ANNEX 5D

F3C MANOEUVRE DESCRIPTIONS

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 A will be flown for the preliminary rounds 1 through 4. Manoeuvre schedule B will be flown for the Fly-Off rounds during the years 2006 and 2007. Manoeuvre schedule C will be flown for the Fly-Off rounds during the years 2008 and 2009.

SCHEDULE A (2006-2009)

A1. DIAMOND	(UU)
A2. INVERTED TRIANGLE	(UU)
A3. HOVERING "M"	(UU)
(FLY BY)	
A4. ROLL REVERSAL	(DD)
A5. DOUBLE ROLLING STALL TURN	(UU)
A6. COBRA ROLL WITH HALF ROLLS	(DD)
A7. FLIPPING PULLBACK	(UU)
A8. CUBAN EIGHT	(DD)
A9. PUSH OVER WITH 360º PIROUETTE	(UU)
(FLY BY)	
A10. AUTOROTATION WITH 180º TURN	(DU)

SCHEDULE B (2006-2007)

B1. HOURGLASS 1	(UU)
B2. CIRCLE WITH TWO 360º PIROUETTES	(UU)
B3. RECTANGLE WITH 180º PIROUETTES	(UU)
(FLY BY)	
B4. HORIZONTAL EIGHT	(DD)
B5. FIGURE "M" WITH 180º STALL TURNS	(UU)
B6. COBRA ROLL + ½ ROLLS AND PUSHED FLIP	(DD)
B7. DUAL FLIP WITH HALF OUTSIDE LOOP	(UU)
B8. PULL-UP WITH 360º INVERTED PIROUETTE	(DD)
B9. SQUARE LOOP WITH HALF ROLLS	(UU)
(FLY BY)	
B10. AUTOROTATION WITH TWO 90º TURNS	(DU)

SCHEDULE C (2008-2009)

C1. HOURGLASS 2	(UU)
C2. PIROUETTING HEXAGON	(UU)
C3. RECTANGLE WITH 4-POINT PIROUETTES	(UU)
(FLY BY)	
C4. 4-POINT ROLL	(DD)
C5. TWO REVERSE OUTSIDE LOOPS	(UU)
C6. KNIFE EDGE COBRA ROLL WITH 450º PIROUETTE	(DD)
C7. FIGURE "M" WITH 540º STALL TURNS	(UU)
C8. HORIZONTAL EIGHT WITH ROLLS	(DD)
C9. VERTICAL SPIKE	(UU)
(FLY BY)	
C10. "S" AUTOROTATION WITH 180º PIROUETTE	(UU)

5D.1 GENERAL

The manoeuvres are displayed in pictorial form in Figures 5D-A, 5D-B and 5D-C 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. Points will also be subtracted if a manoeuvre is not performed as described. If a manoeuvre is unrecognisable, or 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 executed 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 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 aerobatics 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 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 m. Aerobatics 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-A, 5D-B and 5D-C.

5D.2 SCHEDULE A

A1. DIAMOND - UPWIND/UPWIND

The model aircraft lifts off from the helipad and hovers at eye level. The model aircraft backs up and climbs to stop and hover 2.5m AEL over flag 1(2). A 180º pirouette in either direction is performed centred on flag 1(2). The model aircraft then backs up and climbs another 2.5m to stop and hover over the helipad at a height of 5m AEL. A 360º pirouette in either direction is performed. The model aircraft then descends 2.5m and travels backward to arrive over flag 2(1) to stop and hover. A 180º pirouette in either direction is performed centred over flag 2(1). The model aircraft then descends backwards to the helipad and stops to hover at eye level. The model aircraft descends and lands on the helipad.

A2. INVERTED TRIANGLE – UPWIND/UPWIND

Model aircraft takes off vertically to eye level and hovers for 2 seconds. Model aircraft then ascends backwards at 45º, while simultaneously performing a 180º pirouette in either direction to a spot directly over flag 1(2) and stops. Model then flies horizontally while simultaneously performing a 360º pirouette in either direction to flag 2(1) and stops. Model then descends at 45º while simultaneously performing a 180º pirouette in either direction. Model hovers above helipad and descends vertically to a landing.

