## **ANNEX 5D**

## **F3C MANOEUVRE DESCRIPTIONS**

#### 5D.1 GENERAL

The manoeuvres are displayed in pictorial form in Figures A1 and A2 for the case where the wind direction is left to right. The following descriptions apply to all manoeuvres and if not executed properly must result in downgrades. If a manoeuvre is unrecognisable the score shall be zero (0) points. Ascents from, and descents to, the helipad must be vertical. Landings must be smooth and centred on the helipad. During the hovering manoeuvres all stops must be of 2 seconds minimum duration. Circular and linear hovering segments must be executed at a constant speed. Pirouettes must be performed at a constant turning rate. The 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 same for each hovering manoeuvre). The competitor must stand in the 1,2 metre diameter circle marked "P" in Figure 5.4.A during all manoeuvres. All aerobatics manoeuvres must start and end in the direction indicated with a straight and level flight line of 10 metre minimum length. Entry and exit must be at the same altitude and heading. Loops or parts of a loop must be round and have the same diameter. Consecutive loops must be in the same location and plane. Rolls must be executed at a constant roll rate. Consecutive rolls must have the same roll rate and must be at the same altitude and heading. During all aerobatics manoeuvres the competitor must maintain his model aircraft above a minimum altitude of 10 metres. Aerobatics manoeuvres must be centred within the 120 degree horizontal field of view. Aerobatics manoeuvres flown at a distance greater than 100 metres from the judges' line will be downgraded. In case of a dispute the following text takes precedence over Figures A1 and A2.

### 5D.2 SCHEDULE A

#### A1. VERTICAL RECTANGLE 1 - UPWIND/UPWIND

Model aircraft takes off vertically from the helipad and ascends to eye level and stops. It then flies backwards to one of the centre flags (2 or 5) and stops. Model aircraft then climbs vertically 4 m while simultaneously performing a slow 360 degree pirouette and stops. Model aircraft then flies forward 10 m to opposite centre flag and stops. Model aircraft then descends 2 m and stops before it makes a pirouette in the opposite direction to the first pirouette. Model aircraft makes a stop before it descends 2 m to eye level. Model aircraft then flies backward to the centre helipad, makes a stop before it lands on the helipad.

Points will be subtracted for the following reasons:

- 1. Lateral position changed during 360 degree pirouette.
- 2. Pirouettes were not exactly 360 degrees.
- 3. Pirouettes were not centred over the flags.
- 4. Pirouettes were same direction (score = zero).

#### A2. NOSE-IN / TAIL-IN HORIZONTAL EIGHT – UPWIND/UPWIND

Model aircraft takes off from helipad and ascends vertically to eye level and stops. Model aircraft then flies a nosein circle in either direction for the first half of the eight followed by a tail-in circle in the opposite direction for the second half of the eight. The manoeuvre must be executed parallel to the judges' line and the circles must be centred on the centre flags (2 and 5). Model aircraft returns to a point directly over the helipad and stops. Model aircraft then descends to a landing on the helipad.

Points will be subtracted for the following reasons:

- 1. Radii of the circles were not the same.
- 2. Nose or tail of model aircraft did not always point to centre of circle.

## A3. VERTICAL TRIANGLE WITH 180 & 360 ° PIROUETTES - UPWIND/UPWIND

Model aircraft takes off vertical from the helipad to eye level and stops. Model aircraft then flies backwards from the helipad to one of the centre flags (2 or 5) and stops. Model aircraft then performs a 180 degree tail rotor turn in either direction and stops. Model aircraft then climbs backwards at 45 degree to a point 5 m above eye level and directly over the helipad and stops. The model aircraft performs a 360 degree pirouette in either direction and stops again. Model aircraft descends backwards at 45 degree to eye level directly over the opposite centre flag and stops. Model aircraft performs a 180 degree tail rotor turn in opposite direction to the first 180 degree turn and stops. Model aircraft then flies backward to the helipad, stops and descends to a landing on the helipad.

Points will also be subtracted for the following reasons:

- 1. Ascent and/or descent was not at 45 degrees
- 2. Model aircraft rotated during ascent and/or descent.
- 3. Model aircraft did not maintain lateral position during pirouettes.
- 4. 180 degree pirouettes were in the same direction (Score=zero).

### A4. TWO CONSECUTIVE AXIAL ROLLS – DOWNWIND/DOWNWIND

Model aircraft flies straight and level for a minimum of 10m. Model aircraft executes two (2) consecutive rolls while maintaining longitudinal axis in the direction of flight. Rolls may be executed in either direction. The total duration must be a minimum of 4 seconds. Model aircraft must be in upright attitude when it crosses the centreline (CL in Figure 5.4.A).

