# Annex B  Description of compulsory manoeuvres F3N-Freestyle
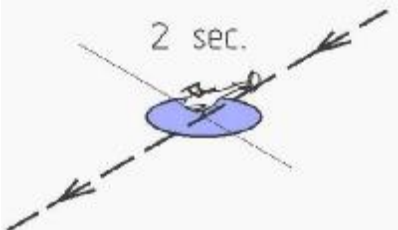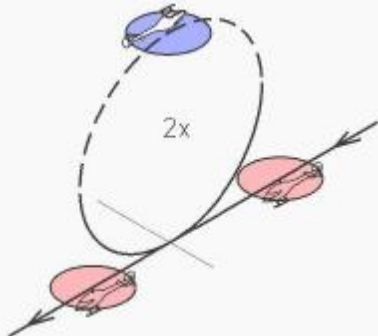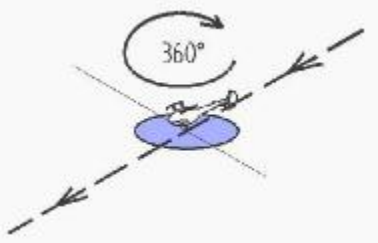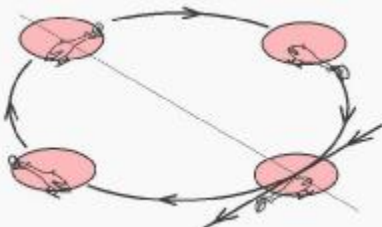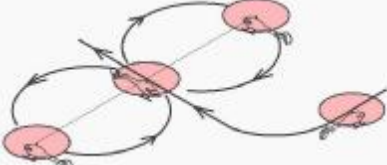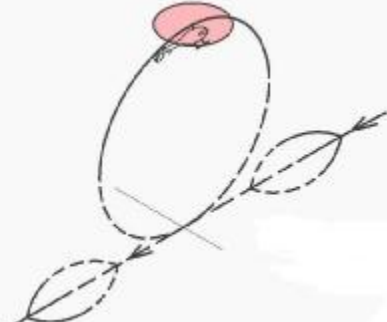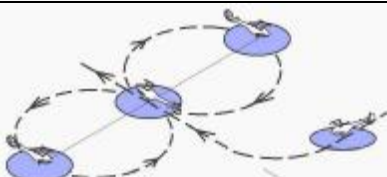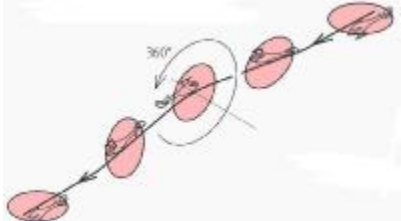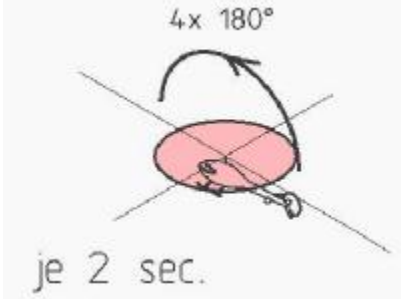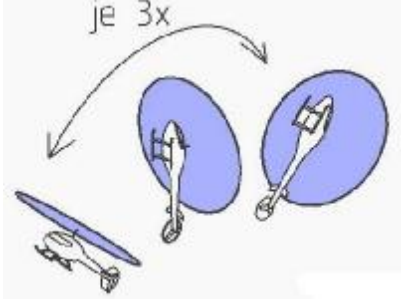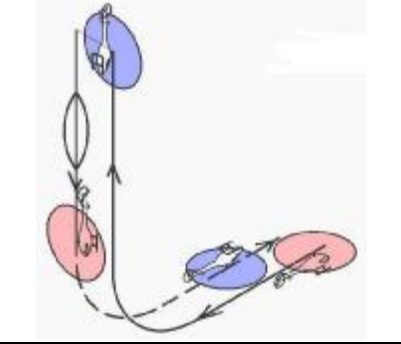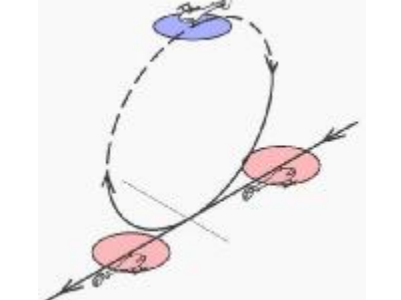
**General:**
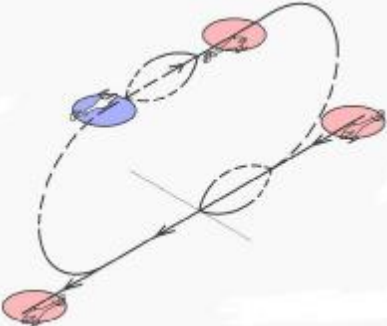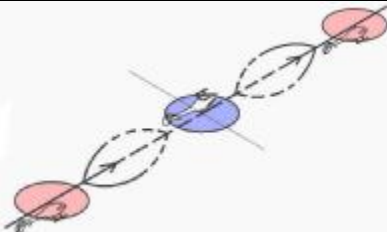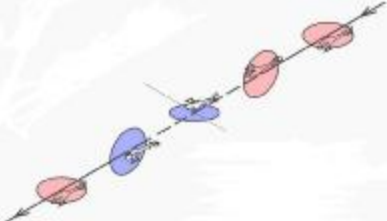The competitor or his caller must announce the name and start and finish of each manoeuvre. All aerobatic manoeuvres start and end with a straight and level flight of 10 metres minimum length parallel to the judge's line. All manoeuvres from stationary flight start and end with a hovering of at least 1 second with the model parallel or vertical to the flight line.
All manoeuvres (considering also entry and exit) should be performed symmetrical to the centerline. For safety reasons, a minimum altitude of 5 metres on aerobatic and 2 metres on hovering manoeuvres should be kept.
The drawings illustrate the manoeuvres. In case of a dispute the following text takes precedence over the drawings. All manoeuvres can also be flown in opposite direction as shown in the drawings.

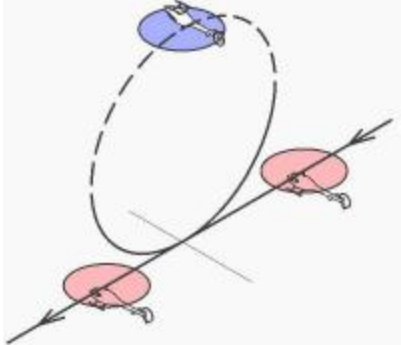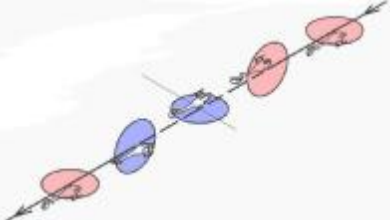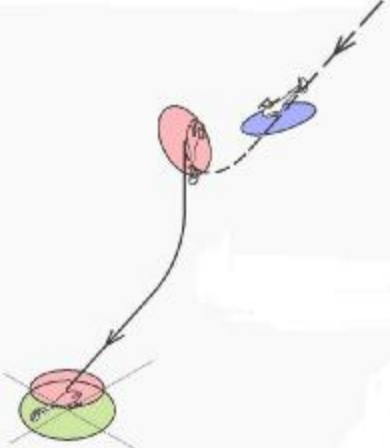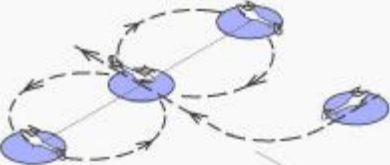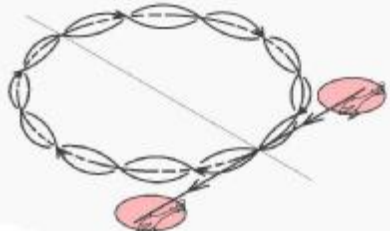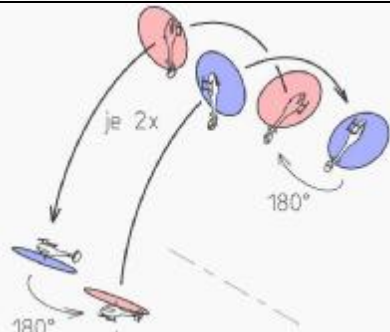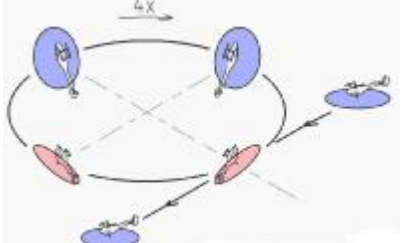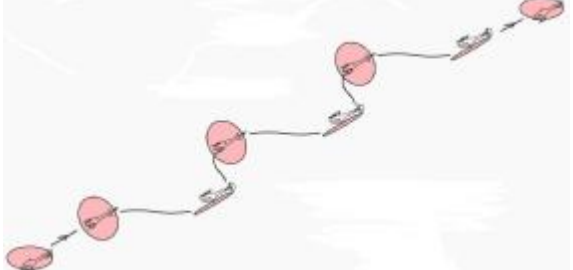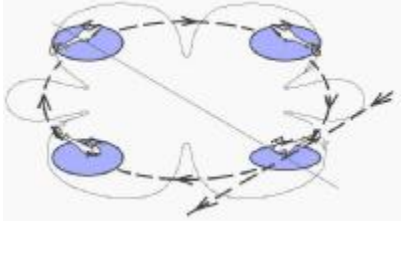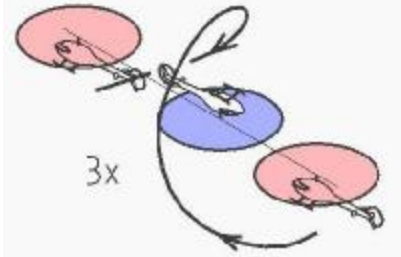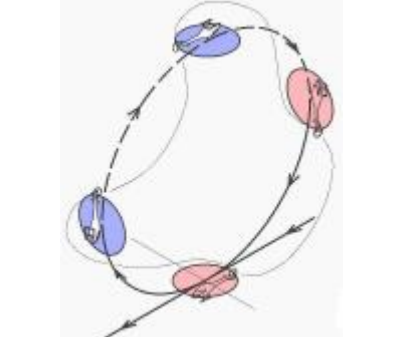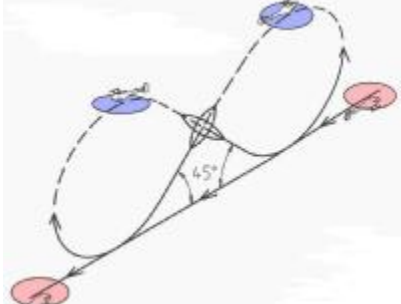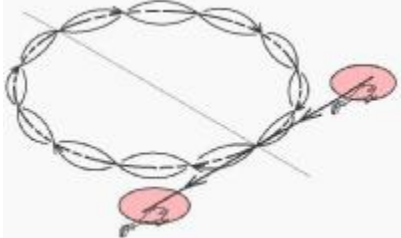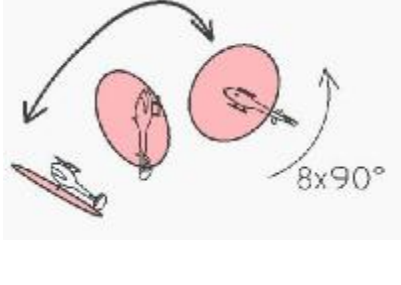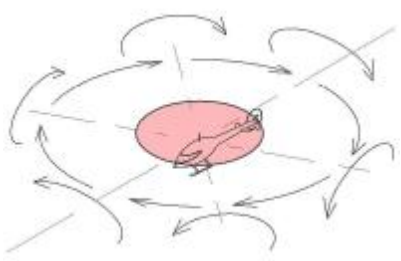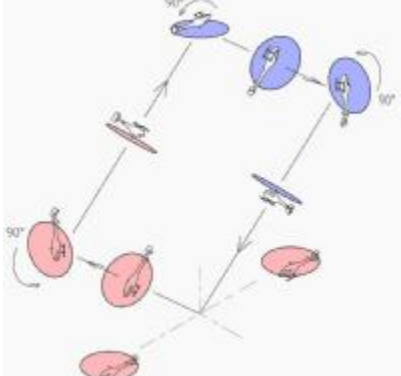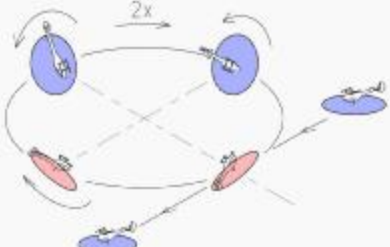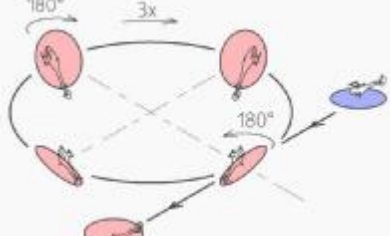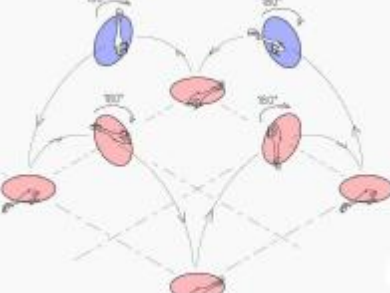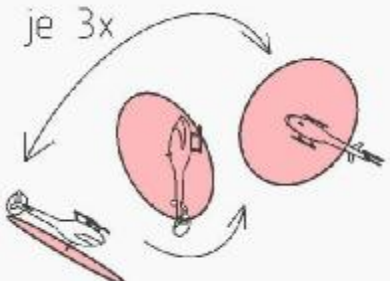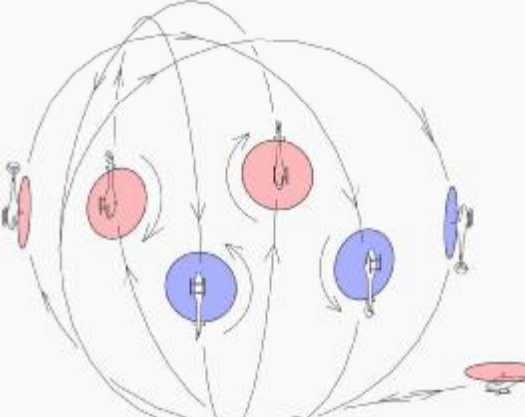| Nr.: | Drawing | Name and description | K-factor |
|---|---|---|---|
