

## ANNEX 5D F3C MANOEUVRE DESCRIPTIONS AND DIAGRAMS 0

The manoeuvre schedules are listed below with the starting and ending direction (UU =Upwind; DD = Downwind - Downwind; DU = Downwind - Upwind; UD = Upwind - Downwind) of each manoeuvre, relative to the wind, as indicated. The competitor has 9 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. FLOWER .....	(UU)
P2. CUP .....	(UU)
(FLY BY)	
P3. DOUBLE CANDLE WITH DESCENDING FLIP .....	(DD)
P4. PULLBACK WITH 3 HALF LOOPS .....	(UU)
P5. UX .....	(DD)
P6. OVAL WITH TRAVELLING FLIP .....	(UU)
P7. OPPOSITE HALF AND FULL INVERTED ROLL .....	(DD)
P8. LOOP WITH FLIP .....	(UU)
(FLY BY)	
P9. AUTOROTATION WITH LOOP .....	(DD/UU)

### SCHEDULE F

F1. UMBRELLA.....	(UU)
F2. FIR-TREE.....	(UU)
(FLY BY)	
F3. CUBAN-EIGHT WITH 360° FLIPS .....	(DD)
F4. OVAL WITH FLIPS AND FOUR-POINT-ROLL .....	(UU)
F5. DOUBLE CANDLE WITH half ROLLS AND DESCENDING FLIPS.....	(DD)
F6. X .....	(UU)
F7. STANDING EIGHT WITH HALF ROLLS.....	(DD)
F8. PULLBACK WITH 2 HALF AND 1 1/2 LOOPS.....	(UU)
(FLY BY)	
F9. AUTOROTATION WITH FLIPS AND PIROUETTE.....	(DD/UU)

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 lengths. 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. Aerobic manoeuvres must be centred within the 120° horizontal field of view and must be symmetrical about the centre line. Aerobic manoeuvres flown at a distance greater than 100m from the judges' line will be downgraded. In case of a dispute the manoeuvre text takes precedence over Figures 5D-P and 5D-F.

Note: When the word "centred" is used, it means that the MA crosses an imaginary plane that extends from a line drawn vertically upward, from the centre judge out through the helipad. This refers to both Schedules P and F.

Scoring criteria for landing; See ANNEX 5E paragraph 5E.6.10.

## **5D.2 SCHEDULE P**

### **P1: Flower (UU)**

**K=1.5**

MA take off vertically from the helipad and ascends to 2m and hovers for a minimum of 2 seconds,  
ascend backwards while performing a quarter of a 5m radius circle and stops over flag 1 (2),  
hovers for a minimum of 2 seconds and then performs half of a 5m radius circle while simultaneously performing a full 360° pirouette and stops over flag 2 (1).  
MA hovers for a minimum of 2 seconds,  
descends backwards while performing a quarter of a 5m radius circle and stops over the helipad hovers for a minimum of 2 seconds,  
descends and lands in the helipad.

### **P2: Cup (UU)**

**K=1.5**

MA takes off vertically from the helipad and ascends to 2 m while performing simultaneously a 180° pirouette. It hovers there for at least 2 seconds,  
ascends flying backwards describing the lower left quarter of a circle with 5 m radius while simultaneously performing a 180° pirouette in any direction,  
stops over the flag for at least 2 seconds,  
hovers to the other flag while simultaneously performing two 360° pirouettes that are in opposite direction, stops and hovers over the flag for at least 2 seconds,  
descends describing the lower right quarter of a circle with 5 m radius while simultaneously performing a 180° pirouette in any direction, stops over the centre line for at least 2 seconds,  
descends and lands into the helipad while simultaneously performing a 180° pirouette in any direction.

Note 1: The change of the pirouettes direction must be done smoothly on the centre line.

### **P3: Double candle with descending flip (DD)**

**K=1.0**

MA flies straight and level for a minimum of 10 m and after crossing the centre line pulls up into vertical ascent by doing a quarter inside loop and coming to a stop,  
flies vertically backward while simultaneously doing half a roll in any direction,  
performs a half pushed flip in the downward flight,  
performs a centred half inside loop, flies vertically up coming to a stop,  
flies vertically backward while simultaneously doing half a roll in any direction,  
performs a half pulled flip in the downward flight,  
performs a quarter inside loop ending at the centre line followed by a horizontal straight and level flight for a minimum of 10 m at the same altitude as when entering the figure.

Note1: The quarter loops and the half loop must have the same radius and must be congruent.

Note 2: The rolls and flips must be executed at the same altitudes.

