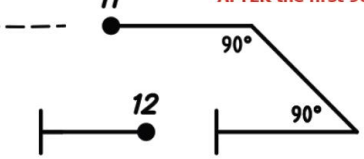
180 degree turn or similar to position downwind for the approach and landing



45 DEGREE DOWNLINE

APPROACH FOR LANDING

Constant descent starts anytime AFTER the first 90 degree turn



LANDING

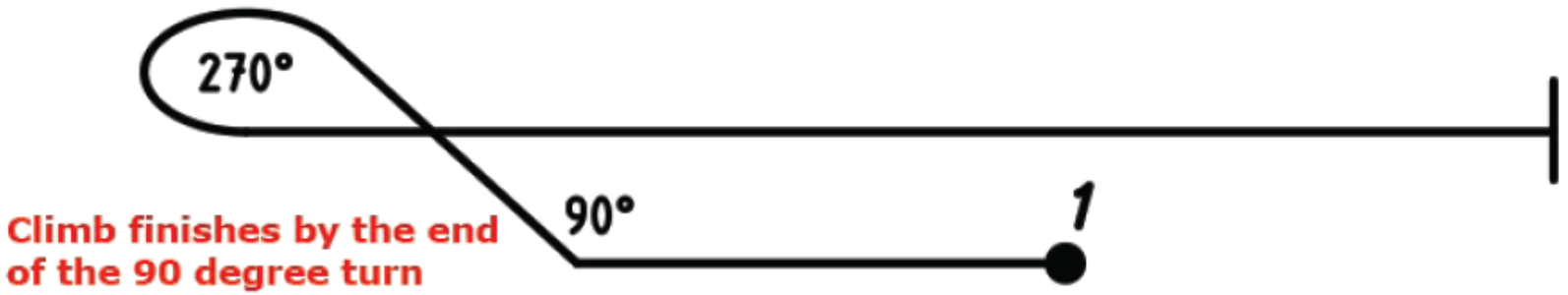
Drawn I Hill–NZ
Rev 2 6.7.22

Remember……

- These are ‘Aresti-like’ representations
- You must refer to the written description to fully understand each manoeuvre

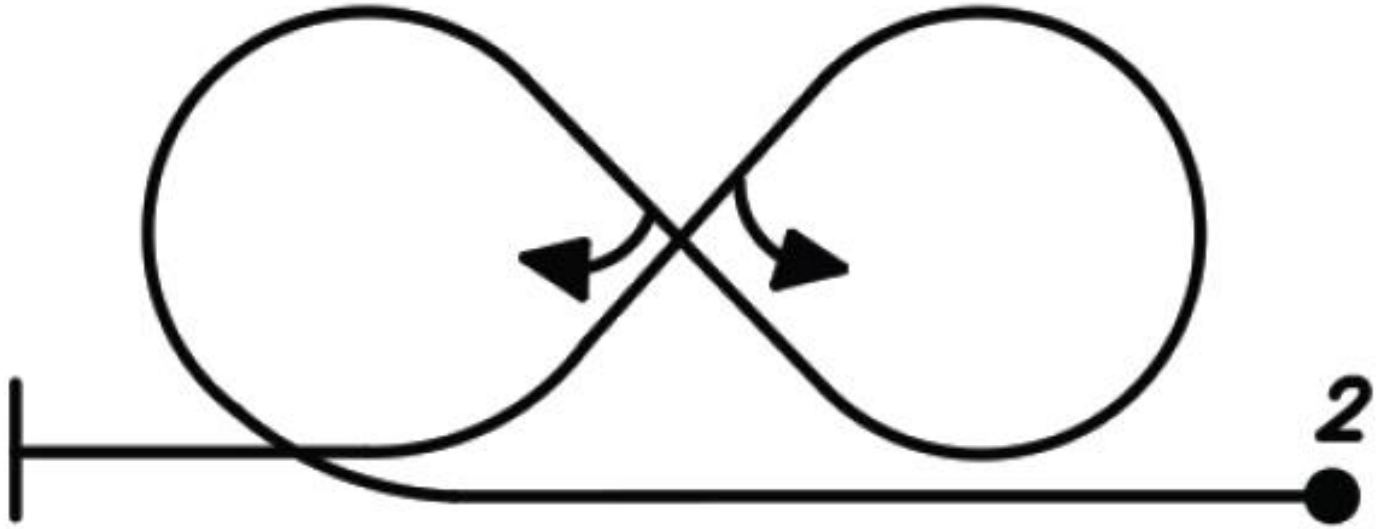
- **TO WATCH THE MANOUVER VIDEOS: Click on the picture, and ‘allow’ the pdf to connect to youtube!**

Take off



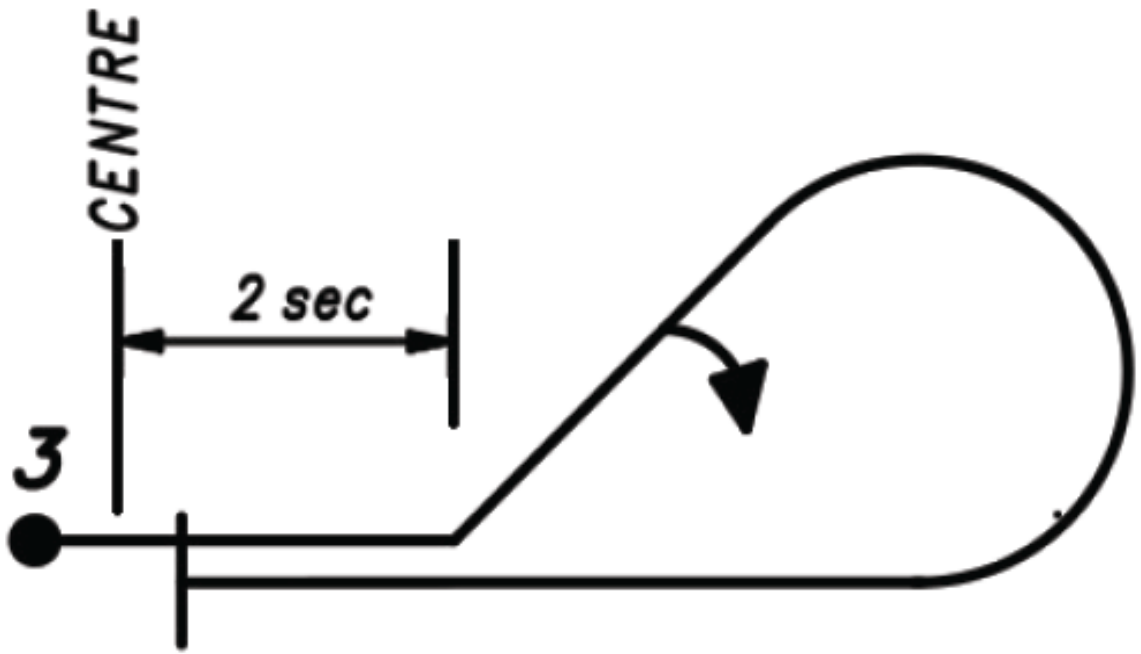
Take-Off Sequence (K=1): The model must stand still on the ground with the motor running without assistance. ‘Commence’ is called, and the model will then smoothly accelerate and shall then take off. The take-off run must be straight, and the model shall lift gently from the ground and climb at a gradual angle. The first turn is 90 degrees out, away from the judges. The climb must be finished before the end of this first 90 degree turn, and the rest of the manoeuvre flown at constant altitude. The model then flies in a straight line for a short length of time and then completes a 270 degree turn in the opposite direction, with the model finishing flying downwind in the opposite direction to take-off. The manoeuvre finishes when the model passes through ‘centre’, and at this point ‘complete’ must be called. Like all other Clubman manoeuvres, the take-off will be scored zero to ten.

Cuban eight



Cuban Eight (K=2): The model starts in straight and level flight, flies through centre, pulls up into a ⅝ inside loop, continues until heading downwards at 45 degrees, pauses, does a half roll, pauses, followed by a ¾ inside loop. When again pointing 45 degrees downwards the model pauses, does another half roll, pauses, and recovers at the same altitude and heading as the entry.

Half reverse cuban eight

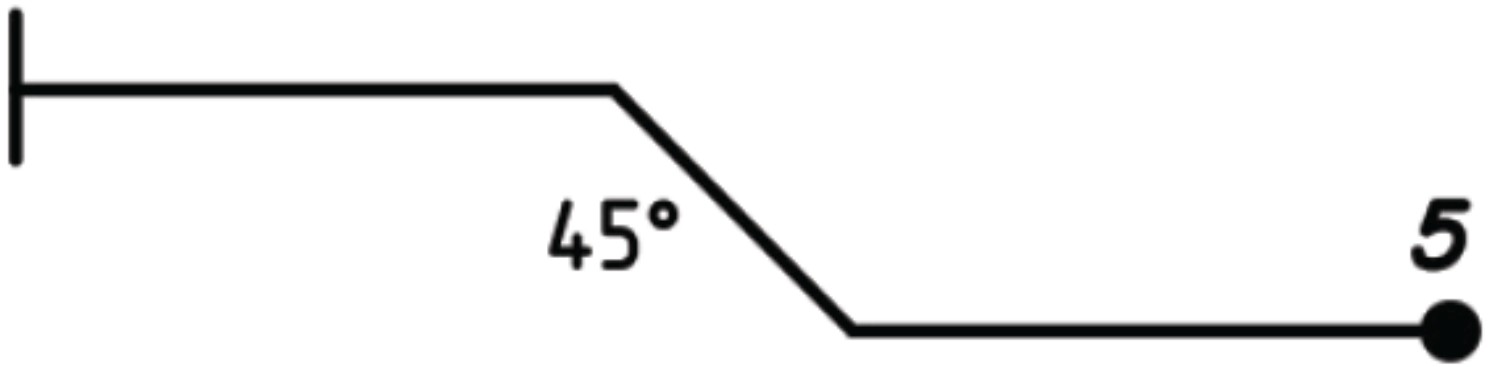


Half Reverse Cuban Eight (K=2): The model starts in straight and level flight, flies through centre. Two seconds after passing centre the model pulls through a ⅛ inside loop into a 45 degree upline, pauses, does a half roll to inverted, pauses, and then pulls through a ⅝ inside loop to recover at the same altitude but opposite heading to entry.

Two point roll

Two Point Roll (K=3): The model starts in straight and level flight and before centre rolls at a uniform rate through 180 degrees to inverted then pauses (‘for a heart beat’), then rolls another 180 degrees in the same direction to finish in upright flight. The model should pass through centre inverted. The approximate time of the manoeuvre is three seconds.

