

Precision Aerobatics Judging Questions – with Answers Explained Set A

Andrew Palmer, New Zealand

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

Tonight's ten questions

Tools to help with judging (and flight training!)

Any questions

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

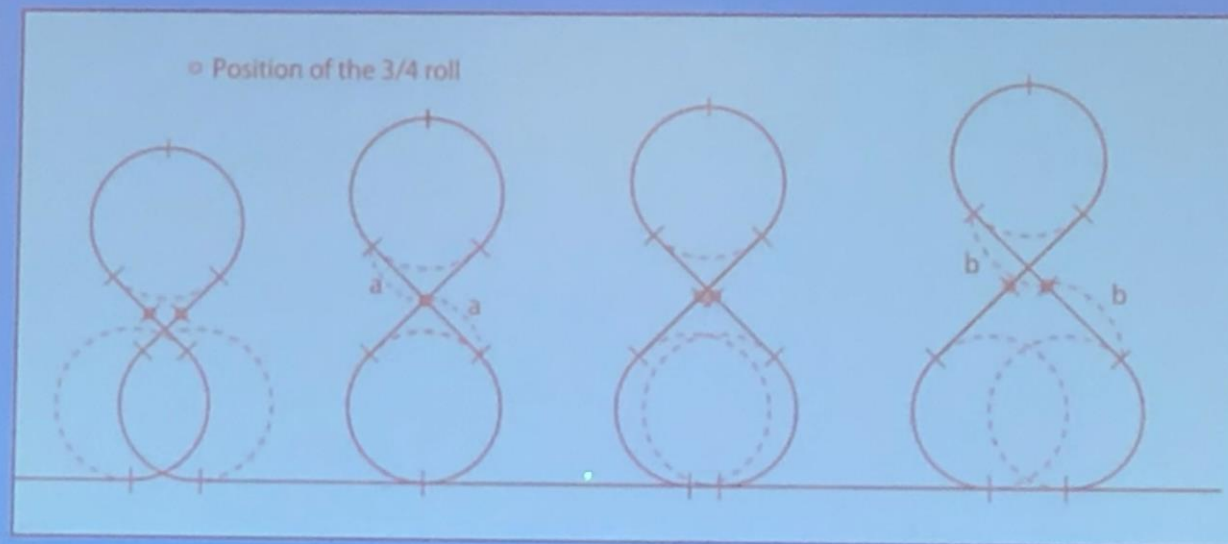




My Interest In Judging



演技解説通りに飛行すると、 45° 上昇、降下経路の長さにより、
下図のような図形が可能となる





FAI SPORTING CODE

Section - 4 Aeromodelling

Fédération Aéronautique Internationale
(国際航空連盟)

1978
WORLD CHAMPION
G. Haruki

2020 年版
FAI スポーティングコード

発効 2020 年 1 月 1 日

VOLUME F3A

R/C AEROBATICS

F3A/P R/C 曲技 動力付き模型飛行機
付則 5A-F3A 演技解説
付則 5B-F3A 飛行演技ガイド
付則 5G-F3A アンノウン演技スケジュール
付則 5M-F3P 飛行演技ガイド
付録 JMA F3P ナービス、アドバンスド 演技解説

日本模型航空連盟・規定委員会 監修
訳: FAI・CIAM 委員 廣瀬 春信

2020/01/01

第 20054 号

審査員講習終了証明書

アントリュー・パルマー 殿

貴殿が審査員講習会において、所定の学科及び実技の
全講習過程を修了したことを証します。

種別 F3A

2020 年 2 月 16 日

日本模型航空連盟

会長 安田 邦男



Where to find Judging Information?



FAI AEROMODELLING COMMISSION (CIAM)

[HOME](#) [ABOUT US](#) [OUR SPORT](#) [EVENTS](#) [RECORDS](#) [AWARDS](#) [NEWS](#) [SPORTING CODE](#) [DOCUMENTS](#) [E-PLENARIES](#) [PROJECTS](#)
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SPORTING CODE

SPORTING CODE - SECTION 4: AEROMODELLING



27 APR 2022 Volume CIAM General Rules - edition 2022 (733 KB)



22 MAY 2022 Volume F1 - Free FLight - Edition 2022 (version2) (615 KB)



07 DEC 2021 Volume F2 - Control Line - edition 2022 (1847 KB)



07 DEC 2021 Volume F2 - Control Line Annex 4j - edition 2022 (199 KB)



07 DEC 2021 Volume F3 Aerobatics - edition 2022 (2669 KB)



22 MAY 2022 Volume F3 - Helicopters edition 2022 (version 2) (2410 KB)



07 DEC 2021 Volume F3 Pylon Racing - edition 2022 (1016 KB)



07 DEC 2021 Volume F3 Soaring - edition 2022 (1080 KB)



Volume F3

Radio Control Aerobatics

2022 Edition

Effective 1st January 2022

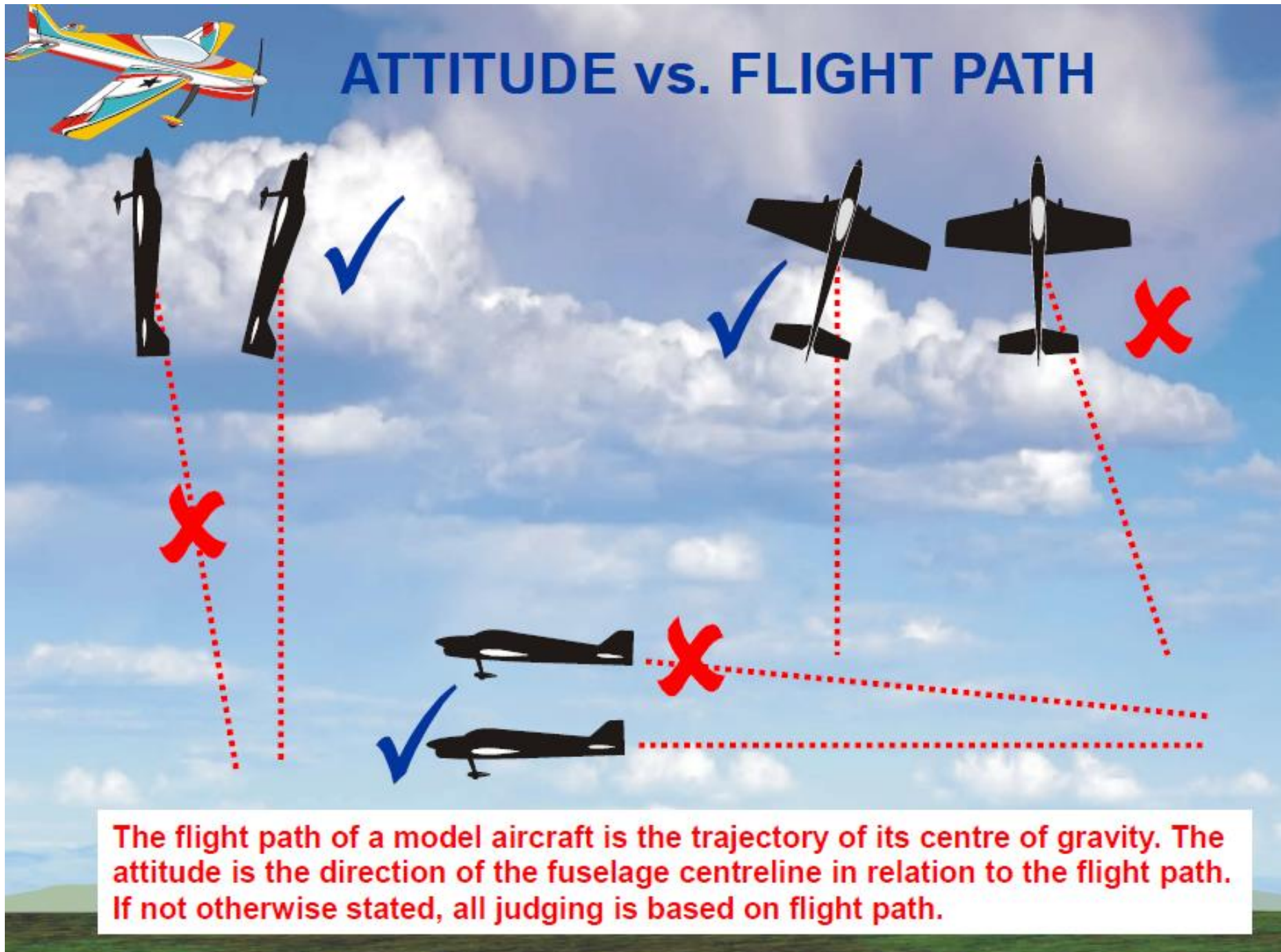
F3A - R/C AEROBATIC AIRCRAFT
F3P - R/C INDOOR AEROBATIC AIRCRAFT
F3S - R/C JET AEROBATIC AIRCRAFT (PROVISIONAL)
F3M - R/C LARGE AEROBATIC AIRCRAFT (OFFICIAL)
ANNEX 5A - F3A DESCRIPTION OF MANOEUVRES
ANNEX 5B - F3 R/C AEROBATIC AIRCRAFT
MANOEUVRE EXECUTION GUIDE
ANNEX 5G - F3A UNKNOWN MANOEUVRE SCHEDULES
ANNEX 5C - F3M FLYING AND JUDGING GUIDE
ANNEX 5M - F3P DESCRIPTION OF MANOEUVRES
ANNEX 5X - F3S DESCRIPTION OF MANOEUVRES
ANNEX 5N - F3A, F3P, F3M WORLD CUP RULES

