

***MODEL AERONAUTICAL ASSOCIATION of  
AUSTRALIA Inc.***



**AUSTRALIAN OFFICIAL RULES**

**Section 9 - R/C Helicopter Rules**

**F3C – R/C Helicopter**

**F3N – R/C Helicopter Freestyle**

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## **9. R/C Helicopter Grading System**

### **9.1. F3C – R/C Helicopters**

#### **9.1.1. Grades of Competition**

The grades of F3C competition are:

F3C

Expert

Advanced

Sportsman

#### **9.1.2. Schedules for F3C competitions**

F3C will fly the current schedule P and F manoeuvres as gazetted by the FAI

Expert will fly the MAAA Expert schedule of manoeuvres

Advanced will fly the MAAA Advanced schedule of manoeuvres.

Sportsman will fly the MAAA Sportsman schedule of manoeuvres.

Refer to ANNEX 1A for MAAA Manoeuvre Descriptions & Diagrams

#### **9.1.3. Judging Criteria**

All manoeuvres will be judged using the F3C criteria or equivalent as described in the FAI Sporting Code, Volume F3 Radio Control Model Helicopters, Class F3C, Annex 5E – Judges Guide when the exact manoeuvre is not part of the F3C schedule.

#### **9.1.4. Judging and Scoring**

The grades of Sportsman, Advanced and Expert will be judged by three (3) judges appointed by the contest director. Scores will be marked out of ten (10) and points will be deducted in half point increments (.5).

Judging for the grade of F3C will be conducted in accordance with the current FAI-F3C rules. Where possible, there shall be at least one calibration flight for judges with a debriefing session before the commencement of a State or National Championship competition. Preliminary round scores will be normalised and the final score will be the accumulation of the normalised P round score and the 2 F round scores.

#### **9.1.5. Downgrades applying to all Sportsman and Advanced and Expert Manoeuvres**

If a manoeuvre is unrecognisable the score shall be zero (0) points.

Ascents from, and descents to, the helipad must be vertical and without pauses (unless specified otherwise). Landings must be smooth and centred on the helipad.

During the hovering manoeuvres, all stops must be of 2 seconds' minimum duration (unless specified otherwise).

Circular and linear hovering segments must be executed at a constant speed.

Every pirouette, or part pirouette, must be performed at a constant turning rate.

Where stated, hovering manoeuvres must be started with the nose of the model aircraft facing left or right and must be flown as a unit (the starting heading must be the same for each hovering manoeuvre).

All aerobatics manoeuvres must start and end in the direction indicated with a straight and level flight line of 10 m minimum length.

Entry and exit for all aerobatic manoeuvres must be at the same altitude and heading (unless specified otherwise).

During all aerobatics manoeuvres the competitor must maintain his model aircraft above a minimum altitude of 10 m.

Aerobatics manoeuvres must be performed within the 120° horizontal field of view of the pilot and must be symmetrical about the centre line.

Aerobatic manoeuvres flown at a distance greater than 100m from the judges' line will be downgraded.

#### **9.1.6. Safety Rules**

All competitors must stand in the 2m diameter Pilot's circle 9m from the helipad as indicated in the contest area layout diagram as depicted in the FAI Sporting Code, Volume F3 Radio Control Model Helicopters, Class F3C.

Models must only be started or armed in the designated start area or on the central helipad and only when signalled by the flight line director.

For the class of Sportsman, all models shall be carried to the central helipad before the commencement of the flight.

For the classes of Advanced and Expert, pilots may fly or carry the model to the central helipad before the commencement of the flight.

All classes may employ the assistance of a helper to carry the model aircraft to the central helipad.

Models with electric propulsion systems carried to the central helipad must not be armed until placed in the central helipad.

Models flown to the central helipad must be flown at 2m (for safety reasons) to the central helipad along the model entry path shown on the Contest Area Layout in the official F3C FAI helicopter rules and must not be turned towards judges, spectators or pits.

After the flight, the propulsion system must be fully shut-off or in the case of electric motors, disarmed (the battery must be disconnected) before the pilot brings the helicopter over the judging line.

The propulsion system must automatically shut-off or return to fully idle the moment an R/C signal failure should occur. (Rotor's not being driven by propulsion system in failsafe)

## 9.2. F3N – R/C Helicopters Freestyle

### 9.2.1. Grades of Competition

The grades of F3C competition are:

F3N

Advanced

Sportsman

The rules defined in the FAI Sporting Code, Section 4 – Aeromodelling Volume F3 Radio Control Model Helicopters, F3N – RC Helicopters Freestyle and the additional rules documented herein shall apply to an official competition.

### 9.2.2. Schedules for F3N competitions

F3N class of competition will be conducted in accordance with the rules defined in the FAI Sporting Code, Section 4 – Aeromodelling Volume F3 Radio Control Model Helicopters, F3N – RC Helicopters Freestyle

Set Manoeuvres as listed in the FAI Sporting Code, Section 4 – Aeromodelling Volume F3 Radio Control Model Helicopters, Class F3N – RC Helicopters Freestyle will apply to all classes.

### 9.2.3. Judging for F3N competitions

All classes will be judged using the F3N criteria as described in the FAI Sporting Code, Section 4 – Aeromodelling, Volume F3, Radio Control Model Helicopters, Class F3N, Annex 5G – Judges Guide.

### 9.2.4. Flight Program

Class	Round 1			Round 2	Round 3	Round 4
	# of Set Manoeuvres	Max K Factor for Round	Time	Freestyle	Set Manoeuvres	Music Freestyle Flight
Advanced	5	35	5 mins	3 - 4 mins	per Round 1	3 - 4 mins
Sportsman	4	25	5 mins	2 - 3 mins	per Round 1	2 - 3 mins

Table 1 - Classes and Rounds Flight Program

#### 9.2.4.1. Set Manoeuvre Flight

Every pilot makes their choice of different manoeuvres from the list of official manoeuvres (refer to Table 1 - Class and Round Flight Program for the number and time limits for each class). Each pilot may choose different manoeuvres for each round if additional Set Manoeuvre rounds are listed in the Flight Program. Pilots competing in Sportsman and Advanced must choose each manoeuvre from the Official FAI 'F3N Annex 5 – Set Manoeuvres' up to the total maximum K factor as indicated in 'Table 1 - Class and Round Flight Program' above. The list with the chosen manoeuvres for a round must be delivered to the Contest Director or an official before the beginning of the round. The flight time of the Set

Manoeuvre rounds for each class is defined in 'Table 1 - Class and Round Flight Program' above.

The caller must announce the name, start and finish of each manoeuvre.

Note: The official F3N Manoeuvre Descriptions and Diagrams published by the CIAM Bureau are available at the following address: <http://www.fai.org/ciam-our-sport/f3-radio-control-helicopters>. Selection of manoeuvres from the Optional Manoeuvre list only applies to the F3N class.

