

# EUROCUP '83/FAI SCHEDULE

## Definition and Description of manoeuvres and general rules – for the benefit and interest of all

### Welcome Contestants and Spectators to the EUROCUP '83 The European Helicopter Championship

Held at Bretons Sports & Social Centre, Upper Rainham Road, Hornchurch, Essex, England.

Organised by The British Radio Control Helicopter Association and Bretons Flying Club.

Organising Chairman Mr Ron Rees, 50 Thompson Road, Dagenham, Essex.  
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#### TIME TABLE

##### Friday 2nd September, 1983

14.00 Arrival and model testing.  
20.00 Field closed for flying.

##### Saturday 3rd September, 1983

09.00 Contest starts.  
17.30 Contest finishes.  
17.30 Flying off the peg.  
20.00 Field closed for flying.  
1 hour for lunch

##### Sunday 4th September, 1983

07.30 Contest starts.  
12.00 Contest finishes.  
12.00 Results and presentation of prizes.  
13.00 Lunch break.  
14.00 Demonstration flying and show.  
17.30 Field closed for flying.

Disco Buffet – will take place on Saturday evening. Entrance £3/person.

#### Family entertainment

A Fun Fair will be on site over the weekend and a Torch light carnival will also take place on Saturday evening.

#### SPORTSMAN CLASS

##### Definition of Manoeuvres

Allowed time: 10 minutes after take off from the heli-pad. Before starting, competitor will choose 8 manoeuvres which will be presented to the Judges. The 8 manoeuvres will give the score for the final classification.

The programme to be executed in the following order:

1. Hovering
2. Hovering circle (vertical)
3. Hovering square
4. 360° pirouette
5. Top hat
6. Hovering eight
7. Straight forward and backward flight
8. Stall turn
9. 360° turn
10. Hovering circle (horizontal)
11. Approach and landing
12. Spot landing

Each manoeuvre will be awarded marks between 0 and 10. The coefficient of each manoeuvre is  $K = 1$ .

##### Starting

The starting order for the competitors will be established by drawing lots or according to the frequencies used before each flight.

The order of flying in the case of dispute is at the discretion of the Contest Director.

Each competitor is allowed three minutes to start and trim his model: after three minutes if the helicopter does not start, the competitor is penalised by one attempt. The rule is the same for any reason. The competitor can then defer his flight to the end of that round.

##### Starting system

When the previous flight has ended, the next competitor waiting in the starting box will carry his model with the engine running to the starting area (Heli-pad) and wait for the signal from the Judges to start his flight.

##### Definition of a non-viable attempt

A flight is considered non-viable in the event of the following:

- a) Model does not start before the end of the three minute starting time.
- b) Flying time is less than 60 seconds.
- c) Part or pieces of the model fall off or become loose during the flight.

Note: If the engine stops after the announcement by the pilot for his first manoeuvre and before the model takes off he can start again. (Time used for re-starting the engine is deducted from the flying time).

##### Number of allowed attempts

Only one attempt is allowed for each manoeuvre during a round.

If in the case of an attempt outside the pilot's control not being completed, a second attempt is allowed, subject to the discretion of the Contest Director.

##### Official flight

A flight is considered official if the model flies more than 60 seconds. If the first flight is non-viable the second flight is considered official whatever the outcome of that flight.

##### Number of flights

Each competitor will fly two rounds in the case of a small number of entries three flights may be required.

##### Deletion of score

The score is deleted when:

- a) It appears at an inspection, during or after the contest, that the competitor was flying a model which does not comply with the general rules.
- b) If upon checking it appears that parts have been changed after a first inspection.
- c) A part or parts of the model fall off or become loose during the starting or the flight.

##### Timing

Timing is by two time-keepers using digital or mechanical chronometers. Timing begins when the competitor receives his transmitter by the starting box, he then has three minutes to start and trim his model.

This time must not be added to the official flight time. The other time-keeper starts his chronometer when the competitor begins his official flight.