A Little About the Manoeuvre Execution Guide and Objective Judging

The rule book attempts to give us guidelines so judging becomes as objective as possible – rather than a subjective opinion on what a manoeuvre should score. Judging should be a methodical process of evaluation.

What about classes other than F3A?

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.



100%
GEOMETRICAL ACCURACY
+
CONSTANT FLYING SPEED
+
CORRECT POSITIONING
+
CORRECT SIZE

What about 'smoothness and gracefulness'?

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 - <i>Appropriate distance out should be based on visibility of aircraft</i>	
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

Tonight's Questions

1. A competitor flies a flawless 4-point roll at a distance greater than 200m, but can be seen clearly. What score would you assign to this manoeuvre?

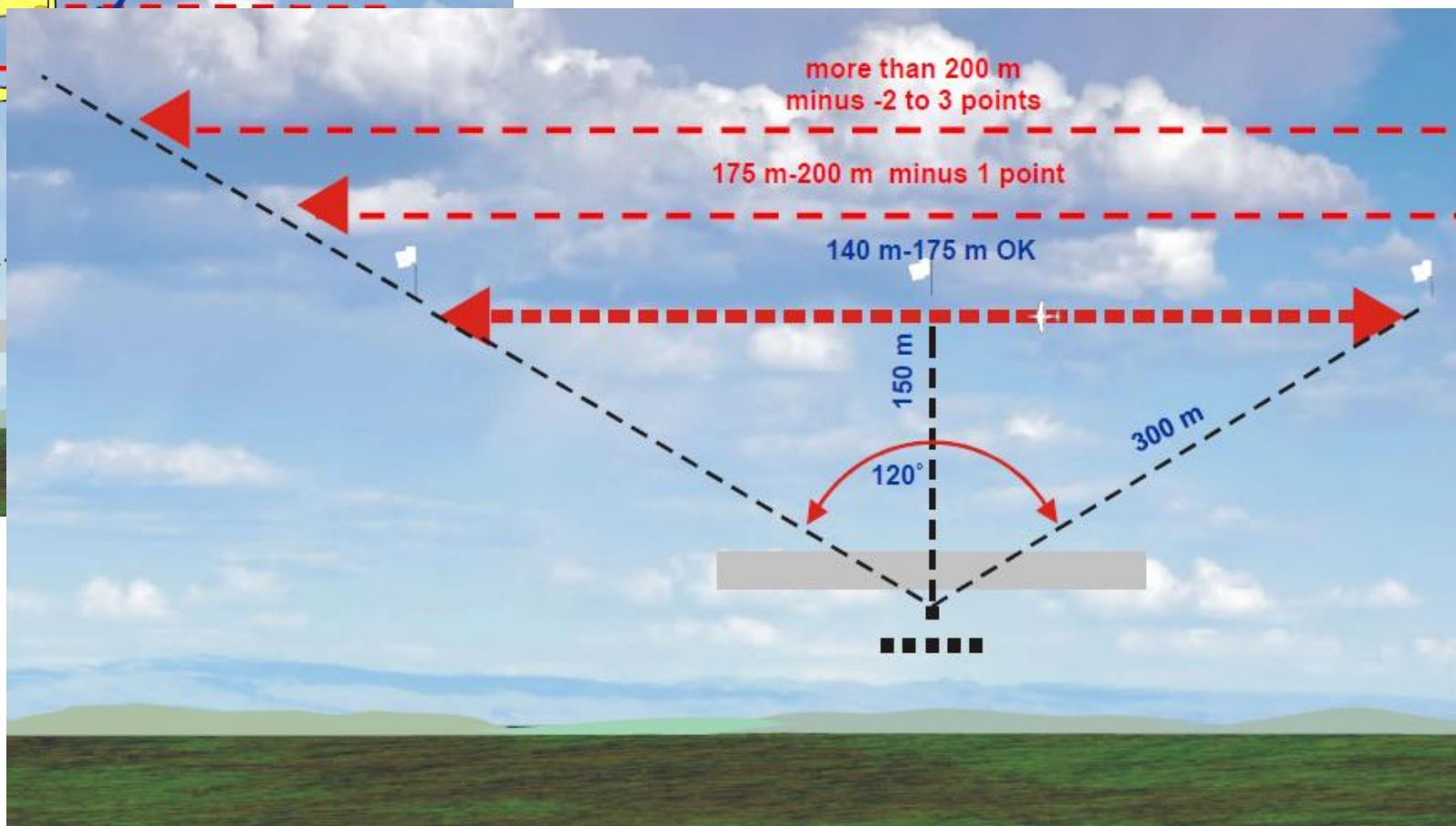
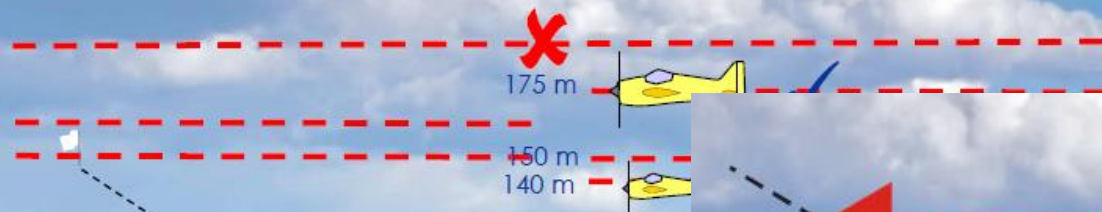
9-10 points <input type="checkbox"/>	Less than 5 points <input type="checkbox"/>
7-8 points <input type="checkbox"/>	Zero the manoeuvre <input type="checkbox"/>
5-6 points <input type="checkbox"/>	



LONGITUDINAL POSITIONING

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

The main criterion is *visibility*!