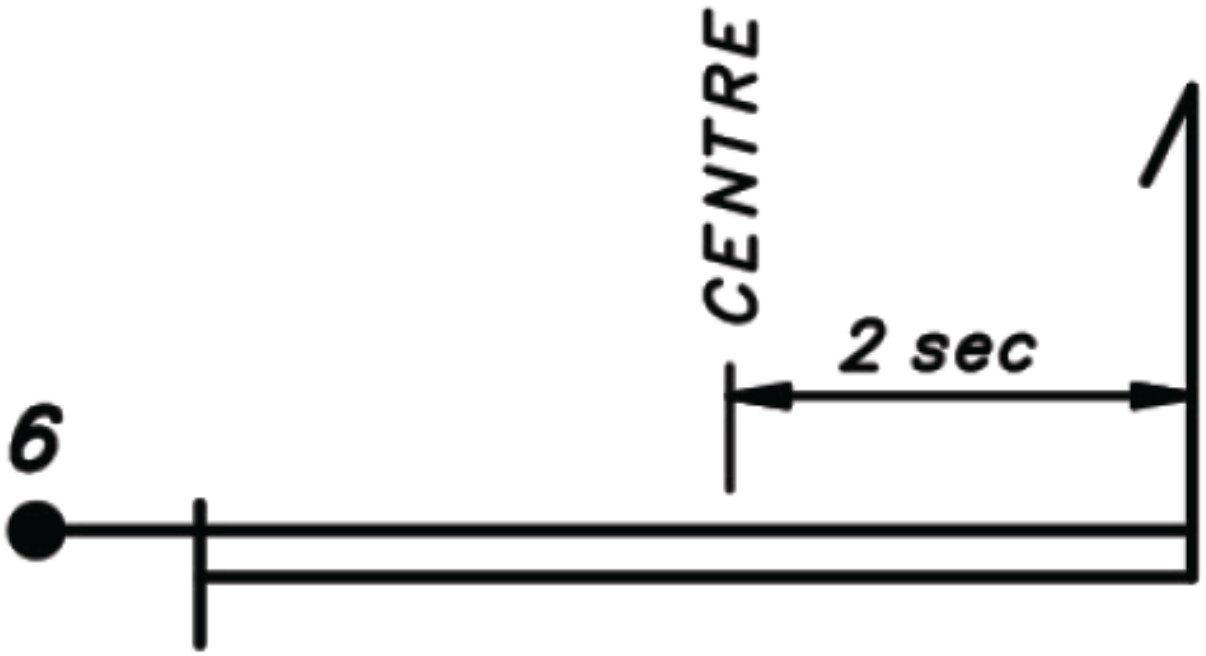
45 degree upline



45 Degree Upline (K=3): The model starts in straight and level flight and before centre pulls through a ⅛ inside loop to a 45 degree upline. The model then flies on a 45 degree upline and eventually pushed out the top through a ⅛ outside loop to level flight.

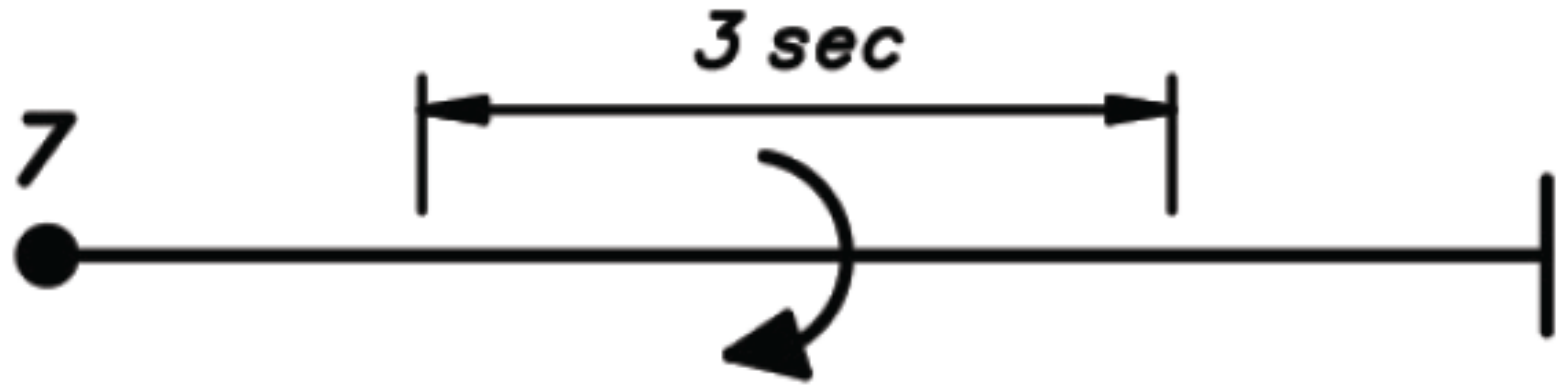
Hint: The plane is now positioned up high, and the next manoeuvre is a stall turn back down at base line height. If you are an experienced pilot, performing a ‘Split-S’ turnaround manoeuvre would position you well for the stall turn. Otherwise, a descending turn or any other manoeuvre can be used to position for the stall turn.

Stall turn



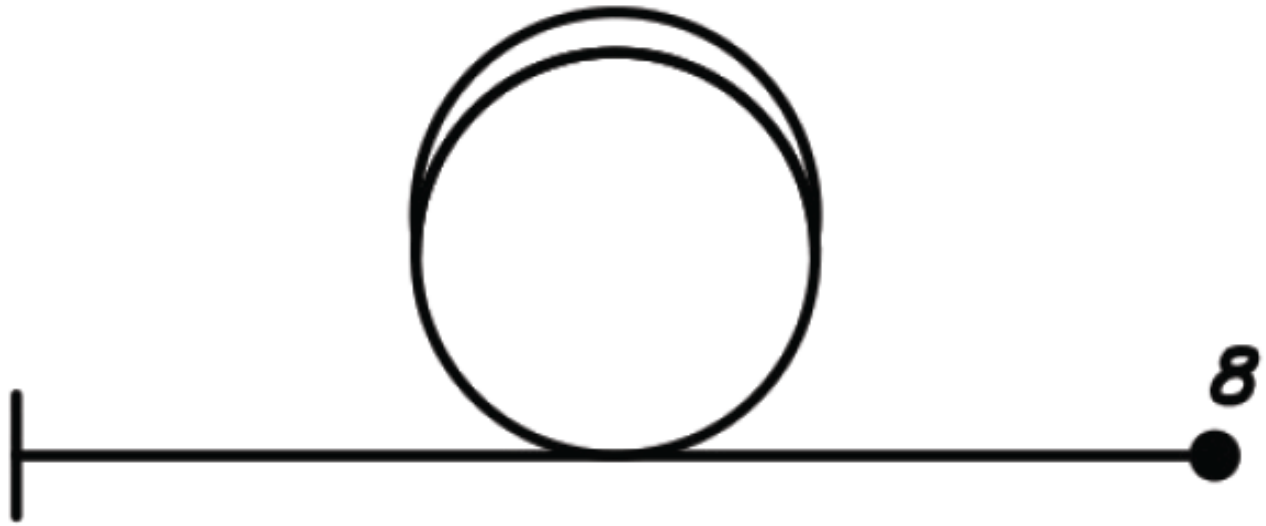
Stall Turn (K=3): The model starts in straight and level flight. The model flies through the centre, and two seconds after centre executes a ¼ loop into a vertical climb. At the top of the climb the model should stop and execute a stall turn (in either direction) to a vertical down line. The model should pivot (yaw) about the centre of gravity, but a pivot radius of up to ½ a wing span is allowed. It then flies vertically down and pulls through another ¼ loop to finish in level flight at the same altitude but opposite heading to entry.

Slow roll



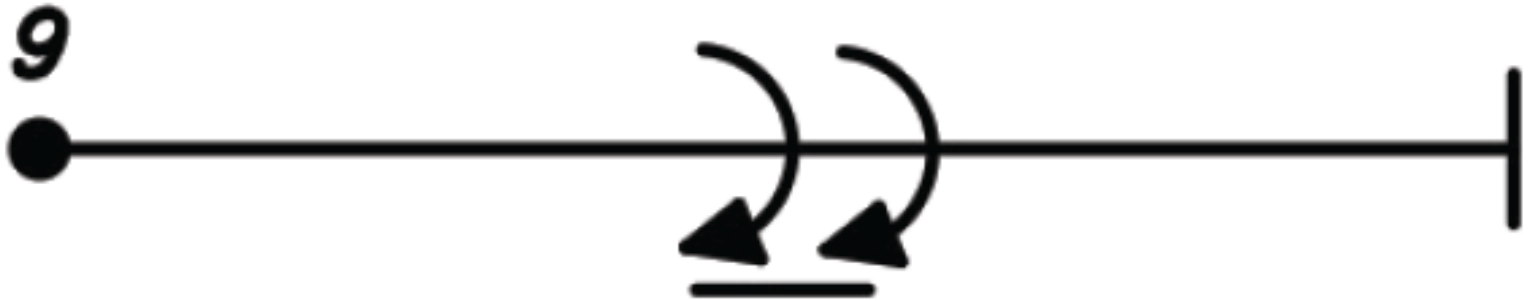
Slow Roll (K=3): The model starts in straight and level flight, then before centre starts rolling slowly through one complete rotation, equally spaced about the centre marker. The model recovers on the same altitude and heading as the entry. The model should be inverted as it passes the centre marker. The approximate time of the roll is to be three seconds.

Two inside loops



Two Inside Loops (K=2): The model flies straight and level then pulls up on centre and completes two inside loops recovering at the same altitude and heading as the entry.

Two rolls

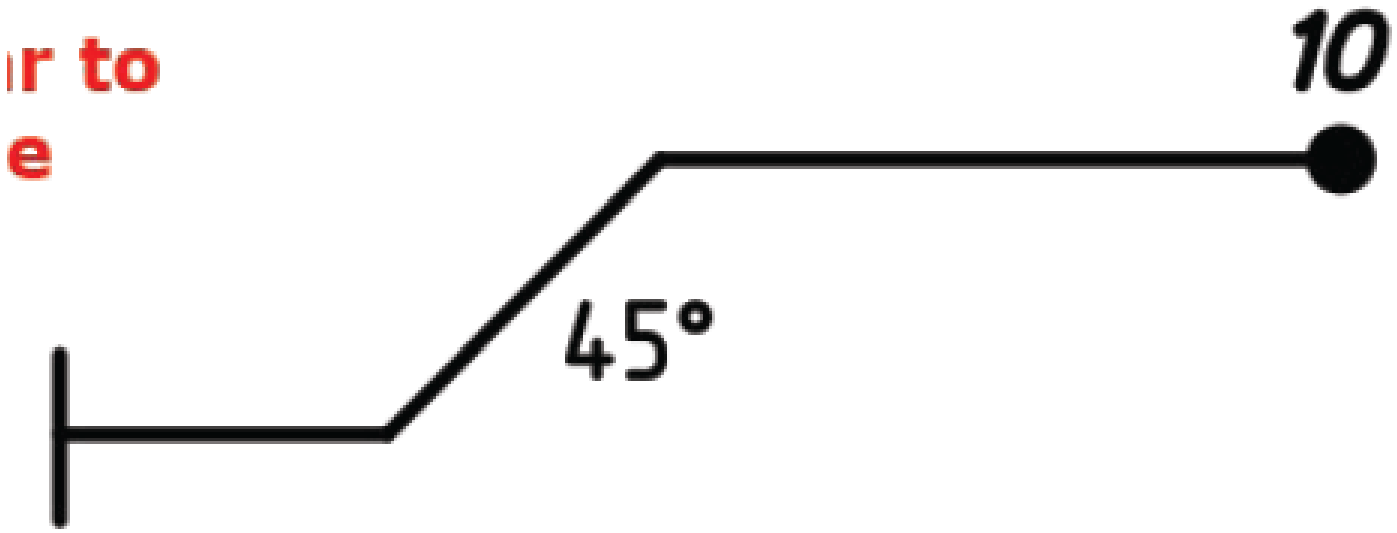


Make sure you are “2” mistakes high when you attempt his one !!

Two Rolls (K=3): The model starts in straight and level flight then rolls at a uniform rate through two complete rotations, finishing in level flight on the same heading and altitude as the entry. The model should pass through centre upright (immediately at the end of the first roll). The rolls must be continuous with no pause between. The approximate time of the rolls to be three seconds.

Hint: The next manoeuvre is a 45 degree downline so you are going to require some height. If you are an experienced pilot, performing a ‘Immelmann Turn’ (a half loop followed by a half roll) would be a great way to position for the 45 degree downline. Otherwise, a climbing turn or any other suitable manoeuvre may be flown.

