ANNEX 5D

F3C MANOEUVRE DESCRIPTIONS AND DIAGRAMS

The manoeuvre schedules are listed below with the starting and ending direction (UU = Upwind - Upwind; DD = Downwind - Downwind; DU = Downwind - Upwind; UD = Upwind - Downwind) of each manoeuvre, relative to the wind, as indicated. The competitor has 10 minutes to complete each schedule. Schedule P will be flown for the preliminary rounds 1 through 4. Schedule F will be flown for the Fly-Off rounds.

SCHEDULE P

P1. FIGURE "M" WITH HALF PIROUETTES ..... (UU)
P2. SEMI CIRCLE WITH PIROUETTE ..... (UU)
P3. DIAMOND 3 ..... (UU)
(FLY BY)
P4. CUBAN 8 WITH HALF 4 POINT ROLLS ..... (DD)
P5. PULLBACK WITH BACKWARD ROLL ..... (UU)
P6. COBRA ROLL WITH ¾ PUSHED FLIP ..... (DD)
P7. CANDLE WITH TWO HALF ROLLS, HALF PUSHED FLIP ..... (UU)
P8. TWO OPPOSITE TWO POINT ROLLS ..... (DD)
P9. INSIDE LOOP WITH PIROUETTE ..... (UU)
(FLY BY)
P10. AUTOROTATION WITH TWO 90º TURNS ..... (DU)

SCHEDULE F

F1. CIRCLE WITH 360º PIROUETTE ..... (UU)
F2. INVERTED TRIANGLE 2 ..... (UU)
F3. OVAL 1 ..... (UU)
(FLY BY)
F4. CUBAN 8 WITH PUSHED FLIP ..... (DD)
F5. PULLBACK WITH 3 HALF LOOPS AND 2 TAIL TURNS ..... (UU)
F6. COBRA ROLL WITH PIROUETTE ..... (DD)
F7. TWO LOOPS WITH HALF ROLLS ..... (UU)
F8. PUSHED FLIP WITH HALF ROLLS ..... (DD)
F9. VERTICAL 540º FLIP ..... (UD)
(FLY BY)
F10. "S" AUTOROTATION ..... (UU)

5D.1 GENERAL

The manoeuvres are displayed in pictorial form in Figures 5D-P and 5D-F for the case where the wind direction is left to right. The following descriptions apply to all manoeuvres and if not performed properly must result in downgrades. Points will also be subtracted if a manoeuvre is not performed as described. The starting/ending altitude for the hovering manoeuvres is 2m above the helipad. If a manoeuvre is unrecognisable it must be severely downgraded. If pirouettes are performed in the wrong direction, 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 (unless specified otherwise). Circular and linear hovering segments must be performed at a constant speed. Every pirouette must be performed at a constant turning rate. The hovering manoeuvres must be started with the nose of the model aircraft (MA) 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 2m diameter circle marked "P" in Figure 5.4.A during all manoeuvres. All aerobatic manoeuvres must start and end in the direction indicated with a straight and level flight line of 10m 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 performed 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 MA above a minimum altitude of 10 m. Aerobatic manoeuvres must be centred within the 120º horizontal field of view and must be symmetrical about the centre line. Aerobatic manoeuvres flown at a distance greater than 100m from the judges' line will be downgraded. In case of a dispute the following text takes precedence over Figures 5D-P-and 5D-F.

5D.2 SCHEDULE P

P1. FIGURE "M" WITH HALF PIROUETTES – (UU)

The MA lifts off from the helipad and hovers at 2m. MA backs up, stops and hovers over flag 1(2). MA ascends 2.5m while performing a 180º pirouette and stops for 1 second, continues ascent while performing a 180º pirouette and stops at 5m. MA descends 2.5m at 45º while performing a 180º pirouette and stops for 1 second. MA continues 45º descent while performing a 180º pirouette and stops at 2m. MA ascends 2.5m at 45º while performing a 180º pirouette and stops for 1 second, continues ascent while performing a 180º pirouette and stops at 5m. MA descends 2.5m while performing a 180º pirouette and stops for 1 second, continues descent while performing a 180º pirouette and stops at 2m over flag 2(1). MA backs up 5m, stops and hovers over helipad. MA descends and lands on helipad.