Think you know the answers? Why not give the judging exam a go here:

<https://www.f3a.com.au/judging/nz-judging-exam>

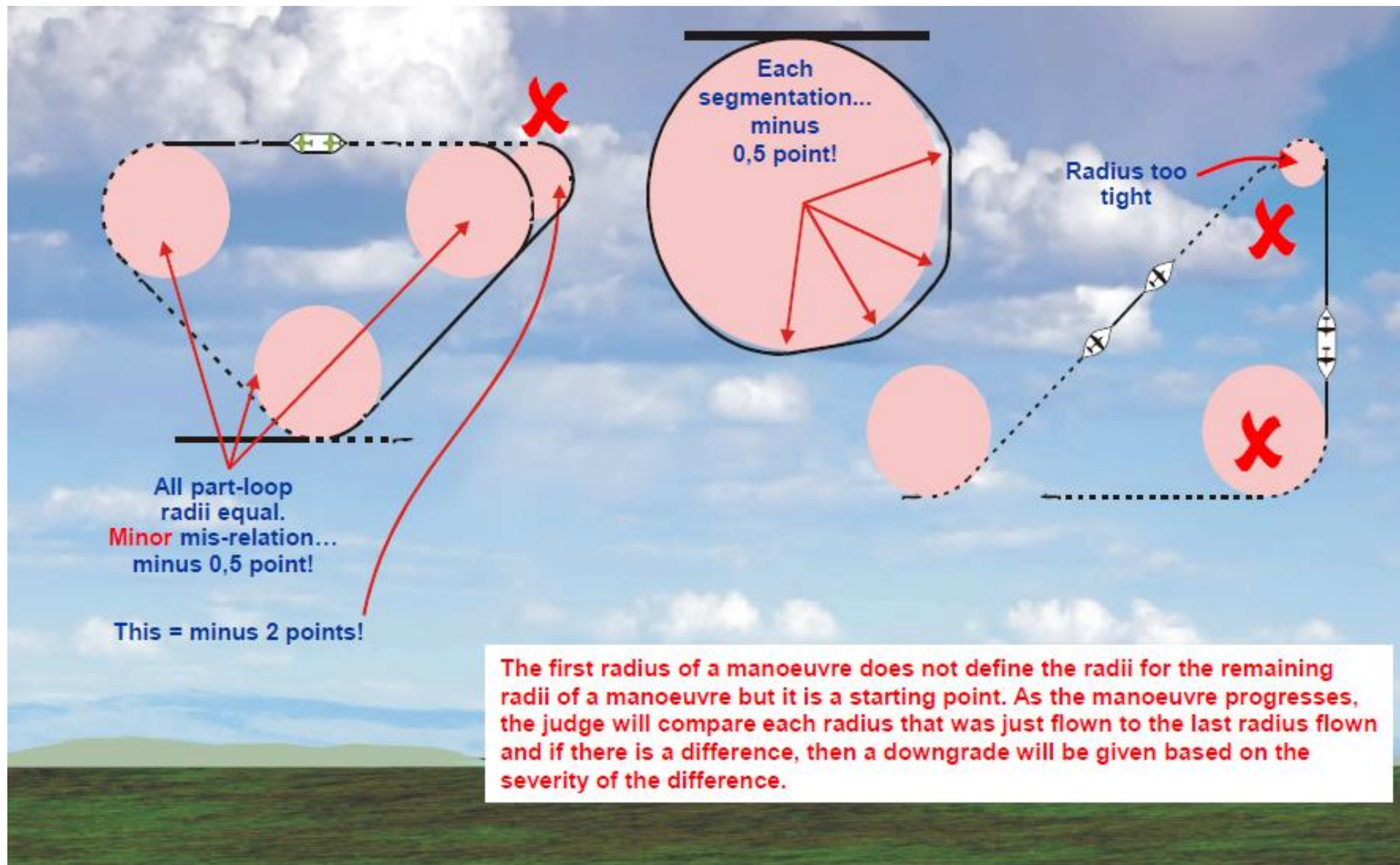


5B.10 - Manoeuvres performed on a line greater than 200m in front of the pilot must be downgraded more severely (in the order of 2 to 3 points).

5B.10 - Flying so far out as to make evaluation of a manoeuvre difficult should be severely downgraded.

2. A loop must have by definition: (Note: Check all correct answers)

A constant radius <input type="checkbox"/>	Must be performed in the horizontal plane <input type="checkbox"/>
Segmented flight path <input type="checkbox"/>	Must be performed in the vertical plane <input type="checkbox"/>
Start and end with well-defined lines <input type="checkbox"/>	



Think you know the answers? Why not give the judging exam a go here:

<https://www.f3a.com.au/judging/nz-judging-exam>



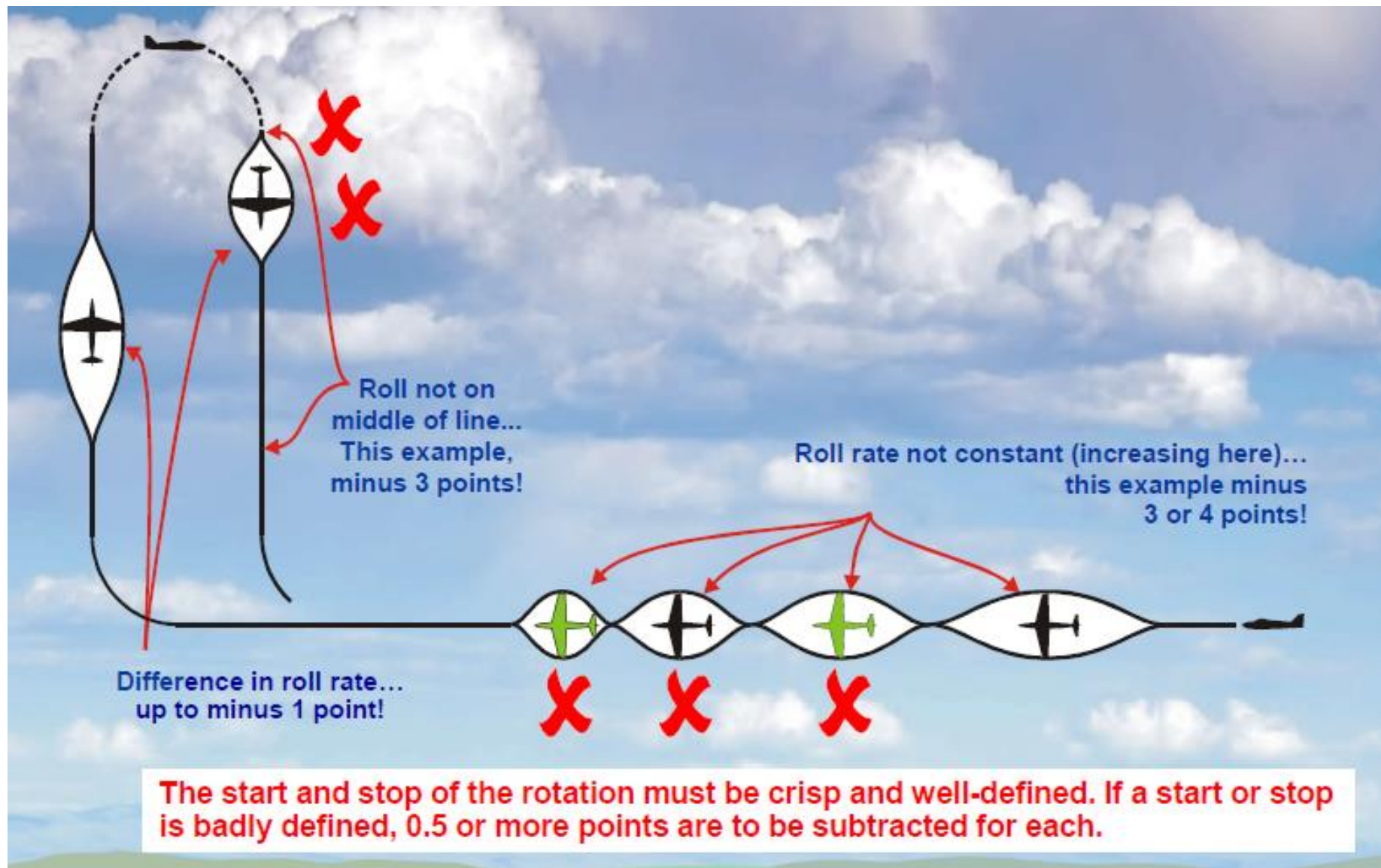
5B.8.4 - A loop must have by definition, a constant radius, and must be performed in the vertical plane throughout. It is entered and exited by a well-defined line

