5F.3 CLASS F3N OPTIONAL MANOEUVRE LIST

The Optional Manoeuvre list will be available from the F3 Helicopter Subcommittee Chairman at the beginning of each year.

The optional manoeuvres will be labelled B1 through B10.

Each year the optional manoeuvres will be modified or changed to adapt to the rapidly evolving F3N class. Organisers of F3N competitions must announce the use of a new list if appropriate at least 6 months prior to the event. The following will apply:

- For World or Continental Championships all optional manoeuvres must come from the annual list.
- For National Championships it is recommended that at least 5 manoeuvres should come from this list.
- For local competitions the organiser does not have to use manoeuvres from this list.

Number	Description	K-Factor

B.1 Rolling Globe reversal   **11.0**

MA enters in upright flight and then performs four rolling loops. During each loop, the flight path is changed continually in a way that the low point is passed rotated about 45° (seen from above) until a complete globe has been described.

After each loop the roll direction is changed. The MA exits the manoeuvre at same altitude as the entry, but in opposite direction. During each loop, the MA must perform at least 2 rolls with constant roll rate.

B.2 Double O One Twins   **11.5**

MA enters in forward upright flight parallel to the flight line. Model performs ¼ of a loop. After the ¼ loop the boom is vertical, and model is on centre line. MA then performs one complete outside loop. During the first half of the loop, the model performs half pirouette, and during the second half of the loop, the model performs another half pirouette in opposite direction. MA is now back to same point on the centreline and with same orientation as when the complete loop started. Model now performs a complete inside loop, with pirouettes similar to the first complete loop. After second complete loop, MA performs ¼ roll, and it then repeats the above sequence with the 2 loops on the centreline. After 4th loop, MA makes ¼ roll and exits via ¼ loop in backward flight to the same side and height as the entry came from. All loops must have same size and pirouettes same constant rate.

B.3 Time Travel   **10.5**

MA hovers upright on the centreline nose in. MA then performs a pirouetting tic toc loop with skids out. The circular loop must consist of exactly 12 tic tocs. After each tic toc the boom must point to the centre of the loop. MA boom will change direction corresponding to 1 hour per tic toc. Each tic must include a half pirouette in one direction, and each toc must include a half pirouette in the opposite direction. MA completes the manoeuvre by stopping in the same orientation and location as the starting point.

B.4 3D Clock   **11.5**

MA is hovering nose in on centreline. It then makes half pulled flip to skids in nose up vertical position. It then performs 12 tic tocs. After or during each tic toc, the tail rotates corresponding to 1 hour. Furthermore, the clock is rotating, so that skids are in at 12 o'clock, tail is in at 3 o'clock, rotor disc is in at 6 o'clock, and finally tail is in again at 9 o'clock. Model exits by returning to hover in same position and orientation as at the start of the manoeuvre.

B.5 Teacup Eyes   **10.0**

MA starts with an upright hover and tail in on the centreline at a minimum of 10m height. It then performs a first pirouetting tic toc loop to either side parallel to the flight line with skids out. The loop must contain a minimum of 8 tic tocs, and each tic toc must clearly include more than 1 pirouette. After the loop, MA is back to the starting point and then immediately reverses the pirouette direction. There is no hovering after the first loop. It then performs a second piro tic toc loop with skids out to the other side of the centreline. After second loop MA stops in same hover position and orientation as the starting point. Loops should be of equal size with a similar number of tic tocs in each loop.

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B.6   **Cuban 8 with roll reversal**   **11.0**

MA enters in upright backward flight. When crossing the centre line it starts continuous rolls. While rolling, MA performs half Cuban 8 parallel to the flight line. Symmetrically around the centreline, MA stops rolls, performs half pushed elevator flip, and restarts rolling in opposite direction by changing the aileron input direction. MA is now in forward flight while rolling. MA then performs second half of the Cuban 8 while continuously rolling. Symmetrically around the centreline, MA stops rolls, performs half pushed elevator flip, and restarts rolling in the same direction as was used at the manoeuvre start. MA stops rolling and exits in upright backward flight.

B.7   **High Seas**   **11.0**

MA starts with an upright hover on the centreline with the boom parallel to the flight line. MA then starts a vertical climb while making a pulled quarter elevator flip on the centerline.

Once complete it starts continuous rolls. While rolling it performs a backwards half loop to the right, and once completed immediately reverses to a forward rolling half loop back to the same upper height on the centreline.

Now with the CG at standstill, roll direction is reversed and MA then performs two similar half loops to the left side, again rolling is stopped when CG is at standstill and MA is at the upper height on centre line.

MA now descends vertically on the centreline while making a pushed quarter elevator flip returning to a hover in the initial starting orientation and position. Half loops should be equal in size with a similar number of rolls in each segment.

B.8   **Rough Diamond**   **10.0**

MA hovers on centreline with boom parallel to judgeline. It then performs 2 forward 360° tumbles while moving in a 45° up direction. MA makes ¼ right (left) pirouette to tail in orientation. It then performs 2 complete right (left) rolls in a 45° up direction, followed by another ¼ right (left) pirouette. MA is now at top of the diamond on the centreline. MA then performs 2 backward 360° tumbles while moving in a 45° down direction, followed by another ¼ right (left) pirouette to nose in orientation. Finally MA performs 2 complete right (left) rolls while moving in a 45° down direction, followed by a last ¼ right (left) pirouette. MA is now back to starting point and in same orientation. Hovering must only occur at start and exit of the manoeuvre.

B.9   **TicToc Loop**   **10.0**

MA hovers on centerline with nose pointing to the pilot. MA performs a ¼ pulled flip and starts with Tic Toc. MA performs a ¼ Tic Toc loop with skids pointing to the pilot. MA then performs a half roll in any direction so that the rotor disc points to the pilot and continues with the Tic Toc loop. On top of the loop MA performs a flip in any direction so that the skids point again to the pilot and continues with the Tic Toc loop. After ¾ of the loop MA performs again a half roll in any direction so that the rotor disc points again to the pilot and finishes the Tic Toc loop on centerline so that MA hovers again on centerline with nose pointing to the pilot.

B.10   **Pirouetting Waltz Reversal**   **11.0**

MA enters in inverted flight and then starts pirouetting whereas it performs different circles in lateral inverted flight with the rotor disk tilt at least 30 degree from a horizontal plane. After a quarter funnel MA performs a complete smaller pirouetting funnel (max. half diameter of the first) while pirouetting in the opposite direction then continues with another quarter larger pirouetting funnel in the same pirouetting direction as the first quarter, followed again by a complete smaller pirouetting funnel again in the opposite direction etc. After the larger pirouetting funnel is completed there is again a complete smaller pirouetting funnel, followed by the exit in inverted flight. The diameter of the large pirouetting funnel should be at least 20 meters.

Pirouetting rate must be chosen, so that each ¼ of the large circle includes exactly 1 complete pirouette, and so that each of the small circles also includes exactly 1 pirouette.

The Optional Manoeuvre diagrams appear overleaf.