Points will be subtracted for the following reasons:

1. Model aircraft hesitated between rolls.

### A5. TWO CONSECUTIVE INSIDE LOOPS – UPWIND/UPWIND

Model aircraft flies straight and level for a minimum of 10m, then enters the first loop. The second loop immediately follows the first loop and must be in same location and plane (superimposed).

Points will be subtracted for the following reasons:

1. Model aircraft hesitated between loops.

### A6. INSIDE LOOP WITH HALF ROLLS – DOWNWIND/DOWNWIND

Model aircraft flies straight and level for a minimum of 10 m, executes a half roll to inverted position followed by a recognisable straight segment, followed by a downward inside loop. Immediately after the completion of the inside loop model aircraft flies a recognisable straight segment followed by a second half roll back to the upright position. Flying straight and level for 10 m minimum completes manoeuvre. Half rolls may be executed in either direction.

Points will also be subtracted for the following reasons::

- 1. Model aircraft drifted toward or away from the judges.
- 2. Half rolls were not exactly 180 degrees.

### A7. ROLLING STALL TURN + 540 STALL TURN - UPWIND/DOWNWIND

Model aircraft flies straight and level for a minimum of 10 m, then transitions to a vertical ascent at 90 degrees immediately followed by a half roll in either direction and vertical ascent of one fuselage length minimum. When the vertical ascent ends, model aircraft executes a 180 degree pirouette so that the nose points downward. After diving, the model aircraft makes a half loop so the model aircraft transitions to a second vertical ascent. After the model aircraft comes to a stop, model aircraft executes a 540 degree pirouette, so that the nose points downward. After descending, model aircraft transitions back to same altitude and opposite heading as at beginning of manoeuvre.

Points will be subtracted for the following reasons:

- 1. Model aircraft did not ascend vertically.
- 2. Model aircraft drifted toward or away from the judges.
- 3. Pirouette was not exactly 180 degrees.
- 4. Pirouette was not exactly 540 degrees.
- 5. Half roll was not exactly 180 degrees.

### A8. PUSHOVER WITH 360° PIROUETTE - UPWIND/UPWIND

Model aircraft flies straight and level for 10 m minimum and then enters a 90 degree vertical ascent. When model aircraft comes to a stop, nose of model aircraft is pushed forward 90 degrees to level and upright position and stops. Model aircraft then executes a slow (4sec minimum) 360 degree pirouette in either direction and stops. This is followed by nose of model aircraft pushed over 90 degrees again to vertical (nose down) position followed by vertical descent and 90 degree pullout back to the same altitude and heading as at start of the manoeuvre. Manoeuvre is completed by flying straight and level for 10 m minimum.

Points will be subtracted for the following reasons:

- 1. Vertical segments were not parallel.
- 2. Model aircraft drifted toward or away from the judges.
- 3. Pirouette was not 360 degrees.
- 4. Pirouette was too fast.
- 5. Pushovers were not 90 degrees.

### A9. AUTOROTATION WITH 180 DEGREE TURN - DOWNWIND/UPWIND

Model aircraft flies at a minimum altitude of 20m. Manoeuvre begins when model aircraft crosses an imaginary plane that extends vertically upward from a line drawn from the centre judge out through the helipad. Model aircraft must be in the auto rotation state when it cuts this plane, the engine must be off at this point and the model aircraft must be descending. The 180° turn must start at this point and the turning and descending rate must be constant from this point to a point just before touchdown on the helipad. 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. The model aircraft's flight path must never be parallel to the ground or judge's line.

### Scoring criteria:

The maximum score of 10 points can only be achieved when the model aircraft makes a smooth touchdown on the helipad with the skids or landing gear completely inside the 1,2m circle and parallel to the judge's line. A maximum score of 9 points can be obtained with a perfect landing inside the 1,2m circle but with part of the landing gear touching the circle (rotor shaft must point to inside of circle when viewed from above). If the model aircraft makes a perfect landing inside the 10m square the manoeuvre can achieve a maximum score of 8 points. If the model aircraft makes a perfect landing outside the 10m square a maximum score of 5 points can be awarded. If the flight path is stretched (flying parallel to the ground and/or judge's line) to reach the square, line or helipad, the manoeuvre will be severely downgraded. If the 180° turn is completed outside the 10m square the maximum score can only be 5 points.

Points will be subtracted for the following reasons:

- 1. Model aircraft made a hard landing.
- 2. Model aircraft landed while it still had forward speed.
- 3. Model aircraft did not perform an exact 180° turn.
- 4. Model aircraft did not maintain a constant rate of descent during 180° turn.
- 5. Model aircraft did not maintain a constant turning rate during 180° turn.
- 6. Flight path was stretched to reach helipad or square.
- 7. If engine was still running after crossing plane, score will be zero.