##### Plan of the heli-pad

See FAI F3C – heli-pad plan.

##### Judging

See FAI F3C – 5.4.9.

##### Description of manoeuvres

During all manoeuvres, no fixed location and position of the pilot is required.

##### 1. Hovering

The helicopter lifts off vertically to a maximum height of one metre, hovers for five seconds, the model then climbs vertically to eye level, hovers for five seconds. The model then climbs vertically to twice eye level, hovers for five seconds, then descends smoothly and lands on to the heli-pad.

Points will be subtracted if:

The helicopter tilts, moves horizontally during take-off and ascent.

The model changes altitude and heading.

The model hovers less than five seconds.

Take-off and landing are rough or erratic.

Model does not land completely in the square.

##### 2. Hovering vertical circle

The model climbs vertically to eye level, hovers briefly and draws in the vertical plane a four metre diameter circle, hovers briefly, descends smoothly and lands in the heli-pad.

Points will be subtracted if:

The plane of the circle is not vertical.

Model changes its heading and speed.

Circle is not well drawn.

Descent and landing are not smooth.

##### 3. Hovering square

The model in the outer heli-pad climbs vertically to eye level, hovers briefly and follows by the right or the left side of the square without changing its heading. Stops above the outer heli-pad, hovers briefly, descends smoothly, and lands on the outer heli-pad.

Points will be subtracted if:

Model changes its heading, speed and altitude.

Sides are not straight.

Take-off and landing are not vertical and smooth.

##### 4. 360° pirouette

The model takes off from the central heli-pad, climbs vertically, hovers, briefly at eye level and performs at a constant altitude a 360° rotation about the yaw axis, hovers briefly, descends vertically and lands in the heli-pad.

Points will be subtracted if:

Model tilts, moves horizontally during climb or landing.

Rotation is not made on the yaw axis or is not exactly at 360° rotation, regular and slow.

Model changes altitude during rotation or stops.

Take-off or landing is not smooth.

# EUROCUP '83/FAI SCHEDULE

## 5. Top hat

The model flies at eye level three metres forward to the outer heli-pad, straight and at a constant altitude and speed. Stops hovers briefly above the outer heli-pad and starts a vertical climb of three metres. Hovers, briefly, flies ten metres forward straight, hovers briefly above the opposite heli-pad and descends vertically at eye level hovers briefly and flies again at eye level three metres forward and at a constant altitude.

Points will be subtracted if:

Model does not fly vertically or horizontally.

Model changes its heading and altitude.

The plane of the manoeuvre is not vertical.

Stops are not above the required heli-pads.

Brief hovering is not executed at the described locations.

## 6. Horizontal eight (fixed heading)

The model on the central heli-pad takes off and climbs up vertically to eye level, hovers briefly and performs a figure eight, nose into the wind either to the right or left. The model has to pass over the four flags of the square, stops vertically above the central heli-pad, hovers briefly descends and lands in the central heli-pad.

Points will be subtracted if:

Take-off and landings are not smooth.

Climb and descent are not vertical.

Model tilts, turns or moves horizontally during climb and descent.

The flight is not at eye level.

## 7. Straight forward and backward flight

The model takes off from the central heli-pad and performs a translational flight into the wind of approximately 50 metres, flies a 180° turn either left or right and flies back over the central heli-pad at a constant altitude.

Points will be subtracted if:

Altitude is not constant.

The turn is not regular.

After the turn speed and altitude are not constant.

The model does not fly above the central heli-pad.

## 8. Stall turn

See fig. 10 of FAI F3C programme, page 45 for description.

## 9. 360° flying turn

The model takes off from the outer heli-pad, climbs up vertically to eye level hovers briefly, and at a constant altitude and speed, performs a 360° turn either left or right around the four flags of the square maintaining longitudinal axis in alignment with the flight path. Stops hovers briefly above the outer heli-pad descends vertically and lands in the outer heli-pad.

