

Model Flying NZ Flying Rules  
**Section 10b: Radio Control Aerobatics Expert Schedule**

**1. EXPERT**

**1.1 General** (Note that the FAI guidelines also apply)

Expert is a step up from the Sportsman class in precision R/C aerobatics. The schedule is designed using manoeuvres that demonstrate three fundamentals of aerobatic flight - lines, loops and rolls.

The NZ Aerobatics SIG would like to acknowledge the hard work of the NSRCA sequence committee, headed by Sean Mersh (NSRCA D8) in designing this sequence, and allowing us permission to use it.

Note the NZRCAA has renamed the sequence from 'Intermediate' (USA) to 'Expert' (NZ) and also removed the take off and landing from the sequence.

The manoeuvres shall be executed in an uninterrupted sequence.

**1.2 Who can enter?**

Any MFNZ member can come along and give it a go! Normally you would start flying Clubman, and then move up to Expert as your skills improve. If you need help, please ask.....

**1.3 Type of model**

Expert requires a model that fits the FAI F3A model specifications. Essentially, the model must fit in a 2m x 2m box, and weigh less than 5kg (including batteries, but without fuel).

**1.4 Competition Format**

**1.4.1** To enter, competitors must register. This enables a draw to be made to determine flying order. A pilot's briefing will be held prior to commencement of the contest, and this is a good time to ask any questions. Time permitting, a demonstration flight of the schedule will follow for the benefit of both contestants and judges.

**1.4.2** The contest will consist of several 'rounds'. A line director will let you know when to start your motor. The contestant shall have a helper/caller to assist with the start, place the aircraft on the flight line, call the manoeuvres during the schedule, and retrieve the aircraft after the flight.

# Expert Maneuver Descriptions And Suggested Downgrades

Study of this guide by the competitor will help him learn exactly what is expected, while study by the judge will help them decide precisely how well the competitor meets these expectations. The competitor or judge should refer to the FAI Judge's Guide for general information regarding downgrades such as the "One Point per 15-Degree Rule". All maneuvers must have a level entry and exit.

- Turnaround maneuvers are never required to exit at the same altitude as the entry.
- Turnaround maneuvers are always required to be exited on a track that is a reciprocal heading (180 degrees) to the entry track.
- Center maneuvers will always exit at the same track as the entry track.
- All maneuvers must have a level entry and exit.
- Unless specifically stated, all maneuver geometry is to be judged by track.
- The only portions of maneuvers where track does not apply, are the entries to the stall turn and spin.
- Although the "15-Degree Rule" applies universally, judges are expected to be more critical of horizontal and vertical tracks than those at off angles, such as 45-degree tracks.

Below is the sequence for Expert. U, D, and T represent Upwind, Downwind and Turnaround, respectively.

|     | <b>NZRCAA Expert Pattern</b>                                  | <b>K-factor</b> |
|-----|---|-----------------|
| 1.  | Stall turn with ¼ rolls up and down                           | 4               |
| 2.  | Half reverse Cuban eight                                      | 2               |
| 3.  | Non rolling Pyramid loop                                      | 4               |
| 4.  | Humpty bump with options (half roll up or ¼ roll up and down) | 5               |
| 5.  | Avalanche   | 4               |
| 6.  | Reverse Shark's tooth ½ roll on the 45 degree up line         | 3               |
| 7.  | Two Horizontal Rolls  | 4               |
| 8.  | Stall turn with a full roll up                                | 3               |
| 9.  | Top hat with half rolls up and down                           | 5               |
| 10. | Half Cuban eight  | 2               |
| 11. | Cuban eight   | 5               |
| 12. | Half loop (inverted exit)                                     | 1               |
| 13. | 45 degree down line with a half roll                          | 3               |
| 14. | Top hat with ¼ rolls, (inline option ½ roll up)               | 4               |
| 15. | 2 half rolls reversed, pause in the middle                    | 4               |
| 16. | Half square loop with a half roll up                          | 2               |
| 17. | Three turn spin   | 3               |
|     |   | <b>56</b>       |

### Maneuver Descriptions:

**1. Stall turn with ¼ rolls up and down. (U):** From upright, pull through a ¼ loop to a vertical up line, hesitate, perform ¼ roll, hesitate, perform a stall turn, hesitate, perform ¼ roll, hesitate, pull a ¼ t loop to exit in upright flight.

#### Downgrades:

- Up and down-tracks not 45°.
- Up and down-tracks not of equal length.
- Loop segments not round and of equal size and radius.
- Wings not level during loop and line segments.
- Changes in track during loop segments.
- Exit not at same altitude and track as entry.

**2. Half reverse Cuban eight (T):** From upright pull a 1/8 inside loop to a 45° up line, hesitate, perform a 1/2 roll, hesitate, perform a 5/8 inside loop to exit in upright flight in the opposite.