A3. HOVERING "M" - UPWIND/UPWIND

Model ascends vertically to eye level and stops. Model then flies backward to flag 1(2) and stops. Model then ascends vertically 5m while simultaneously performing a 360º pirouette in either direction and stops. Model then performs another 360º pirouette in the same direction while descending at a 45º angle to eye level above the helipad and stops. Model then ascends at a 45º angle while performing a 360º pirouette in the opposite direction to a point 5m AEL over flag 2(1) and stops. Model then descends to eye level while performing a 360º pirouette in the same direction and stops. Model then flies backward to the helipad and stops. Model descends vertically and lands on the helipad.

A4. ROLL REVERSAL – DOWNWIND/DOWNWIND

Model aircraft flies straight and level for a minimum of 10m. 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 upright straight segment must be centred on the centre line. The total duration of the two rolls must be four (4) seconds minimum.

A5. 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 90º followed by a half roll in either direction and followed by a vertical ascent of one fuselage length minimum. At the top, model aircraft executes a 180º pirouette so that the nose points downward. After diving, the model aircraft makes a half inside loop into another stall turn at the same altitude and executes a 180º pirouette so that the nose points downward. The model aircraft then makes a half roll in either direction. 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. Rolls were not performed at same altitude
2. Pirouettes were not performed at same altitude.

A6. COBRA ROLL WITH HALF ROLLS – DOWNWIND/DOWNWIND

Model aircraft flies straight and level for 10m and enters the manoeuvre by pulling up into a 45º climb. After a 5m minimum straight segment the model aircraft performs a half roll in either direction to the inverted position and continues to climb at 45º for 5m minimum. At this point the model aircraft performs a ¼ inside loop and enters a 45º dive inverted and after a 5m minimum straight segment performs another half roll in either direction. Model aircraft continues for 5m minimum and then recovers at starting altitude in level flight for 10m to finish manoeuvre.

Points will also be subtracted for the following reasons:

1. Straight segments before and after half rolls were not recognisable.

A7. FLIPPING PULLBACK - UPWIND/UPWIND

Model aircraft flies straight and level for 10m and enters the manoeuvre by pulling up into a vertical ascent after passing the centre line. After the model comes to a stop the model performs small backward ¼ inside loop and flies backwards and performs a travelling, centred pushed flip at constant altitude. This is followed by another small backward ¼ inside loop to a vertical nose down stop. The model then continues by descending on a path that mirrors the entry path. After the descent, model transitions to same heading and altitude as at the start of the manoeuvre. Model continues for 10m to finish the manoeuvre.

A8. CUBAN EIGHT - DOWNWIND/DOWNWIND

Model aircraft flies straight and level for a minimum of 10m and executes a 5/8 inside loop. When the model aircraft is in 45º descent and inverted it executes a ½ roll in either direction to upright and enters a ¾ inside loop. When the model aircraft is again in 45º descent and inverted it executes a second ½ 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 centred nor superimposed.

A9. PUSH OVER WITH 360º PIROUETTE - UPWIND/UPWIND

Model aircraft flies straight and level for 10m minimum and then enters a 90º vertical ascent. When model aircraft comes to a stop, model aircraft performs a ¼ pushed flip to upright position and stops. Model aircraft then executes a slow [4 sec minimum] 360º pirouette in either direction and stops. Model aircraft then performs a ¼ pushed flip to vertical (nose down) position followed by vertical descent and ¼ inside loop back to the same altitude and heading as at start of the manoeuvre. Flying straight and level for 10m minimum completes manoeuvre.

Points will also be subtracted for the following reasons:

1. Pirouette was not 360º or 4 seconds duration.

A10. AUTOROTATION WITH 180º 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 for landing: See ANNEX 5E Paragraph 5E.6.10.