Points will be subtracted if:

Take-off and landing are not smooth.

Climb or descent is not vertical.

Model does not maintain constant speed and altitude during the turn.

The circle is not regular.

Model longitudinal axis is not in alignment with the flight path.

## 10. Hovering circle

See fig. 2 of FAI F3C programme, page 42 for description.

## 11. Spot landing

From the central heli-pad model climbs vertically to eye level and hovers briefly, flies forward at a constant height over the second box hovers briefly and descends vertically landing in the heli-pad. Model lifts vertically to eye level hovers briefly flies forward at a constant height over the third box hovers briefly, descends vertically and lands in the heli-pad. Pilot to remain in his heli-pad at all times.

Points will be subtracted if:

Take-off and landing are not smooth.

Climb and descent are not vertical.

Model tilts, turns or moves horizontally during climb and descent.

The flight is not at eye level.

The model lands outside the heli-pads.

The pilot moves out of his heli-pad.

## 12. Landing

See fig. 20 of FAI F3C programme.

## 5.4. Class F3C helicopter

*General rules see also 1.4.15. (Sporting Code)*

### 5.4.1. Definition of a radio controlled helicopter

A helicopter is a heavier-than-air aeromodel which derives all of its lift and horizontal propulsion from a power driven motor system(s) rotating about a nominally vertical, axis (or axes). Fixed horizontal supporting surfaces, up to 4% of the swept area of the lifting rotor(s) are permitted. A fixed or controllable horizontal stabilizer up to 2% of the swept area of the lifting rotor(s) is permitted. Ground effect machines (hovercraft), convertiplanes or aircraft which hover by means of a propeller slipstream(s) deflected downward are not considered to be helicopters.

### 5.4.2. Prefabrication of the model

*Permitted:* A helicopter which is assembled by the builder from prefabricated parts and in which the builder installs the equipment.

*Not permitted:* Models which are completely prefabricated and require only a few minutes of unskilled effort for their completion or complete ready to fly models which have been built by a person other than the pilot.

### 5.4.3. General characteristics

*Area:* Maximum swept area of the lifting rotor(s) counting only once any area of superimposition, 300dm<sup>2</sup>, except for coaxial helicopter whose rotors are further than one rotor radius apart, in which case the total area of both rotors is counted.

*Weight:* Maximum 6kg without fuel.

*Motor:* Piston motor displacement: Maximum 10cm<sup>3</sup>; electric or extensible

motors: no restrictions.

*Tail gyro:* An electronic rate gyro is permitted on the yaw axis only.

*Rotor blades:* Metal main or tail rotor blades are forbidden. Knife edge leading edges are forbidden on main and tail rotor blades. No metal in or on the rotor blades is permitted except at the blade attachment points.

*Contest area layout:* A descriptive sketch is provided in the annex.

### 5.4.4. Number of helpers

Each pilot is permitted one helper.

### 5.4.5. Number of flights

Each competitor is in principle entitled to three official flights.

### 5.4.6. Definition of an official flight

There is an official flight when the pilot is officially called, whatever the result. The flight may be repeated, at the Contest Director's discretion when for any unforeseen reason outside the control of the competitor the model fails to make a start, such as:

- The take-off cannot be made within the allowed time limit due to safety reasons.
- The competitor can prove that take-off was hindered by outside interference.
- Judging was impossible for reasons outside the control of the competitor (model, engine, or radio failure are not considered outside the control of the competitor).

In such cases take-off may be repeated immediately after the attempt, or, after reporting to the Contest Director, during the same round, or with the approval of the Contest Director, after the round.

### 5.4.7. Marking

Each manoeuvre may be awarded marks between 0 and 10 by each of the judges during the flight. These marks are multiplied by a coefficient which varies with the difficulty of the manoeuvres. Any manoeuvre not completed shall be scored zero (0). The manoeuvres must be performed in an air space which will allow them to be seen clearly by the judges, approximately 60 degrees vertically and 90 degrees horizontally. The non-observance of this rule will be penalised by loss of points. There shall be an official located in a position where any flight over spectators can be observed, and a visual and audible signal shall be given to indicate such over flights. If this happens before a manoeuvre is completed no points shall be given for the manoeuvre. The judges shall score all manoeuvres. If an infringement has been made the scores will be deleted on all cards.