P2. SEMI CIRCLE WITH PIROUETTE – (UU)

MA takes off vertically to 2m and stops. MA flies backward to flag 1(2) and stops. MA then performs a semi circle with 5m radius with a simultaneous full pirouette in either direction to 2m above flag 2(1) and stops. MA hovers backward to helipad and stops . MA descends to helipad and lands.

P3. DIAMOND 3 – (UU)

MA ascends vertically to 2m and stops. MA ascends backwards 2.5m in a straight line while simultaneously performing a 90º pirouette (nose to the pilot) and stops over flag 1(2). MA ascends sideways 2.5m in a straight line and stops over helipad. MA performs a 360º pirouette in either direction and stops. MA descends sideways 2.5m in a straight line and stops over flag 2(1). MA descends 2.5m in a straight line while simultaneously performing a 90º pirouette in opposite direction to the first one and stops at 2m over helipad. MA descends to helipad and lands.

P4. CUBAN 8 WITH HALF 4 POINT ROLLS – (DD)

MA flies straight and level for a minimum of 10m and performs a 5/8 inside loop. When MA is in 45º descent and inverted it performs a half 4 point roll (180º roll with hesitation at 90º) in either direction to upright and enters a ¾ inside loop. When the MA is again in 45º descent and inverted it performs a second half 4 point roll (180º roll with hesitation at 90º) in either direction and finishes the first partial loop in upright attitude. MA flies 10m straight and level exit.

P5. PULLBACK WITH BACKWARD ROLL – (UU)

MA flies straight and level for 10m and enters the manoeuvre by pulling up into a vertical ascent after passing the centre line. After MA comes to a stop the MA accelerates with a 90º pushed travelling flip to backward flight and performs a full backward roll at constant altitude. This is followed by another 90º pushed travelling flip to a vertical nose down stop. MA then continues by descending on a path that mirrors the entry path. After the descent, MA transitions to same heading and altitude as at the start of the manoeuvre. MA continues for 10m to finish the manoeuvre.

P6. COBRA ROLL WITH ¾ PUSHED FLIP – (DD)

MA flies straight and level for 10m and enters the manoeuvre by pulling up into a 45º climb. After a 5m minimum straight segment MA performs a half roll in either direction to the inverted position and continues to climb at 45º for 5m minimum. After MA comes to a stop MA makes a 270º pushed stationary flip before it enters a 45º dive and after a 5m minimum straight segment performs another half roll in either direction. MA continues for 5m minimum and then recovers at starting altitude in level flight for 10m to finish manoeuvre.

P7. CANDLE WITH TWO HALF ROLLS, HALF PUSHED FLIP – (UU)

MA flies straight and level for 10m and enters the manoeuvre by pulling up into a 5m (minimum) vertical ascent, followed by half roll and another 5m (minimum) ascent. MA performs a half pushed travelling flip such that the first half occurs during the ascent and the second half occurs during the descent. MA goes into a vertical 5m descent followed by a half roll and another 5m descent to same altitude as entry. MA continues for 10m to finish the manoeuvre.

Note : MA must be horizontal at the top.

P8. TWO OPPOSITE TWO POINT ROLLS – (DD)

MA flies straight and level for a minimum of 10m and performs a 180º roll and continues with 1 second inverted flight. MA performs a second 180º roll in same direction followed by 1 second upright flight. MA performs third 180º roll in opposite direction of first two and continues with 1 second inverted flight. MA performs fourth 180º roll in same direction as third 180º roll to upright flight. Manoeuvre is completed with 10m straight and level flight.

P9. INSIDE LOOP WITH PIROUETTE – (UU)

MA flies straight and level for 10m minimum entry. MA performs an inside loop with a travelling 360º pirouette on top with minimum duration of 2 seconds. Manoeuvre is completed with 10m straight and level flight.

P10. AUTOROTATION WITH TWO 90º TURNS – (DU)

MA flies at a minimum altitude of 20 m. Manoeuvre begins when MA crosses an imaginary plane that extends vertically upward from a line drawn from the centre judge out through the helipad. MA must be in the autorotation state when it cuts this plane. The engine power must be reduced to idle (or off) at this point and the MA must be descending. The first 90º turn must be made after the MA has made 1/3 of the total descent. After this turn the MA must fly straight before the next turn is made after the MA has made 2/3 of the descent. The MA 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 MA 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 for landing: See ANNEX 5E Paragraph 5E.6.10.