#### **9.2.4.2. Freestyle Flight**

Each competitor is given a flight timeframe as listed in 'Table 1 - Class and Round Flight Program' which defines the minimum and maximum time for the flight. During this time, there are no restrictions for the flight or the performed manoeuvres except those regarding safety. The play-back of music is not allowed. The flight time begins when the helper gives a distinctive hand signal and finishes only with another distinctive helper hand signal.

#### **9.2.4.3. Contest Area Layout**

As defined in the FAI Sporting Code, Volume F3 Radio Control Model Helicopters, Class F3N Helicopter Freestyle, FIGURE 5.11.A – F3N CONTEST LAYOUT AREA and must cater for the minimum safe distances of all pilots, judges and spectators as per MAAA requirements.

#### **9.2.4.4. Scoring**

Three judges will be appointed by the Contest Director prior to the commencement of the competition. Scoring will follow the FAI Sporting Code, Volume F3 Radio Control Model Helicopters, Class F3N Helicopter Freestyle Scoring and to the criteria as defined in Annex 5G - F3N Judges Guide.

*Note: A competitor's lowest scoring round will not be a throwaway score unless the four rounds are flown in an organised competition.*

#### **9.2.4.5. Safety Rules**

The competitor must stand in the designated pilot position during the flight as indicated in the Contest Layout Area diagram above and must adhere to the following rules:

- a) The 9 meter rule must be observed at all times.
- b) The helicopter must not cross the Judges and Safety Line or be flown between the pilot and judges.

The non-observance of these rules will be penalised by a zero score for the manoeuvre in the Set Manoeuvres flight or a zero score in the safety criterion for the flight in Freestyle and Freestyle Flight to Music.

If, during a flight a part of the helicopter except the landing gear or tail fin touches the ground, the flight will be terminated and scored zero points. This does not apply to the helicopter tilting over after a landing or autorotation.

Models must only be started or armed in the designated start area or on the central helipad and only when signalled by the flight line director.

Models flown to the Flight Area must be flown at 2m (for safety reasons) on the outside of the Judges and Safety Line and must not be turned towards judges, spectators or pits.

All classes may employ the assistance of a helper to carry the model aircraft to the central helipad.

Models with electric propulsion systems carried to the central helipad must not be armed until placed in the central helipad.

After the flight, the propulsion system must be fully shut-off or in the case of electric motors, disarmed (the battery must be disconnected) before the pilot brings the helicopter over the Judges and Safety line.

The propulsion system must automatically shut-off or return to fully idle at the moment an R/C signal failure should occur. (Rotor's not being driven by propulsion system in failsafe)

### **9.3. Entry into a State or National Championship Competition**

Entry into a grade of competition at a State or National Championship is subject to the approval by the Contest Director (CD) and/or Registrar of the recognised championship competition and will be based on the entrants flying history and the recognition of proficiency as recorded by the MAAA Pilot Proficiency Scheme (Award of Wings).

Eligibility of entry:

Sportsman: Entries will be open to pilots with no Wings/Bronze Wings

Advanced: Entries will be open to pilots with Bronze Wings/Gold Wings

Expert and F3C/F3N: Entries will be open to pilots with Gold Wings

Competitors without a recognised proficiency may elect to fly in any grade level at his/her first State or National Championship competition however the competitor may be required to demonstrate their ability to fly at the appropriate level of the grade if requested by the Contest Director prior to competing in their nominated grade of competition.

### **9.4. Competitor promotion to a higher level.**

Having been placed as a winner of the event at a National Championship competition, promotion to the next highest grade of competition will be automatic. An exception may be made if the competitor's next competition is held within 3 months of the Nationals competition. No promotion will be awarded for State Titles.

A pilot who has won or placed at State Championship level may elect to fly in the next higher grade at a National Championship.

A new competitor may elect to fly in any grade level at his first National Championship Competition subject to the criteria defined in section 9.3.

A competitor in may elect to fly at the next lower level if the competitor has never won a National Championships at the lower level or having won, has not competed in any State or National level for at least two years since the promotion to the higher level.

### **9.5. Changes to Official Schedules**

MAAA schedules of manoeuvres for the grades of competition defined above may change every two years to coincide with official FAI-F3C schedule changes. Schedules, schedule descriptions, and manoeuvre diagrams will be updated and released by the MAAA appointed Helicopter Technical Advisor for the commencement of a competition year in which the FAI-F3C schedule change occurs.

All schedules will be recognised as the official competition schedules for State and National Championship competitions no less than three months (90 days) after the release of the official FAI rules for the forthcoming competition year in which the rules are effective.

#### **9.6. Organisation of a State or National Championship Competition**

A National Championship competition will be organised and conducted in accordance to the rules as defined in the MAAA official administrative rules.

A State Championship competition will be organised and conducted by the nominated representative(s) of the relative State body hosting the State Championship.

#### **9.7. Number of Flights**

At a State or National Championship competition, each competitor is entitled to a minimum of three (3) and maximum of four (4) official flights. If due to unforeseen circumstances the minimum number of flights cannot be achieved, scores will be dropped from incomplete rounds and individual placing will be calculated on the scores from the number of completed rounds. Where four (4) official flights have been completed, final placing of competitors will be determined by counting all completed rounds and dropping the lowest scoring round for each competitor.

F3C shall fly 2 rounds of Schedule P (Preliminary) and Schedule F (Final) as per the FAI Sporting Code.



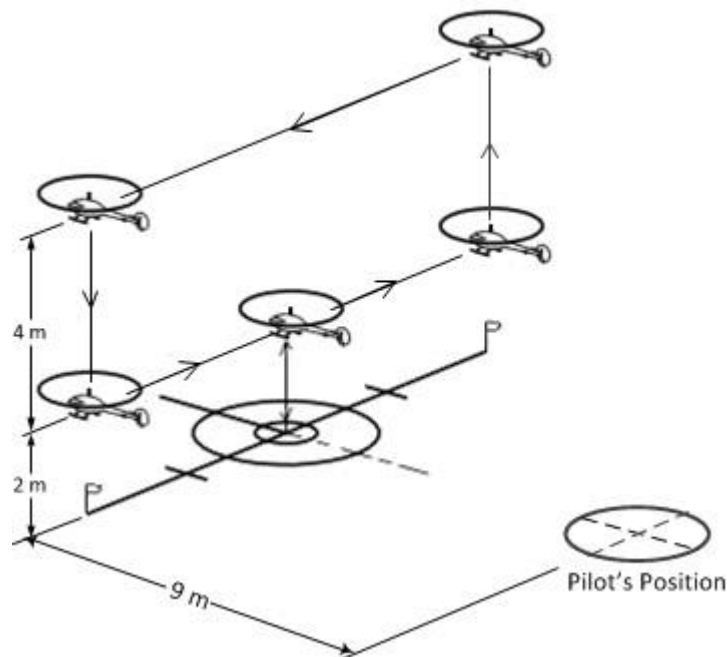
**ANNEX 9A - F3C MANOEUVRE DESCRIPTIONS AND DIAGRAMS**

All manoeuvres must be completed in the following order:

- S1. Constant Heading Vertical Rectangle
- S2. Constant Heading Triangle
- S3. Constant Heading Inverted Semi-Circle
- S4. Constant Heading Vertical Diamond
- S5. Quarter, half, Quarter Pirouettes
- S6. Constant Heading Triangle with 45° Descent and Landing

**9A.1.1 Sportsman Manoeuvre Descriptions and Diagrams****S1 Constant Heading Vertical Rectangle**

Model takes off from central helipad and ascends vertically to 2m and stops. Model then flies sideways to a point directly above one of the flags (1 or 2) and stops. Model then ascends vertically 4 m and stops. Model then flies sideways 10 m to a point directly above the opposite flag and stops. Model then descends 4 m to the beginning height and stops. Model flies sideways to a point directly over the central helipad and stops. Model then descends to a landing on the central helipad.