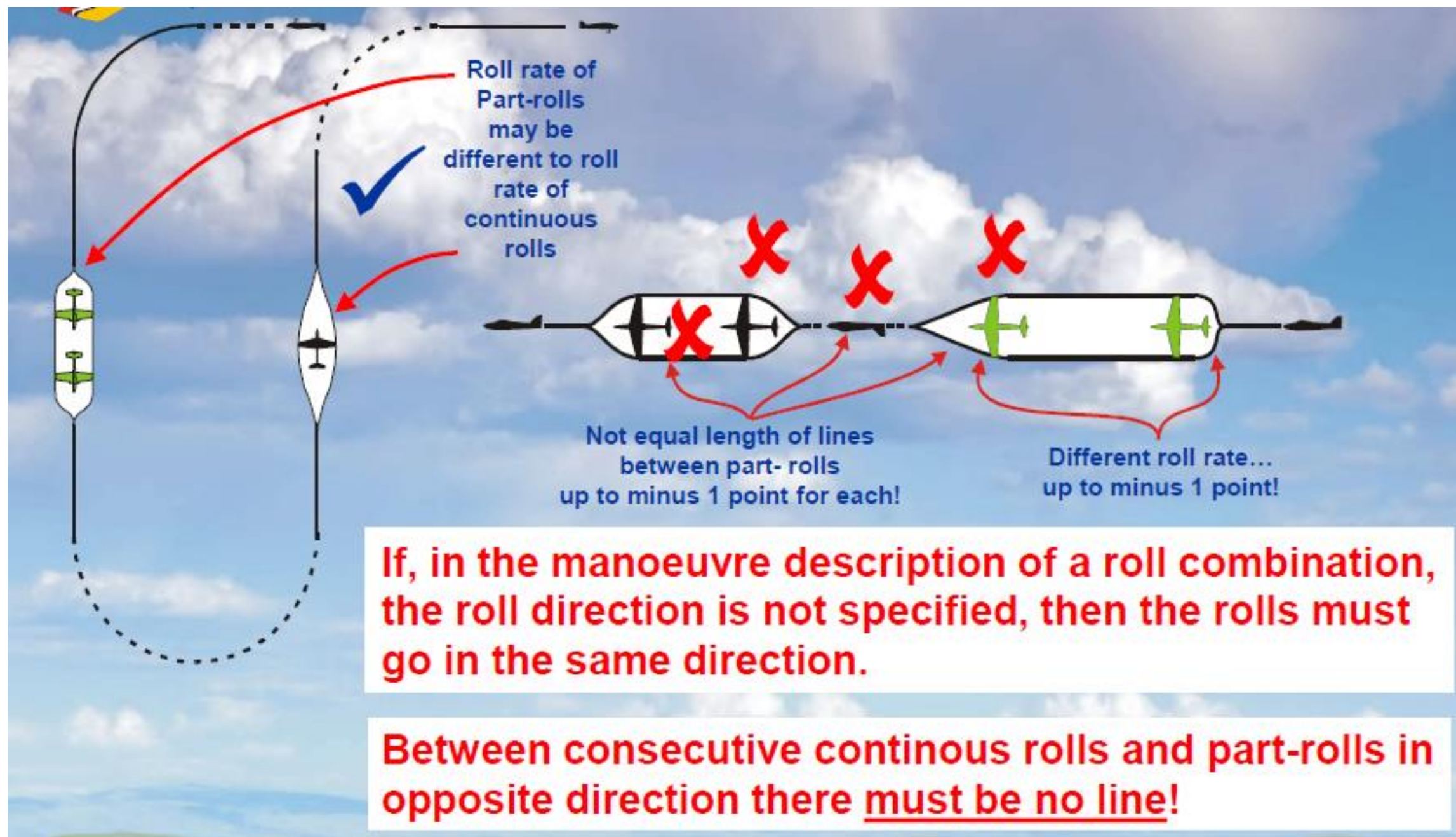
3. A manoeuvre is described as “Roll Combination with consecutive $\frac{1}{2}$ roll, snap roll, $\frac{1}{2}$ roll” with the full description being “From upright, perform consecutively a $\frac{1}{2}$ roll, a snap-roll, a $\frac{1}{2}$ roll, exit upright”. Which statement is true:

All rolls in the manoeuvre must be performed in the same direction, with a short pause between each roll element. If the roll direction is not specified, then the rolls must go in the same direction ☐

Rolls may be performed in either direction, at the pilots discretion, and may (or may not) have a pause between each roll element. ☐

Rolls may be performed in either direction, at the pilots discretion. If performed in the same direction, there must be a pause. If performed in opposite (reversal), there must be no pause ☐



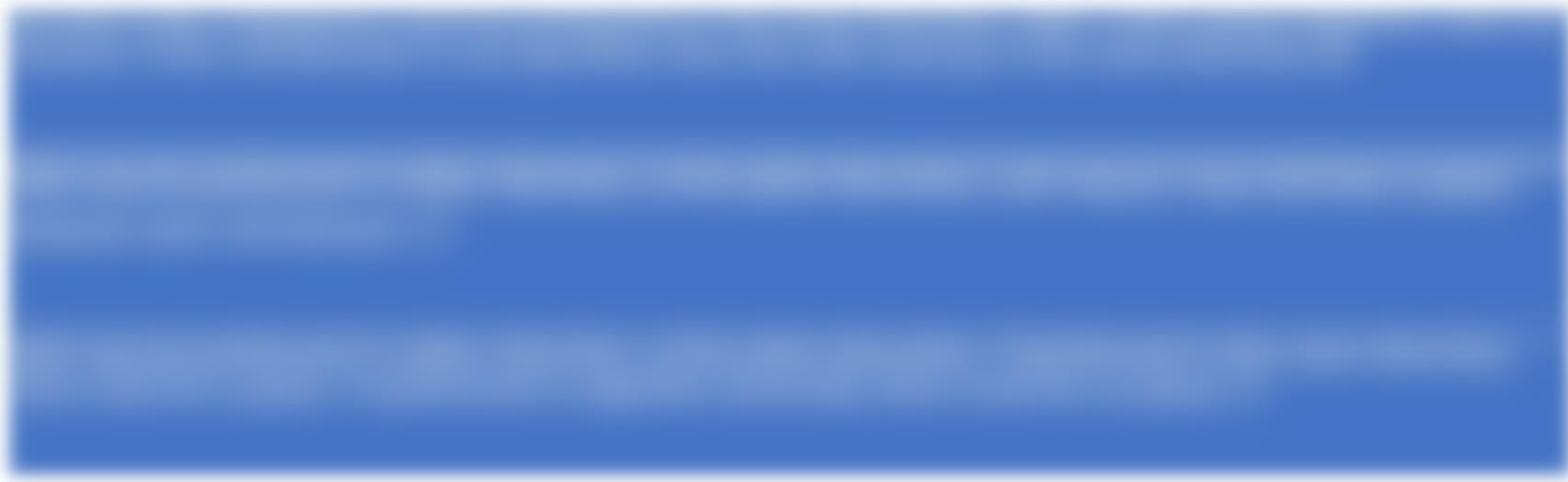




Missing or additional Part-Rolls: Use the 1 point per 15° rule

- 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

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



5B.8.5 - If, in the manoeuvre description of a roll combination, the roll direction is not specified, then the rolls must go in the same direction.
5B.8.5 e) - Lines between consecutive part-rolls must be short and of equal length
Refer to APA Rule Clarification (images/stories/Judging/apa-p17-judging-and-flying-clarification-050416.pdf)

4. A Rolling Circle must demonstrate which of these qualities: (Note: Check all correct answers)

Constant roll rate <input type="checkbox"/>	Integration of rolls <input type="checkbox"/>
Circular flight path <input type="checkbox"/>	Entry and exit at the same altitude <input type="checkbox"/>
Constant altitude <input type="checkbox"/>	Constant distance from the judges <input type="checkbox"/>



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 and Part Circles

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

Think you know the answers? Why not give the judging exam a go here:

<https://www.f3a.com.au/judging/nz-judging-exam>



5B.8.9 a) - Horizontal circles and Part Circles are mainly judged about the circular flight path, constant altitude of the circle, and by constant rates of roll, and integration of the continuous rolls or part-rolls with the circle, if applicable.

5. A score of _____ should only be given if a manoeuvre appears perfect to the judge, it is well positioned, and no defects are observed.

10 points ☐

9 points ☐

8 points ☐



**100%
GEOMETRICAL ACCURACY**

+

CONSTANT FLYING SPEED

+

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“!