5D.3 SCHEDULE B

B1. HOURGLASS 1 – UPWIND/UPWIND

Model aircraft takes off vertically from the helipad and ascends to eye level and stops. The model backs up to flag 1(2) while executing a travelling 180º pirouette in either direction and stops. A diagonal line is flown backwards across and up to 4m AEL, and stops to hover over the opposite flag 2(1). A 360º pirouette in either direction is performed while travelling at the same altitude to stop and hover over flag 1(2). A diagonal line is flown backward across and down to arrive at eye level over flag 2(1). Another 180º pirouette in either direction is performed while travelling to the centre helipad. The model stops to hover over the centre helipad then lands.

B2. CIRCLE WITH TWO 360º PIROUETTES – UPWIND/UPWIND

Model aircraft takes off vertically from helipad and stops at eye level. Model flies forward into an ascending vertical circle (5m diameter) while simultaneously executing a 360º pirouette ending at the top of the first half. At this point the pirouette switches direction for the second half of the circle stopping over the helipad at eye level. Model then descends to a landing on the helipad.

B3. RECTANGLE WITH 180º 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 flags 1(2) and stops. Model aircraft then ascends vertically 4m while performing two 180º pirouettes of opposite direction and stops. Model aircraft then flies horizontally to a point over flag 2(1) while simultaneously performing a 360º pirouette and stops. Model aircraft then descends vertically 4m while performing two 180º pirouettes of opposite direction to eye level and stops. Model aircraft flies back to centre helipad and stops. Model aircraft then descends to a landing on centre helipad.

B4. HORIZONTAL EIGHT - DOWNWIND/DOWNWIND

Model aircraft flies straight and level and executes a 5/8 inside loop. When the model aircraft is in 45º descent it enters a ¾ outside loop. When the model aircraft is again in 45º descent it executes a partial inside loop to upright horizontal attitude.

B5. FIGURE M WITH 180º STALL TURNS - UPWIND/UPWIND

Model pulls vertical and does a quarter roll so that the top of the disk is toward the pilot and continues for a minimum of 1 fuselage length. When the model stops climbing the model performs a 180º stall turn. On the way down the model does another quarter roll and performs an inside half loop. Model goes vertical again and does another quarter roll so that the top of the disk is toward the pilot and continues for a minimum of 1 fuselage length. Model does another 180º stall turn. Model does another quarter roll and pulls out at starting altitude in level flight for 10m to finish the manoeuvre.

B6. COBRA ROLL WITH ½ ROLLS AND PUSHED FLIP - DOWNWIND/DOWNWIND

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

Points will also be subtracted for the following reasons:

1. Straight segments before and after half rolls were not recognisable.

B7. DUAL FLIP WITH HALF OUTSIDE LOOP - UPWIND/UPWIND

Model aircraft flies straight and level for a minimum of 10 m. Model aircraft performs a ¼ inside loop and establishes a vertical line. At the peak of the ascent the model performs a ½ outside flip so that it points nose down. The model aircraft descends vertically and executes a ½ roll. The model aircraft then performs a ½ outside loop centred on the centre line and then ascends vertically again and at the peak of the ascent the helicopter completes a ½ inside flip so that the nose points down. The model aircraft then descends vertically and executes a ½ roll followed by a straight segment. The model aircraft then performs a ¼ inside loop to recover upright with the same altitude and direction as the entry for a minimum of 10m.