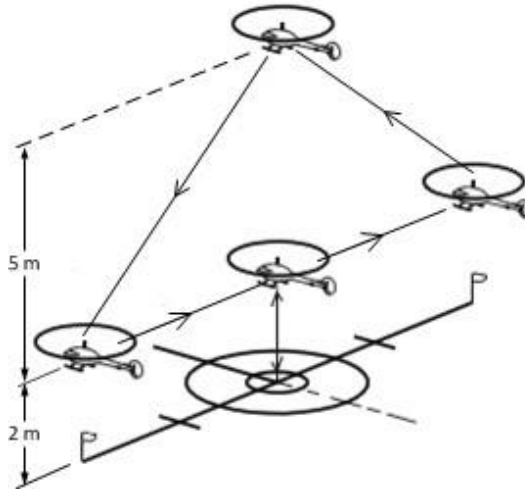


Points will also be deducted for the following reasons:

1. Model did not maintain a constant heading.
2. Horizontal line is not horizontal.
3. Vertical line is not vertical.

**S2 Constant Heading Triangle**

Model takes off from central helipad and ascends vertically to 2m and stops. Model then flies sideways to a point directly above one of the flags (1 or 2) and stops. Model ascends 5m at 45° and stops at a point directly over the central helipad. Model descends 5m at 45° to a point directly above the opposite flag and stops. Model flies sideways to a point directly over the central helipad and stops. Model then descends to a landing on the central helipad.

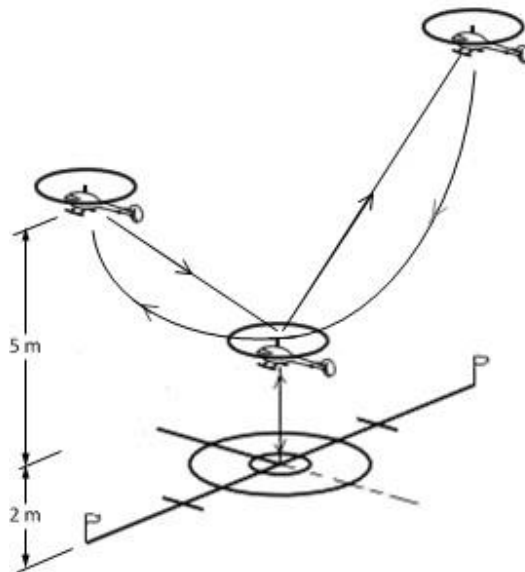


Points will also be deducted for the following reasons:

1. Model does not maintain a constant heading.
2. Ascent and / or decent is not  $45^\circ$ .
3. Horizontal line is not horizontal.

### S3 Constant Heading Inverted Semi-Circle

Model takes off from central helipad and ascends vertically to 2m and stops. Model ascends 5m at  $45^\circ$  to a point directly above one of the flags (1 or 2) and stops. Model performs half of a 5m radius circle to directly above the opposite flag and stops. Model descends 5m at  $45^\circ$  to a point directly over the central helipad and stops. Model then descends to a landing on the central helipad.



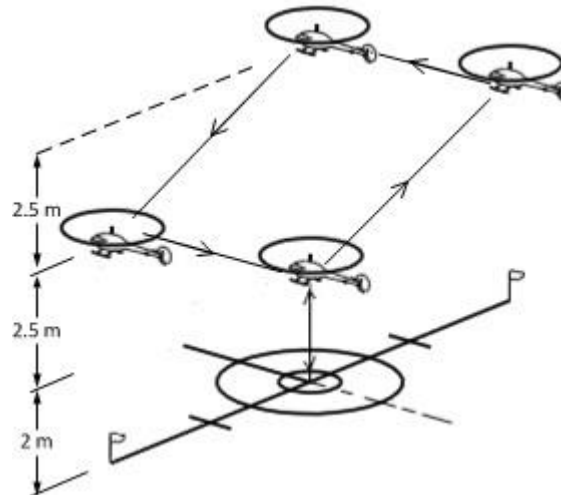
Points will also be deducted for the following reasons:

1. Model does not maintain a constant heading.
2. Ascent and / or decent is not  $45^\circ$ .
3. Shape of semi-circle is not round.

### S4 Constant Heading Vertical Diamond

Model takes off from central helipad and ascends vertically to 2m and stops. Model ascends 2.5m at  $30^\circ$  to a point directly above one of the flags (1 or 2) and stops. Model ascends a further 2.5m at  $30^\circ$  to a point directly above the central helipad and stops. Model descends 2.5m at  $30^\circ$  to a point directly above the opposite flag and stops. Model descends a further

2.5m at 30° to a point directly over the central helipad and stops. Model then descends to a landing on the central helipad.



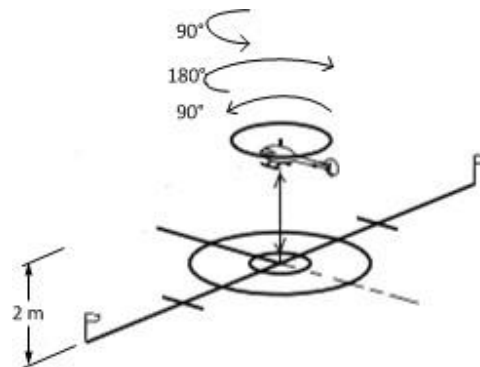
Points will also be deducted for the following reasons:

1. Model does not maintain a constant heading.
2. Ascent and / or decent path is not linear.

### S5 Quarter, Half, Quarter Pirouettes

Model takes off from central helipad and ascends vertically to 2m and stops. Model then turns 90 degrees to the left or right as elected by the pilot and stops in the side on hover. Model then turns back 180° (tail turning towards the pilot) until the model faces the opposite direction and stops in the opposite side on hover. Model then turns back 90° until the tail is pointed at the pilot and stops. Model then descends to a landing on the central helipad.