| 1. |  | **Immelmann**<br>Model executes a half inside loop immediately followed by a half roll to upright flight. | 3 |
| 2. |  | **Inverted hovering**<br>Model approaches slowly in inverted flight, stops in an altitude of 5-10 metres for at least 2 seconds and transitions to a slow inverted forward flight. | 3 |
| 3. |  | **Double inside loop**<br>Model enters the first loop, immediately followed by the second loop. Loops are in same plane and location (superimposed). | 3,5 |
| 4. |  | **Inverted pirouette**<br>Model hovers in inverted flight and performs a slow (at least 4 seconds) 360°-pirouette, maintaining its lateral position. | 3,5 |
| 5. |  | **Circle backwards**<br>Model enters the manoeuvre backwards in upright flight and executes a horizontal circle aligned to the centerline. | 3,5 |

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|---|---|---|---|
| 6. | | **Double Immelmann**<br>Model executes a half inside loop immediately followed by a half roll to upright flight. After a straight flight of about 20 metres model performs a half outside loop, again immediately followed by a half roll to upright flight. | 4 |
| 7. | | **2-point roll**<br>Model enters in upright flight, and then performs a half roll followed by a recognisable straight segment in inverted flight and another half roll back to upright flight. | 4 |
| 8. | | **Double roll backwards**<br>Model enters in upright backward flight and executes two consecutive axial rolls. | |
| 9. | | **4-point roll**<br>Model enters in upright forward flight and then performs 4 quarter rolls, separated each by a recognisable straight segment of the same duration. | 4,5 |
| 10. | | **Backwards figure 8**<br>Model enters in upright backward flight parallel to the judges line, executes a 90°-turn to a straight flight over the centerline and then performs a horizontal eight, consisting of two 360° circles. | 4,5 |
| 11. | | **Double outside loop**<br>Model enters the first loop from inverted forward flight, immediately followed by the second loop. Loops are in same plane and location (superimposed). | 5 |
| 12. | | **Inverted figure 8**<br>Model enters in inverted forward flight parallel to the judges line, executes a 90°-turn to a straight flight over the centerline and then performs a horizontal eight, consisting of two 360° circles. | 5 |