Points will also be subtracted for the following reasons:

1. Rolls were not performed at same altitude.
2. Flips were not performed at same altitude.

B8. PULL-UP WITH 360º INVERTED PIROUETTE - DOWNWIND/DOWNWIND

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

Points will also be subtracted for the following reasons:

1. Pirouette was less than 4 seconds duration.

[Note: For safety, manoeuvre B8 has been amended to change the sequence of the manoeuvre and to delete the full roll. Effective 1st May 2006]

B9. SQUARE LOOP WITH HALF ROLLS - UPWIND/UPWIND

Model aircraft flies straight and level for 10m minimum. The model aircraft then performs a ¼ inside loop followed by a straight segment. This is followed by another ¼ inside loop and a straight segment with a half roll. The model aircraft then performs a ¼ outside loop followed by a straight segment and another ¼ outside loop followed by a final straight segment with a half roll to level upright flight. The manoeuvre is completed by flying level for at least 10m.

Points will also be subtracted for the following reasons:

1. Segments of the square were not of equal length.
2. ½ rolls were not centred.

B10. AUTOROTATION WITH TWO 90º 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 90º 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 for landing: See ANNEX 5E Paragraph 5E.6.10.

5D.4 SCHEDULE C

C1. HOURGLASS 2 – UPWIND/UPWIND

Model aircraft takes off vertically from the helipad and ascends to eye level and stops. Model aircraft hovers back to flag 1(2) and stops. Model ascends diagonally while simultaneously performing two 180º pirouettes in opposite directions to a point 4m above flag 2(1) and stops. Model then flies horizontally across to flag 1(2) simultaneously performing two 180º pirouettes in opposite directions and stops. The first 180º pirouette will end directly above the helipad followed by an immediate reversal of direction for the second 180º pirouette. Model then descends 4m diagonally while simultaneously performing two 180º pirouettes in opposite directions to eye level above flag 2(1) and stops. Model then flies back to the helipad and stops. Model then descends and lands on helipad.

C2. PIROUETTING HEXAGON – UPWIND/UPWIND

Model aircraft takes off vertically from helipad and stops at eye level. The model then backs up and stops to hover halfway between the helipad and flag 1(2). Helicopter executes a 90º pirouette in either direction and stops. The model then ascends sideways to 2m AEL over flag 1(2) and stops. The model then makes a 90º-pirouette in the same direction and stops. The model then ascends backwards to a point 4m AEL halfway between flag 1(2) and the helipad. At this point, the helicopter makes a third 90º pirouette in the same direction as the previous two. The model then travels sideways 5m across the top of the hexagon and stops halfway between the helipad and flag 2(1) still at 4m AEL. The model completes a 90º pirouette in the opposite direction to the last three turns. The model travels and descends backwards to 2m AEL over flag 2(1) and stops. The model performs another 90º pirouette in the same direction as the previous one and stops. The model then descends sideways to eye level to a point halfway between flag 2(1) and the helipad. The model performs another 90º pirouette in the same direction as the previous two and stops. The model backs up horizontally to hover over the central pad and stops. The model then descends to and lands on the helipad.

Points will also be subtracted for the following reasons:

1. Hexagon was not symmetrical.
2. Second three pirouettes same as first three (score =zero).

C3. RECTANGLE WITH 4-POINT 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 flags 1(2) and stops. Model aircraft then ascends in 1m increments performing a continuous 90º pirouette in either direction with a stop for each increment up to 4m above eye level. Model aircraft then flies across to the opposite flag 2(1) while simultaneously performing a 360º pirouette in either direction and stops. Model aircraft then descends in 1m increments performing a continuous 90º pirouette in either direction with a stop for each 1m increment down to eye level. Model aircraft then flies backward to the helipad, stops and descends to a landing on the helipad.

C4. FOUR-POINT ROLL - DOWNWIND/DOWNWIND

Model aircraft flies straight and level for a minimum of 10 m. Model aircraft executes a 4-point roll in either direction. The four individual segments must be recognisable and of equal length. The model must exit the manoeuvre with a straight and level segment of 10 m.

Points will also be subtracted for the following reasons:

1. Duration of segments was not equal.
2. Not all segments were recognisable.

C5. TWO REVERSE OUTSIDE LOOPS - UPWIND/UPWIND

Model aircraft enters the manoeuvre by performing a half roll to inverted flight. Model then flies straight and level for 20m and executes two upward outside loops. After the loops, model aircraft flies straight and level for 20m and executes a half roll to upright flight.