*Note: for the entire manoeuvre the model is to maintain a position over the centre helipad.*



Points will also be deducted for the following reasons:

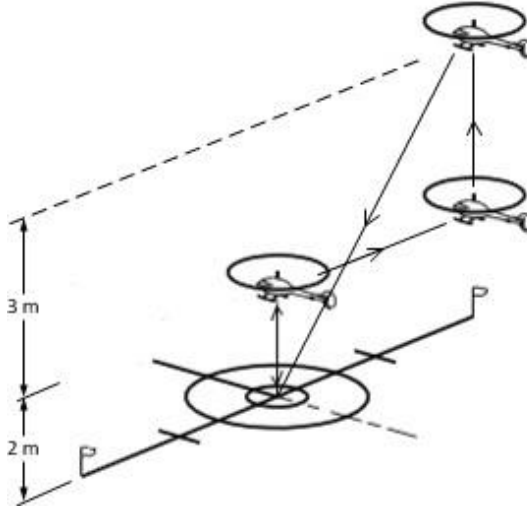
- 1 The main shaft of the model drifts away from the centre line of the helipad.
2. Helicopter fails to 'pirouette' to a position 90 degrees to the pilot.

### S6 Constant Heading Triangle with 45° Descent and Landing

Model takes off from central helipad and ascends vertically to 2m and stops.

Model then flies sideways to a point directly above one of the flags (1 or 2) and stops. Model then ascends vertically 3 m and stops. Model descends 5m at 45° to land in the central helipad.

*Note: Model is to touchdown without a pausing*



Points will also be deducted for the following reasons:

1. Model does not maintain a constant heading.
2. Horizontal line is not horizontal.
3. Vertical line is not vertical.
4. Decent is not  $45^\circ$  and/or constant speed.
5. Model does not land in the central helipad.

## 9A.2 Advanced Schedule of Manoeuvres

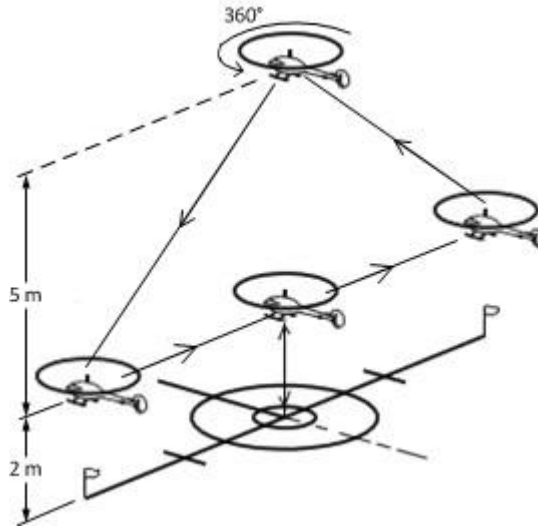
All manoeuvres must be completed in the following order:

- A1. Constant Heading Triangle w/ $360^\circ$  Pirouette
- A2. Inverted Semi-Circle w/ $90^\circ$  Opposite Pirouettes (-Upwind)
- A3. Inside Loop – Upwind / Upwind
- A4. Slow Roll – Downwind / Downwind
- A5.  $180^\circ$  Stall Turn – Upwind / Downwind
- A6. Candle – Upwind / Downwind
- A7. Half Cuban Eight – Downwind / Upwind
- A8.  $180^\circ$  Approach and Landing – Downwind / Upwind

### 9A.2.1 Advanced Manoeuvre Descriptions and Diagrams

#### A1 Constant Heading Triangle w/ $360^\circ$ Pirouette

Model takes off from central helipad and ascends vertically to 2m and stops. Model flies sideways to a point directly above one of the flags (1 or 2) and stops. Model ascends 5m at  $45^\circ$  to a point directly over the central helipad and stops. Model performs a  $360^\circ$  pirouette in either direction and stops. Model descends 5m at  $45^\circ$  to a point directly above the opposite flag and stops. Model flies sideways to a point directly over the central helipad and stops. Model then descends to a landing on the central helipad.

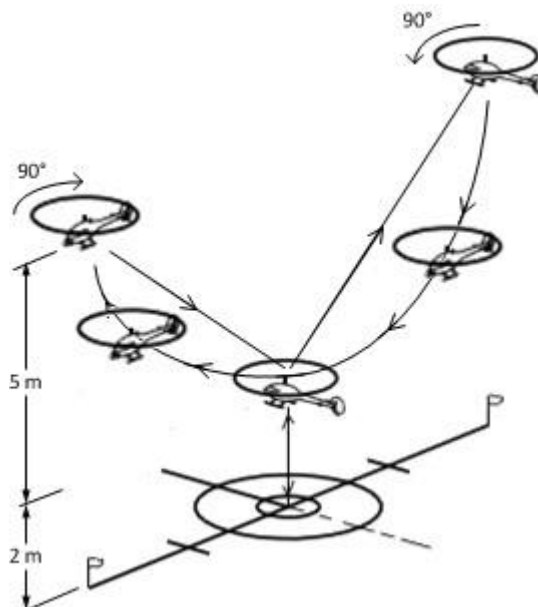


Points will also be deducted for the following reasons:

1. Model did not maintain a constant heading except during pirouette.
2. Horizontal line is not horizontal.
3. Ascent and / or decent is not 45°.
4. The main shaft of the model drifts away from the centreline of the helipad or model does not maintain a constant height during the pirouette.

### A2 Inverted Semi-Circle w/90° Opposite Pirouettes

Model takes off from central helipad and ascends vertically to 2m and stops. Model ascends 5m at 45° to a point directly over flag 1 (2) and stops. Model performs a 90° pirouette to face the opposite flag and stops. Model performs half of a 5m radius circle to a point directly over flag 2 (1) and stops. Model performs a 90° pirouette in the opposite direction (tail to the pilot) and stops. Model descends 5m at 45° to a point directly over the central helipad and stops. Model then descends to a landing on the central helipad.

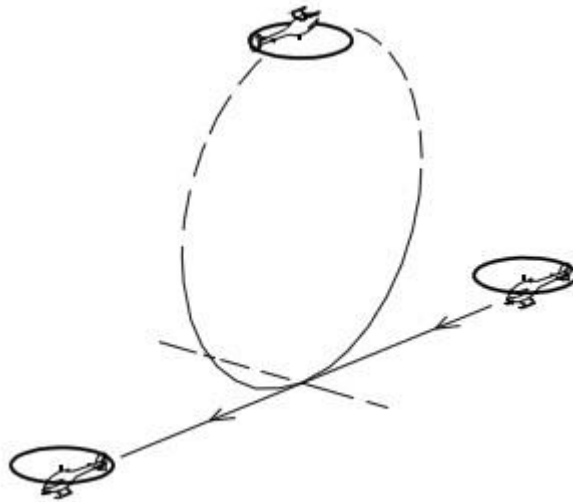


Points will also be deducted for the following reasons:

1. Ascent and / or descent are not 45°.
2. Model fails to 'pirouette' to a position 90° to the pilot.
3. Shape of semi-circle is not round.

### A3 Inside Loop - Upwind/Upwind

Model flies straight and level for a minimum of 10m, then performs an inside loop centred on the centreline. The model ends the loop and flies straight and level.