Downgrades:

- Half loops not of constant and equal radius.
- Roll is executed before completion of half loop.
- Roll not executed immediately after completion of half loop.
- Roll rate not constant.
- Changes in track during half loop or roll.
- Under or over rotation of prescribed roll element. Apply “One Point per 15- Degree Rule”.

**3. Non-rolling Pyramid loop (D):** From upright fly past center and pull a 3/8 inside loop to an inverted 45° up line, hesitate, pull a 1/4 inside loop to a 45° downline, hesitate, pull a 3/8 inside loop to upright horizontal level flight.

Downgrades:

- Loop not round
- Wings not level during loop
- Changes in track during loop
- Exit not at same altitude and track as entry

**4. Humpty bump with options (half roll up or 1/4 roll up and down). (T):** From upright pull a 1/4 inside loop to a vertical up line, hesitate, perform 1/2 roll, hesitate, perform a 1/2 inside or outside loop to a vertical downline, hesitate, perform a 1/8 loop to horizontal flight in the opposite direction. Optionally perform 1/4 roll on the up and down line, exit upright

Downgrades:

- Half roll not 180 degrees. Apply “One Point per 15-Degree Rule”.
- Half loop not started immediately after 2 of 4 roll.
- Half loop not constant radius.
- Changes in track.
- 2 of 4 roll not in level flight.
- Model track does not finish exactly opposite the direction of entry.
- Wings not level during looping segment.

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**5. Avalanche. (U):** From upright pull 1 full inside loop with an inside or outside snap roll performed at 180 degrees.

Downgrades:

- Up and down-tracks not vertical. Apply “One Point per 15-Degree Rule”.
- Loop segments not round and of equal size and radius.  
Changes in track during loop segments or prescribed roll elements.
- Prescribed rolls not centered on respective lines.
- Roll rates not constant.
- Over or under rotation of prescribed rolls. Apply “One Point per 15-Degree Rule”.
- Pivot radius greater than half wingspan.
- Pivot radius greater than two wingspans: 0 pts.
- Forward or backward flop: 0 pts.
- Pendulum movement after stall.
- Entry and exit altitudes not the same
- Vertical track not on center

**6. Reverse Shark’s tooth with ½ roll on the 45° upline. (T):** From upright pull a 1/8 inside loop to a 45 degree up line, hesitate, perform a ½ roll, hesitate, pull a 3/8 inside loop to a vertical downline, hesitate, pull a ¼ inside loop to upright horizontal flight in the opposite direction.

Downgrades:

- Track not vertical in up and down-tracks. Apply “One Point per 15-Degree Rule”.
- Rolls not centered in respective vertical lines.
- Over or under rotation on prescribed rolls. Apply “One Point per 15-Degree Rule”.
- Loop segments not round with same size and radius.
- Roll rates not constant within roll types.
- If optional cross-box maneuver is used, 1/2 loop not 90 degrees to the flight line.

**7. Two Horizontal Rolls (D):** From upright, perform two rolls to exit upright.

Downgrades:

- Changes in track during rolls.
- Changes in altitude during rolls.
- Roll rate not constant.
- Over or under rotation of rolls. Apply “One Point per 15-Degree Rule”.
- Wings not level at beginning or end of roll sequence. Apply “One Point per 15-Degree Rule”.
- Center point of the rolls is not on center. Center point is when the airplane is upright between the rolls.

**8. Stall turn, full roll up. (T):** From upright, pull through a 1/4 loop to a vertical up line, hesitate, perform 1 full roll, hesitate, perform a stall turn, hesitate, pull through a 1/4 loop to exit upright in the opposite direction.

Downgrades:

- Up and down-tracks not vertical. Apply “One Point per 15-Degree Rule”.
- Loop segments not round and of equal size and radius.
- Changes in track during loop segments.
- Pivot radius greater than half wingspan.
- Pivot radius greater than two wingspans: 0 pts.
- Forward or backward flop: 0 pts.
- Pendulum movement after stall.

**9. Top hat with half rolls up and down. (U):** From upright, pull a ¼ inside loop to a vertical up line, hesitate, perform ½ roll, hesitate, pull a ¼ inside loop to inverted horizontal flight, hesitate, pull a ¼ inside loop to a vertical downline, hesitate, perform a ½ roll, hesitate, perform a ¼ inside loop to exit in upright horizontal level flight. The length of the horizontal flight will be equal to the length of the vertical portion.

Downgrades:

- Loop segments not round and of equal radius.
- Changes in track in loop segments.
- Legs of loop not of equal length.
- Wings not level.
- Tracks not at 45 degrees. Apply “One Point per 15-Degree Rule”.
- Exit and entry altitudes not the same.

**10. Half Cuban eight. (T):** From upright, pull a 5/8 inside loop to a 45° downline, hesitate, perform a ½ roll, hesitate, perform a 1/8 inside loop to exit in horizontal flight in the opposite direction.