5D.3 SCHEDULE F

F1. CIRCLE WITH 360º PIROUETTE – (UU)

MA takes off vertically from the helipad and ascends to 2m and stops. MA starts backwards into a 5m vertical circle while simultaneously performing a 360° pirouette. At the end of the vertical circle M A comes to a stop at 2m over helipad. MA then descends to a landing on the helipad.

F2. INVERTED TRIANGLE 2– (UU)

MA takes off vertically from helipad and stops at 2m. MA performs a 90º pirouette so nose points to the pilot. MA ascends at 45º while performing 180º pirouette and stops over flag 1(2). MA then flies horizontally to flag 2(1) while performing a 4 point pirouette and stops. (The stops between the points of 4-point pirouette are of 1 second duration.) MA descends at 45º while performing 180º pirouette and stops at 2m over helipad. Model then performs a 90º pirouette and stops. MA then descends to and lands on helipad.

F3. OVAL 1- (UU)

MA takes off vertically from helipad to 2m and stops. MA moves 2.5m backwards while performing 90º pirouette and continues into a half ascending vertical circle of 5m diameter while simultaneously performing a 180º pirouette. MA hovers sideways from one halfway line to the other with nose facing the pilot. MA continues into a half descending vertical circle while simultaneously performing a 180º pirouette in opposite direction to the first to the second half way line and then continues back while performing a 90º pirouette to 2m over helipad and stops. MA descends to a landing on the helipad. (There are no stops during this manoeuvre except the two over the helipad).

F4. CUBAN 8 WITH PUSHED FLIP – (DD)

MA flies straight and level for a minimum of 10m and performs a 5/8 inside loop. When the MA is in first 45º descent and inverted it performs a full pushed travelling flip. MA continues with a ¾ outside loop. When MA is in second 45º descent it finishes the first partial loop in upright attitude. MA flies straight and level for a minimum of 10 m.

F5. PULLBACK WITH THREE HALF LOOPS AND TWO TAIL TURNS - (UU)

MA flies straight and level for a minimum of 10m. MA enters vertical ascent and stops and performs a small backward half inside loop followed by a 180° tail turn. MA performs a small backward half outside loop followed by a 180° tail turn. MA performs a small backward half inside loop and stops. MA then descends vertically to same altitude as entry and finishes by flying straight and level for 10m.

F6. COBRA ROLL WITH PIROUETTE – (DD)

MA flies straight and level for a minimum of 10 m. MA pulls up to establish a 45º line. MA then performs a 180º roll to inverted and continues to the apex. At apex MA performs a 135º pushed stationary flip followed by a slow (4 seconds minimum) 360º pirouette followed by a second 135º pushed stationary flip. MA then enters a 45º descent with a centred 180º roll back to the same altitude as at entry. MA finishes manoeuvre with straight and level flight of 10m minimum.

F7. TWO LOOPS WITH HALF ROLLS – (UU)

MA flies straight and level for a minimum of 10m. MA flies a half loop with a half roll on top, continues with a full outside loop followed by a half roll and half inside loop. The two half rolls must be included in the loop paths. (The two half rolls must be included in the loop paths such that MA is in knife edge flight at the top of the loops). MA finishes manoeuvre with a straight and level flight of 10m minimum.

F8. PUSHED FLIP WITH HALF ROLLS – (DD)

MA flies straight and level for a minimum of 10m. MA performs a 180º roll to 1 second duration inverted flight. MA then performs a travelling, full pushed flip followed by 1 second inverted flight. MA then performs a second 180º roll to upright and finishes the manoeuvre with 10m straight and level flight.

F9. VERTICAL 540º FLIP – (UD)

MA flies straight and level for a minimum of 10m. MA then enters a centred vertical climb and performs a 540º pushed travelling flip. Half (270º) of the pushed travelling flip is performed during the ascent and the second half is performed during the descent. MA must be horizontal and inverted at the top. MA then descends vertically 5m (minimum), performs a 180º roll followed by another 5m (minimum), 90º inside loop back to entry altitude and opposite heading. MA finishes manoeuvre with 10m minimum straight and level flight.