Points will also be deducted for the following reasons:

1. The loop is not round.
2. The model did not maintain the same heading throughout the manoeuvre.
3. Entry and exit lines are different altitudes

### A4 Slow Roll - Downwind/Downwind

Model flies straight and level for a minimum of 10m. At a constant altitude the model starts a slow roll in either direction around an axis which coincides with the line of flight centred on the centreline. The model continues this roll in the same direction until it flies horizontally straight and level.

*Note: The model should be inverted directly over the centreline*



Points will also be deducted for the following reasons:

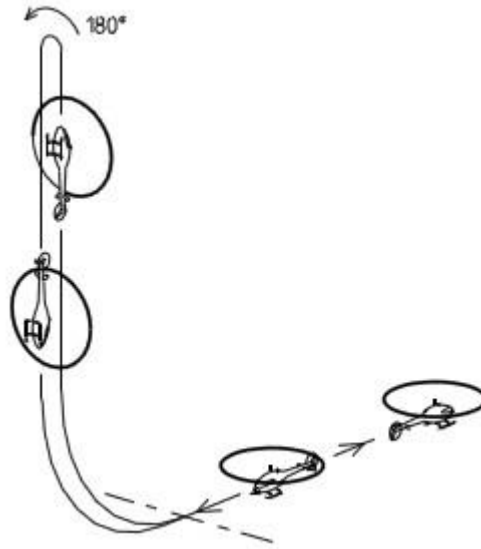
1. The roll should be a minimum duration of 3 seconds.
2. Roll must be executed at a constant roll rate.
3. The model finishes the manoeuvre on a different heading or height from that on which it started the manoeuvre.
4. Manoeuvre is not centred on the centreline

### A5 180° Stall Turn - Upwind/Downwind

Model flies straight and level past the centreline for a minimum of 10m then climbs vertically with a smoothly rounded curve of 90°. When the vertical climbs stops the model rotates 180°

around the yaw axis so that the nose points downward. While diving the model follows the same path as the climb and recovers to straight and level flight on the same entry line.

*Note: The vertical climb must commence within 25m of the centreline or a downgrade will apply*



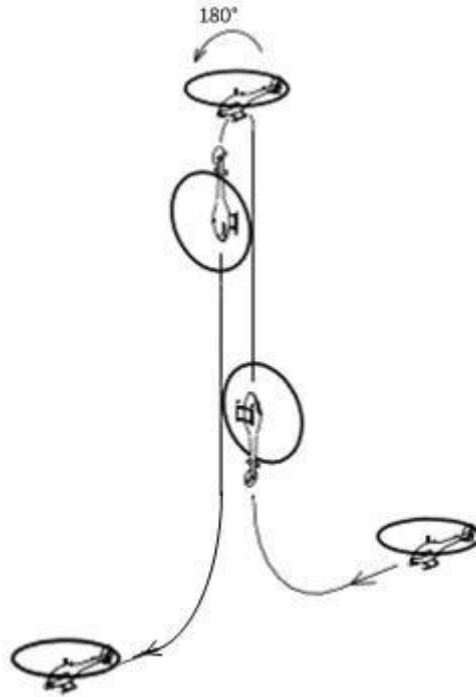
Points will also be deducted for the following reasons:

1. The model does not climb exactly vertical or does not end its vertical climb.
2. The model does not rotate exactly 180° and oscillates before diving.
3. The 90° curves are of different radii.
4. Rotation is before or after the end of climb
5. The model does not finish the manoeuvre on a heading exactly 180° to that on which it started the manoeuvre.
6. Entry and exit lines are different altitudes

### **A6 Candle - Upwind/Upwind**

Model flies straight and level for a minimum of 10 m then enters a vertical ascent with a smoothly rounded curve of 90° centred on the centreline. Before the model comes to a stop, the model performs a 180° pushed flip to the vertical so that the nose points downward. The model performs a vertical descent followed by a smoothly rounded 90° curved pull out back to straight and level flight at the same altitude and heading as at the start of the manoeuvre.

*Note: The 180° pushed flip must be performed so that the model is travelling upwards during the first 90° and downwards during the final 90°*

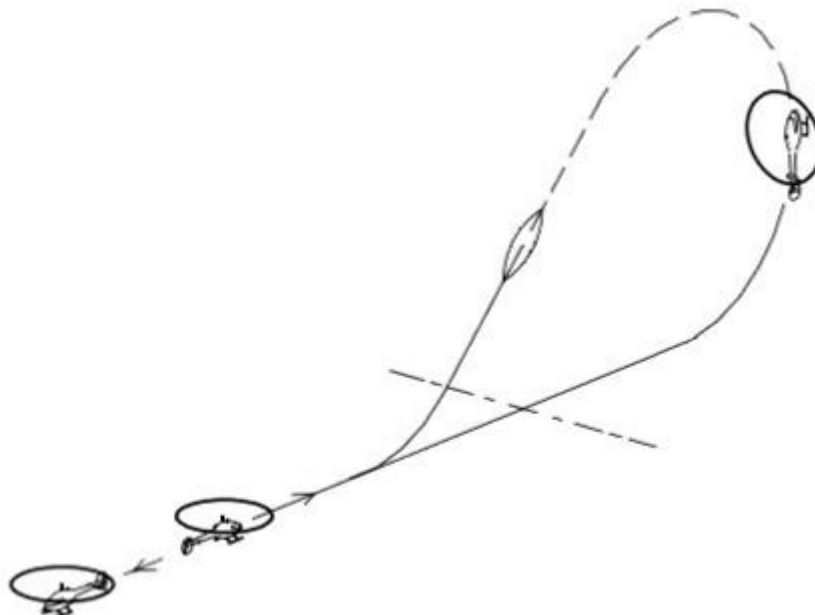


Points will also be deducted for the following reasons:

1. The model does not climb exactly vertical or does not end its vertical climb.
2. The model does not rotate exactly 180° and/or oscillates before diving.
3. The 90° curves are of different radii.
4. Model is not horizontal at the stall point of the vertical upward travel
5. Entry and exit lines are different altitudes

### A7 Half Cuban Eight - Downwind/Upwind

Model aircraft flies straight and level for a minimum of 10m and executes a 5/8 inside loop. When the model aircraft is in 45° descent and inverted it executes a ½ roll in either direction to upright and smoothly levels out and flies straight in the opposite direction down the original line of flight.