Think you know the answers? Why not give the judging exam a go here:

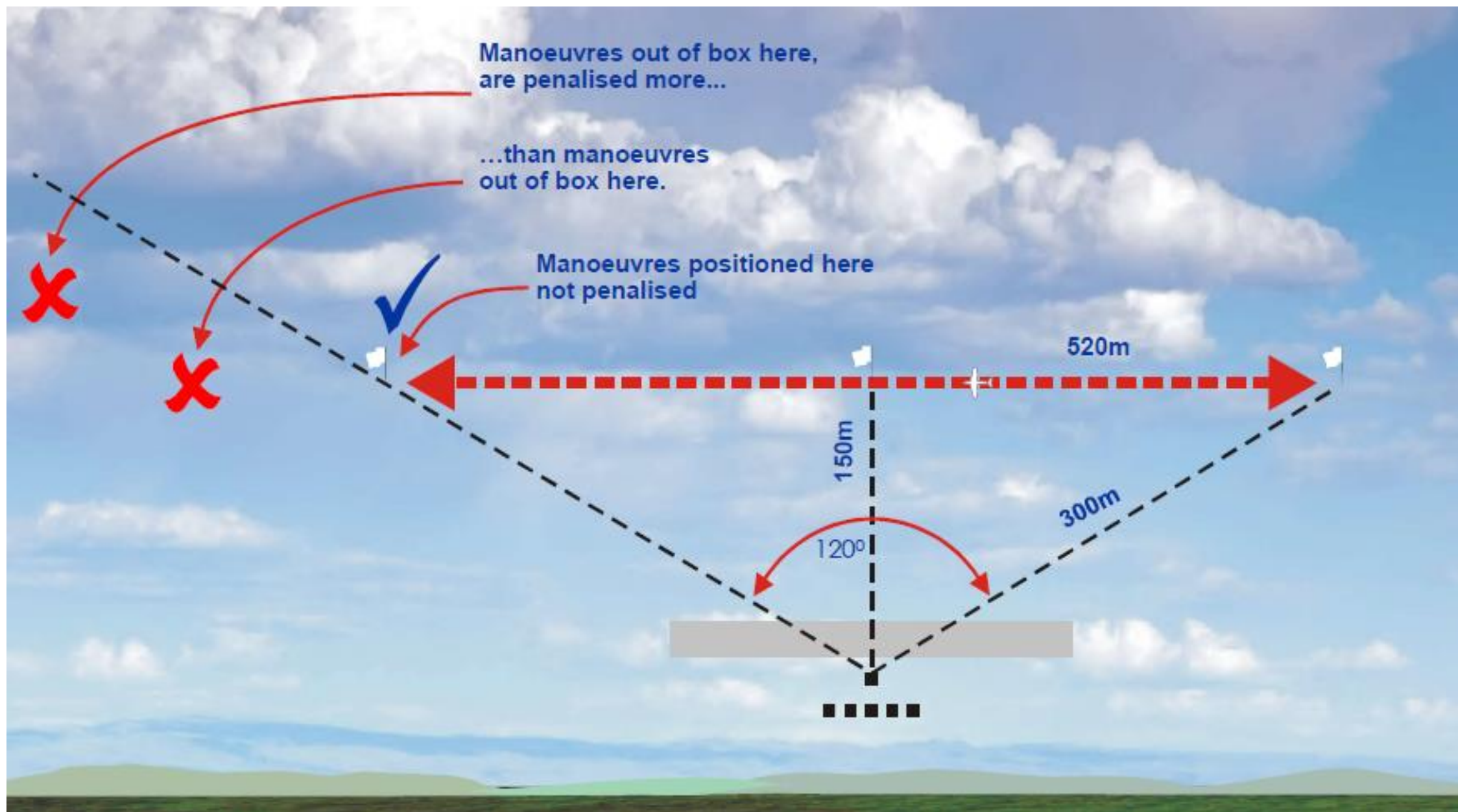
<https://www.f3a.com.au/judging/nz-judging-exam>



5B.5 - Every manoeuvre starts with the mark of 10 points and will be downgraded for each defect during the execution of the manoeuvre in one or multiple 0.5 point steps, depending on the severity of the defect. The remaining points result in the mark for the manoeuvre. A high score should remain only if no substantial, severe or multiple defects are found.

6. A small portion (10%) of a half outside loop is flown past the 60 degree line. What downgrade would you assign for this 'box' infringement?

0 points (ignore the infringement) <input type="checkbox"/>	3 points <input type="checkbox"/>
1 point <input type="checkbox"/>	Severe downgrade (more than 5 points) <input type="checkbox"/>
2 points <input type="checkbox"/>	Zero the manoeuvre <input type="checkbox"/>



Proportion of the manoeuvre outside of the manoeuvring zone

Box markers are indicators only.

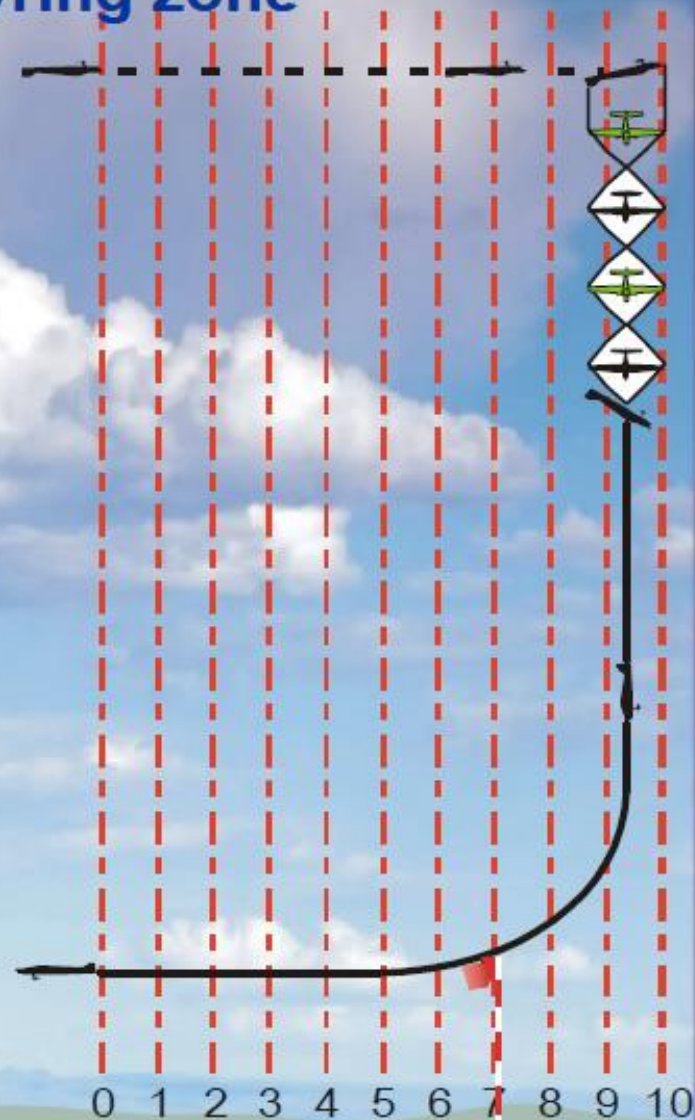
Do not downgrade unnecessarily!





Proportion of the manoeuvre outside of the manoeuvring zone

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



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 - Downgrades for flying a manoeuvre partially out of the zone should be in proportion to the degree of infraction, ie a small part of the manoeuvre (10%) flown past a 60 degree line would call for a downgrade of 1 point, while more of the manoeuvre (30%, 40%, 50%, etc) flown past a 60 degree line must be downgraded accordingly by 3, 4, 5, etc points.