F10. “S” AUTOROTATION– (UDU)

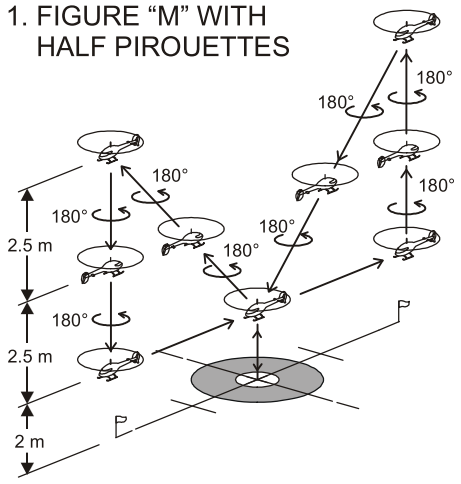
MA enters the manoeuvre going upwind at a minimum altitude of 40m and some distance out. Before crossing the centre plane upwind the MA must be in the auto rotation state, the engine power must be reduced to idle (or off) at this point and the MA must be descending. MA then makes the first 180º turn towards the pilot. As MA crosses the centre plane again but downwind it enters another descending 180º turn toward the pilot and lands upwind.

Scoring criteria for landing: See ANNEX 5E Paragraph 5E.6.10.

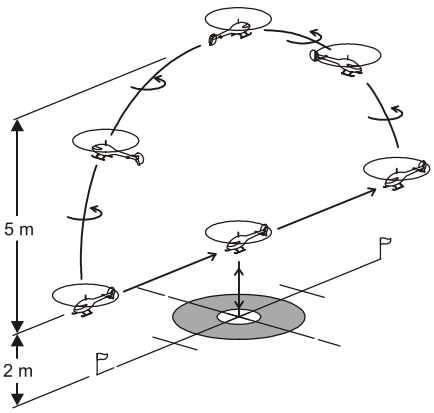
Note: Manoeuvre diagrams are overleaf.