Points will also be deducted for the following reasons:

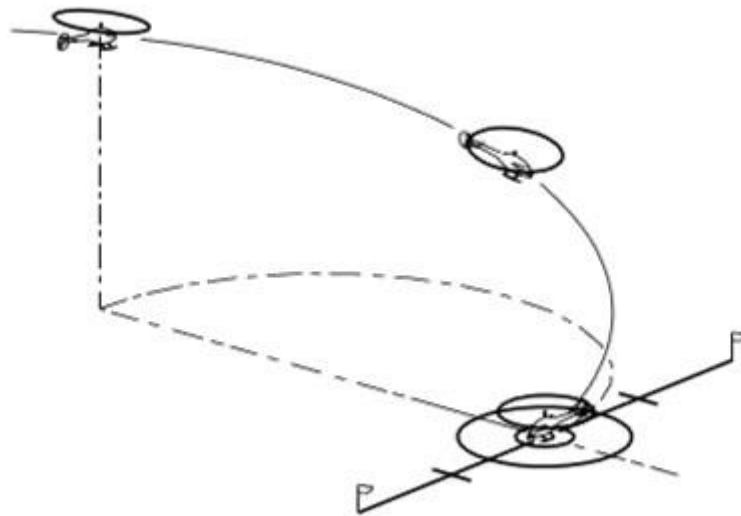
1. 5/8 Loop is not circular
2. Decent is not 45°
3. ½ Roll is not centred on the centreline
4. Roll is more or less that 180°
5. Model does not exit at the same altitude as entry

**A8a 180° Approach and Landing Power On (K Factor = 1) - Downwind/Upwind**

From a minimum height of 30m, the model establishes descent before the model crosses the centreline. The model then executes a constant radius, constant rate of descent 180° turn to land on the central helipad.

**A8b 180° Approach and Landing Power to Idle (K Factor = 1.5) - Downwind/Upwind**

From a minimum height of 30m, the model establishes descent and the engine power is reduced to idle before the model crosses the centreline. The model then executes a constant radius, constant rate of descent 180° turn to land on the central helipad.



Points will also be deducted for the following reasons:

1. The descent rate is not constant.
2. The turn rate is not constant.
3. Landing is not on the central helipad.

*Note: The competitor has the right to choose either option if weather conditions become unfavourable*

### 9A.3 Expert Schedule of Manoeuvres

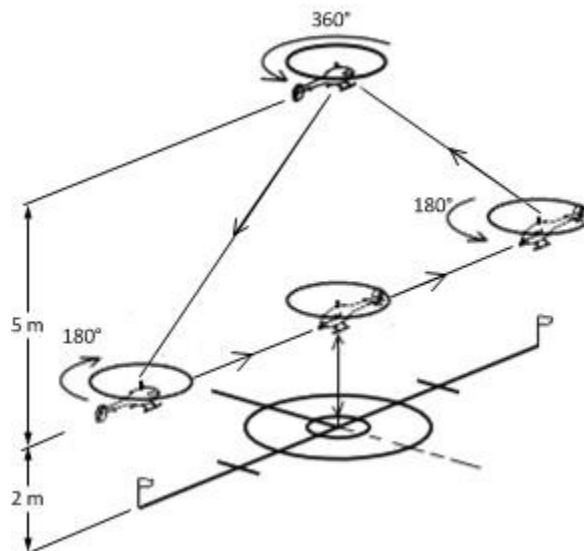
All manoeuvres must be completed in the following order:

- E1. Triangle w/360° pirouette – Upwind / Upwind
- E2. Inverted Semi-Circle (Flower) with Opposite 360° Pirouettes – Upwind / Upwind
- E3. Candle with Pulled Flip – Downwind / Downwind
- E4. Pullback with Half loop – Upwind / Upwind
- E5. Cobra Roll with Half Rolls – Downwind / Downwind
- E6. Oval with Full Roll – Upwind / Upwind
- E7. Roll Reversal with Hesitation – Downwind / Downwind
- E8. Double Rolling Stall Turn – Upwind / Upwind
- E9. 180° Autorotation – Downwind / Upwind

#### 9A.3.1 Expert Manoeuvre Descriptions and Diagrams

##### A1 Triangle w/360° pirouette – Upwind / Upwind

Model takes off from central helipad and ascends vertically to 2m and stops. Model flies backwards to a point directly above one of the flags (1 or 2) and stops. Model performs a 180° pirouette in either direction and stops. Model ascends 5m at 45° to a point directly over the central helipad and stops. Model performs a 360° pirouette in either direction then stops. Model descends 5m at 45° to a point directly above the opposite flag and stops. Model performs a 180° pirouette in the either direction and stops. Model flies backward to a point directly over the central helipad and stops. Model then descends to a landing on the central helipad.

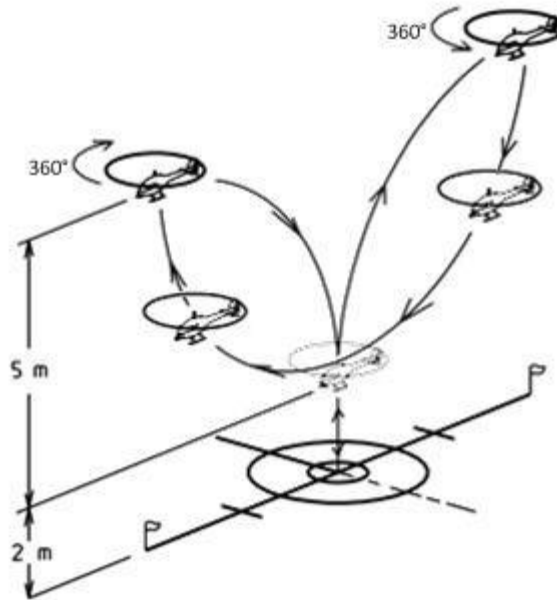


Points will also be deducted for the following reasons:

1. Model did not maintain a constant heading except during pirouette.
2. Horizontal line is not horizontal
3. Ascent and / or decent is not 45°
4. The main shaft of the model drifts away from the centreline of the helipad or flag and/or the model does not maintain a constant height during the pirouette.

**E2 Inverted Semi-Circle (Flower) with Opposite 360° Pirouettes – Upwind / Upwind**

Model takes off from central helipad and ascends vertically to 2m and stops. Model ascends backwards while performing a quarter of a 5m radius circle to a point directly over flag 1 (2) and stops. Model performs a 360° pirouette in either direction then stops. Model performs half of a 5m radius circle at a constant rate to a point directly above flag 2 (1) and stops. Model performs a 360° pirouette in the opposite direction then stops. Model descends backwards while performing a quarter of a 5m radius circle to directly over the central helipad and stops. Model then descends to a landing on the central helipad.



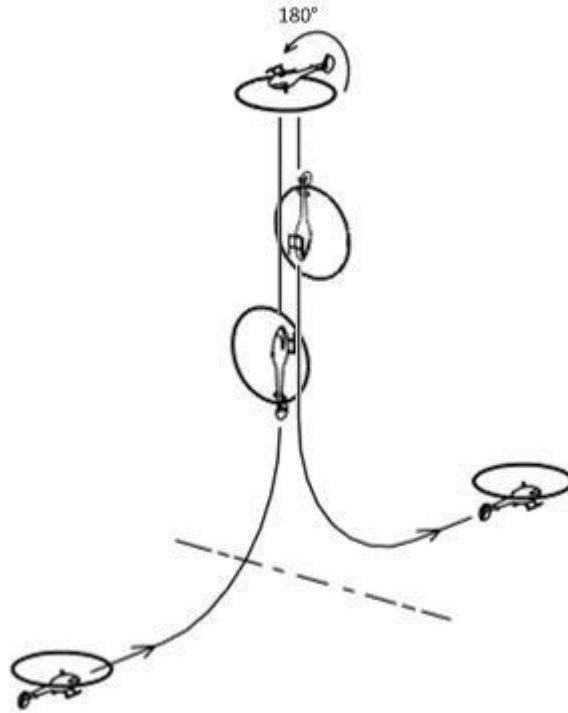
Points will also be deducted for the following reasons:

1. The radii of each segment is not the same
2. The main shaft of the model drifts away from flag and/or the model does not maintain a constant height during the pirouettes
3. Pirouettes are not in opposite directions

**E3 Candle with pulled Flip - Downwind/Downwind**

Model flies straight and level for a minimum of 10m then climbs vertically with a smoothly rounded curve of 90° for a minimum of 10m. Before the model comes to a stop, the model performs a pulled 180° flip to a vertical position so that the nose points downward. The model performs a vertical descent followed by smoothly rounded 90° curved pull out at the same altitude and heading as at the start of the manoeuvre.