7. A three-turn spin is finished one-half turn too soon. The downgrade for this error should be:

0 points <input type="checkbox"/>	3 points <input type="checkbox"/>
1 point <input type="checkbox"/>	Severe downgrade (more than 5 points) <input type="checkbox"/>
2 points <input type="checkbox"/>	Zero the manoeuvre <input type="checkbox"/>



1 POINT PER 15° DEVIATION

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

Perfect geometry =
No downgrade

Wings
level -
roll axis



Horizontal
lines -
pitch axis



Approximate 15°
deviation =
1 point downgrade



Approximate 30°
deviation =
2 points downgrade



Approximate 45°
deviation =
3 points downgrade





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

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

Think you know the answers? Why not give the judging exam a go here:

<https://www.f3a.com.au/judging/nz-judging-exam>



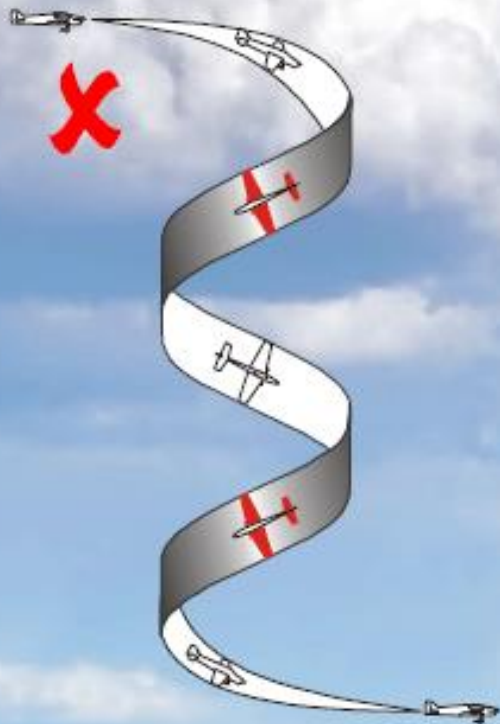
8. A two-turn opposite spin is performed during a wind shift and starts downwind, but correctly positioned. In order to make the model spin the pilot performs a snap roll. After two turns the model stops perfectly on heading, and spins exactly two turns in the opposite direction without a shift from the vertical centre line, stops, flies a vertical down-line and pulls horizontal but the wing is 15 degrees low. What score would you give?

9-10 points <input type="checkbox"/>	1-4 points <input type="checkbox"/>
7-8 point <input type="checkbox"/>	Zero the manoeuvre <input type="checkbox"/>
5-6 points <input type="checkbox"/>	



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 - If the model aircraft does not stall or if the model aircraft is snap-rolled or spiral-dive into the spin, the manoeuvre is zeroed.

9. All aerobic manoeuvres are entered and exited by a horizontal line of recognisable length. Where no horizontal line is flown between two manoeuvres: (Note: Check all correct answers)

0 points deducted ☐

The upcoming manoeuvre should be downgraded by one point ☐

The just-finished manoeuvre should be downgraded by one point ☐

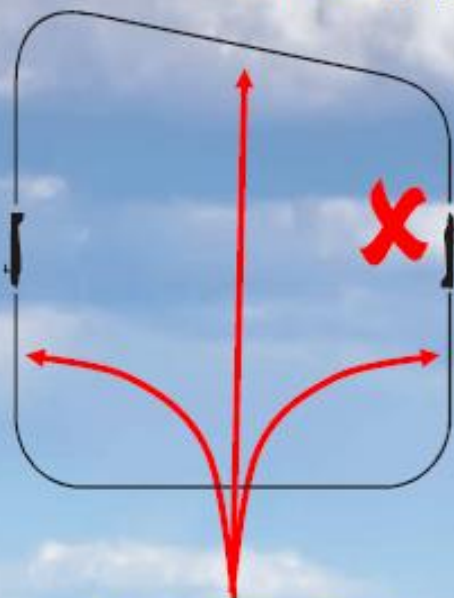
The upcoming manoeuvre should be downgraded by two points ☐

The just-finished manoeuvre should be downgraded by two points ☐



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!



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



Line after and
Before roll =
not equal...
up to minus
2 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.8.3 - 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

10. An entire manoeuvre must be within the aerobic zone (box) to avoid being penalised:

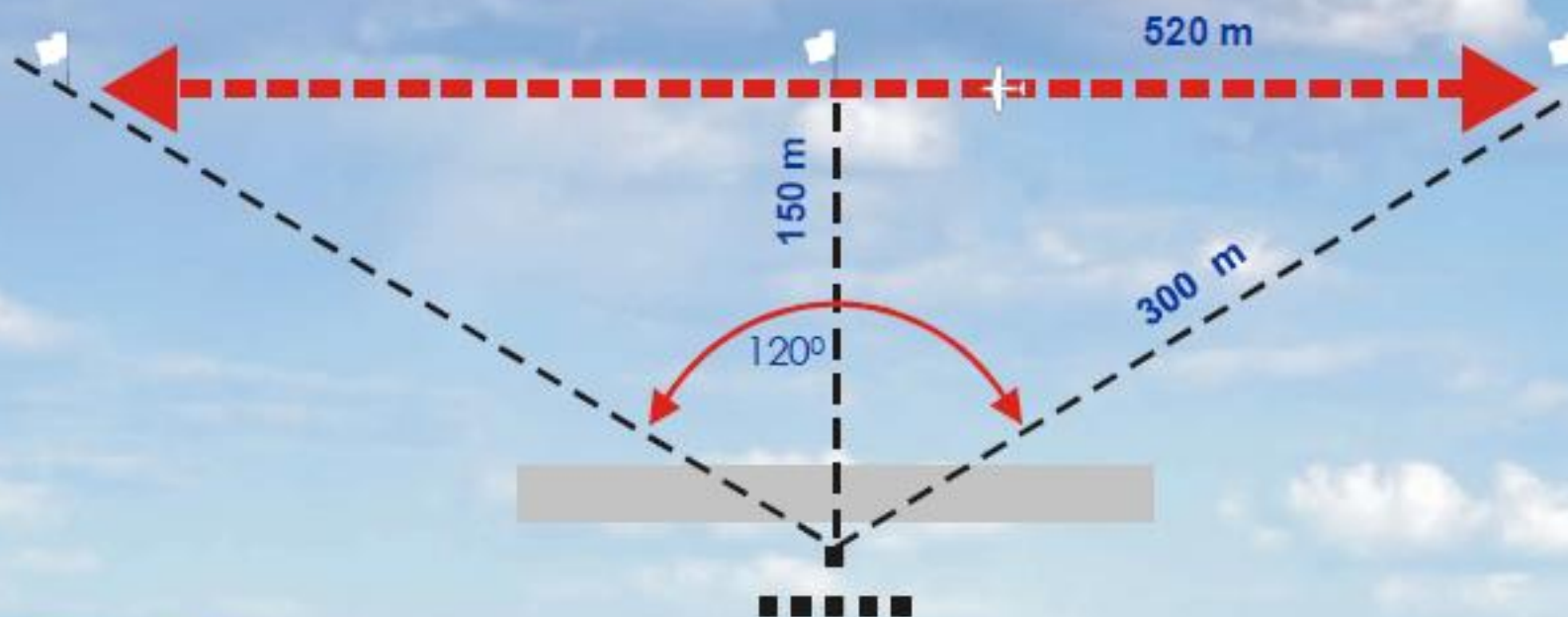
TRUE ☐

FALSE ☐

Partly true ☐

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, must deviate from the 150m distance of flight.