**P4: Pullback with 3 half loops (UU)**

**K=1.0**

MA flies straight and level for a minimum of 10m and pulls up into a vertical ascent.

After coming to a stop, MA performs a half backward loop.

After a vertical tail up, stop, MA performs a centred inverted half loop.

After a vertical nose up, stop, MA performs a half backward loop.

After a vertical tail up, stop, MA performs a vertical descent.

MA pulls into horizontal straight and level flight for a minimum of 10m at the same altitude as entered.

Note: The 3 half loops must be of the same radius & altitude.

**P5: UX (DD)**

**K=1.0**

MA flies straight and level for a minimum of 10m and pulls up into a 45° ascent with a centred half roll.

Once the MA has come to a stop, MA performs a 135° pulled flip performs a centred 'U', stop performs a 135° pulled flip, performs a 45° descent with a centred half roll.

MA pulls into horizontal straight and level flight for a minimum of 10m.

Note: The bottom of the 'U' and the rolls must be centred.

**P6: Oval with travelling flip (UU)**

**K=1.0**

MA flies straight and level for a minimum of 10m and pulls up into a half loop,

flies inverted for a minimum of 1 second performs a travelling 360° centred pushed flip flies inverted for a minimum of 1 second performs a half loop.

MA pulls into horizontal straight and level flight for a minimum of 10m.

**P7: Opposite half and full inverted rolls (DD)**

**K=1.0**

MA flies straight and level for a minimum of 10m and performs a half roll in either direction, flies inverted for a minimum of 1 second,

performs a full centred inverted roll in the opposite direction Flies inverted for a minimum of 1 second,

performs a half roll in the same direction as the first half roll.

MA flies straight and level flight for a minimum of 10m.

Note: The middle of the manoeuvre must be centred.

**P8: Loop with flip (UU)**

**K=1.0**

MA flies straight and level for a minimum of 10m and pulls up into a full centred loop with a full centred transitional pulled flip on top.

MA pulls then into horizontal straight and level flight for a minimum of 10m.

Note 1: The flip trajectory must be included in the loop path.

Note 2: The flip must be 1/4 of the loops trajectory.

**P9: Autorotation with loop (DU)**

**K=1.0**

MA flies straight and level for a minimum of 10m and performs a centred loop and cuts the engine (or at idle) at the top of the loop,

completes the loop with the engine off (or at idle)

enters a descending 180° turn toward the pilot and land upwind.

Note 1: An excessively high entry level will be 1 point downgraded.

Note 2: The descent rate must be constant from the end of the loop to a point just before touchdown on the helipad.

Note 3: The flight path of the MA must appear as a half circle when viewed from above.

### 5D.3 SCHEDULE F

#### **F1: Umbrella (UU)**

**K=1,5**

MA takes off vertically from the helipad and ascends to 2m and hovers 2 seconds minimum performs a half 2,5m radius circle while performing a 180° nose in pirouette and stops over flag 1 (2),

hovers 2 seconds minimum,

performs a half 5m radius circle while performing a 360° pirouette in either direction and stops over flag 2 (1),

hovers 2 seconds minimum,

performs a half 2,5m radius circle while performing a 180° nose in pirouette and stops over helipad,

hovers 2 seconds minimum descends to helipad and lands.

#### **F2: Fir-tree (UU)**

**K=1,5**

MA takes off vertically from helipad and ascends to 7 m while simultaneously performing a 450° pirouette. It stops with its nose pointing to the pilot and hovers for at least 2 seconds,

descends (any direction) at a 45° angle while simultaneously performing a 180° pirouette in any direction, stops over the flag and hovers for at least 2 seconds,

hovers to the other flag while simultaneously performing two 180° pirouettes that are in opposite direction,

ascends at a 45° angle while simultaneously performing a 180° pirouette in any direction and stops for at least two seconds with its nose pointing to the pilot.

MA descends vertically seven meters to the helipad while simultaneously performing a 450° pirouette that must be in the opposite direction than the pirouette at the beginning of the figure and lands in the helipad.

Note 1: If at the start of the figure the nose of the MA points to the left then the ascending pirouette must be in left direction also.

Note 2: If at the start the nose of the MA points to the right then the ascending pirouette must be in right direction.

Note 3: The change of the pirouettes direction must be done smoothly on the centre line.

#### **F3 Cuban-eight with 360° flips (DD)**

**K=1.0**

MA flies straight and level for a minimum of 10 m before crossing the centre line.

MA crosses the centre line and performs 3/4 of an inside loop,

flies 45° downwards while performing a pushed, cantered 360° flip.

performs 3/4 of a outside loop,

flies 45° downwards while performing a pulled, centred 360° flip.