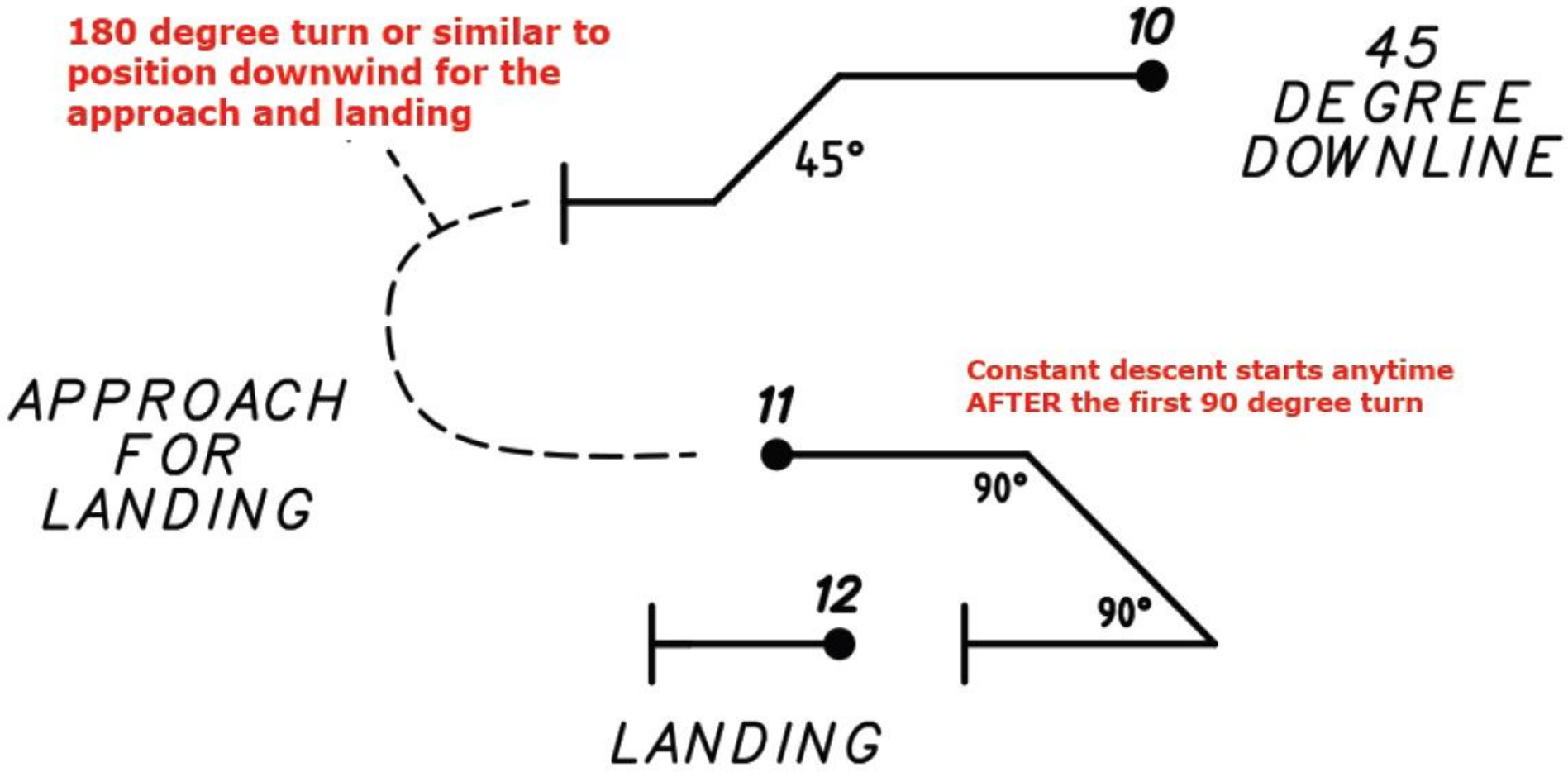
45 degree downline

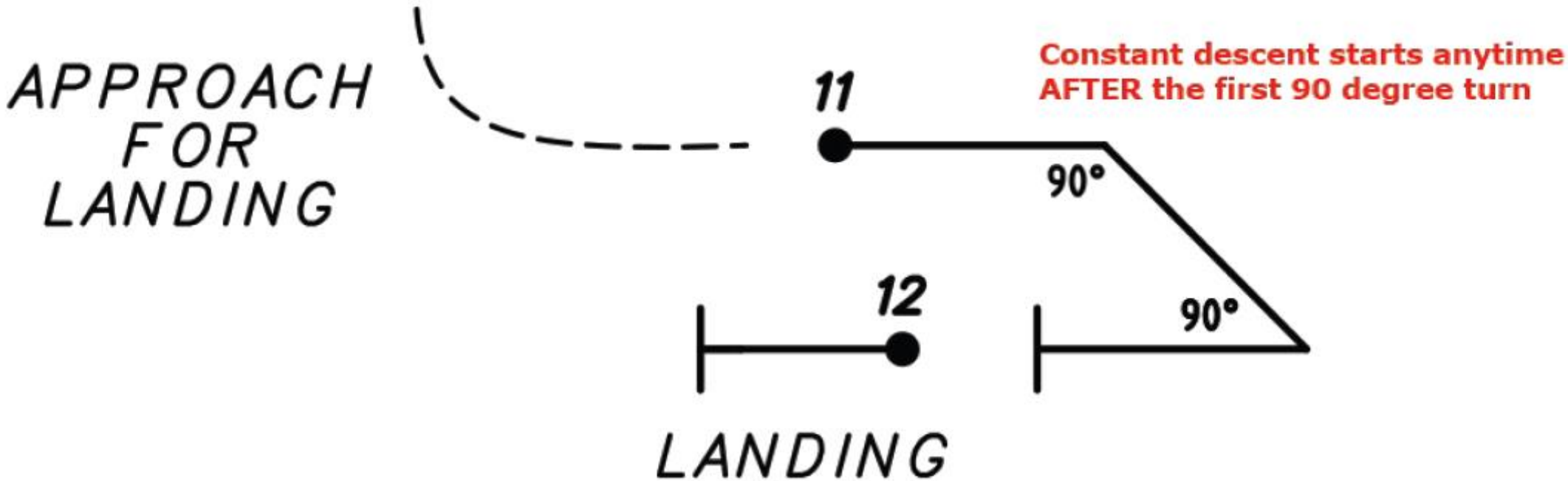


- **45 Degree Downline (K=3):** The model starts in straight and level flight at the top of the aerobatic ‘box’ and before centre pushed through a ⅛ outside loop to a 45 degree down line. The model then flies a 45 degree downline and then performs a ⅛ inside loop to recover at a lower altitude but the same heading as entry.

Hint: Following the 45 degree downline (done into wind) you want to position the model heading downwind to start the approach followed by landing. A ‘procedure turn’ or a simple 180 degree turn are good ways to correctly position downwind for the approach and landing. Either way, give yourself plenty of room to correctly position the model downwind before the start of the approach. Remember you need to position the plane far enough out from yourself to do the upcoming two 90 degree turns, and a straight base leg of at least ‘visible length’ and end up lined up on the runway on finals.