*Note: The 180° pulled flip must be performed so that the model is travelling upwards during the first 90° and downwards during the final 90°*

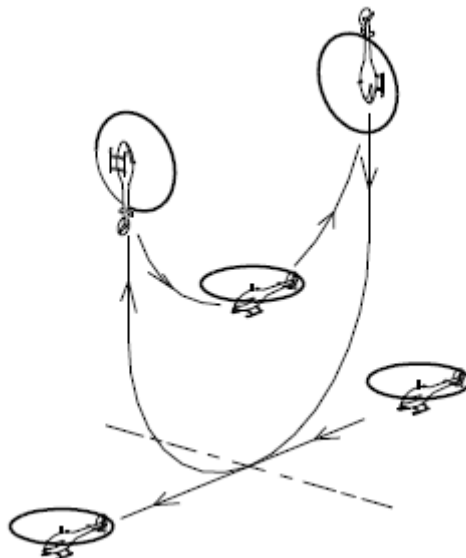


Points will also be deducted for the following reasons:

1. The model does not climb exactly vertical or does not end its vertical climb.
2. The model does not rotate exactly 180° and/or oscillates before diving.
3. The 90° curves are of different radii
4. Model is not inverted horizontal at the stall point of the vertical upward travel.
5. Entry and exit lines are different altitudes

#### **E4 Pullback with Half loop - Upwind/Upwind**

Model flies straight and level for a minimum of 10m then climbs vertically with a smoothly rounded curve of 90°. After coming to a stop, the Model performs a half backward loop to a vertical tail up stop. The model performs a vertical descent followed by smoothly rounded 90° curved pull out at the same altitude and heading as at the start of the manoeuvre.

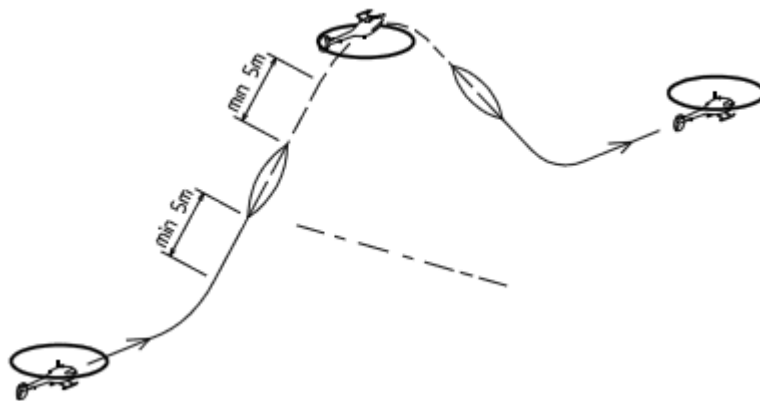


Points will also be deducted for the following reasons:

1. The model does not climb exactly vertical
2. The ½ loop is not round
3. The ½ loop is not centred
4. Stop at back half of loop is different altitude than stop at the start of loop
5. Descent is not vertical
6. Entry and exit loop radii are different.

### **E5 Cobra Roll with Half Rolls - Downwind/Downwind**

Model flies straight and level for a minimum of 10m then climbs in a smoothly rounded curve of 45°. The model flies straight for a minimum of 5m, does a ½ roll to inverted, and continues straight for an additional 5m minimum. At the centreline, the model executes a sharp 90° inside loop. The model flies straight for 5m minimum, does a ½ roll to upright, continues straight for 5m minimum, recovers smoothly to level flight, and flies straight and level.

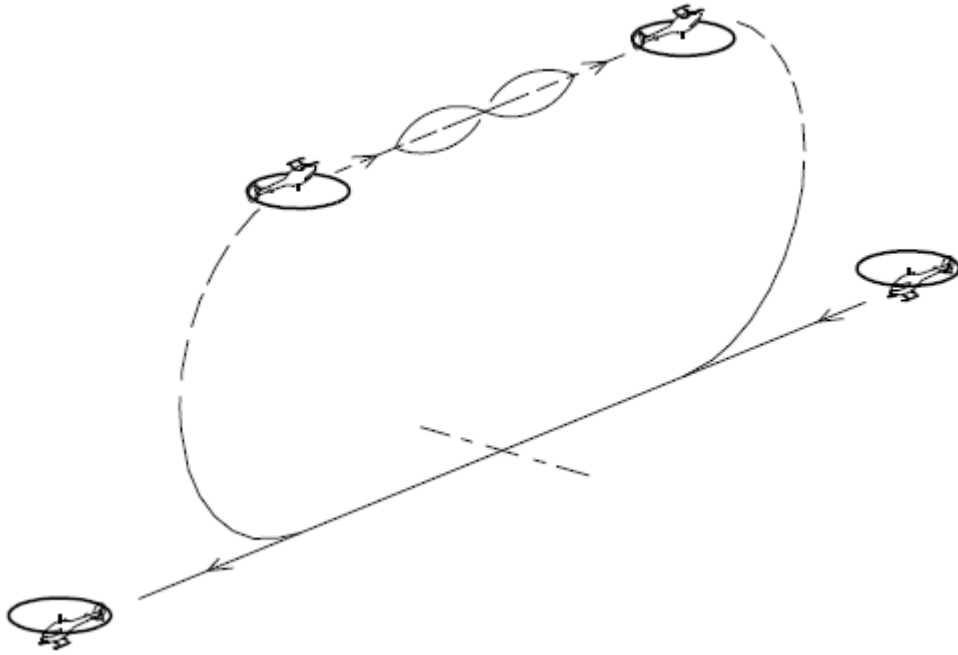


Points will also be deducted for the following reasons:

1. Climb and descent are not 45° to horizontal.
2. Rolls are more or less than 180°.
3. A minimum of 5m in not achieved before and after the rolls.
4. Pull at top is more or less than 90°.
5. Manoeuvre is not centred on the centreline.

### **E6 Oval with Full Roll - Upwind/Upwind**

Model flies straight and level for a minimum of 10m then pulls up into a half loop and flies inverted for a minimum of 1 second. Model then performs a full roll inverted to inverted. Model flies inverted for a minimum of 1 second and performs a half loop. Model pulls into horizontal straight and level flight for a minimum of 10m to exit.