MA pulls into horizontal straight and level flight for a minimum of 10 m at the same altitude as when entering the figure.

Note 1: Before and after the flip the MA may fly a straight line. All straight lines must have the equal length corresponding also to the pushed flip.

#### **F4 Oval with flips and four-point-roll (UU)**

**K=1.0**

MA flies straight and level for a minimum of 10 m before crossing the centre line,

crosses the centre line and performs a half inside loop,

performs two pushed 360° flips in the horizontal flight,  
performs a half inside loop that ends at same height as when entering the figure,  
performs a four-point-roll,  
flies horizontal straight and level for a minimum of 10 m.

Note 1: Before and after the flips the MA may fly a straight line on its back, both lines must have the same length. The first 360° flip must end exactly on the centre line.

Note 2: Before performing the four-point-roll the MA may fly a straight line. However, the inverted flight phase of the four-point-roll must end exactly on the centre line.

#### **F5 Double candle with half rolls and descending flips (DD)**

**K=1.0**

MA flies straight and level for a minimum of 10 m and after crossing the centre line pulls up into vertical ascent by doing a quarter inside loop and coming to a stop.

MA flies vertically backward while simultaneously doing half a roll in any direction,  
performs a half pushed flip in the downward flight,

performs a centred half inside loop, flies vertically up coming to a stop,

flies vertically backward while simultaneously doing half a roll in any direction,

performs a half pulled flip in the downward flight,

performs a quarter inside loop ending at the centre line followed by a horizontal, straight and level flight for a minimum of 10 m at the same altitude as when entering the figure.

Note 1: The quarter loops and the half loop must have the same radius and must be congruent.

Note 2: The rolls and flips must be executed at the same altitudes.

#### **F6: X (UU)**

**K=1.0**

MA flies straight and level for a minimum of 10m and  
pulls up into a 45° ascent with a centred half roll.

When MA stops, it performs a centred, horizontal 3/4 transitional pushed flip performs a 45° descend with a centred half roll.

MA pulls into horizontal straight and level flight for a minimum of 10m.

Note: The bottom of the triangle must be centred.

#### **F7 Standing eight with half rolls (DD)**

**K=1.0**

MA flies straight and level for a minimum of 10 m, performs a half roll and flies inverted,  
straight and level for a minimum of 1 second.

MA flies then an outside loop upward,

followed by a inside loop downward,

flies inverted, straight and level for a minimum of 1 second at the same altitude as when entering the figure,

performs a half roll and flies straight and level for a minimum of 10 m.

Note 1: Both inverted flights at beginning and ending of the figure must be of identical length measured in time as well as in distance, the duration must be in minimum one second.

Note 2: The half rolls may be executed in any direction. Both loops must have the same radius.

#### **F8 Pullback with 2 half and 1 1/2 loops (UU)**

**K=1.0**

MA flies straight and level for a minimum of 10 m, crosses the centre line and pulls up into vertical ascent by doing a quarter inside loop.

After coming to a stop, MA performs a half backward inside loop.

When the tail is vertical and the MA has stopped, it performs one and a half centred outside loops.

When the nose is vertical and the MA has stopped, it performs again a half backward inside loop.

When the tail is vertical and the MA has stopped, it descends vertically, then does a quarter inside loop and goes into horizontal straight and level flight for a minimum of 10 m at the same altitude as when entering the figure.

Note: the radius of all loops must be the same (quarter loops, half loops, one and a half loop)

### **F9 Autorotation with flips and pirouette (DD/UU)**

**K=1.0**

MA flies straight and level for a minimum of 10 m, pulls up into vertical ascent by doing a quarter inside loop before the centre line.

Coming to a stop it performs a pulled quarter flip and hovers for 2 seconds, executes in a minimum of 3 seconds a 360° pirouette in inverted position, hovers for a minimum of 2 seconds and powers off the engine, performs a pulled quarter flip with powered off engine, flies a positive quarter loop until it reaches the centre line, executes from the centre line a constantly descending 180° curve in the direction of the pilot and lands against the wind on the helipad.

Note 1: An excessively high entry level will result in one point deduction.

Note 2: The radius of the quarter loop is equal to the distance from the centre line.

Note 3: The descent rate of the 180° curve must be constant from the centre line to a point just before touchdown on the helipad.

Note 4: The flight path of the MA must appear as a half circle when viewed from above.

Reason: The need for change of manoeuvres.

Technical Secretary's note: The drawings for these manoeuvres will be produced for the Plenary meeting.