### 5D.3 SCHEDULE B

#### **B1. VERTICAL RECTANGLE 3 – UPWIND/UPWIND**

Model aircraft takes off vertically from the helipad and ascends to eye level and stops. Model aircraft then flies backwards to the outer flag (2 or 5) and stops. Model aircraft climbs 4 m above eye level while simultaneously performing a slow 360 degree pirouette in either direction and stops. Model aircraft then flies forward 10 m to opposite centre flag while simultaneously performing a slow 360 degree pirouette in either direction and stops. Model aircraft then direction and stops. Model aircraft then descends 4 m to eye level while simultaneously performing a slow 360 degree pirouette in the opposite direction to the first pirouette and stops again. Model aircraft then flies backward to the helipad and stops. Model aircraft then descends to a smooth landing on the helipad.

Points will also be subtracted for the following reasons:

- 1. Model aircraft did not ascend or descend in a straight line in vertical segments.
- 2. Lateral position changed during 360 degree pirouette.
- 3. Pirouettes were not exactly 360 degrees.
- 4. Pirouettes were not centred over the flags.
- 5. Pirouettes were in same direction (score = zero).

### **B2.** CIRCLE WITH 360 DEGREE PIROUETTES – UPWIND/UPWIND

Model aircraft takes off vertically from helipad and stops at eye level. Model aircraft then flies backwards to one of the centre flags (2 or 5) and stops. Model aircraft then flies a circle in either direction while simultaneously rotating three times (relative to the centre of the circle) about its yaw axis. The three pirouettes must be executed in the same direction as the circular path and at a constant rate (for a clockwise circle viewed from above, the pirouettes must be executed in clockwise direction). Model aircraft comes to a stop at 360° point. Model aircraft flies forward to a point directly over the helipad and stops. Model aircraft descends vertically to a landing on the helipad.

Points will be subtracted for the following reasons:

- 1. Circle was not round.
- 2. Nose or tail was not pointing to centre of the circle at appropriate points.
- 3. Pirouettes were not executed at a constant rate.
- 4. Pirouettes in opposite direction to circle (score =zero).

### **B3. TRIANGLE WITH TWO 360° PIROUETTES- UPWIND/UPWIND**

Model aircraft takes off vertically from helipad to eye level and stops. Model aircraft then flies backwards from the helipad to one of the centre flags (2 or 5) and stops. Model aircraft then makes a 45° climb to a point directly over the helipad while performing a slow 360 degree pirouette and stops. The model aircraft then makes a 45° descent while performing a slow 360 degree pirouette in opposite direction to eye level directly over the opposite centre flag and stops. Model aircraft then flies backward to the helipad, stops and descends to a landing on the helipad.

Points will also be subtracted for the following reasons:

- 1. Ascent and/or descent were not at 45 degrees.
- 2. Model aircraft did not make a constant rotation during ascent and/or descent.
- 3. 360 degree pirouettes were in same direction (score = zero)

### **B4. ROLL REVERSAL - DOWNWIND/DOWNWIND**

Model aircraft flies straight and level for a minimum of 10 m. Model aircraft executes a roll in either direction followed by a recognisable upright straight segment, followed by a roll in the opposite direction while maintaining longitudinal axis in the direction of flight. Second roll must be executed at same roll rate. The straight segment must be centred on the centre line. The total duration of the two rolls must be four (4) seconds minimum.

Points will also be subtracted for the following reasons:

- 1. Duration of manoeuvre was less than 4 seconds.
- 2. Upright straight segment between rolls was not centred.

### **B5. ONE LOOP WITH A STRAIGHT ROLL - UPWIND/UPWIND**

Model aircraft flies straight and level for a minimum of 10 m, then enters a half inside loop. When the half loop is finished the model aircraft performs an axial roll in either direction and then performs a second half loop back to the same altitude as at the start of the manoeuvre. The model aircraft then flies straight for the distance of the roll plus 10 m.

Points will also be subtracted for the following reasons:

- 1. Half inside loops not round
- 2. Axial roll not level
- 3. Half inside loops not same diameter

### **B6. CUBAN EIGHT - DOWNWIND/DOWNWIND**

Model aircraft flies straight and level and executes a 5/8 inside loop. When the model aircraft is in 45 degree descent and inverted it executes a 1/2 roll in either direction to upright and enters a 3/4 inside loop. When the model aircraft is again in 45 degree descent and inverted it executes a second 1/2 roll in either direction and finishes the first partial loop in upright attitude.

Points will also be subtracted for the following reasons:

- 1. Half rolls were not 180 degrees.
- 2. Half rolls were not superimposed.