Approach and landing

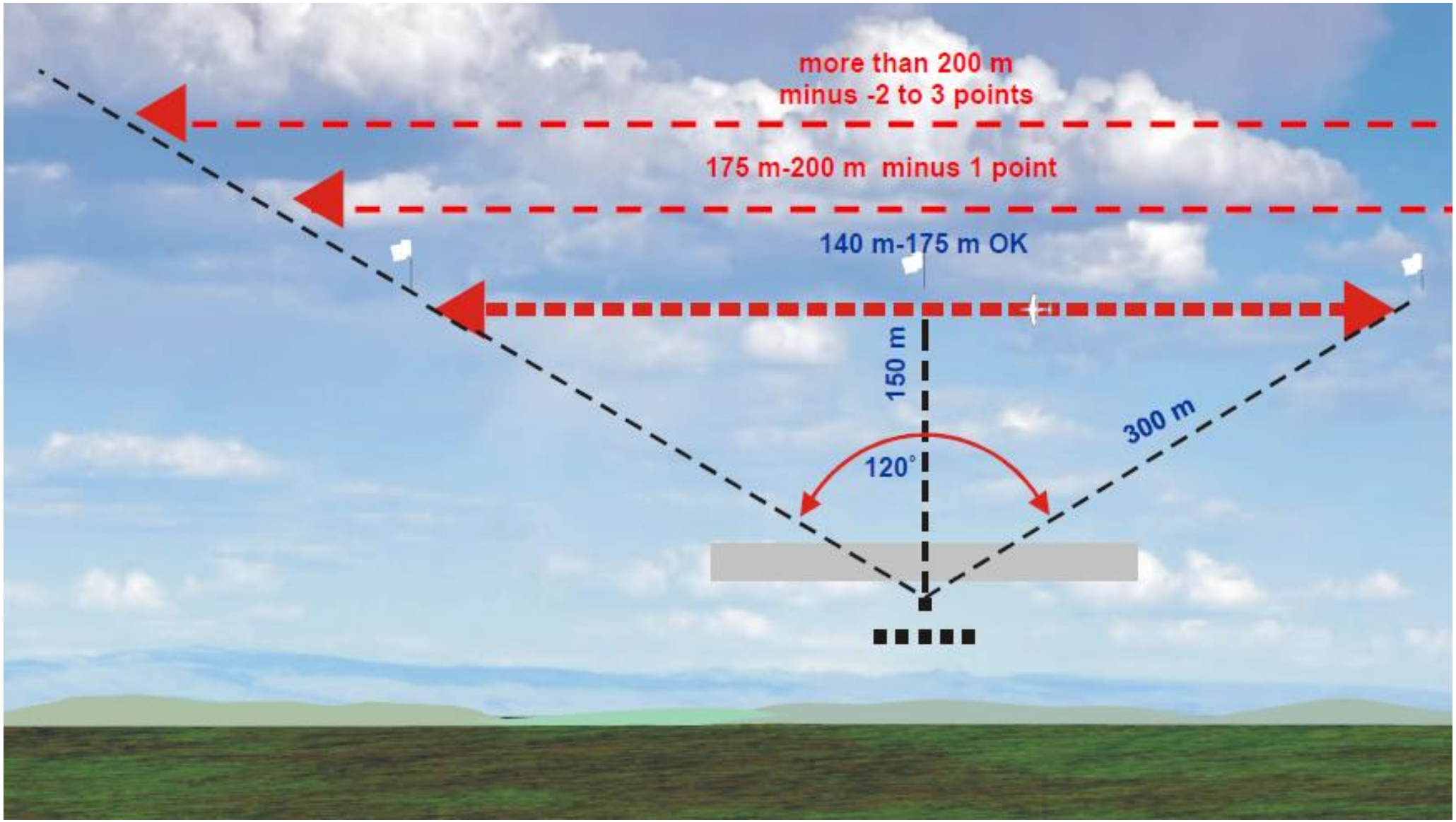


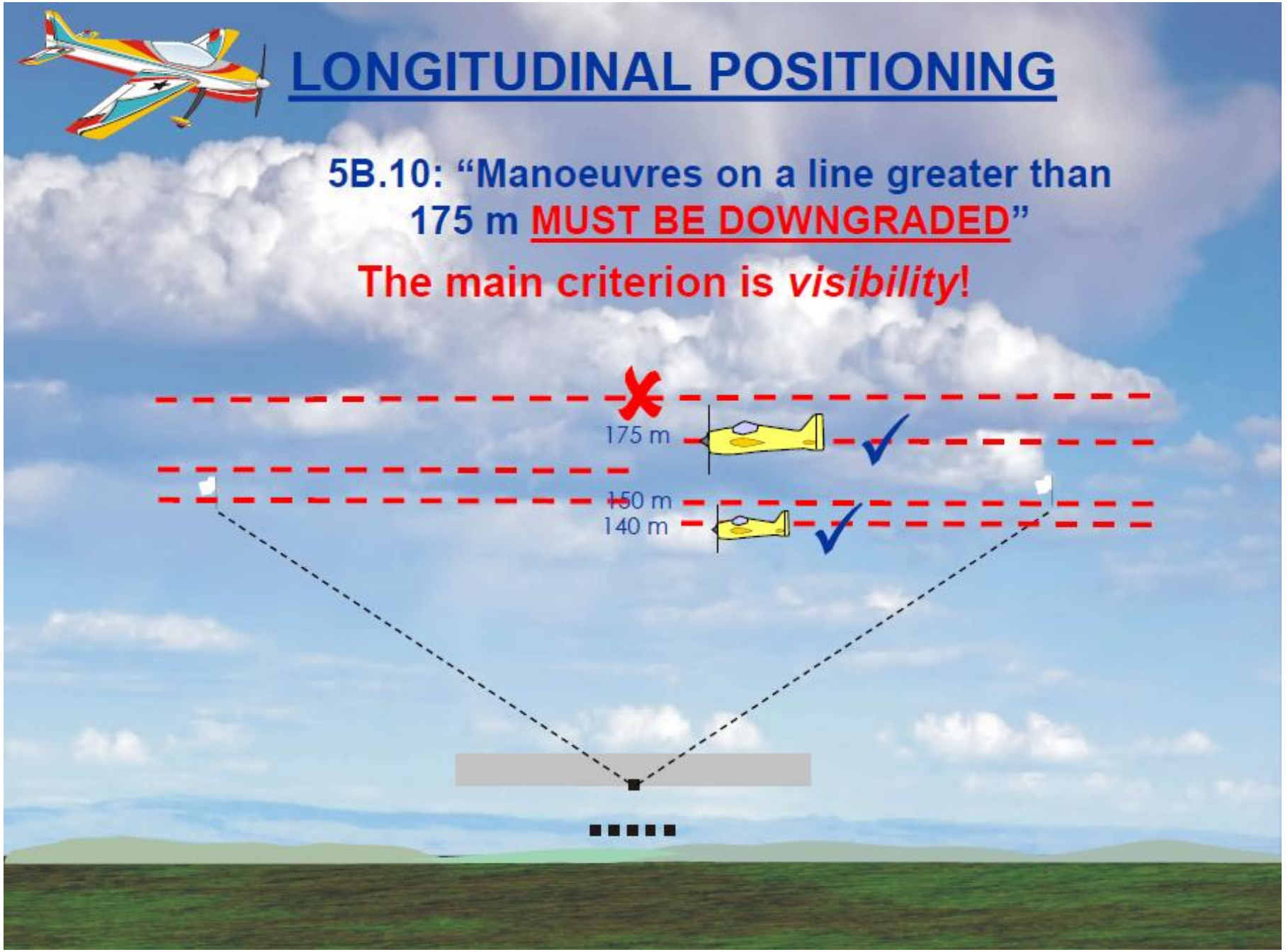

APPROACH
FOR
LANDING
11
Constant descent starts anytime
AFTER the first 90 degree turn
90°
12
90°
LANDING

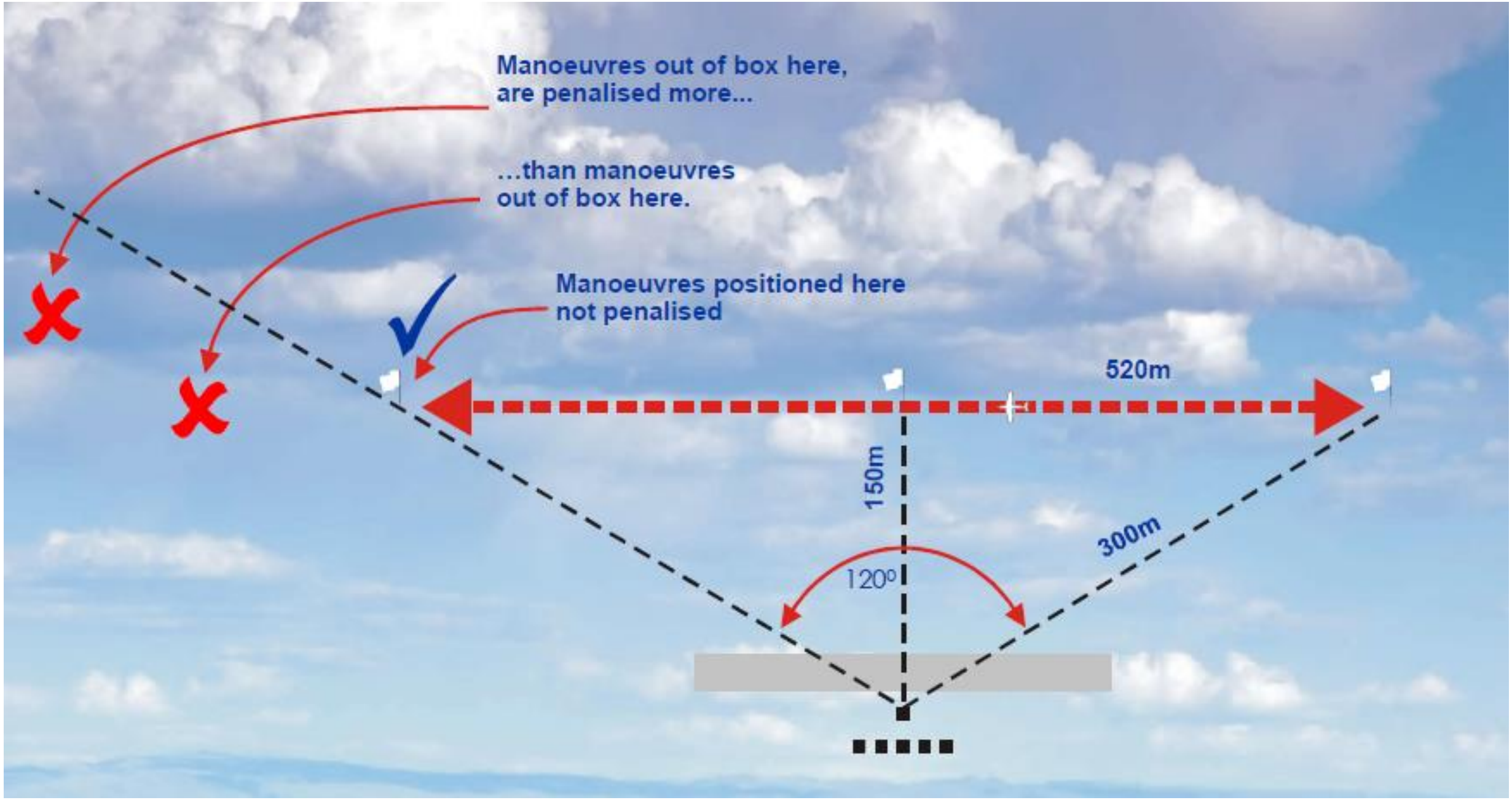
Approach and 12. Landing (each K=1): Commence should be called prior to centre while the model is being flown downwind at a comfortable distance out from the runway. Once a sufficient distance down wind, the model should be turned through 90 degrees to a base leg. Once on base leg a constant descent can be started at any time (and should then be maintained until the landing round out and flare). The second 90 degree turn should be started at a point that will position the model down the centre line of the runway. Once the model reaches a height of approximately two meters on the approach, the judges will start judging the landing. The model should smoothly flare to touch the ground in the landing zone (as defined by the contest director) without bounce or changes in heading. The model should roll to a complete stop before complete is called to end the landing manoeuvre. Note that the pilot does not make any announcement between the end of the approach and the start of the landing. The transition occurs at a height of approximately two meters.

Tonight's Questions

1. Box violations that occur near the 150-meter line should be seen _____ _____ than those on a line further out.


more than 200 m
minus -2 to 3 points
175 m-200 m minus 1 point
140 m-175 m OK
150 m
300 m
120°


LONGITUDINAL POSITIONING
5B.10: “Manoeuvres on a line greater than 175 m MUST BE DOWNGRADED”
The main criterion is visibility!
175 m
150 m
140 m


Manoeuvres out of box here,
are penalised more...
...than manoeuvres
out of box here.
Manoeuvres positioned here
not penalised
520m
150m
300m
120º

Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.12 - However, violations of a 60 degree line that occur near the 150 metre line (ie approximately over a 60 degree flag) should be seen less severely than violations along a line further out and more distant from the judges.

2. Directly before a model enters a spin, you observe a small drift (but remains in the manoeuvring area). What downgrade would you apply?

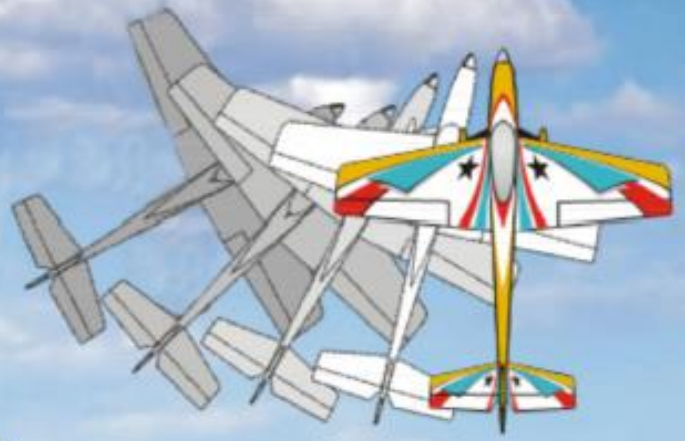
0 points ☐	**Downgrade by the one point/15 degree rule ☐**
1-3 points ☐	Zero the manoeuvre ☐
Severe downgrade (more than 5 points) ☐	

SPIN: DRIFT - YAWING

No penalty for wind compensation.
No penalty for drifting with wind close to stalled condition

Severe yawing (rotation with wing level) before stall has to be downgraded by 1 point per 15 degrees with ½ point steps.

No penalty for drifting with wind close to stalled condition



Direction of wind

Direction of wind

Direction of flight

Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.8.12 - The entry is flown in a horizontal flight path with the nose-up attitude increasing as the speed decreases. Drift of the model aircraft from the flight path at this point should not be downgraded, since it is in a near-stalled condition.

