

## **ANNEX 5G**

### **F3N JUDGES GUIDE**

#### **5G.1 PURPOSE**

The purpose of the F3N 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.

#### **5G.2 PRINCIPLES**

The principles of judging a radio controlled model helicopter should be based on the perfection with which the model aircraft performs each set manoeuvre as described in Annex 5F.11.

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 or even the maximum of 20 points.

Basically all judging starts with the respective point maximum, from where points are subtracted according to the grading criteria of this guide.

#### **5G.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 should 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.

#### **5G.4 CRITERIA FOR JUDGING MANOEUVRES**

A description of each set manoeuvre is provided in Annex 5F.11.

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.

#### **5G.5 ATTITUDE AND FLIGHT PATH**

The flight path of the model aircraft (MA) is the trajectory of its centre of gravity. The attitude is the orientation of the rotor disc (RD) in relation to the flight path. All judging should be based on the flight path, but the angle between flight path and RD should not exceed 15° (if not specified otherwise). For higher angles one point per 5° should be subtracted.

#### **5G.6 GRADING CRITERIA FOR MANOEUVRES AND SEGMENTS**

The set manoeuvres are composed of segments. The following criteria are furnished to provide the judge with a guide for downgrading deviations from the defined manoeuvre segments.

These segments are: Loop, Roll, horizontal Circle, Turn, Pirouette, Autorotation, Flip, Tic-Toc, Rainbow, Snake and Funnel or parts of them. If a manoeuvre contains several segments of the same type than these have to be similar, e.g. same radii for loops, same roll rates for rolls, same pirouette turning rates etc.

Basically all aerobatic manoeuvres start and end with a straight and level flight of 10 metres minimum length parallel to the judges line (except horizontal eights). All manoeuvres from stationary flight start and end with a hovering of at least 1 second with the model parallel or vertical to the flight line. If one of these segments is missing 2 points should be subtracted.

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If the orientation of the entire manoeuvre or segments of it is not parallel to the defined line or plane, 1 point per each 5° deviation should be subtracted. If the manoeuvre is not positioned symmetrically to the centreline a downgrade of 1 point per each 5 m should be made.

These two guides (1 point per 5° and 1 point per 5 m) can also be used as a rule of thumb when in doubt and if the downgrades are not defined otherwise.

If the flight altitude changes in horizontal passages a downgrade of 1 point per 2 m for aerobatic and of 1 point per 50 cm for hovering manoeuvres should be made.

In general every severe mistake should also lead to a severe downgrade about 6 points, a medium defect to about 3 points and a small deviation to about one point. Of course the number of mistakes has a big influence too, if a manoeuvre has many severe defects the first one will result in 6 points downgrade, the second one in 4 points, the third in 2 and every further in 1 point. If, in spite of many severe mistakes, the manoeuvre is still recognisable and no parts are missing, the score should not fall below 5 points. If entire segments are missing or the manoeuvre is completely unrecognisable the score must be zero.

#### **5G.6.1 LOOP**

A loop must have a constant radius and must be flown in a vertical plane. MA attitude and flight path have to differ to keep the momentum (but less than 15°). The speed of MA should not vary too much and the radius must be smooth and not segmented.

#### **5G.6.2 ROLL**

A roll is a rotation about the longitudinal axis of MA. To keep the momentum, for a horizontal roll the longitudinal axis must maintain its angle to a horizontal plane. Start and end of rolls should be crisp and well defined.

#### **5G.6.3 HORIZONTAL CIRCLE**

MA speed and circle diameter should be chosen in a way that a circle is flown with less than 20° declination of RD. MA speed and circle diameter have to be constant.

#### **5G.6.4 TURN**

A turn is a rotation about the yaw axis after a vertical ascent and just before the complete stop of MA. This rotation must be symmetrical by performing half of it before and the other half after the moment MA comes to a halt. The rotation must be of constant rate without interruptions, with crisp and well defined start and end.