Downgrades:

- Loop segments not round and of equal radius.
  - Changes in track in loop segments.
  - Climbing track not 45 degrees before and after prescribed roll. Apply “One Point per 15-Degree Rule”.
  - Over or under rotation of 1/2 roll. Apply “One Point per 15-Degree Rule”.
  - Roll not centered on 45-degree line.
  - Roll rate not constant.
  - Vertical down line not vertical. Apply “One Point per 15-Degree Rule”.
- Model changes track.
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**11. Cuban eight. (D):** From upright, fly past center and perform a 5/8 inside loop to a 45° inverted downline, hesitate, perform a ½ roll, hesitate, perform a ¾ inside loop to a 45°

inverted downline, hesitate, perform a ½ roll, hesitate, pull a 1/8 inside loop to exit in horizontal level flight.

Downgrades:

- Over or under rotation of rolls. Apply “One Point per 15-Degree Rule”.
- Changes in track or altitude.
- Roll rates not equal or constant.
- Model does not hesitate at inverted.
- Half rolls not opposite: 0 pts.

**12. Half loop (inverted exit). (T):** From upright, pull through a ½ loop to exit in inverted horizontal flight in the opposite direction.

Downgrades:

- Model not vertical at start and finish of one quarter rolls.
- Quarter rolls not exactly 90 degrees.
- Model does not fly straight and level inverted and at 90 degrees to the flight line.
- Rolls not centered on line segments.
- Loop segments not round with same size and radius.
- Up and down-tracks not vertical.
- Model not inverted on top line: 0 pts.

**13. 45° downline with ½ roll. (U):** From inverted pull through a 1/8 inside loop to an inverted 45° downline, hesitate, perform one half roll, hesitate, pull a 1/8 inside loop to upright horizontal flight.

Downgrades:

- Loop segments not round and of equal radius.
- Changes in track in loop segments or during prescribed roll.
- Roll elements not centered on 45-degree lines.
- Under or over rotation of roll elements. Apply “One Point per 15-Degree Rule”.
- 45-degree up tracks not at 45 degrees. Apply “One Point per 15-Degree Rule”.

**14. Top hat with ¼ roll up and down, (inline option ½ roll up). (T):** From upright perform ¼ inside loop to a vertical up line, hesitate, perform ¼ roll, hesitate, perform a ¼ inside loop to an inverted horizontal track, hesitate, perform a ¼ inside loop, hesitate, perform a ¼ roll, hesitate, pull a ¼ inside loop to upright level flight in the opposite direction. Optionally perform a ½ roll on the up line and no rolls on the down line.

Downgrades:

- Changes in track during half loop.
- Half loop not a constant radius.

**15. Two half rolls reversed, pause in the middle. (D):** From upright, before center perform a  $\frac{1}{2}$  roll, hesitate, perform a  $\frac{1}{2}$  roll in the opposite direction, exit in horizontal upright flight.

Downgrades:

- Half loops not round with constant and equal radius.
- Half loops not completed exactly above or below point of commencement of half loops.
- Horizontal legs not equal to diameter of half loops.
- Rolls not executed immediately after completion and before start of half loops.
- Roll rates not constant and equal.
- Changes in track during half loop, rolls, or lines.
- Entry and exit not at same altitude or not level.
- Under or over rotation of prescribed roll elements. Apply "One Point per 15Degree Rule".
- Line segments, including rolls, not straight, horizontal and on track.

**16. Half Square loop with a half roll (T):** From upright perform a  $\frac{1}{4}$  inside loop to a vertical up line, hesitate, perform one half roll, hesitate, perform  $\frac{1}{4}$  outside loop to exit in upright horizontal flight in the opposite direction.

Downgrades:

- Loop segments not of equal radius.
- Changes in track in loop segments.
- Vertical track not vertical. Apply "One Point per 15-Degree Rule".

**17. Three turn spin (U):** From upright approach center with decreasing speed until model stalls at center, performs the required 3 turns of rotation (spin) and stops with the wings perpendicular to the flight line in a vertical downline, hesitate, perform a  $\frac{1}{4}$  loop to upright level flight to finish. Stall is the center of the maneuver and should occur directly over the center pole. All spins begin and end with a horizontal line.

Downgrades:

- Snap roll or entry not stalled entry - 0 pts.
  - Model climbs or dives during entry. Apply "One Point per 15 Degree Rule" (Entry ends with the stall).
  - Model climbs or dives during exit. Apply "One Point per 15 Degree Rule" (Exit begins at completion of quarter loop to level flight).
  - Wings not level during entry or exit.
  - At stall, spin is forced in the opposite direction to initial wing drop.
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- Wings not perpendicular to flight line at end of required number of turns. Apply "One Point per 15-Degree Rule".
  - Spiral dive or pure rotation around roll axis of more than one-half ( $\frac{1}{2}$ ) turn - 0 pts.

- Tail of model does not describe a cone during rotation - 0 pts.
- Wing passes through vertical plane before nose passes through horizontal plane (snap roll entry) – 0 pts.
- Fuselage reaches a vertical attitude before rotation begins (simulation of stall by application of elevator) -0 pts.