FIGURE 5D-P F3C MANOEUVRE SCHEDULE P

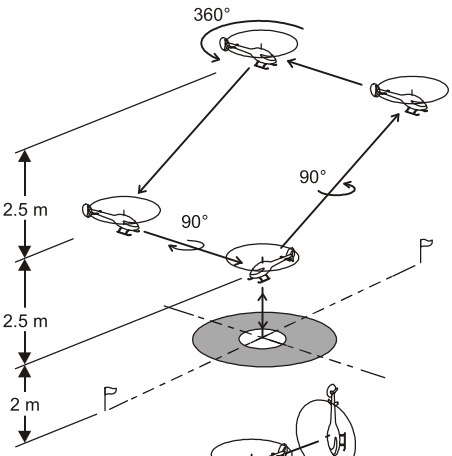
1. FIGURE "M" WITH HALF PIROUETTES



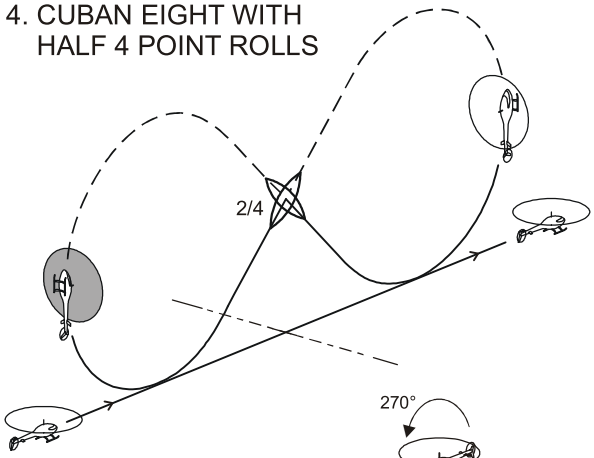
2. SEMI CIRCLE WITH PIROUETTE



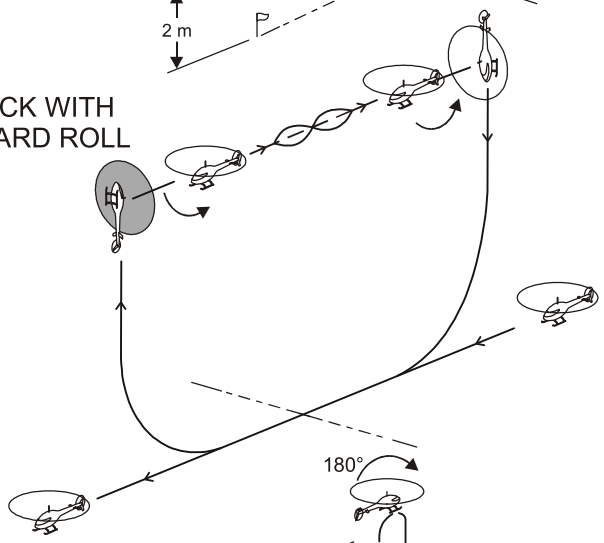
3. DIAMOND 3



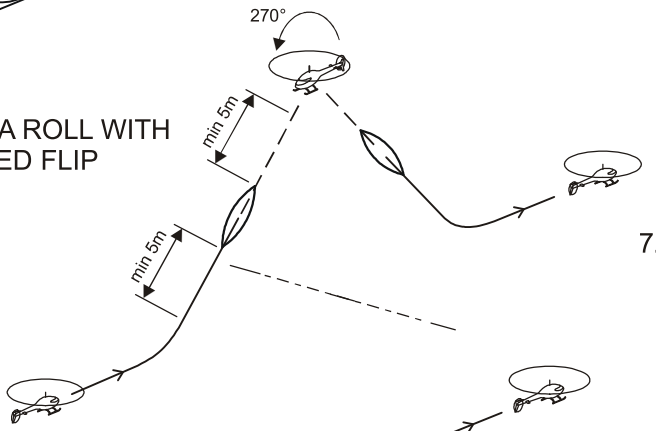
4. CUBAN EIGHT WITH HALF 4 POINT ROLLS



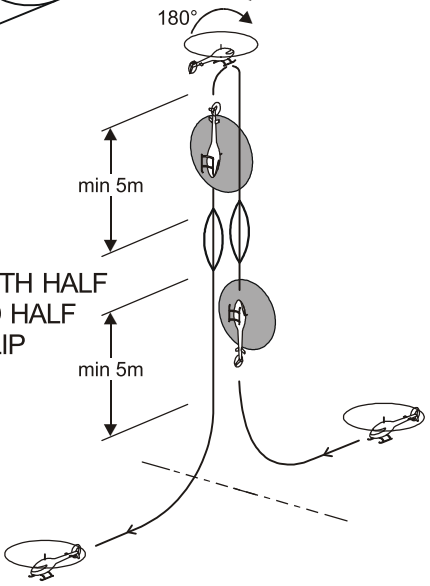
5. PULLBACK WITH BACKWARD ROLL



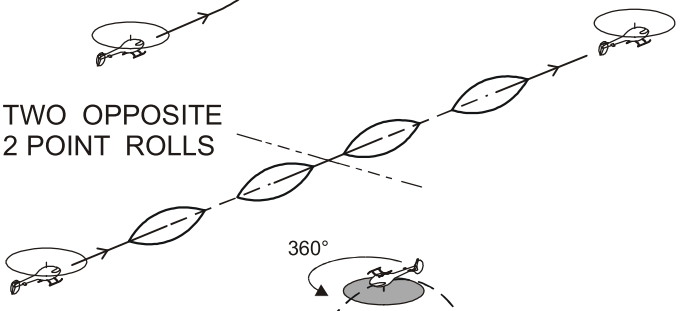
6. COBRA ROLL WITH PUSHED FLIP



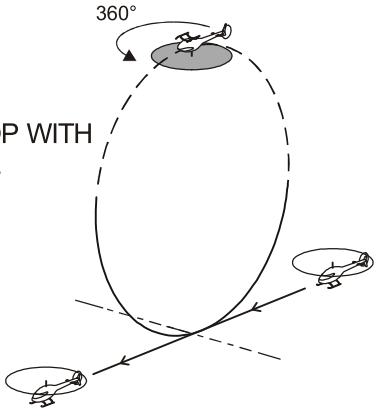
7. CANDLE WITH HALF ROLLS AND HALF PUSHED FLIP