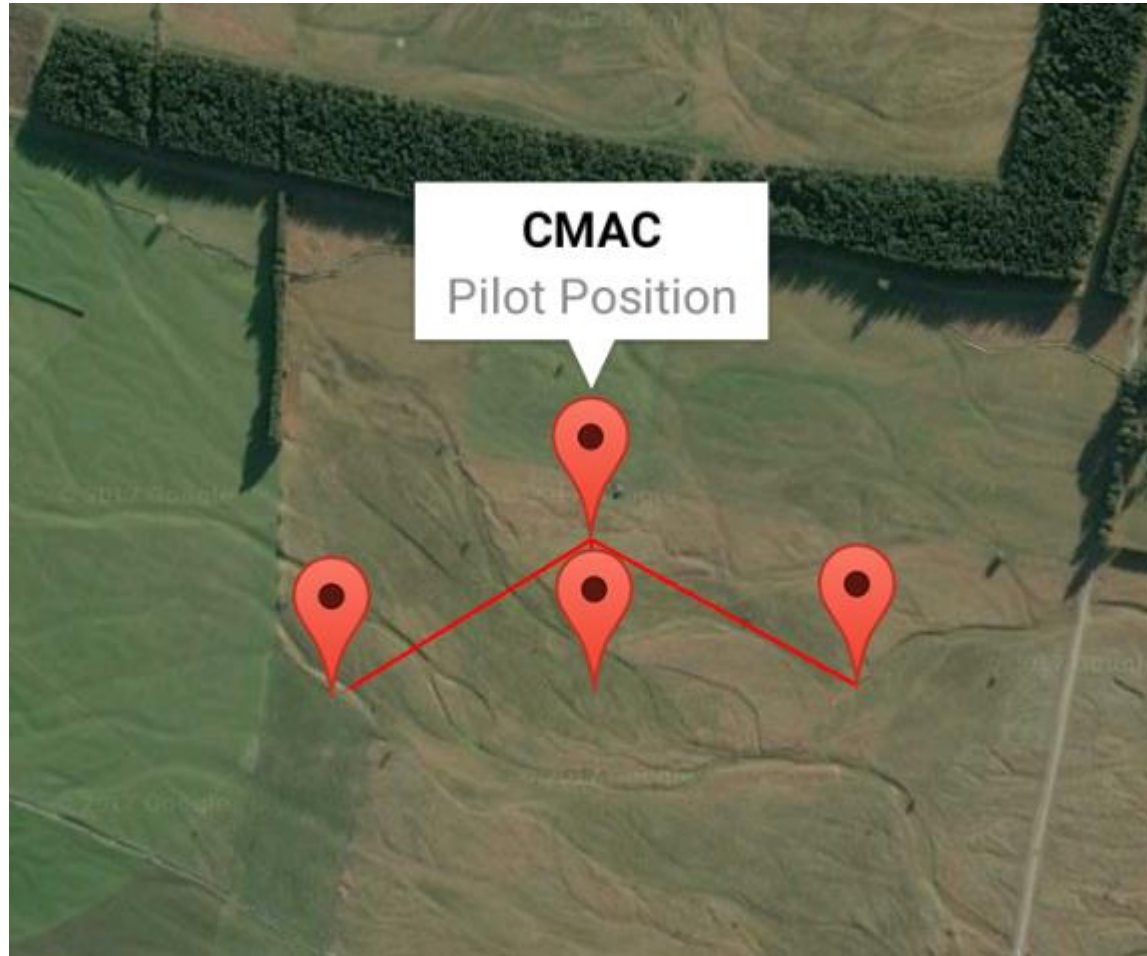
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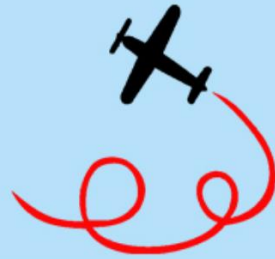
5B.12 - Downgrades for flying a manoeuvre partially out of the zone should be in proportion to the degree of infraction.

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

F3A Zone Pro (iOS and Android)



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

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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).




```
File: Generated P23.json
Origin: 0, 0, 6.03
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
```

SW: v2.0.44H/v2.0.44H

Views

 Settings

↑ Judge

↓ Top

→ Left

← Right

↕ Mid

 Load BIN

↓ Open JSON

Save JSON

Template

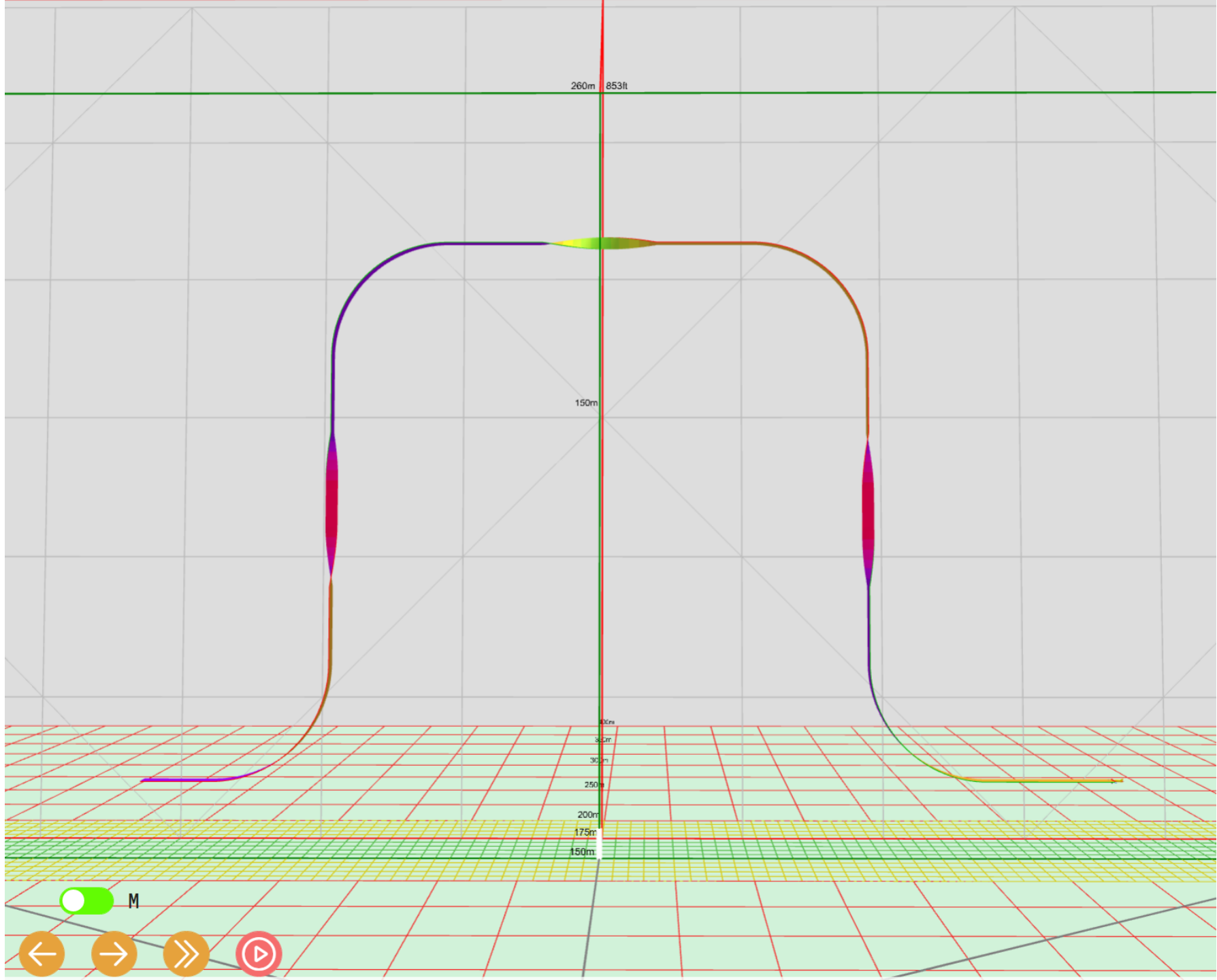
 Save Image

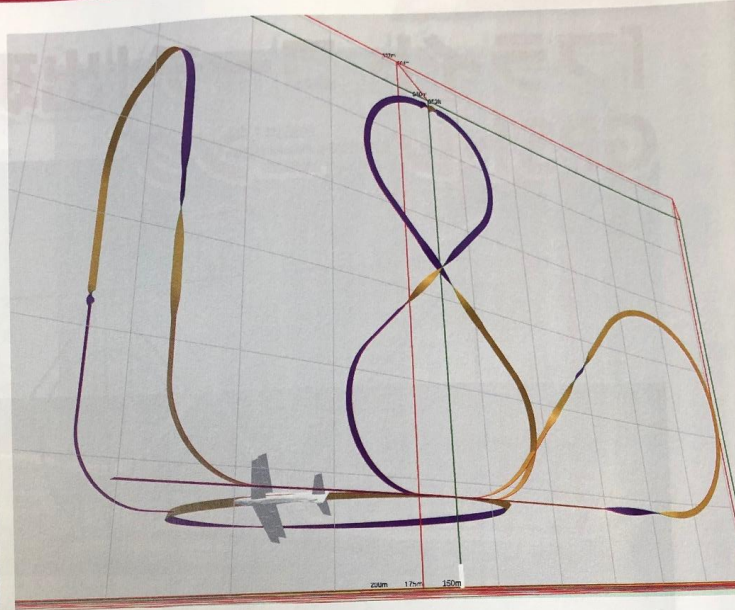
Manual

Hide ☒

Att Vel M

Navigation icons: back, forward, search, and other controls.