3. Directly before a model enters a spin, you observe a yaw/weathercock by 45 degrees. What downgrade would you apply?

0 points ☐	**3 points ☐**
1 point ☐	Severe downgrade (more than 5 points) ☐
2 points ☐	Zero the manoeuvre ☐

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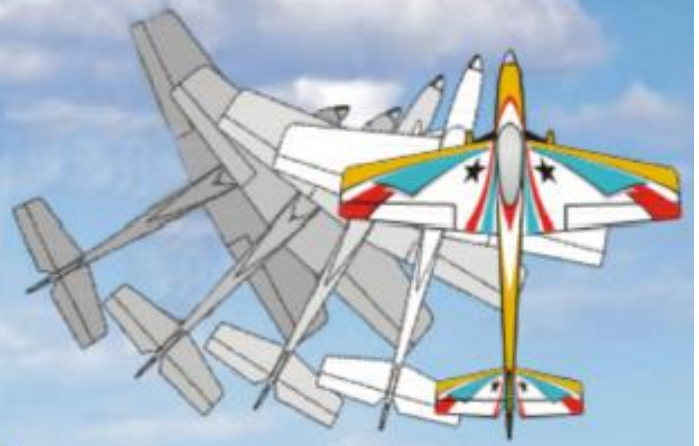


Direction of wind

Direction of wind

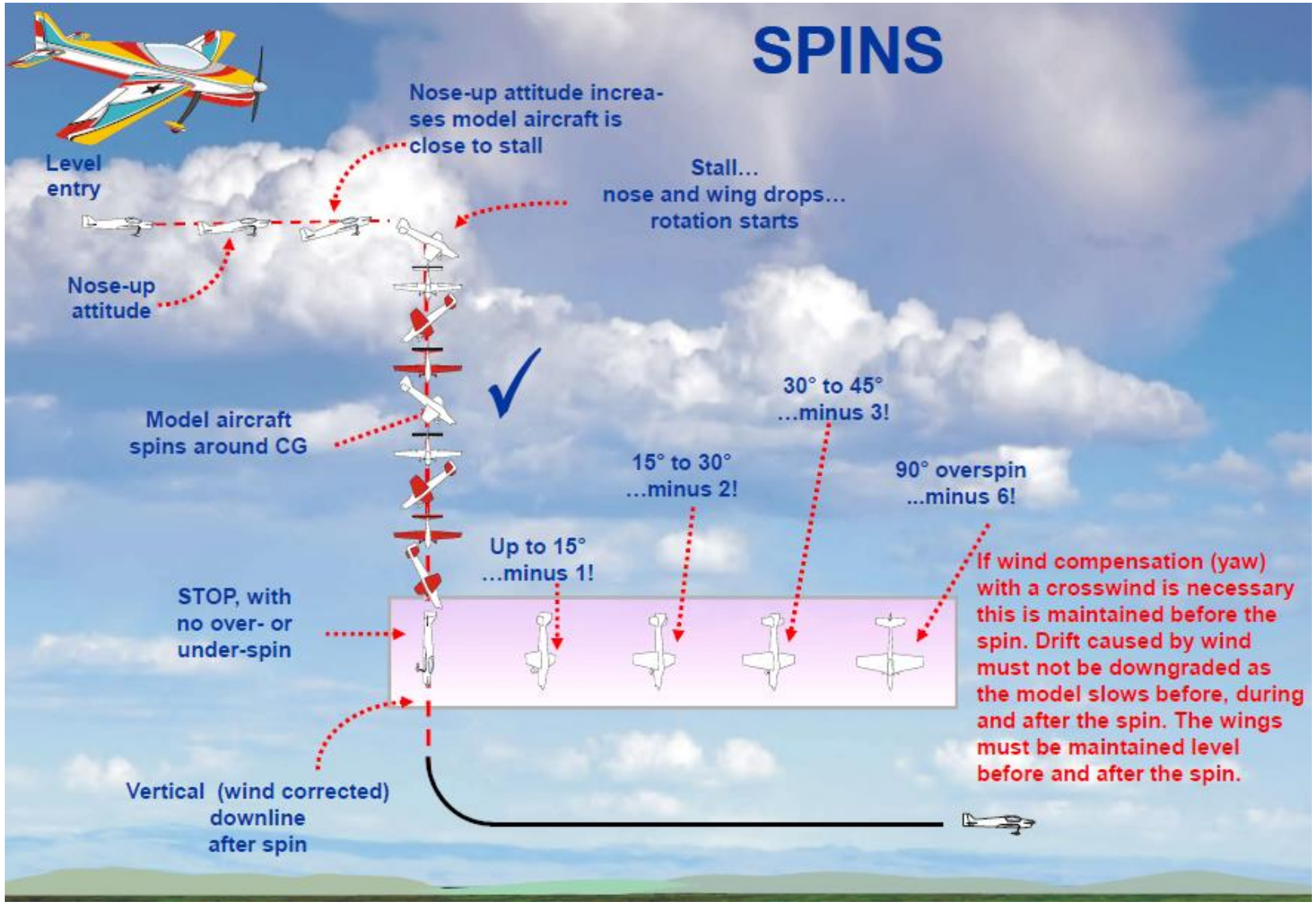
Direction of flight

Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.8.12 - Severe yawing or weathercocking during the near-stalled condition, should be downgraded by 1 point per 15 degrees.
45 degrees = 3 points

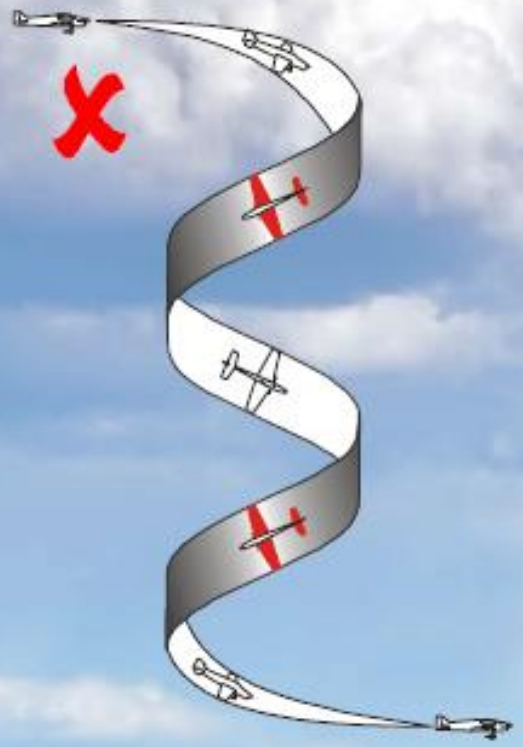
4. Directly before a model enters a spin, you observe the model climbing. What downgrade would you apply?

0 points (ignore the infringement) ☐	**Downgrade one point per length of fuselage of the climb ☐**
1 point ☐	Severe downgrade (more than 5 points) ☐
2 points ☐	Downgrade by the one point/15 degree rule (based on the entry line) ☐
3 points ☐	Zero the manoeuvre ☐


SPINS
Level entry
Nose-up attitude increa-ses model aircraft is close to stall
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
If wind compensation (yaw) with a crosswind is necessary this is maintained before the spin. Drift caused by wind must not be downgraded as the model slows before, during and after the spin. The wings must be maintained level before and after the spin.
Vertical (wind corrected) 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!

Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.8.12 - A climbing flight path just prior to the spin must be downgraded, using the 1 point pe
15 degree rule.

5. During a one roll rolling loop, which of the following must occur? (Note: Check all correct answers)

- The loop must be round ☐
- The roll must be smoothly and continuously integrated into the loop ☐
- The wings are in the plane of the loop at 3 and 9 o'clock positions ☐

Rolls
(Continous Rolls and Part-Rolls)

Continous 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

Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.8.10 - Flight paths of continuous rolls or part-rolls that are integrated with loops or horizonta circles should be smooth, continuous, and of constant radius.

6. The size of a manoeuvre is defined by its matching size relative to the size of the manoeuvring zone and relative to the size of the other manoeuvres performed throughout a schedule. For not matching size how many points should be deducted?

0 points ☐	**1-3 points ☐**
0.5 point ☐	Zero the manoeuvre ☐
Up to 1 point ☐	

Size of the Manoeuvre

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.

Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.11 - For not matching size up to 1 point downgrade.

7. During a Spin entry, you observe the model nose drop, then the model starting to rotate in one direction, but is then forced in the opposite direction. What downgrade would you apply?

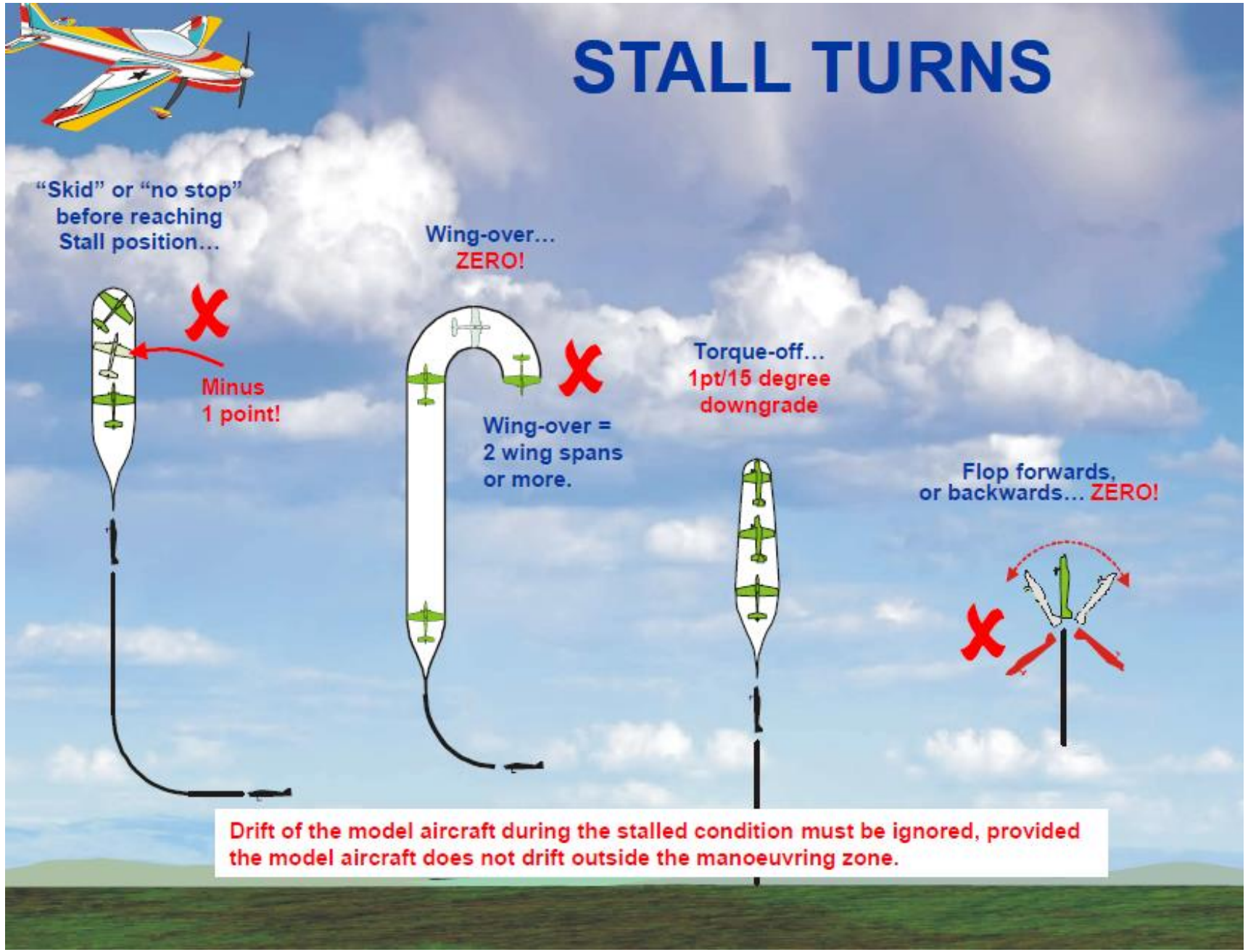
0 points ☐	Severe downgrade (more than 5 points) ☐
1 point ☐	Downgrade by the one point/15 degree rule (based on the initial rotation) ☐
2 points ☐	Zero the manoeuvre ☐
3 points ☐	