8. TWO OPPOSITE 2 POINT ROLLS



9. INSIDE LOOP WITH PIROUETTE



10. AUTOROTATION WITH TWO 90° TURNS

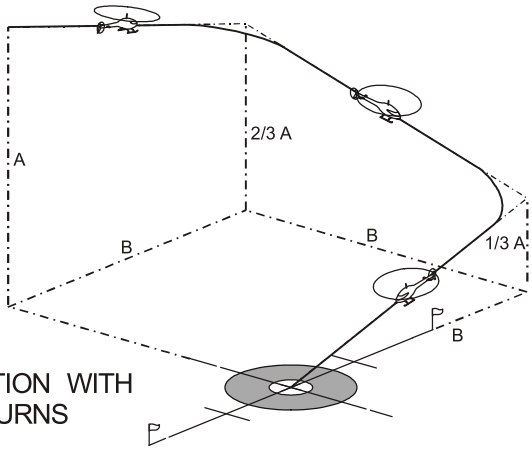
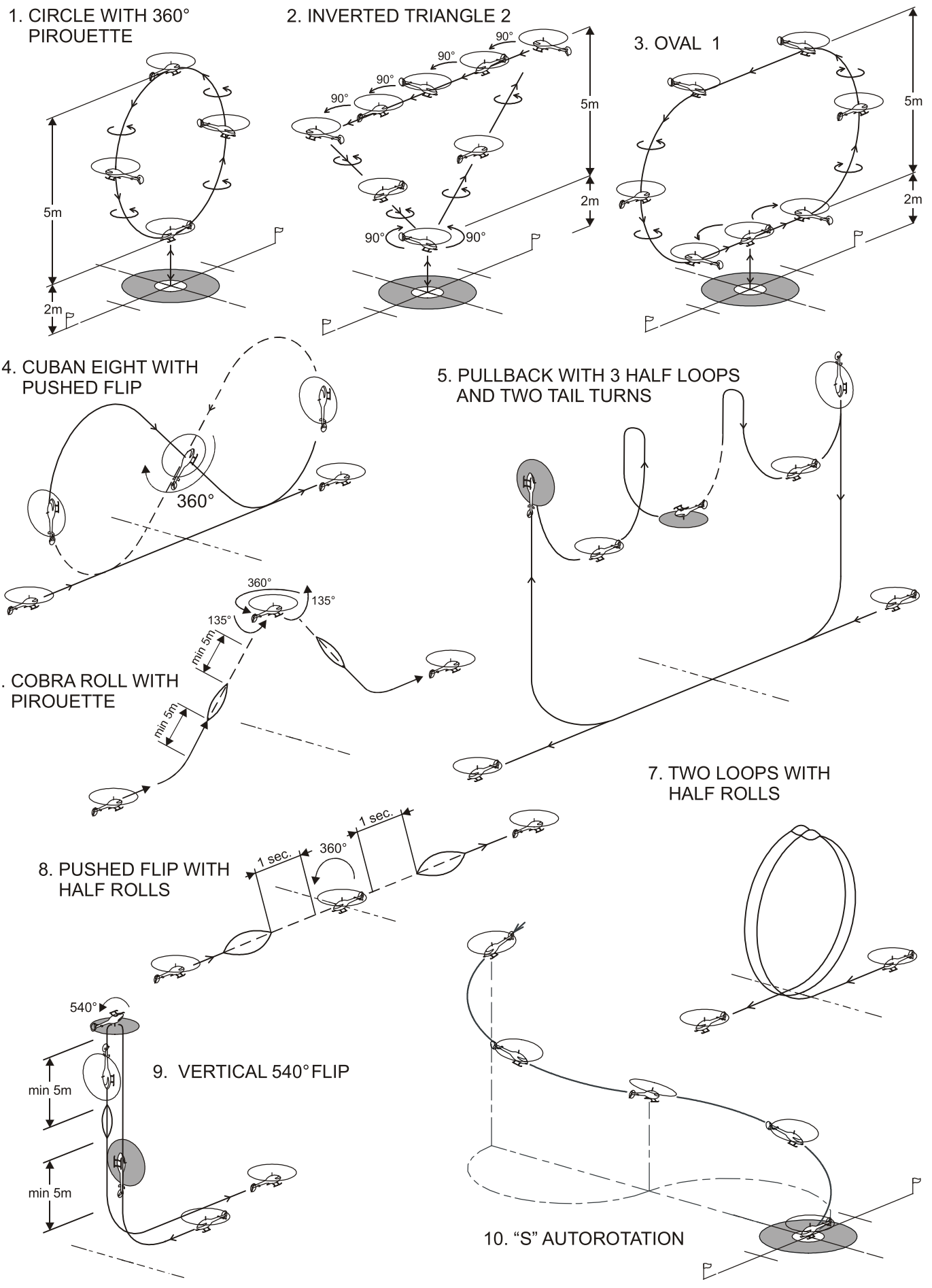


FIGURE 5D-F F3C MANOEUVRE SCHEDULE F



ANNEX 5E
F3C JUDGES' GUIDE

5E.1 PURPOSE

The purpose of the F3C Judges' Guide is to provide an accurate description of the major judging criteria to serve as a reference for use in developing a uniformly high standard of judging.