Points will also be subtracted for the following reasons:

1. Half axial rolls not at same altitude

C6. KNIFE EDGE COBRA ROLL WITH 450º PIROUETTE - DOWNWIND/DOWNWIND

Model aircraft flies straight and level for a minimum of 10 m. Model aircraft pulls up to establish a 45º line. Model then performs a ¼ roll to knife-edge with the rotor disc facing the pilot and on centre of the 45º line. The model aircraft then performs a travelling 450º pirouette in the same direction as the parabolic path while in knife-edge flight until it reaches a 45º descent. The model aircraft then executes a ¼ roll to upright, flies a straight segment and then recovers to horizontal flight of at least 10m.

Points will also be subtracted for the following reasons:

1. Pirouette not exactly 450º.
2. Knife edge not vertical.

C7. FIGURE M WITH 540º STALL TURNS - UPWIND/UPWIND

Model aircraft flies straight and level for a minimum of 10 m. Helicopter pulls vertical and establishes a vertical line. The helicopter completes a ¼ roll such that the rotor disc faces pilot and continues for a minimum of 1 fuselage length. At the top, model aircraft executes a 540º pirouette so that the nose points downward. The model aircraft descends vertically and performs a ¼ roll to an inverted attitude. The model aircraft then performs a centred inverted outside half loop and continues on a second vertical ascent. The model aircraft performs another ¼ roll so that the rotor disc again pilot and continues for a minimum of 1 fuselage length. After the model aircraft stops it performs another 540º pirouette until the nose points downward. The model aircraft then descends vertically and performs another ¼ roll. The model aircraft then performs a ¼ inside loop to recover at the same altitude as the entry.

Points will also be subtracted for the following reasons:

1. Vertical ascent after ¼ rolls not recognisable.
2. 540º pirouettes not a same altitude.

C8. HORIZONTAL EIGHT WITH ROLLS - DOWNWIND/DOWNWIND

Model aircraft flies straight and level and executes a 5/8 inside loop. When the model aircraft is in 45º descent it performs a full roll and enters a ¾ outside loop. When the model aircraft is again in 45º descent it executes another full roll and a partial inside loop to upright attitude.

Points will also be subtracted for the following reasons:

1. Crossover rolls were not centred nor superimposed.

C9. VERTICAL SPIKE - UPWIND/UPWIND

Model aircraft flies straight and level for 10m minimum. The model aircraft pulls to vertical and ascends vertically and performs a ¼ roll such that the rotor disc pilot and continues for a minimum of 1 fuselage length. After the model stops it performs a ¼ pulled flip to an inverted nose-in hover and stops. The model aircraft then hovers inverted for 3 seconds. The model then completes three 90º pirouettes pausing to hover inverted for a minimum of 1 second at each point to complete the 270º rotation. The direction of pirouette must be such that the model completes the 270º with the tail into the wind and inverted. The model then performs a ¼ pulled flip and begins to fall vertically. The model aircraft then performs a ¼ inside loop and recovers upright at the starting altitude.

C10. "S" AUTOROTATION WITH 180º PIROUETTE – UPWIND/DOWNWIND/UPWIND

The model aircraft enters the manoeuvre going upwind at a minimum altitude of 40m and some distance out. After crossing the plane upwind, and some distance out, the model makes the first 180º turn towards the pilot. As the model crosses the plane again but downwind it performs a quick 180º pirouette and enters a backward descending 180º turn toward the pilot and lands.