#### **5G.6.5 PIROUETTE**

A pirouette is a rotation about the yaw axis. The rotation must be of constant rate without interruptions, with crisp and well defined start and end. Since in F3N pirouettes are not flown stationary but only combined with other manoeuvre segments (like loops, flips and funnels) it is important, that the pirouette does not affect the flight path.

#### **5G.6.6 AUTOROTATION**

During this manoeuvre the model should follow an almost straight flight path from the start to the landing on the helipad. This path may be interrupted by a flip or roll but should be resumed after this. If the landing point is not in the circle, a downgrade of 1 point per 1 m distance should be made.

#### **5G.6.7 FLIP**

A flip is a rotation about an axis normal to the rotor shaft. Stationary flips need to have a small altitude oscillation (low with RD horizontal, high with RD vertical) which should be less than 50 cm. Lateral deviations of these flips should be downgraded by 1 point per 50 cm.

Travelling flips should not affect the described flight path.

A pushed flip is done by performing the elevator impulse at the transmitter in forward direction. A pulled flip is done by performing the elevator impulse at the transmitter in backward direction.

#### **5G.6.8 TIC-TOC**

MA hovers or moves slowly and is rotated using cyclic pitch about 135°. It then rotates its RD in a 90° arc back and forth. A movement of the centre of gravity of less than 2 m for simple tic-tocs or less than 5 m for tic-tocs with pirouettes should not lead to a downgrade, for greater deviations 1 point should be subtracted for the mentioned distances.

#### **5G.6.9 RAINBOW**

A rainbow is a semicircle, starting from hovering, with RD always normal to the flight path. The diameter of the semicircle should not be less than 10 m. The start and stop shall be crisp and well defined.

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**5G.6.10 SNAKE**

While in fast flight MA follows a wavy line by alternately performing upright and inverted quarter circular segments of equal diameter and length.

During these circular segments the banking must not fall below 45°. A banking of less than 20° means just an array of quarter circles but not a snake and makes the manoeuvre unrecognisable, ie zero points.

**5G.6.11 FUNNEL**

A funnel is a circle with at least 10 m diameter, performed with a declination of RD of at least 45° from a horizontal plane. MA speed, declination and circle diameter should be constant. A declination of less than 20° means just a horizontal circle but not a funnel and makes the manoeuvre unrecognisable, ie zero points.

**5G.6.12 REVERSAL**

Cyclic or pirouette reversals must be performed in a way, that the number of rotations in each direction is almost equal. A relation of e.g. 2:1 should lead to a downgrade of 4 points.

If not defined otherwise, the direction of rotation should alter after every 360° rotation.

**5G.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 5F.11 is preserved in the model aircraft's flight path.

To countervail lateral wind (in horizontal or vertical passages) MA must turn its longitudinal axis against the wind. This attitude must not lead to a downgrade as long as the flight path is correct.

Wind parallel to the flight line must be compensated with pitch in vertical passages, an angle between flight path and attitude will in that case lead to a downgrade of 1 point per 5°.

**5G.8 CRITERIA FOR JUDGING FREESTYLE FLIGHT AND MUSIC FREESTYLE**

For freestyle and music freestyle flights the entire flights will be judged according to the table below:

<b>Criterion</b>	<b>Max Points Freestyle</b>	<b>Max Points Music Freestyle</b>
Difficulty	20 k=3	20 k=2
Harmony	20 k=1	20 k=2.5
Creativity	20 k=1	20 k=2.5
Precision	20 k=3	20 k=2
Safe presentation	20 k=1	20 k=1

For freestyle and music freestyle flights the judges can give maximum 20 points to all criteria. The valence of each criterion is regulated by k-factors.

The scores are given after the flight for all five criteria. It is important, that the scores for each criterion reflect the entire flight, not only some details of the flight.