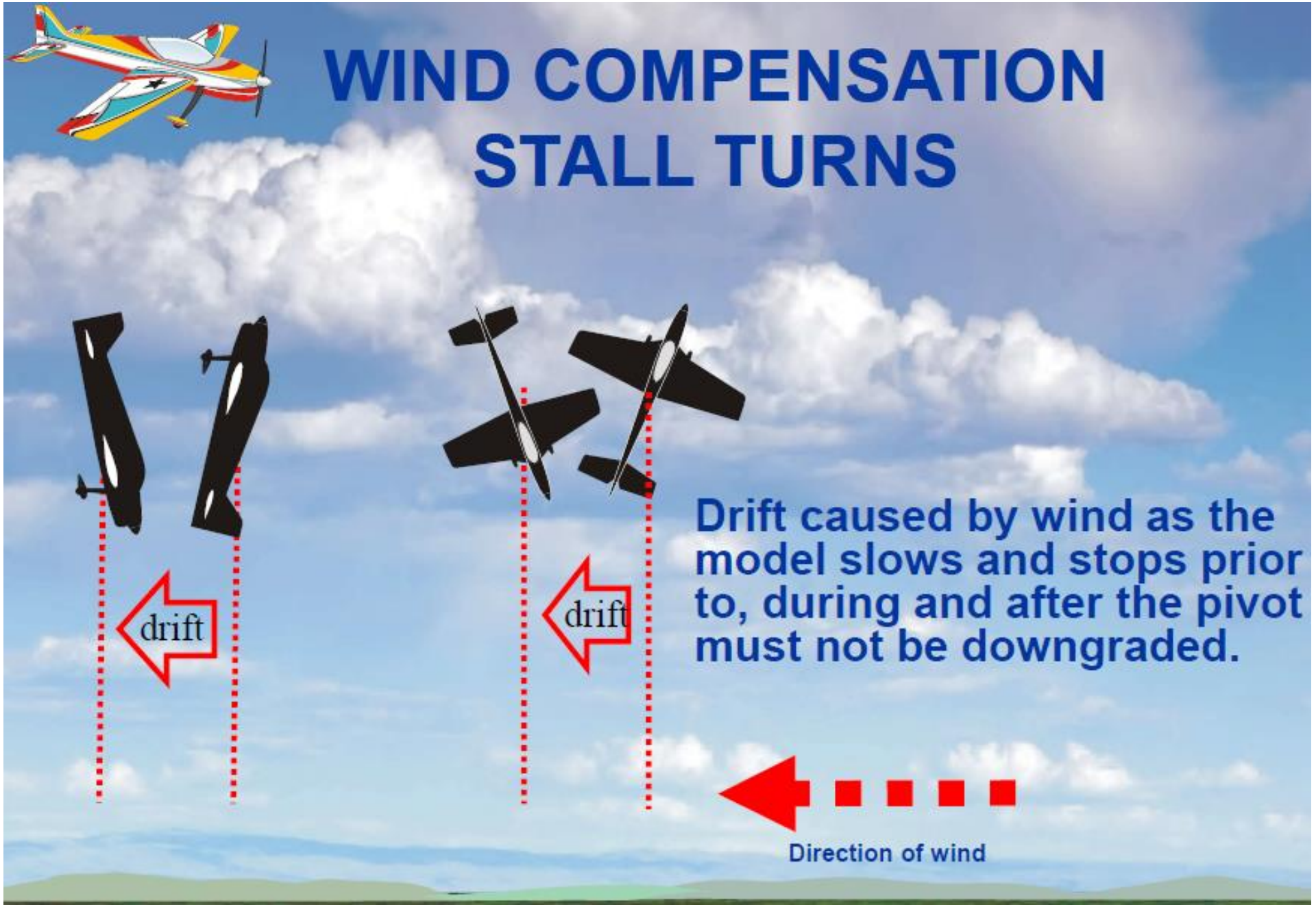
Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.8.12 - Forcing the model aircraft to spin in the opposite direction as the initial rotation must be severely downgraded.

8. During a Stall Turn, the model 'torques-off'. Eg: The model twists during the stall, resulting in the wings being in a different plane after the stall. What downgrade do you apply?

0 points ☐	4-5 points ☐
1 point ☐	Severe downgrade (more than 5 points) ☐
2-3 points ☐	Downgrade by the one point/15 degree rule ☐
Zero the manoeuvre ☐	


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.


WIND COMPENSATION
STALL TURNS
drift
drift
Drift caused by wind as the model slows and stops prior to, during and after the pivot must not be downgraded.
Direction of wind

Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.8.11. - If the model aircraft should 'torque-off' during the stall turn, a downgrade must be applied using the 1 point per 15 degree rule.

9. During a Stall Turn, the model falls forward. The rest of the manoeuvre was perfect. What score would you give?

9-10 points ☐	Less than 5 points ☐
7-8 point ☐	Zero the manoeuvre ☐
5-6 points ☐	

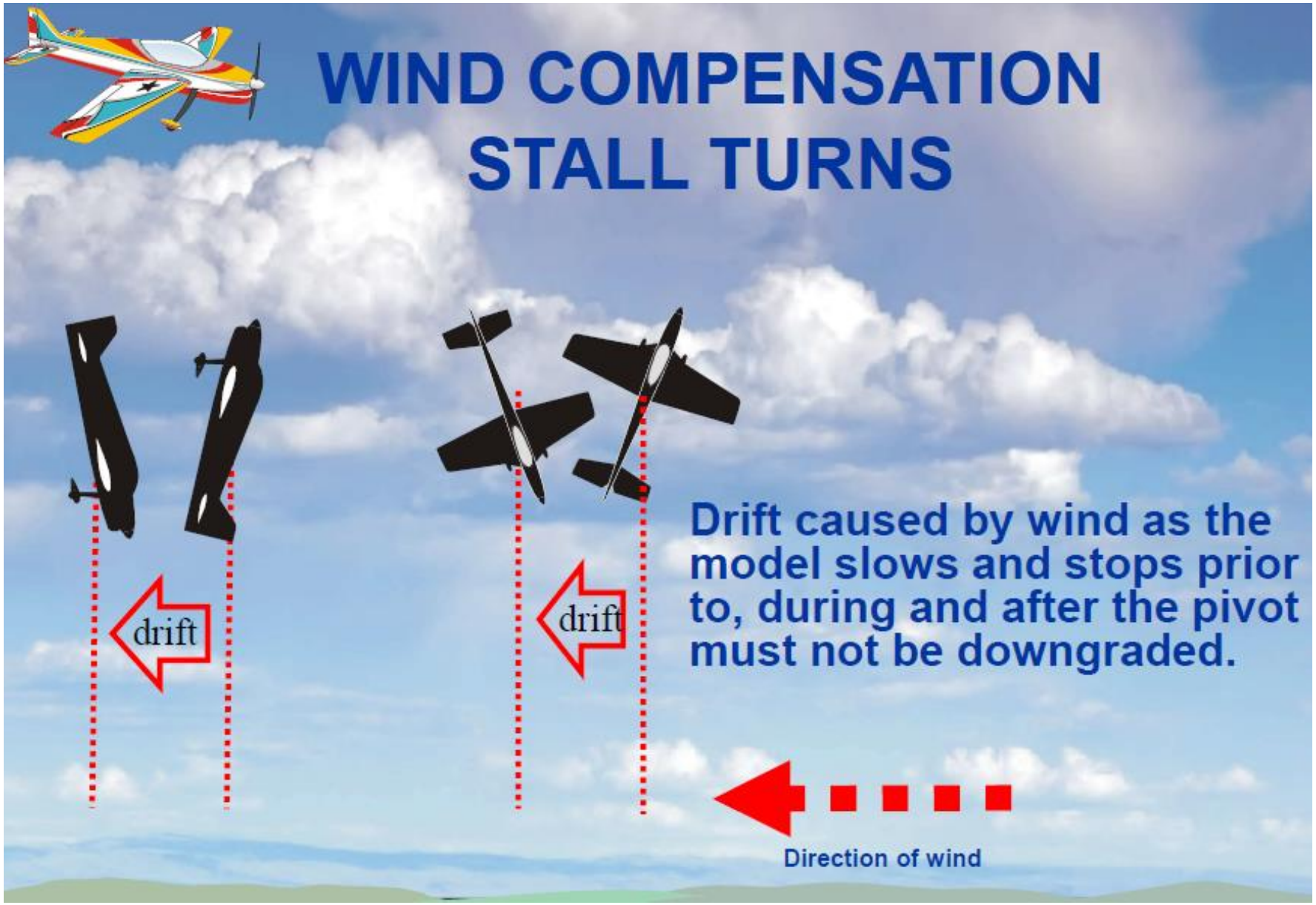

Flop forwards,
or backwards... ZERO!

Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.8.11 - If the model aircraft flops forward or backward in a stall turn, a zero score must be given.

10. During the stall while performing a Stall Turn, you observe a small drift, but the model remains in the manoeuvring zone (the 'box'). What downgrade would you apply?

0 points ☐	Severe downgrade (more than 5 points) ☐
1-3 point ☐	Zero the manoeuvre ☐
Downgrade by the one point/15 degree rule ☐	

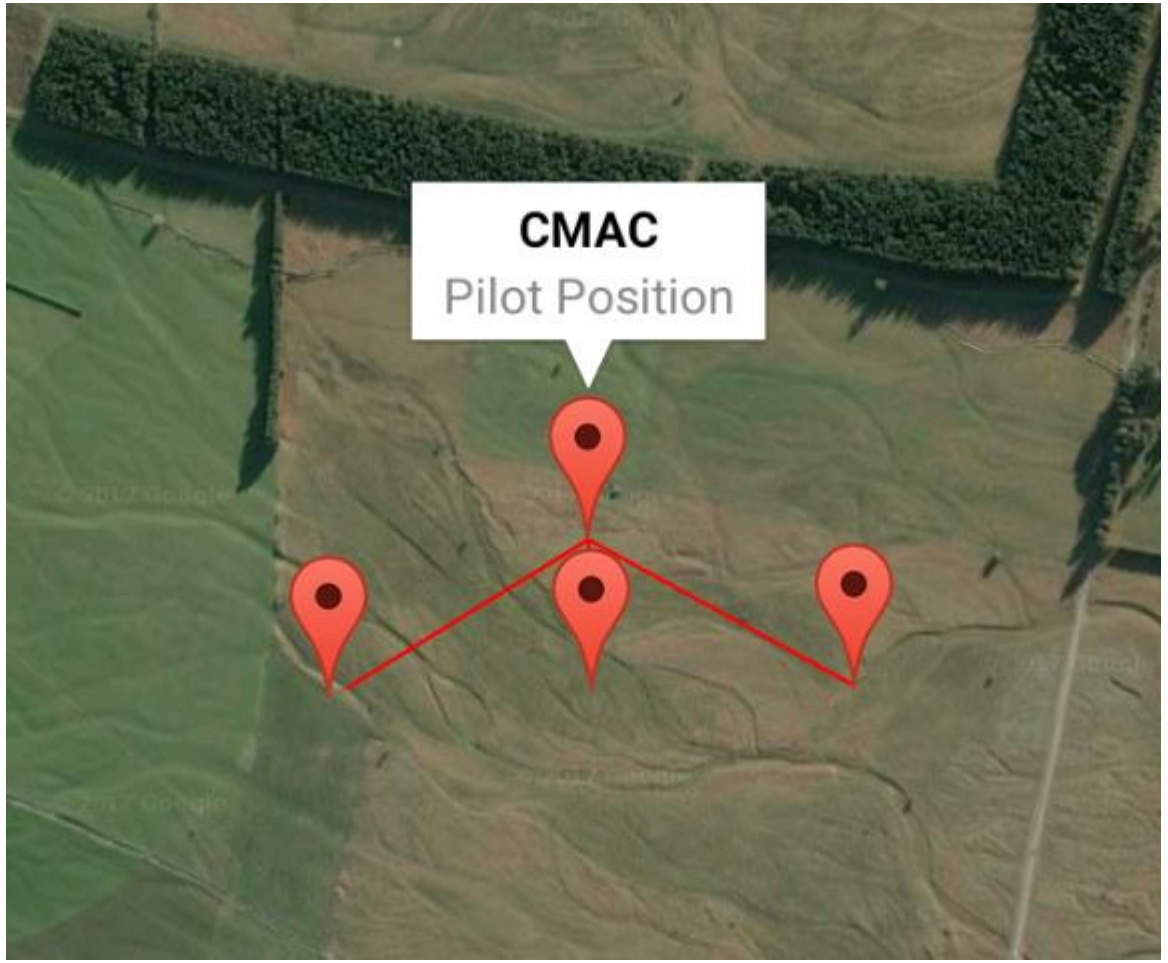

WIND COMPENSATION
STALL TURNS
drift
drift
Drift caused by wind as the model slows and stops prior to, during and after the pivot must not be downgraded.
Direction of wind

Think you know the answers? Why not give the judging exam a go here:
https://www.f3a.com.au/judging/nz-judging-exam

5B.8.11. - Drift of the model aircraft during the stalled condition must be ignored, provided the model aircraft does not drift outside the manoeuvring zone.