5E.2 PRINCIPLES

The principles of judging a radio controlled model helicopter should be based on the perfection with which the MA performs each manoeuvre as described in Annex 5D.

The main principles used to judge the degree of perfection are:

1) Precision of the manoeuvre.

2) Smoothness and gracefulness of the manoeuvre.

3) Positioning or display of the manoeuvre.

4) Size of the manoeuvres relative to each other.

The requirements are listed in order of importance; however, all of them must be met for a manoeuvre to receive a high score.

5E.3 ACCURATE AND CONSISTENT JUDGING

The most important aspect of judging is consistency. Each judge must establish his standard and then maintain that standard throughout the competition. It is recommended that the contest director or organiser hold a conference prior to the start of competition to discuss judging so that the standards are as uniform as possible. This can be accomplished with demonstration flights that all judges score simultaneously and privately. After these flights, the defects in each manoeuvre should be discussed by all judges and agreement reached about the severity of the defects. After the competition is started, the individual judges should not alter their standard. Judging accuracy is also very important. Being consistent, whether high or low is not sufficient if the scores awarded do not fairly reflect the performed manoeuvre.

5E.4 CRITERIA FOR JUDGING MANOEUVRES

A description of each manoeuvre is provided in Annex 5D. Each manoeuvre should be downgraded according to:

1) The type of defect.

2) The severity of the defect.

3) The number of times a defect occurs.

4) The positioning of the manoeuvre.

5) The size of the manoeuvre relative to other manoeuvres.

A high score should be given only if no major defects are noted and the manoeuvre is accurately positioned. Whenever there is doubt a lower score should be given.

5E.5 ATTITUDE AND FLIGHT PATH

The flight path of the MA is the trajectory of its centre of gravity. The attitude is the direction of the fuselage (canopy, boom, etc.) centreline in relation to the flight path. All judging should be based on flight path, but the angle between the flight path and the longitudinal axis should never exceed 10º.

5E.6 GRADING CRITERIA FOR MANOEUVRE SEGMENTS

The following criteria are furnished to provide the judge with a guide for downgrading deviations from the defined manoeuvre segments. The segments are: Takeoffs, Landings, Stops, Lines, Pirouettes, Loops, Rolls, Stall turns and Flips.

5E.6.1. TAKEOFFS

Takeoffs for the hovering manoeuvres must start from the centre of the 1m circle to obtain maximum score. Takeoffs must be smooth and the MA must ascend vertically until the skids or landing gear are at 2m over helipad. Non-vertical ascents where the MA moves forward or backward by half a fuselage length result in a downgrade of 1 point.

5E.6.2. LANDINGS

Landings for the hovering manoeuvres must be centred in the 1m circle of the helipad to obtain a maximum score. If a portion of the skids or landing gear is outside of the 1m circle (but rotor shaft points to the inside of the 1m circle when viewed from above), the downgrade is one point. A landing outside of the 1m circle (rotor shaft points to the outside of the 1m circle when viewed from above) results in a downgrade of 2 points. Non-vertical descents where the MA moves forward or backward by half a fuselage length result in a downgrade of 1 point.

5E.6.3 STOPS

For the hovering manoeuvres the stops must be equal to or greater than 2 seconds in duration if not otherwise specified. All stops must be of the same duration. If a stop is less than 2 seconds long, a downgrade of half a point should be made. If a stop is greater than 2 seconds, no downgrade should result as long as the MA does not move.

5E.6.4. LINES

For the hovering manoeuvres the lengths of the lines are defined by the 10m distance between flags 1 and 2 and must be straight. Diagonal lines must be performed at the proper angle. However, the aerobatic manoeuvres must be started and ended by equal horizontal lines of minimum length 10 m. A greater length of a vertical or climbing line, resulting from the performance of the MA, must not be allowed to positively influence a judge's score. One point should be subtracted for a recognisable difference. If there is a complete absence of a line, before or after a manoeuvre, 2 points should be subtracted.