**5G.8.1 DIFFICULTY**

This criterion evaluates the level of difficulty of the freestyle flight and music freestyle flight. It is important, that the entire flight is to be judged, not only some highlights. So the score reflects the average level of difficulty. The K-factors of the set manoeuvres may give some reference values for the difficulty, but during the calibration flights and by watching practice flights the judge should get a clear impression of the range of difficulties of possible manoeuvres. Risky manoeuvres should never be mistaken as difficult manoeuvres. Risky manoeuvres must not lead to higher scores for difficulty, but result in a downgrade for safety.

**5G.8.2 HARMONY**

The combination of the manoeuvres, smooth or flowing transitions between them are the main factors for this criterion. Also the manoeuvres size and dynamic in relation to the model aircrafts performance is of influence. The pace is not of influence here, harmony can be as well demonstrated in dynamic as in gentle sequences.

In Music flights also the harmony between the music and the presentation comes to influence here.

**5G.8.3 CREATIVITY**

New combinations or new manoeuvres at all will lead to high scores here. Also dynamic and diversified sequences are positive.

There also should be a variety of different tempi in the presentation. Sequences without manoeuvres or repetitions will lead to downgrades.

In Music flights the transformation of musical accents into the performance is of great importance here.

**5G.8.4 PRECISION**

Precision and recognition of manoeuvres and sequences are evaluated here. The criteria cannot be as strict as for the set manoeuvres as they have to meet an entire flight, but the principles stay the same.

**5G.8.5 SAFE PRESENTATION**

In addition to the safety rules during the flight(s) (5F.10), the impression of the presentation related to safety is the guide here. If a pilot does not exceed the limit of his skills or flies unsafe in any way (eg too close to himself) a high score can be given here. Flying low (within the rules) by itself is not a reason for downgrade.

**5G.8.6 EVALUATION OF THE LEVEL OF DIFFICULTY FOR FREESTYLE SCHEDULE**

The following table gives reference values for the estimation of the level of difficulty for both schedules, unlimited and music freestyle.

<b>Aerobatic Manoeuvres in Basic Orientations</b>	
3	Examples: Immelmann, short straight passages, loop, loop with full pirouette on top, roll, turn, 540° turn, pirouettes
5	Examples: ½ Cuban eight, long passages, nose-in circle, flips, autorotation
6	Examples: inverted hovering on eyelevel, flip sideward, Cuban eight, flips with hovering stops
6-10	Examples: Horizontal eight, loop sideways, turn with hesitations and/or changes of turning direction, rolling stall turn, autorotation with 180 degree turn, death spiral, knife edge pirouette, speed circle, stationary tictoc, funnel, 4-point roll, multi-point tictoc, Snake
<b>Aerobatic Manoeuvres in Several Orientations</b>	
10-15	Aerobatic manoeuvres that demonstrate several orientations like inverted, sideways, backwards etc. Examples: Backward Inverted Cuban eight, skids in and out knife edge manoeuvres, snake parallel to flight line and to centerline, different kinds of funnels like waltz
<b>Aerobatic Manoeuvres including Piro, Rolls and Flips Etc</b>	
13-18	Aerobatic manoeuvres flown in a way where in addition to the CG movement of the main manoeuvre, the model is continuously performing rolls, piro, flips, tictocs or similar. In order to get a high score, many orientations must be shown. Examples: Pirouetting Globe, Chaos, Rolling Globe, Rolling circles, Pirouetting funnels
<b>Aerobatic Manoeuvres including Reversals and Transformations</b>	
17-20	Aerobatic manoeuvres flown in a way, where piro, rolls, tictocs or other secondary manoeuvres are included/integrated and reversed in an equal and balanced way. Examples: Rolling globe with roll reversals, horizontal circle with continues flips/rolls so that tail boom is always parallel to centerline, Reversing chaos In order to score near maximum, many orientation changes must be displayed, and flight must include many clearly defined manoeuvres.