- The competitor flies a model that has been flown in the same contest by another competitor, or flies a model that does not comply with the definition and general characteristics of a radio controlled helicopter.
- The competitor starts his model not in the prescribed starting sequence.
- The competitor does not deliver his transmitter to the compound or operates his transmitter during the rounds without permission.
- The competitor does not release his model at the prescribed take-off point or requires the assistance of more than one helper.
- The competitor gets his transmitter from the compound before the first call.
- The competitor switches on his transmitter before the second call to start his engine and adjust the model.
- The competitor enters the take-off square (heli-pad) before the final call to fly.

### 5.4.8. Classification

The final classification will be determined by the sum of the best two flights. In the case of a tie for first place, the final result will be established by a fly-off. Any fly-off must take place within one hour of the normal finishing time of the contest. If only one flight has taken place the final classification will be obtained by this one flight. If two flights have taken place the final classification will be obtained by counting the points of the best of the two flights.

### 5.4.9. Judging

- The organiser must appoint a panel of at least three judges for each flight. The judges shall preferably be of different nationalities and be elected from a list of persons who are approved by the National Aero Club and the CIAM. A rotation system or equivalent systems may be used so that each judge will score each contestant an equal number of times. The specific system to be employed at a World Championship must be stated in advance by the organisers and must have prior approval by the CIAM or CIAM Bureau.
- There shall be training flights for judges with a briefing before and after to be held immediately before every World Championship.

### 5.4.10 Organisation for radio controlled helicopter contest

All transmitters to be used during the contest must be checked and placed in a compound kept under observation. During the contest a steward must be in control of the transmitter compound and he will issue the transmitter to the competitor when his name is called to stand by the starting box. As soon as the flight has ended the competitor must immediately return his transmitter to the transmitter compound. All unauthorised transmissions during the contest will result in automatic disqualification of the offender from the entire contest and render him liable to further penalties. The order of starting of the competitors will be established by means of a drawing before the start of the contest. No two flyers in succession may use the same radio frequency. If this situation turns up as a result of the drawing, the second person drawn on a given frequency shall be placed at the next convenient place. A competitor must be called at least five minutes before he is required to enter the starting box. A starting box at least 2 metres square will be provided away from the flight line and a safe distance from spectators, competitors and models. The competitor is given five (5) minutes to start his engine and make last minute adjustments without the model leaving the starting box or rising above eye

# EUROCUP '83/FAI SCHEDULE

level. When the flight in progress is completed the competitor in the starting box flies his helicopter directly to the central heli-pad and awaits the signal from the judges to begin his flight. At this time the next competitor moves to the starting box and another competitor is called to stand by.

*If the competitor in the starting box fails to get ready within five (5) minutes the timer will start the watch measuring the allotted time for the set of manoeuvres.*

## 5.4.11. Schedule of manoeuvres for radio controlled helicopters

The manoeuvres are in two groups: Required and Optional. The pilot is given ten (10) minutes to complete the total group of manoeuvres in the order they are listed on the score sheet, with the chosen optional manoeuvres underlined by the contestant and numbered in the order they will be executed. The total group of manoeuvres shall consist of 8 manoeuvres of the total group of manoeuvres:

- It is compulsory to do manoeuvres 1, 2 and 3 of the required group.
- 4 manoeuvres selected from 'optional' group.
- It is compulsory to finish with manoeuvres 19 or 20 from the required group.

If the allowed time expires before a manoeuvre is completed, that manoeuvre will be scored zero and the pilot is required to land as soon as possible. A landing is not required to be one of the optional manoeuvres. A new score sheet is issued for each contestant for each round. Only the contestant's number, not his name or nationality, will appear on the score sheet. The required manoeuvres are executed as described with landings performed only where listed.