### **B7. DOUBLE ROLLING STALL TURN - UPWIND/UPWIND**

Model aircraft flies straight and level for a minimum of 10 m, then transitions to a vertical ascent at 90 degrees immediately followed by a half roll in either direction and followed by a vertical ascent of one fuselage length minimum. When the vertical ascent ends, model aircraft executes a 180 degree pirouette so that the nose points downward. After diving, the model aircraft makes a half inside loop and then executes a 180 degree pirouette so that the nose points downward. The model aircraft then immediately makes a half roll in opposite direction of the first. The model aircraft then transitions back to same altitude and heading as at beginning of manoeuvre.

Points will also be subtracted for the following reasons:

- 1. Model aircraft did not climb vertically.
- 2. Model aircraft drifted toward or away from the judges.
- 3. Half rolls were not exactly 180 degrees.
- 4. Rolls were not performed at same altitude
- 5. Pirouettes were not exactly 180 degrees.
- 6. Pirouettes were not performed at same altitude.
- 7. If half rolls were in same direction, score = zero.

### **B8. COBRA ROLL WITH HALF ROLLS AND OUTSIDE FLIP - DOWNWIND/DOWNWIND**

Model aircraft flies straight and level for 10 m and enters the manoeuvre by pulling up into a 45 degree climb. After a 5 m minimum straight segment the model aircraft performs a half roll in either direction to the inverted position and continues to climb at 45 degrees for 5 m minimum. At this point the model aircraft makes an outside flip before it enters a 45 degree dive and after a 5 m minimum straight segment performs another half roll in either direction. Model aircraft continues for 5 m minimum and then recovers at starting altitude in level flight for 10 m to finish manoeuvre.

Points will also be subtracted for the following reasons:

1. Ascending and/or descending segments were not at 45 degrees.

- 2. Straight segments before and after half rolls were not recognisable.
- 3. Flip was not made on the centreline.
- 4. Model aircraft moved horizontally or vertically during flip.

## **B9. PULLUP WITH 360° INVERTED PIROUETTE - UPWIND/UPWIND**

Model aircraft flies straight and level for 10 m minimum and then enters a 90 degree vertical ascent. When model aircraft comes to a stop, nose of model aircraft is pulled back 90 degrees to level and inverted position and stops. Model aircraft then executes a slow [4 sec minimum] 360 degree pirouette in either direction and stops. This is followed by nose of model aircraft pulled back 90 degrees again to vertical (nose down) position followed by vertical descent and 90 degree pullout back to the same altitude and heading as at start of the manoeuvre. Flying straight and level for 10 m minimum completes manoeuvre.

Points will also be subtracted for the following reasons:

- 1. Vertical segments were not parallel.
- 2. Model aircraft drifted toward or away from judges.
- 3. Pirouette was not 360 degrees.
- 4. Pullbacks were not 90 degrees.

### B10. AUTOROTATION WITH TWO 90° TURNs - DOWNWIND/UPWIND

Model aircraft flies at a minimum altitude of 20 m. Manoeuvre begins when model aircraft crosses an imaginary plane that extends vertically upward from a line drawn from the centre judge out through the helipad. Model aircraft must be in the autorotation state when it cuts this plane, the engine must be off at this point and the model aircraft must be descending. The first 90 degree turn must be made after the model aircraft has made 1/3 of the total descent. After this turn the model aircraft must fly straight before the next turn is made after the model aircraft has made 2/3 of the descent. The model aircraft then flies straight down to the helipad. Each leg of the manoeuvre must be a minimum of 10m in length. The descent rate must be constant from start to a point just before touchdown on the helipad. The flight path of the model aircraft must appear as an open square when viewed from above, starting at the vertical plane and ending at a line drawn from the centre judge through the helipad.

#### Scoring criteria:

The maximum score of 10 points can only be achieved when the model aircraft makes a smooth touchdown on the helipad with the skids or landing gear completely inside the 1,2 m circle and parallel to the judge's line. A maximum score of 9 points can be obtained with a perfect landing inside the 1,2 m circle but with part of the landing gear touching the circle (rotor shaft must point to inside of circle when viewed from above). If the model aircraft makes a perfect landing inside the 10 m square the manoeuvre can achieve a maximum score of 8 points. If the model aircraft makes a perfect landing outside the 10 m square a maximum score of 5 points can be awarded. If the flight path is stretched (flying parallel to the ground) to reach the square, line or helipad, the manoeuvre will be severely downgraded.

Points will also be subtracted for the following reasons:

- 1. Model aircraft made a hard landing.
- 2. Model aircraft landed while it still had forward speed.
- 3. Model aircraft did not perform two exact 90° degree turns.
- 4. Model aircraft did not maintain constant rate of descent during *3* segments and turns.
- 5. Flight path was stretched to reach helipad or square.
- 6. If engine was still running after crossing plane, score will be zero

# 2002 F3C MANOEUVRE SCHEDULE A