| 13. | | **Knife edge pirouette backwards**<br>Model enters in upright forward flight, transitions to a slight ascent (max 15°) and executes a quarter roll. After a recognisable straight segment model performs a 360°-pirouette, followed by another straight segment and a quarter roll in opposite direction to the first to upright flight. | 5,5 |
|---|---|---|---|
| 14. | | **4 half flips forward**<br>Model hovers in upright position, then executes four half flips forward (pushed), separated each by a hovering of about 2 seconds. Model maintains its position during the manoeuvre. | 5.5 |
| 15. | | **Loop sideways**<br>Model enters in upright sideways flight and performs an inside loop with the longitudinal axis always vertical to the flight path. | 5,5 |
| 16. | | **TicToc (Metronome)**<br>Model hovers or moves slowly and is brought to vertical position (Nose up). It maintains its position by rotating alternately about the lateral axis for about 45° in each direction. Both 45°-positions have to be reached at least three times. The tail rotor stays almost in the same position during the manoeuvre. | 6 |
| 17. | | **0°-turn with half roll**<br>Model enters in upright backward flight and performs a quarter inside loop to a vertical climb and a stop. During the following dive model executes a half roll and a quarter outside loop to inverted forward flight. | 6 |
| 18. | | **Loop backwards**<br>Model enters in upright backward flight and performs an inside loop with the tail always pointing in flight direction. | 6 |

| 19. | | **360°-turn with roll** <br> Model enters in upright forward flight and executes a quarter (inside) loop to a vertical climb. Just before the stall, model executes a 360°-pirouette to a vertical (backward) dive, followed by another quarter (inside) loop to upright flight and an axial backward roll. | **6,5** |
|---|---|---|---|
| 20. | | **4-point roll backwards** <br> Model enters in upright backward flight and then performs 4 quarter rolls, separated each by a recognisable straight segment of the same duration. The tail of the model always points in the flight direction. | **6,5** |
| 21. | | **Inverted autorotation** <br> Model enters in an altitude of at least 30 metres in inverted flight. The engine stops and the model descends in the inverted autorotative state for at least 5 seconds. Then it is brought to upright position, either by a half roll or a flip and descends to a smooth landing on the helipad. | **6,5** |