The optional manoeuvres should be performed in a smooth flowing sequence. Preferably one manoeuvre should be performed on each pass before the judges. The pilot need not perform the same set of optional manoeuvres on every flight.

The name of each manoeuvre and its start and finish must be announced by the pilot or his helper. *Unannounced manoeuvres will not be scored.* The competitor may make only one attempt to execute each manoeuvre during any one flight.

## Description of manoeuvres

### 5.4.12 Required manoeuvres

The pilot stands in square midway between flags 1 and 4 of the 10 metre square except for horizontal eight and rectangular approach and landing.

#### 1. Hovering MK = 6

Pilot stands in the outer heli-pad, model takes off from central heli-pad and climbs vertically to eye level, hovers briefly. Whilst heading constantly into the wind, model moves along diagonal line to flag 1 at the near right corner, hovers briefly moves forward to flag 2, hovers briefly and so on to flag 3 and 4 and then to a point over the heli-pad, hovers briefly and descends smoothly to the heli-pad. Points will be subtracted for the following reasons:

- Model tilts, turns, or moves horizontally during take-off and climb.
- Model changes altitude, heading or speed during horizontal flight.
- Model goes off course or fails to hover directly over flags.
- Take-off or landing is rough or sudden.
- Model does not land completely on heli-pad.
- Pilot steps out of the outer heli-pad.

#### 2. Hovering circle KI = 6

Pilot stands in the outer heli-pad, model takes off from central heli-pad, climbs vertically to eye level and hovers briefly. Model flies sideways to left or right, holding constant altitude, maintaining constant distance from pilot and keeping tail always pointed towards pilot until it returns to starting point directly over the central heli-pad, model lands. Complete circle must have a diameter of about 10 metres.

Points will be subtracted for the following reasons:

- Take-off and landing rough or with heading changes.
- Take-off or landing non-vertical.
- Altitude changes during flight, radius or circle not constant and tail does not always point towards pilot.
- Model does not land completely on heli-pad.
- Speed changes during flight.
- Pilot steps out of outer heli-pad.

#### 3. Horizontal eight K = 8

Pilot chooses a fixed location and positions himself accordingly. Model takes off from central heli-pad, climbs vertically to eye level and hovers briefly, then starting forward begins a circle turning either right or left, maintaining longitudinal axis in alignment with the flight path. The circle passes over the two flags on one side of the square and ends over the centre of the heli-pad. Without slowing down the model continues and makes a circle in the other direction, flies over the other two flags and returns to a point over the centre of the heli-pad, hovers and descends smoothly and vertically onto the heli-pad and lands.

Points will be subtracted for the following reasons:

- Take-off and landing not smooth.
- Climb or descent non-vertical.
- Model tilts, turns or moves horizontally during climb or descent.
- Model does not maintain constant speed and altitude during circles.
- Model's longitudinal axis is not in alignment with the flight path.

- Circles are not round, equal and do not pass directly over the flags.
- Pilot moves away from the fixed location chosen by him.

#### 5.4.12.19. Landing K = 6

The model begins the manoeuvre at an approximate height of 20 metres and descends at an approximate angle of 45 degrees to land smoothly, without stopping, in the central heli-pad. (ie No hovering above the heli-pad before touchdown.)

Points will be subtracted for the following reasons:

- Erratic flight path.
- Yawing motion of model.
- Overshooting the heli-pad.
- Landing roughly or not completely on the heli-pad.

OR

#### 5.4.12.20. Autorotation K = 9

The model approaches the heli-pad on a final minimum altitude of 20 metres and flies at a speed which requires less power than the stationary flight. When it reaches a position, depending on the wind, where an autorotative descent will bring it approximately on the heli-pad, the model must reduce the collective pitch to obtain the optimum autorotation.