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

FIGURE 5D-A F3C MANOEUVRE SCHEDULE A (2006 -2009)

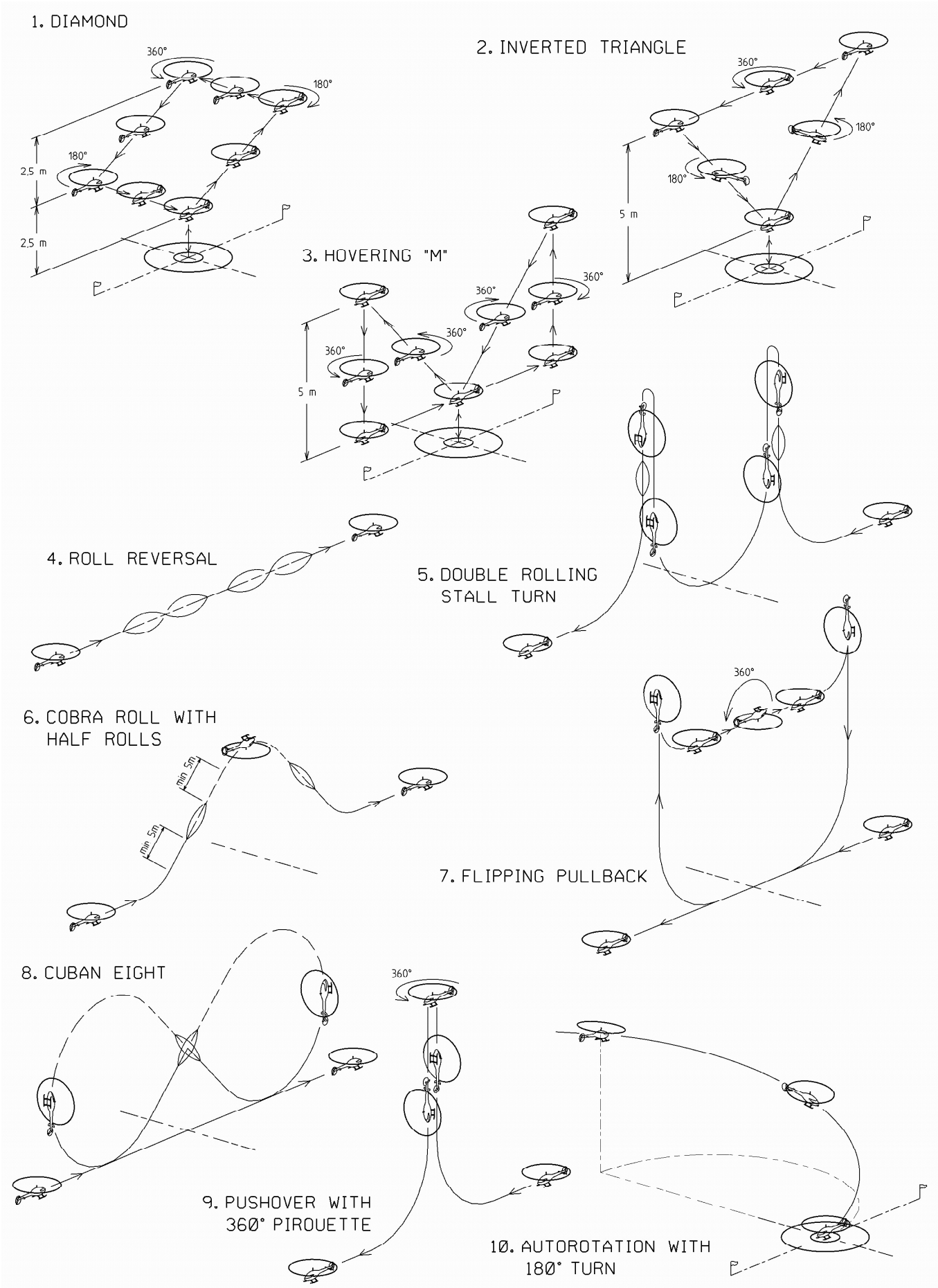

FIGURE 5D-B F3C MANOEUVRE SCHEDULE B (2006-2007)