| 22. | | **Inverted backwards figure 8** <br> Model enters in inverted backward flight parallel to the judges line, executes a 90°-turn to a straight flight over the centre line and then performs a horizontal eight, consisting of two 360° circles with the tail always pointing in flight direction. | **7** |
| 23. | | **Rolling circle** <br> Model executes a horizontal circle while it performs consecutive axial rolls. Model speed, rolling rate and the radius of the circle should be constant. | **7** |
| 24. | | **4 Rainbows with ½ rolls.** <br> From upright hover the model performs a ½ forward flip bacwards(rainbow) with a horizontally travel of at least 10 meters. At the end of the travel – where the model shows an angle of at least 30° beyond vertical – the model performs ½ stationary roll, and starts a new Rainbow from this positon in the opposite direction. The manoeuvre consists of at least 4 Rainbows and ends with the model back into normal upright hover. | **7,5** |

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| 25. |  | **Funnel**<br>The model flies inverted, parallel to the judges. It turns it's tail 90° to the centre of the circle when passing the centerline and executes 4 superimposed circles with the rotor disc tilted at least 45° from horizontal. The circle diameter should be at least 5m | 7,5 |
| 26. |  | **Snake**<br>The model flies backwards, parallel to the flight line and executes a snakelike line that consists of at least 4 equal partial circles. The model executes these partial circles alternating in inverted and upright position. The manoeuvre should have a length of about 40 meters. | 7,5 |
| 27. |  | **Inverted pirouetting circle**<br>Model enters in inverted flight and executes a horizontal circle while it performs consecutive pirouettes. Model speed, pirouetting rate and the radius of the circle should be constant. | 8 |
| 28. |  | **Pirouetting flip (3 times)**<br>Model hovers or moves slowly and then starts pirouetting. At the same time or after one pirouette the model starts to flip three times while continuing to perform pirouettes. There should be at least one pirouette during each 360°-flip (2 pirouettes are shown in the drawing). Both rotations should have a constant rate and the model maintains its position during the manoeuvre. | 8 |