What Tools are out there to Help with Judging (and Flight Training)?

F3A Zone Pro (iOS and Android)



F3A ZONE PRO

ANDROID APP ON Google play

Download on the App Store

F3A Zone Pro on Android also lets you easily walk out to the flight line (in a safe position) and see who is flying at 150-165m (and who is not!) – this is great for gaining an appreciation of where we should be flying.

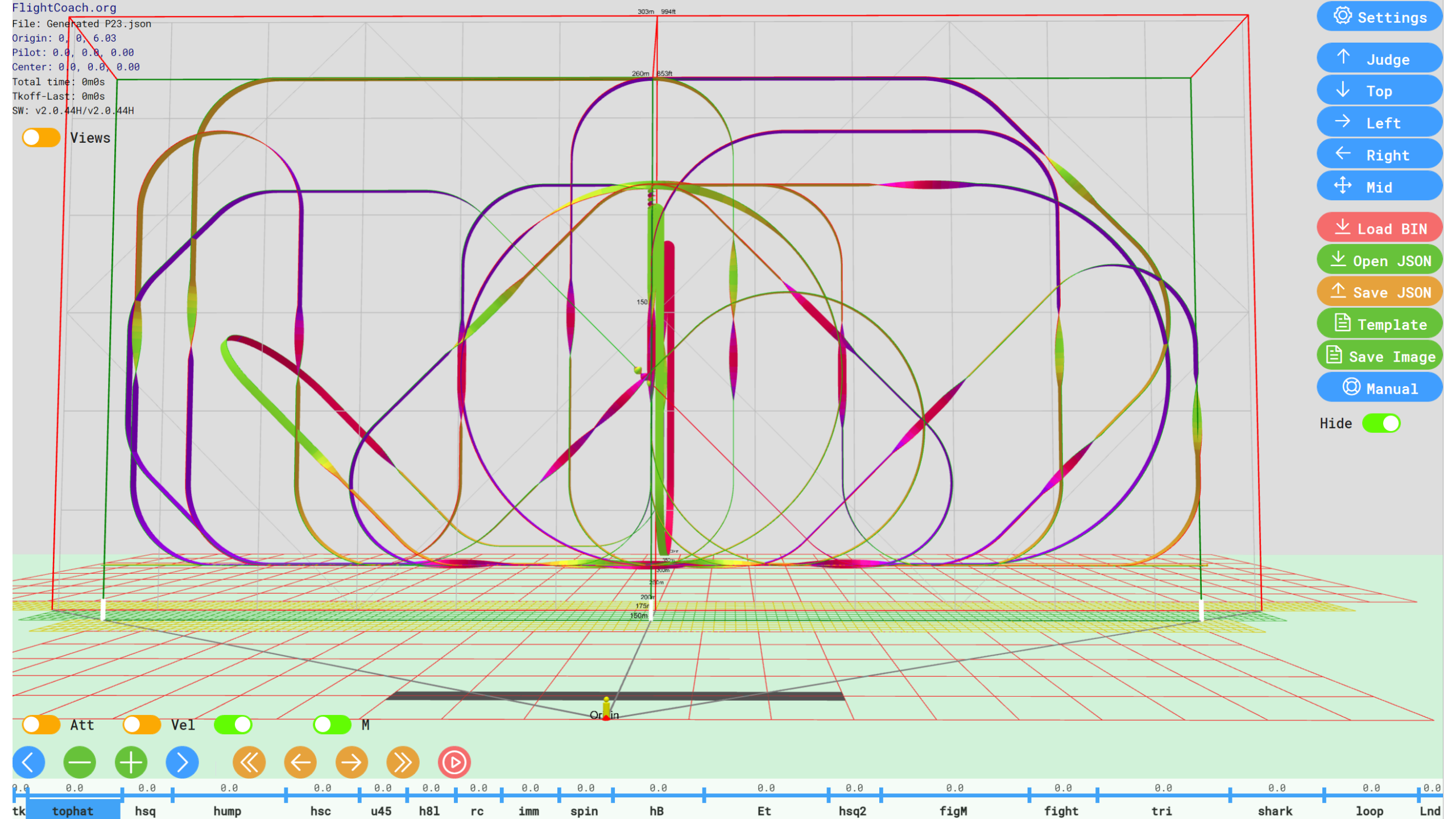
Flight Coach

Your Radio Control Flight Geometry Companion

Home

The Flight Coach Project develops data driven tools for precision aerobatic pilots and judges with the aim of making the sport more objective. The project was started by a group of keen F3A and IMAC competitors, but the work is also applicable to other RC and full size aerobatic disciplines.

Most of our work involves installing inexpensive GPS and attitude tracking hardware in the aircraft, then post processing the data on the ground to provide feedback. All the Flight Coach project outputs are free to use (see specific license details in Instructions/Software).


FlightCoach.org
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Pilot: 0.0, 0.0, 0.00
Center: 0.0, 0.0, 0.00
Total time: 0m0s
Tkoff-Last: 0m0s
SW: v2.0.44H/v2.0.44H
Views
303m 994ft
260m 853ft
150
Settings
Judge
Top
Left
Right
Mid
Load BIN
Open JSON
Save JSON
Template
Save Image
Manual
Hide
Att
Vel
M
tk
tophat
hsq
hump
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imm
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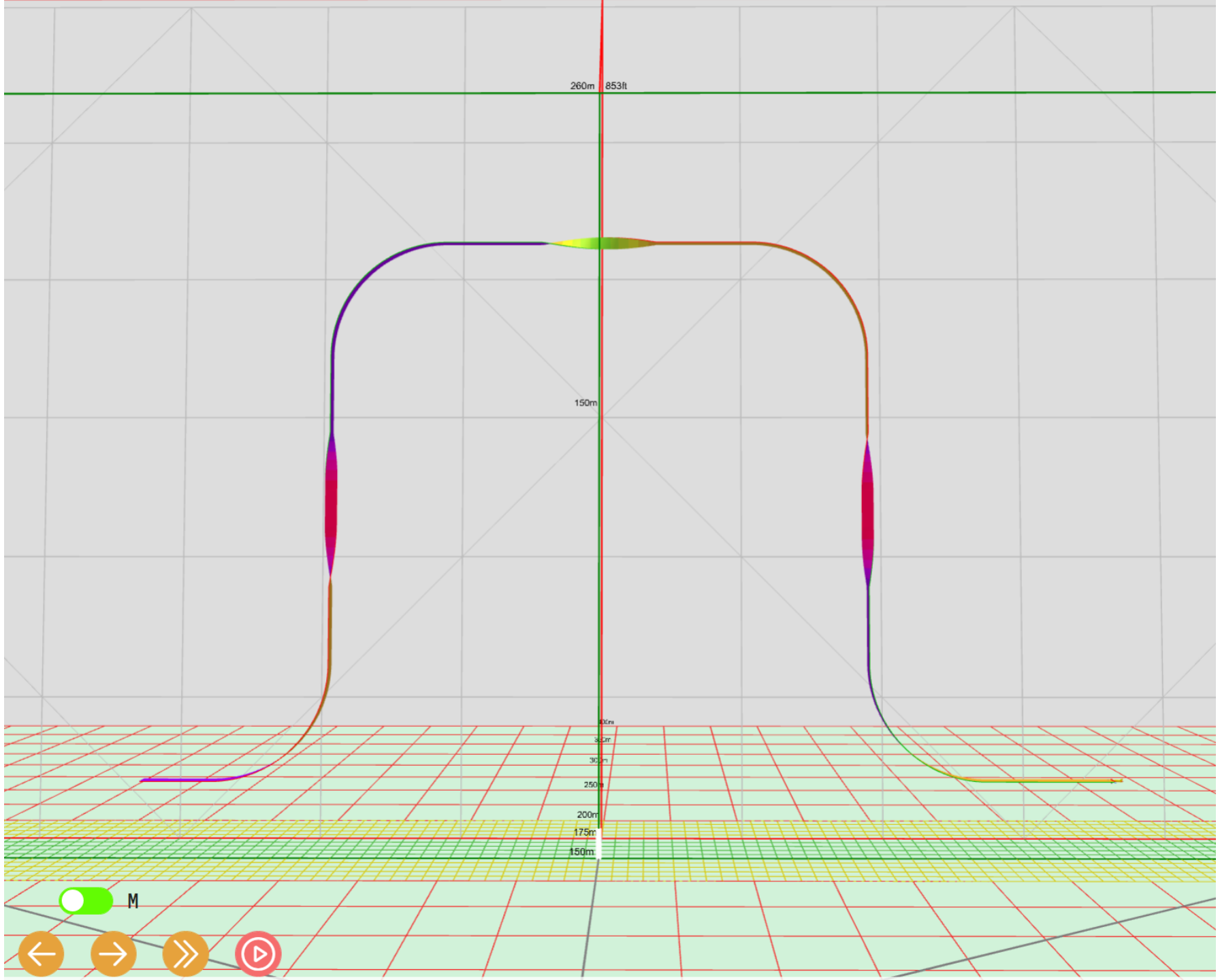
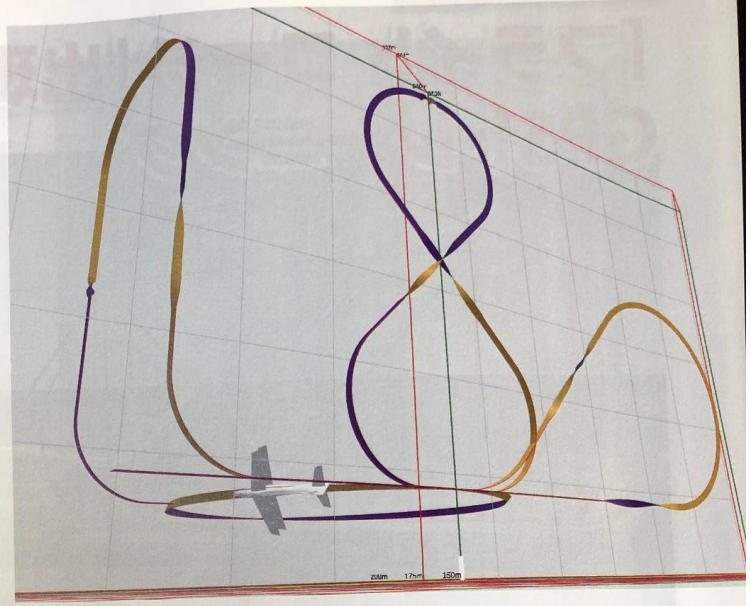
tri
shark
loop
Lnd