「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を従って、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>

YouTube ^{NZ}

Search

ArduPilot Aerobatics

The aerobatic 'box'



- 150m out from origin
- 60 degrees either side of centre
- 60 degrees high

- Can we fly this path autonomously?

(not with current code)

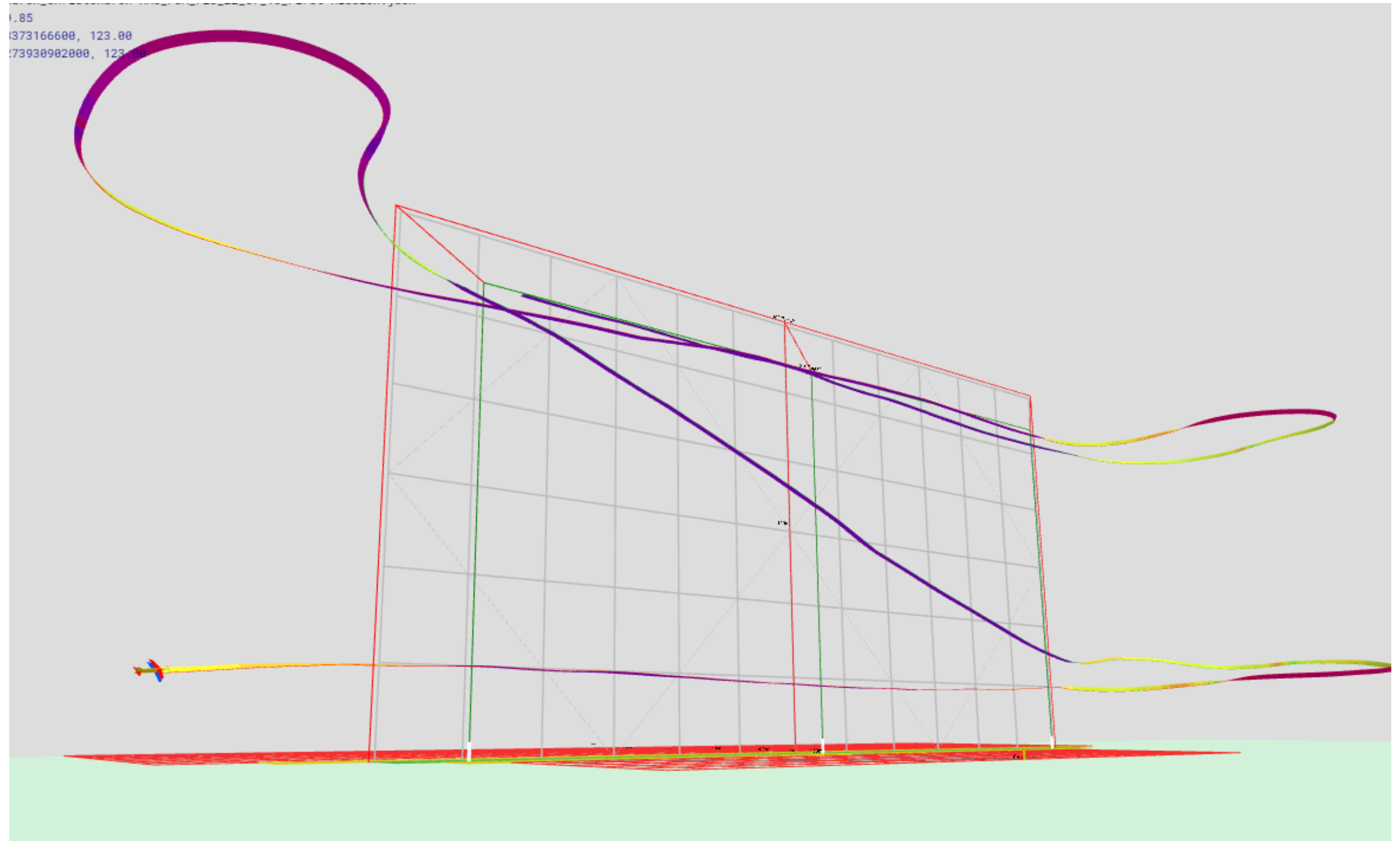
ARDUPILOT
Versatile, Trusted, Open

Andrew Palm...

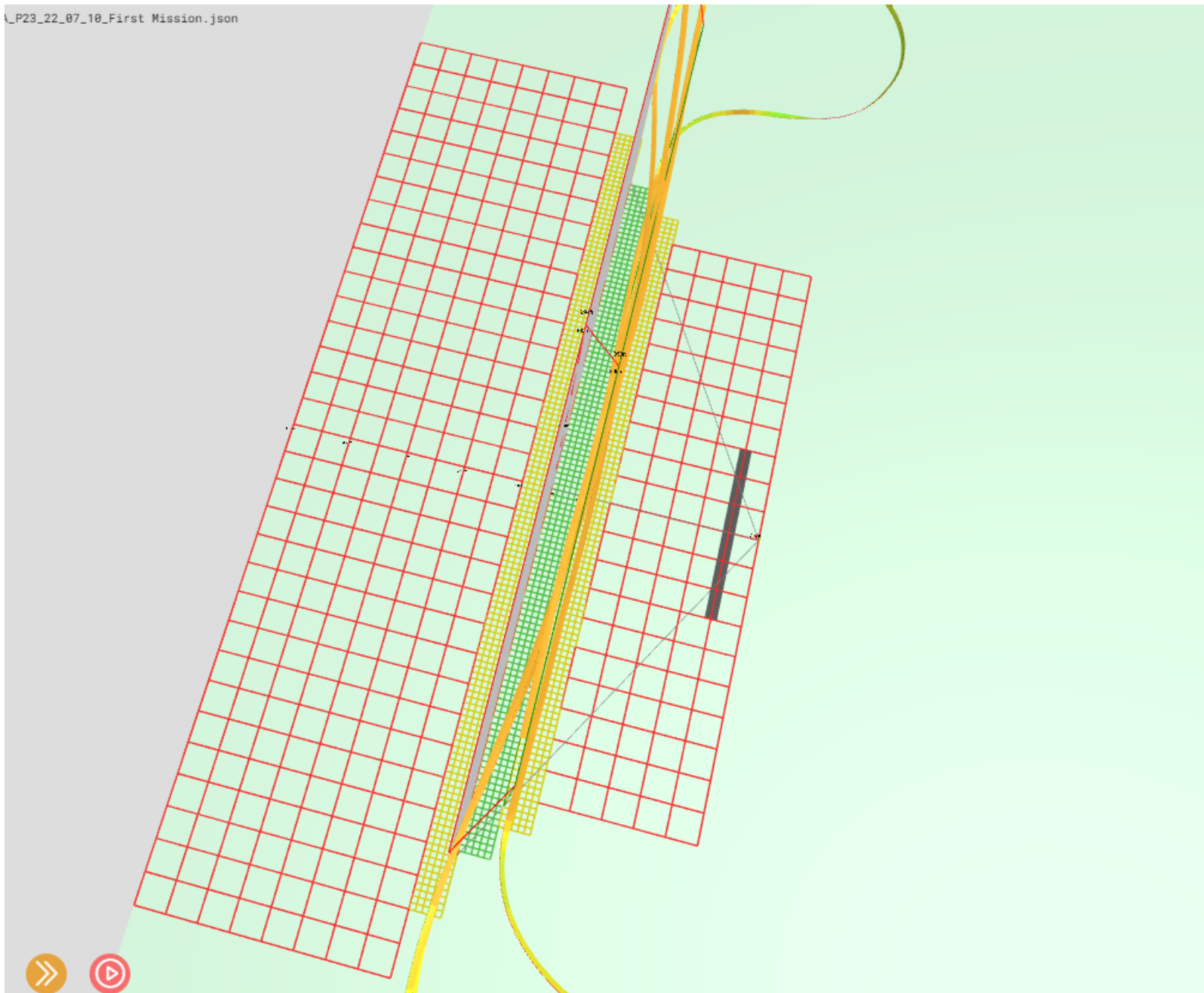
9:12 / 3:35:43

zoom

1.85
373166600, 123.00
73930902000, 123.00



_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 4 x sets of 10 questions to go!
- Walk through each of the pattern sequences (Clubman, Expert, Masters, F3A) – from a flying and judging perspective
- Electronic score entry systems

Any Questions?