| 29. |  | **Pirouetting loop**<br>Model enters in upright flight and starts performing pirouettes. Then it executes an inside loop while constantly rotating about the yaw axis. During the loop there have to be at least 2, max 6 pirouettes. The pirouettes should be distributed symmetrical on the loop. | 8,5 |
| 30. |  | **Cuban eight backwards**<br>Model enters in upright backward flight and executes a 5/8 inside loop to a 45°-descent. It performs a half roll, followed by a ¾ inside loop and another half roll in 45° descent. Model then finishes the first partial loop to upright backward flight. The tail of the model always points in the flight direction. | 8,5 |

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|---|---|---|---|
| 31. | | **Rolling circle backwards**<br>Model enters in backward flight and executes a horizontal circle while it performs consecutive axial rolls. Model speed, rolling rate and the radius of the circle should be constant and the tail of the model always points in the flight direction. | 8,5 |
| 32. | | **Wipperl with 270° turn**<br>Model enters the manoeuvre backwards in upright flight and execute 4 U-turns at a line. At the top of each U-turn the model performs a 270° turn which must be in the same direction each time. The radius of the half loops must be equal and be performed on the same line. The altitude the model reaches on the top of the U-turns must be equal. | 9 |
| 33. | | **4-time tictoc (2 turns)**<br>The model flips from hovering in vertical position (elevator-axis) with it's tail pointing to the ground and hold's it's position through alternately turning around it's elevator axis about 45°(TicToc). Both final positions must be reached at least 1 time. The tail rotor rotates 90° after each completed TicToc and the manoeuvre is continued with the other cyclic function. 2 complete 360° tail rotor turns (in 90° steps) must be performed while executing TicTocs. | 9 |
| 34. | | **Semmel (stationary rolling circle)**<br>The model hovers upright and starts performing stationary rolls (at least 6). During the stationary rolls the model rotates constantly 360°Both rotation motions must be constantly and without interrupts during the hole manoeuvre | 9 |