The engine must be stopped. Touchdown should be made without the help of the engine and the model should land as close as possible to the centre of the heli-pad. To achieve a maximum score of 10 points landing must be on heli-pad. If the model lands inside of the 10 metre landing square, the maximum score is 9 points. If the model lands outside of the landing square the score is 5 points. *The maximum score can only be achieved with a perfectly executed landing.*

Points will be subtracted for the following reasons:

- Brutal landing.
- The model lands while it still has a forward translation speed.
- The model deviates from a straight line whilst descending, except when touching down.
- Yawing of the helicopter.
- If the engine is re-engaged during the manoeuvre, zero points are awarded.

#### 5.4.13. Optional manoeuvres

For the Loop, Immelman, Stall turn and the Rolling Stall turn the ideal altitude should be 10 metres, and the diameter of the manoeuvre should also be 10 metres.

#### 4. Double pirouette K = 8

Pilot stands in outer heli-pad, model takes off from central heli-pad, climbs vertically, hovers briefly and at a constant altitude performs a slow 720 degree rotation about the yaw axis, hovers and descends vertically towards the heli-pad where it lands softly. The highest points will be given to a rotation made at eye level.

Points will be subtracted for the following reasons:

- Model tilts, turns or moves horizontally during climb or descent.
- Rotation is not made on the yaw axis or is not exactly at 720 degrees regular and slow.
- Short stops are not marked.
- Model changes altitude during rotation or stops.
- Take-off or landing is rough.
- Pilot steps out of the outer heli-pad.

#### 5. Top hat K = 8

The pilot stands at a fixed position chosen by him, the model flies at eye level 10m forward, straight and at a constant altitude. It hovers briefly vertically above the outer heli-pad and starts a vertical climb of 2m. Hovers briefly, rotates then slowly 360 degrees to the left or the right about the yaw axis. Hovers briefly and climbs again for 2m. Hovers briefly and moves forward for about 10m, at a straight and constant altitude until it is vertically above the opposed heli-pad where it hovers briefly. Then it descends 2m vertically, hovers briefly, makes a slow 360 degrees rotation about the yaw axis, to the right or left, hovers again briefly. Descends again 2m vertically and hovers briefly. The model flies again at eye level 10m forward, straight and with a constant altitude. The direction of 360 degrees rotation in ascending and descending must be opposite to each other.

Points will be subtracted for the following reasons:

- The model does not fly horizontally or vertically in the described parts.
- Altitude changing or horizontal deviation during the 360 degrees rotations.
- Deviation of the vertical plan of the manoeuvres.
- Brief hoverings are not made at the described place.
- The rotations are not equal to 360 degrees or irregular or not performed about the yaw axis of the model.
- The 360 degrees rotations are performed at different altitudes.
- The rotations are not performed in the described directions or not vertically above the heli-pad.
- The described altitudes are not respected.
- The pilot leaves the fixed point chosen by him.

#### 6. Nose-in circle K = 9

The pilot stands in the outer heli-pad, the model takes off with the nose pointed towards the pilot from the central heli-pad, climbs vertically to eye level and hovers briefly. The model flies then sideways to the left or right, maintaining a constant altitude, maintaining a constant distance from the pilot and keeping the nose always pointed towards the pilot until it returns directly above the central heli-pad and lands slowly, keeping the nose towards the pilot. The diameter of the circle shall be approximately 10m.

Points will be subtracted for the following reasons:

- Take-off and landing are rough or with heading changes.

# EUROCUP '83/FAI SCHEDULE

- b) Altitude changes during flight, the radius of the circle is not constant or the front of the model is not always pointed towards the pilot.
- c) The model does not land entirely on the heli-pad.
- d) The speed changes during the flight.
- e) The pilot steps out of the outer heli-pad.

## 7. *Shovel K = 9*

Pilot stands in the central heli-pad facing the model which has an altitude of 20 metres. Model begins a slow descent of 45 degrees towards the outer heli-pad directly in front of the pilot. Model stops at eye level height vertically in line with outer heli-pad, hovers briefly. Model now flies sideways either right or left towards the corner of the square and hovers.