5E.6.5. PIROUETTES

All pirouettes must be performed around the vertical axis. If the deviation is greater than 20º one point will be subtracted. During a hovering pirouette (stationary tail rotor turn), if the MA moves vertically or laterally by a noticeable amount, 1 point should be subtracted. If the vertical or lateral movement of the helicopter is significant (more than 25cm), 2 or more points should be subtracted. During an ascending pirouette, if the MA moves laterally by a noticeable amount, 1 point should be subtracted. If the MA's movement is greater than 25cm, 2 or more points should be subtracted. Travelling pirouettes must be synchronised with flight path. If the pirouettes are performed in the same direction for manoeuvres where pirouettes of opposite direction are prescribed, the score must be zero.

5E.6.6. LOOPS

A loop must, by definition, have a constant radius, and must be flown in a vertical plane. It starts and ends with a well-defined line, which for a complete loop will be horizontal. Every loop must be flown without segmentation. Every clearly seen segment should result in a downgrade of 1 point. If a loop is not flown entirely in a vertical plane, a minor drift should be downgraded by 1 point, while a more severe drift should be downgraded by several points.

5E.6.7. ROLLS

The roll rate must be constant. Small variations in roll rate should be downgraded by 1 point while more severe variations receive larger downgrades. Rolls (including partial rolls) must have crisp and well-defined starts and stops. If a start or stop is badly defined, 1 point is subtracted for each. Duration of the rolls must meet the minimum times specified.

5E.6.8. TAIL TURNS

The tail turns must be symmetrical by performing half of the rotation before and after the top. The tail turn must be around the main rotor shaft. If there is significant horizontal displacement, 1 point should be subtracted. The entry and exit must consist of partial loops with constant and equal radii.

5E.6.9. FLIPS

Flips are stationary or travelling rotations about the lateral (elevator) axis of the MA. The direction of the flip is described according to the movement of the (elevator/longitudinal cyclic) control stick (Push = Negative - Nose down, Pull = Positive - Nose up). For the case of a stationary flip, one point should be subtracted if the MA moves forward or backward more than a fuselage length. For the case of a travelling flip, one point should be subtracted for a deviation of more than a fuselage length from the path of the described manoeuvre.

5E.6.10. AUTOROTATIONS

An autorotation begins when MA crosses an imaginary plane that extends vertically upward from a line drawn from the centre judge out through the centre of the 1m helipad. MA must be in the autorotation state when it cuts this plane, the engine power must be reduced to idle (or off) at this point and the MA must be descending. During the manoeuvre, the forward speed and rate of descent should be constant, which means that the angle of the flight path is also constant. After landing the MA must be parallel to the judges' line. If the flight path is stretched, shortened or deviated from, to reach a circle the manoeuvre must be downgraded. The original flight path gives a basic maximum score according to the description and there will be additional downgrades of 1 or 2 points depending of the severity of the deviation. For example: If the flight path clearly points to a landing close to flag 1 (2) and the path is stretched to reach a circle, the score can only be a maximum of 6 (outside the circles) and there will be an additional downgrade of 2 points for the stretch, so the score can only be a maximum of 4. If the pilot would have landed without stretching, the maximum score would have been a 6. Therefore, stretching the flight path must never lead to a higher score.

Scoring criteria for Autorotation landings:

Landing gear inside 1m circle = Maximum 10 points.

Rotor shaft points to inside of 1m circle = Maximum 9 points.

Landing gear inside 3m circle = Maximum 8 points.

Rotor shaft points to inside of 3m circle = Maximum 7 points.

Rotor shaft points to outside of 3m circle = Maximum 6 points.

5E.7 WIND CORRECTION

All manoeuvres are required to be wind corrected in such a way that the shape of the manoeuvre as described in Annex 5D is preserved in the MA's flight path.

5E.8 POSITIONING

All aerobatic manoeuvres must be performed within the 60º vertical and 120º horizontal viewing angle. Manoeuvres that are flown off centre will be downgraded according to the displacement. The downgrade may be in the range of 1 to 4 points. If a portion of a manoeuvre is flown outside of this air space a severe downgrade will occur. If the entire manoeuvre including entry and exit is flown outside of the window it must be scored zero points. Flying so far out as to make the evaluation of a manoeuvre difficult should also be severely downgraded. The main criterion here is visibility. Manoeuvres performed on a line further out than 100m away but in front of the judges should be downgraded in any case because even the keenest eye begins to lose perspective at that distance.