| 35. | | **Boarische Raute** (Bavarian rhomb)<br>The Model enters in slow upright flight and starts at the centerline with a 45° climb (with the nose of the model pointing downwards about 45°) from at least 20 meters. After a pushed 90° flip the model climbs under 45° inverted back to the centreline. After a second pushed 90° flip the model descends downwards in 45°. After the third pushed 90° flip, the model descends in an angle of 45° back to the centreline (with the tail of the model pointing downwards about 45°) to the starting point and leaves the manoeuvre in a slow upright and horizontal attitude. During the 45°- climbs/descends the longitudinal axis of the model is almost vertical to the flight path. | 9.5 |

| 36. |  | **Pirouetting Funnel**<br>The model enters the manoeuvre in inverted attitude and starts flying two superimposed circles with an inclination of at least 45° while the model pirouettes. The model should execute at least 3 complete pirouettes per circle. | 9,5 |
|---|---|---|---|
| 37. |  | **Funnel with ½ rolls**<br>The model flies inverted, parallel to the judges. It turns it's tail 90° to the centre of the circle when passing the centerline and executes 3 superimposed circles with a diameter with at least 10 meters and circles with an inclination of at least 45°.<br>After every half circle the model performs a  180° roll and fly on the circular path. The trip takes place in normal flight attitude. The model exits the manoeuvre upright.. | 9,5 |
| 38. |  | **Biertrag´l** (Bavarian spelling for „crate of beer")<br>The model performs a sequence of rainbows (1/2 flip with elevator or aileron with an offset of the end positions of at least 10m in the shape of a semi-circle). At the top of each rainbow the model performs a half flip with the other cyclic function than the respective Rainbow is performed. After each Rainbow the other cyclic function is used for the next Rainbow, until the model has flown a complete square. | 10 |
| 39. |  | **Pirouetting TicToc**<br>The model goes from hovering into vertical position (Tail downwards) and holds it's position by alternately rotating around it's yaw or longitudinal axis (45° on each side). The model then pirouettes at a constant turning rate while it continues to perform TicTocs. Both 45°-positions have to be reached at least three times. | 10 |
| 40. |  | **Pirouetting Globe**<br>The model performs 4 pirouetting loops and thereby changes its flight direction in a way, which after each loop the flight path changed about 45°, until an imaginary globe has been described. The model exits the manoeuvre after the fourth loop in opposite direction to the entrance direction. During each loop the models performs at least 2 complete pirouettes. | 10 |