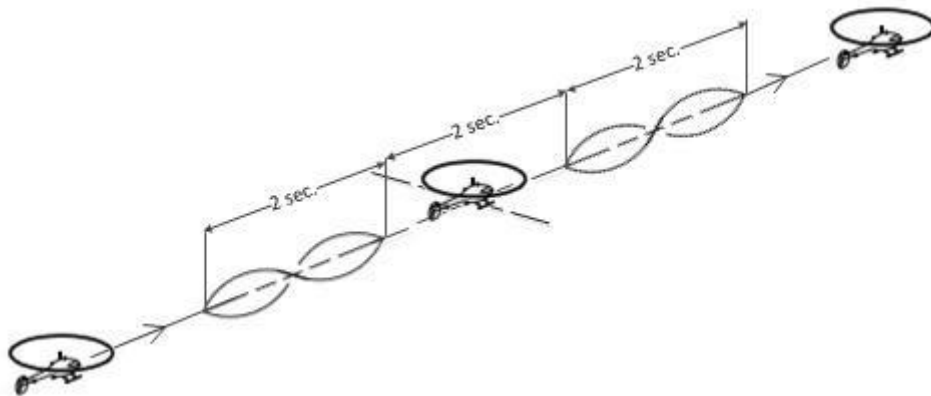


Points will also be deducted for the following reasons:

1. Model performs more or less than  $\frac{1}{2}$  loop up.
2. Roll is more or less than  $360^\circ$ .
3. Roll changes heading.
4. Roll changes altitude.
5. Model performs more or less than  $\frac{1}{2}$  loop down.
6. Entry and exit height are different altitudes.

### **E7 Roll Reversal w/hesitation - Downwind/Downwind**

Model flies straight and level for a minimum of 10m and executes a minimum 2 second roll in either direction. Model then flies a minimum of 2 seconds in the upright segment centred above the centreline and then performs a minimum 2 second roll in the opposite direction and exits the manoeuvre horizontally straight and level.



Points will also be deducted for the following reasons:

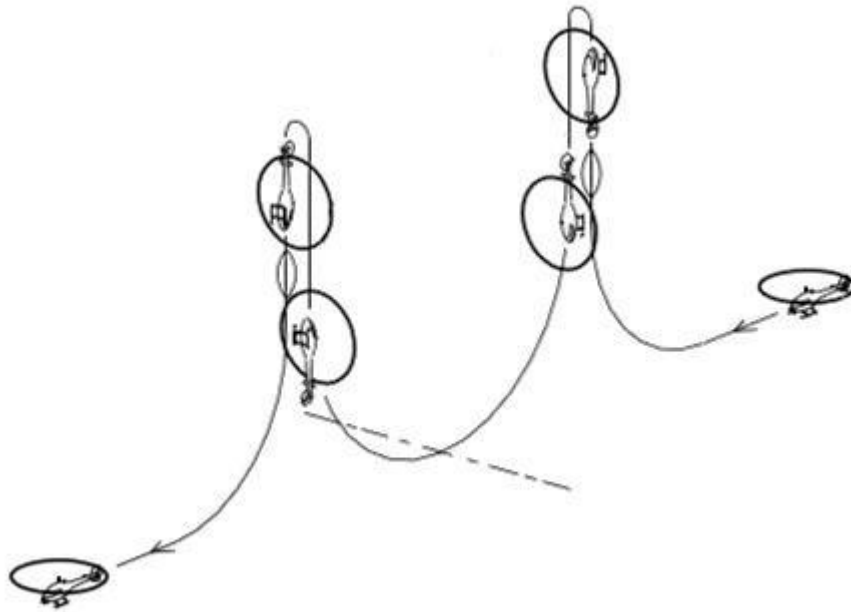
1. Each segment is less than the minimum 2 seconds

2. Model does not maintain longitudinal axis in the direction of flight.
3. Entry and exit height are at different altitudes

### **E8 Double Rolling Stall Turn – Upwind/Upwind**

Model flies straight and level for a minimum of 10m then climbs vertically with a smoothly rounded curve of 90° followed by a half roll in either direction and continues to climb. At the top, model performs a 180° pirouette so that the nose points downward. After diving, the model makes a half inside loop into another stall turn at the same altitude and executes another 180° pirouette so that the nose points downward. Model then makes a half roll in either direction. The model continues the vertical descent followed by smoothly rounded 90° curved pull out at the same altitude and heading as at the start of the manoeuvre.

*Note: Vertical ascent after half roll must be a minimum of one fuselage length.*



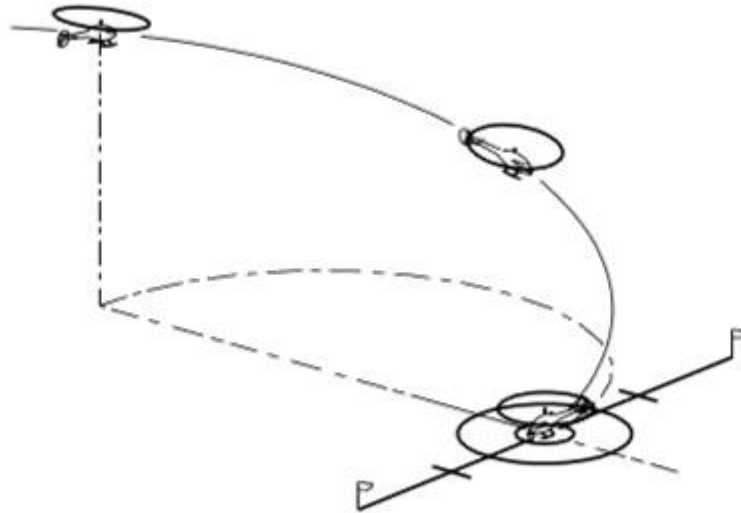
Points will also be deducted for the following reasons:

1. Climbs are not vertical
2. Loop is not round
3. Tops of climb and top of loop are not all same height
4. Rolls are more or less than 180°
5. Manoeuvre is not centred on the centreline.
6. Entry and exit height are at different altitudes

### **E9 180° Autorotation – Downwind/Upwind**

Model flies at a minimum altitude of 20m. Manoeuvre begins when model aircraft crosses the centreline. Model aircraft must be in the auto rotation state (engine must not be driving the main rotor ) before the model crosses the centreline and begins a 180° descending turn to land on the central helipad.

*Note: The flight path of the model aircraft must appear as a semi-circle when viewed from above, starting at the vertical plane and ending at a line drawn from the centre judge through the helipad.*



Points will also be deducted for the following reasons:

1. Model made a hard landing.
2. Model landed while it still had forward speed.
3. Model did not perform an exact 180° turn.
4. Model did not maintain a constant rate of descent during 180° turn.
5. Model did not maintain a constant turning rate during 180° turn.
6. Flight path was stretched or shortened to reach helipad or circle.