In stationary flight model executes a 90 degrees turn around its yaw axis, hovers briefly. Model now flies sideways towards the next outer heli-pad, begins a half nose in circle around the pilot to the opposite outer heli-pad and continues sideways to the corner, hovers briefly. Model executes again a 90 degrees turn around its yaw axis, hovers briefly and moves sideways to the outer heli-pad in front of the pilot, hovers briefly. Model executes a slow 180 degrees rotation around the yaw axis, hovers briefly and regains the original 20 metres altitude by a 45 degrees ascent at the same speed as the initial descent.

Points will be subtracted for the following reasons:

- a) During descent or climb model tilts, changes heading or speed and these are not maintain at 45 degrees.
- b) Model does not stop exactly above the outer heli-pad and corners of the square.
- c) Deviation from flight path described above and has not maintained constant altitude and speed.
- d) Half nose-in circle was not performed at a constant altitude, radius and speed.
- e) The 180 degrees rotation was not made on the yaw axis.
- f) Model has not made a 90 degrees turn over the corners of the square.
- g) Pilot steps out of the central heli-pad.

## 8. *Pilot's promenade K = 8*

Model takes off from central heli-pad, climbs vertically to eye level, remains stationary on a fixed course. Pilot commences a slow, even circular walk around his model.

Points will be subtracted for the following reasons:

- a) Model tilts, turns or moves horizontally during take-off, climb, descent or landing.
- b) Model changes altitude or course during stationary position.
- c) Pilot walk is irregular.
- d) Model does not land completely on central heli-pad.

## 9. *Four point pirouette K = 9*

Pilot stands in outer heli-pad. Model takes off from the central heli-pad, climbs vertically to eye level, hovers briefly, and at a constant altitude performs a slow 360 degrees turn around the yaw axis with a marked stop of at least 2 seconds every 90 degrees. Model lands vertically on the central heli-pad.

Points will be subtracted for the following reasons:

- a) Model tilts, turns or moves horizontally during climb or descent.
- b) Rotations are not made on the yaw axis and are not exactly of 90 degrees each time, regular and slow.
- c) The stops are less than 2 seconds each.
- d) Model changes altitude during rotations or stops.
- e) Take-off or landing is rough.
- f) Pilot steps out of the outer heli-pad.

## 10. *Stall turn K = 6*

The model flies straight and horizontal for about 20 metres, climbs then vertically with a smoothly rounded curve of 90 degrees. At the precise moment the vertical climb stops, the model turns 180 degrees about its yaw axis half a rotation, so that the nose points downwards. While diving, the model follows the same path as when it started the manoeuvre. The radii of curves whilst ascending or descending, in turns, must be the same.

Points will be subtracted for the following reasons.

- a) The model vibrates, changes heading or altitude during the horizontal flights.
- b) The curve which brings the model in a vertical climb is too wide or too sudden.
- c) The model does not climb exactly vertical or does not end its vertical flight.
- d) The model drifts away during the vertical flight or rotation.
- e) The model does not turn exactly 180 degrees and vibrates before diving.
- f) The model ends the manoeuvre on a different flight path as the one it started on.
- g) The speed changes during the flight or after turning.
- h) The manoeuvre is not performed directly in front of the Judges or is performed too high.

## 11. *Looping K = 8*

The model flies straight and horizontal for about 10 metres. It climbs for a looping while maintaining the nose in the direction of flight. The model ends the looping and flies again straight and horizontal for about 10m, on the same heading and same altitude as at the start of the manoeuvre.

Points will be subtracted for the following reasons:

- a) The model vibrates, changes heading or altitude during the horizontal flight.
- b) The looping is not round or is too small.

- c) The model vibrates or does not stay in the vertical plane it started the looping with.
- d) The looping ends on a different altitude or heading than that of the start.
- e) The speed is not constant during the flight.
- f) The looping is not performed in front of the Judges or is performed too high.