260m 853ft
150m
250m
200m
175m
150m
M



「フライト コーチ」開発者からのメッセージ

オーストラリアを代表するF3Aフライヤーや技術者が中心となって開発した、飛行軌跡の3D可視化技術と、それを司るアプリケーションの名称が「フライト コーチ」です。今回、その開発チームより本誌にメッセージが届きました。彼らのサイトへのアクセスは自由とのことなので、ぜひチャレンジしてみてください。

https://www.flightcoach.org

https://www.flightcoach.org/template-flights/

●日本のフライヤーに向けて●

F3Aの飛行は難しく、正確かつ優雅に飛行することはさらに困難です。吉岡さん、成家さん、秋葉さん、鈴木さん、八田さん、音田さん(そして、もちろんもっと多くの!)のような日本の偉大なF3Aパイロットに秘訣をたずねたら、きっと「コーチや指導者からの評価やアドバイスに従って、何千回もフライトしましょう」という共通する返事が聞かれそうです。しかし、指導者なしで自分の飛行を正確に評価できますか? または、あなたとあなたの指導者が飛行について意見が一致しない場合はどうなりますか? 私たちが開発したシステムは、低コストで簡単に入手できるハードウェアを使用し、パイロットが飛行場での練習中、または帰宅後快適な自宅で飛行の出来映えを客観的に評価するためのツールを提供します。

Flight Coachは、英国のIMACおよびF3Aのトップパイロットであるthomas Davidのアイデアから始まりました。GPS、安価なマルチローター飛行制御ボード、そして独自のコンピューター分析ツールを融合すれば、指導の支援に有用な飛行分析ができないか? 答えは確かにイエスでした! もちろん、そのようなプロジェクトの実現は複雑で容易ではありません。オーストラリアのF3Aパイロットであるartur Uzieblo は、幅広い知識とプログラミングスキルを持って参加しました。 Andrew Palmer(ニュージーランドF3Aパイロット)はアイデアを整理し、ハードウェア・システムを開発しました。Russell Edwards(オーストラリアのF3Aパイロット)はシステムテストに寄与し、プロッターのマニュアルを作成しました。

中心となるのは、GPSベースの測位を拡張した慣性航法システムです。高度なセンサーフュージョン・アルゴリズムにより毎秒15〜25ポイントのスムーズで正確な飛行経路と姿勢のログを提供します。これは一般的なGPSのみのシステムでの姿勢情報なしで1秒あたり1〜2点だけのものとは比べ物になりません。データはmicroSDカードに記録されます。そして、無料で使用できるWebブラウザベースのFlight Coachソフトウェアが、飛行後の分析を提供します。フライト コーチ・システムはF3Aの難しさを取り除くことはできませんが、機体の飛行経路に関する客観的なデータを提供し、飛行後の分析を可能にすることで、貴重なトレーニングの支援を提供します。

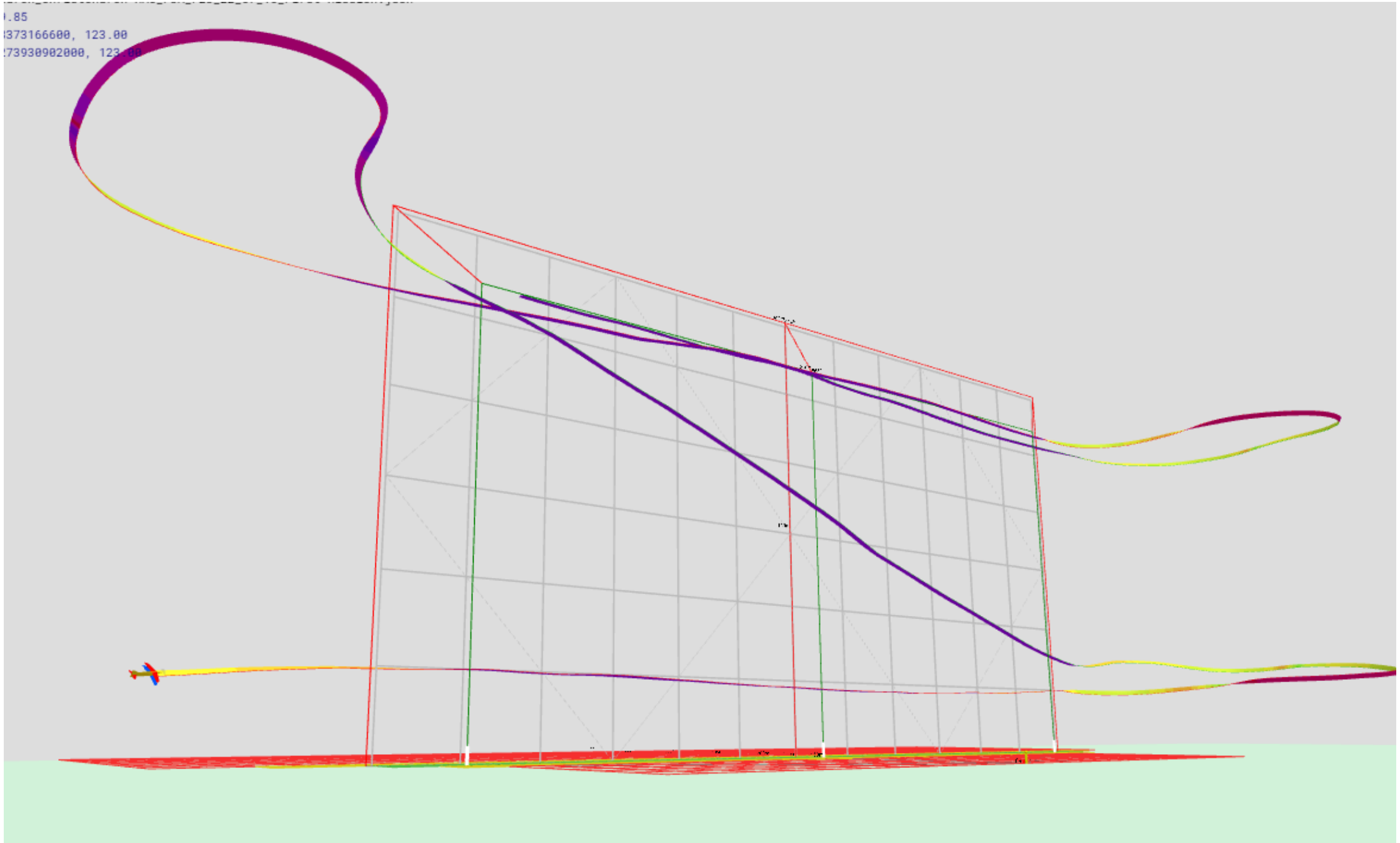
実はハードウェアは、ログに膨大な数のパラメーターを記録しています。現在、Flight Coachはそのうちのいくつかのみを使用しています。これは将来のバージョンで拡張され、パイロットがより多くの情報を利用できるようになる可能性もあります。機体位置での風向、迎え角と横滑り、対気と対地速度、G力などの推定を含める可能性があります。

日本の皆さんがフライト コーチ・システムを体験できることを願っています。練習に時間と労力を費やせば、それだけ飛行の改善に役立つと確信しています。

Andrew Palmer (訳/佐々木 哲)

Ardupilot Autonomous Aerobatics Project

https://www.youtube.com/watch?v=MmUDC3A7Ntk


.85
373166600, 123.00
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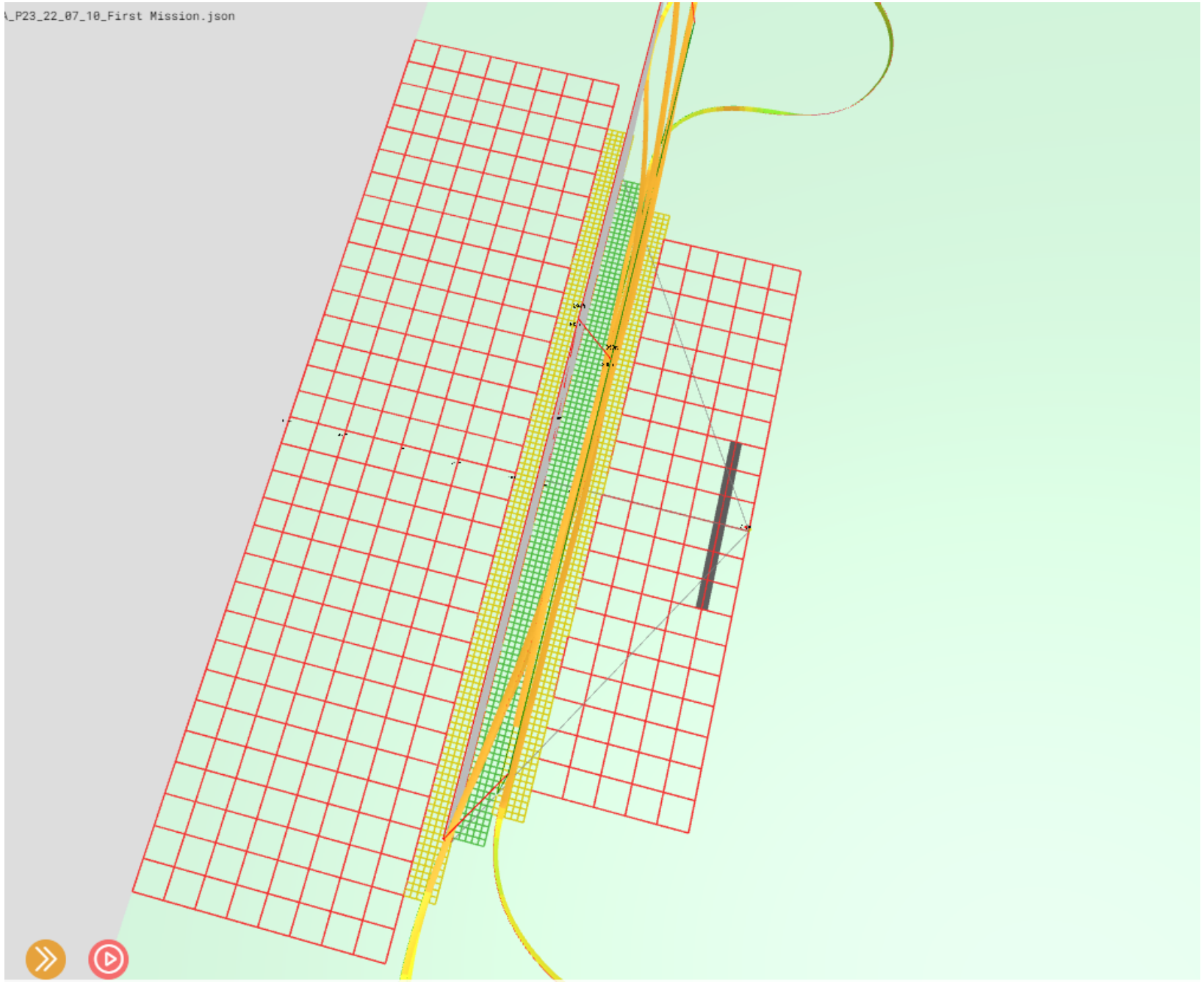
_P23_22_07_10_First Mission.json


ROLL
TRAINER
By Knife Edge Software
START


Roll
1/4
Score
No Attempts
START OVER
SHOW DETAILS
How much error do you see?
0
5
10
15
20
25
30
35
40
45

Next time

- I still have 3 x sets of 10 questions to go!
- Walk through each of the pattern sequences (Expert, Masters, F3A) – from a flying and judging perspective
- Electronic score entry systems

Any Questions?