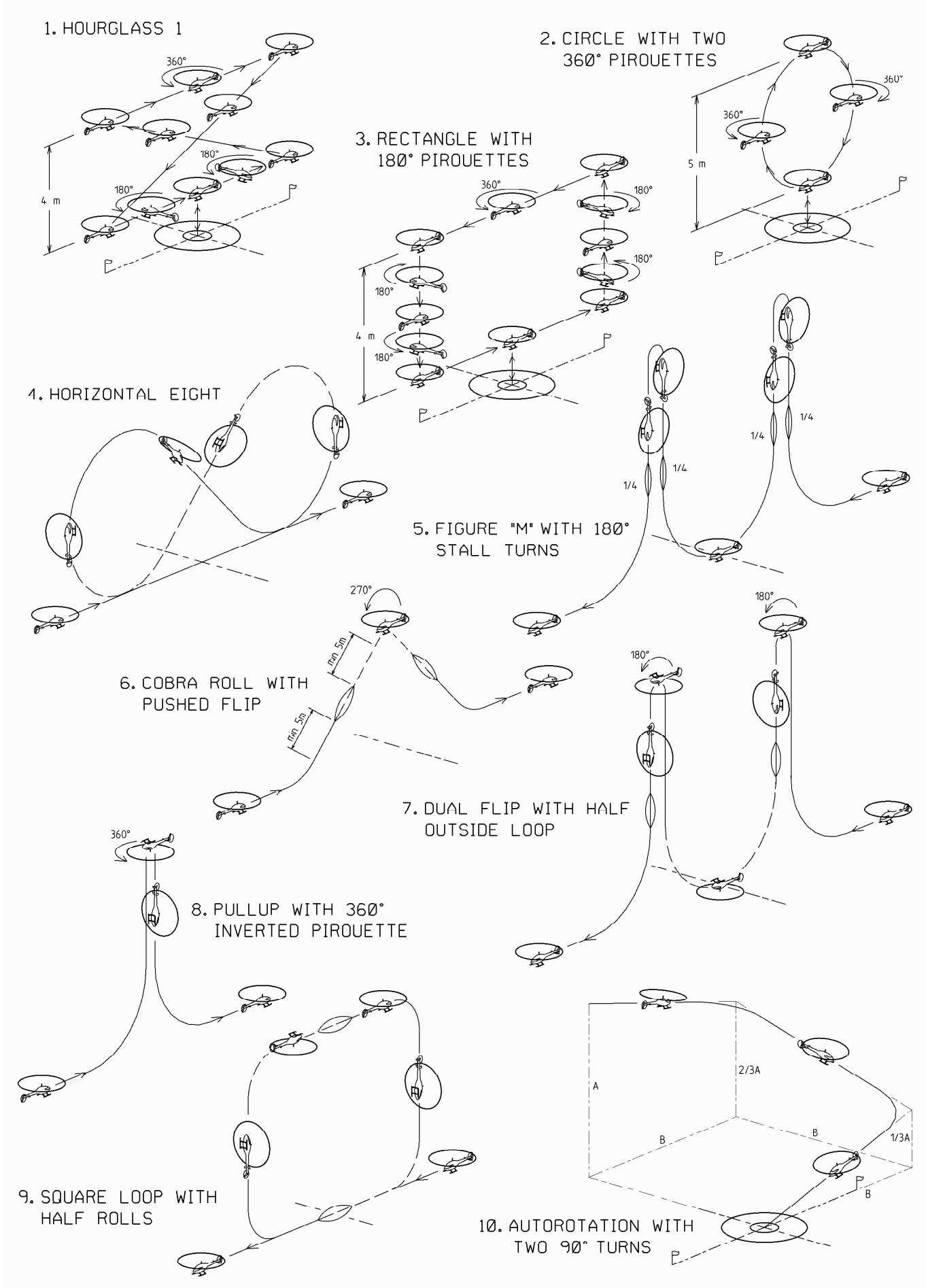

FIGURE 5D-C F3C MANOEUVRE SCHEDULE C (2008-2009)