## 12. *Split S K = 8*

The model flies straight and horizontal for about 20m. by making half a roll on the flight-path the model goes to inverted flight and maintains this for a short moment before it starts a half downward circle which brings it back to the normal flight altitude, it continues its route by flying straight and horizontal on a heading opposed to the one it started with. It covers about 20m.

Points will be subtracted for the following reasons:

- a) The model vibrates, changes heading or altitude during the horizontal flights.
- b) The speed is not constant during the manoeuvre.
- c) The model vibrates or does not stay in the vertical plane it started the Split S with.
- d) The half roll is not on the axis of the horizontal flight.
- e) The inverted flight is not distinctly separated before the half circle is performed.
- f) The half circle is not round or is too small.
- g) The Split S is not ended on a heading directly opposed to the one of the start.
- h) The manoeuvre is not exactly performed in front of the Judges or is performed too high.  
Ideal start and end altitudes are 20 and 10 metres respectively.

## 13. *Immelman K = 8*

**As for Split S** (also called Inverted Immelman), but the model makes the half circle upward and a short inverted flight before making the half roll which brings it in a straight and horizontal flight.

## 14. *Observation K = 10*

Pilot stands in central heli-pad. The model, nose to the square at a distance of at least 20 metres from the square and at an altitude of 5 metres approaches the square in line with the outer heli-pad facing the pilot at a constant slow speed. Model stops vertically above this outer heli-pad, hovers briefly and executes a slow 360 degrees rotation around the yaw axis at a constant altitude. Model hovers briefly, descends vertically to eye level height and executes a slow four point pirouette. Model hovers briefly, climbs vertically to the initial altitude of 5 metres executes a slow 180 degrees rotation around the yaw axis at a constant altitude and flies away horizontally in the opposite direction of its initial approach.

Points will be subtracted for the following reasons:

- a) During the horizontal flights, model changes altitude, tilts, flies at a non constant speed.
- b) Model does not stop exactly above the heli-pad.
- c) Descent and climb are not vertical and smooth.
- d) Rotations are not on the yaw axis, regular and slow.
- e) The stops during the 4 point pirouette are less than 2 seconds each.

## 15. *Roll K = 9*

The model flies straight and at a constant altitude of about 10 metres starts a slow roll in either direction around an axis which coincides with the line of flight and continues this roll in the same direction until it flies again horizontally and at a constant altitude for about 10 metres.

Points will be subtracted for the following reasons:

- a) The roll is too fast, too long or too short.
- b) The model loses altitude during the roll.
- c) The model ends the manoeuvre on a different heading from that on which it started on.
- d) The manoeuvre is not performed exactly in front of the Judges or is performed too high.

## 16. *Rolling stall turn K = 9*

The model flies straight and level for about 10 metres, then ascends vertically. During vertical ascent it performs, a half axial roll. At the end of vertical ascent, the model performs a 180 degrees tail rotor turn followed by a vertical dive and horizontal recovery. The manoeuvre is completed with a 10 metre horizontal flight at the same heading and altitude as at the start of the manoeuvre. The radii of curves whilst ascending or descending in turns must be the same.

Points will be subtracted for the following reasons:

- a) The model vibrates, changes heading or altitude during the horizontal flights.
- b) The 90 degrees curves are too wide or too sudden.
- c) The model is not precisely climbing or diving vertically.
- d) The half roll is not in the axis of the vertical climb.
- e) The model does not turn 180 degrees precisely around its yaw axis and vibrates before diving.
- f) The model is not on the same heading and has not the same altitude before the vertical climb and after the horizontal recovery which follows the dive.
- g) The manoeuvre is not exactly performed in front of the Judges or is performed too high.

## 17. *540 degrees stall turn K = 8*

**As for the stall turn**, but the model turns 540 degrees, that is one and a half rotations before descending vertically.