

## VOLUME F3 HELICOPTERS

### PART FIVE - TECHNICAL REGULATIONS FOR RADIO CONTROLLED CONTESTS

#### 5.4. CLASS F3C – RC AEROBATIC HELICOPTERS

##### 5.4.1. Definition of a Radio Controlled (R/C) Helicopter

An R/C helicopter is a heavier-than-air model aircraft (MA) that derives all of its lift and horizontal propulsion from a power driven rotor system(s) rotating about a nominally vertical axis (or axes). Fixed horizontal supporting surfaces up to 4% of the swept area of the lifting rotor(s) are permitted. A fixed or controllable horizontal stabiliser of up to 2% of the swept area of the lifting rotor(s) is permitted. Ground effect machines (hovercraft), convertiplanes or aircraft that hover by means of propeller slipstream(s) deflected downward are not considered to be helicopters.

##### 5.4.2. Builder of the Model Aircraft

There is no requirement for the competitor to be the builder of the model in F3C. Refer C.5.1.2. in *CIAM General Rules*.

##### 5.4.3. General Characteristics

- a) AREA: The swept area of the lifting rotor cannot exceed 250dm<sup>2</sup>. For helicopters with multiple rotors whose rotor shafts are more than one rotor diameter apart the total swept area of both rotors cannot exceed 250dm<sup>2</sup>. For helicopters with multiple rotors whose rotor shafts are less than one rotor diameter apart the swept area of both rotors (counting the area of superposition only once) cannot exceed 250dm<sup>2</sup>. The tail rotor must be driven by the main rotor and must not be driven by a separate engine/motor.
- b) WEIGHT: The weight of the model aircraft (with fuel / with batteries) must not exceed 6.5 kg.
- c) MOTOR: Internal combustion engine displacement: no restrictions.  
Electric motors are limited to a maximum no load voltage of 51 volts for the propulsion circuit.
- d) GYROS: The use of pre-programmed flight manoeuvres is forbidden. The use of automatic position (latitude and longitude) locking devices and altitude locking devices, whether with external references or not, are forbidden.
- e) ROTOR BLADES: All-metal main or tail rotor blades are prohibited.

##### 5.4.4. Noise Limit

Noise level measurements must be made before the start of a competition, preferably during the official practice day. The noise level must be measured at a distance of 3m (3 metres) while the helicopter is hovering with the skids/landing gear at 2m over the centre of a 2m diameter circle. A remote microphone mounted on a tripod must be used. The engine speed (RPM) must be the same as that used during the hovering portion of the flight schedules. During the measurement the helicopter must be rotated through 360° to determine the maximum noise level. The sound pressure level must not exceed 87dB (A) over a soft (grass) surface or 89dB (A) over a hard (asphalt, concrete, etc) surface. If the noise level limit is exceeded during the first measurement, two additional measurements must be made to substantiate the excessive noise level. The competitor may modify the helicopter and/or silencer system to reduce the noise level and after verification of an acceptable level, will be permitted to fly. If the noise level cannot be reduced to or below the noise level limit it will not be allowed to fly in the competition. The measuring equipment must be calibrated to the dB (A) sound pressure level scale defined in applicable ISO Standards. If noise measuring equipment that can be calibrated to ISO Standards is not available, the measurements will be advisory only and no competitor can be excluded from the competition.

##### 5.4.5. Contest Area Layout

See FIGURE 5.4.A. Note: If two flight lines are used they must be parallel, operate simultaneously, face in the same direction and be separated by a minimum of 500m for a "front-to-back configuration" or a minimum of 1000m for a side-by-side configuration.

##### 5.4.6. Number of Helpers

Each competitor is allowed only one mechanic/caller. The mechanic/caller must announce the start, finish and name or number of each manoeuvre, and should inform the pilot of wind direction, remaining flight time, proximity to prohibited areas and intrusions into the flight area.

Team managers may observe the flight from a position 5m behind the judges and away from the start circle. Team managers may serve as mechanic/caller if no separate person is available for this task.

#### 5.4.7. Number of Model Aircraft

The number of model aircraft eligible for entry is two (2). Model aircraft numbers 1 and 2 may only be exchanged within the start circle. Both model aircraft must use the same radio frequency.

#### 5.4.8. Number of Flights

At Continental and World Championships, each competitor is entitled to four (4) official preliminary flights. After completion of the preliminary flights the top 28 pilots are entitled to two (2) semi final flights. After completion of the semi final flights, the top 14 pilots are entitled to two (2) final flights. At National and Open International Competitions, the preliminary/semi final/final system is not mandatory.

#### 5.4.9. Definition of an Official Flight

There is an official flight when the competitor is officially called. The flight may be repeated if, for any unforeseen reason outside the control of the competitor, the model aircraft fails to make a start such as:

- a) The flight cannot safely be made within the allowed time limit.
- b) The competitor can prove that the flight was hindered by outside interference.
- c) Judging was impossible for reasons beyond the control of the competitor (model aircraft, engine, or radio failures are not considered to be outside the control of the competitor). In such cases the flight **shall** be repeated as close to the published time as possible. The competitor, however, has the right to refuse a reflight.

#### 5.4.10. Scoring

Each manoeuvre is given a score between 0 and 10 (including half) points by each judge. A new score sheet is issued to each competitor for each round. Only the competitor's number (no name or nationality) will appear on the score sheet. Any manoeuvre not completed shall be scored zero (0) points. If a manoeuvre is scored zero points all judges must agree. There shall be an official located on the field where any flight over the prohibited area can be observed. The prohibited area is the shaded area in Figure 5.4.A behind the judges' line. The area extends to infinity to the left, right and rear. A visual or audible signal shall be given to indicate such over flights. Competitors flying over this area will be penalised by scoring zero (0) points for the current flight. However, the judges shall score all manoeuvres. If an infringement has been made, the scores will be deleted from all score sheets after the flight. In addition, there shall be no score when:

- a) The competitor flies a model aircraft that has been flown in the same competition by another competitor, or flies a model aircraft that does not comply with the definition and general characteristics of a radio controlled helicopter.
- b) The competitor does not deliver his transmitter to the impound or operates any transmitter at the competition area during a round without permission.
- c) The competitor starts his model aircraft outside of the start circle.
- d) The competitor gets his transmitter from the impound before he is officially called.
- e) Manoeuvres must be performed where they can be seen clearly by the judges. If a judge, for some reason beyond the control of the competitor, is not able to follow the model aircraft through the entire manoeuvre, he may put a "Not Observed" (N.O.) mark. In this case, his score will, for that particular manoeuvre, be set to the average score given by the other judges, rounded to the nearest half point.

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**5.4.11. Classification**

Part of Competition	# of Competitors	# of Rounds	Classification	Ranking
Preliminary	All registered and qualified pilots	4	Sum of normalized points of each of the four rounds. Dropping the lowest result, only if there are at least 3 completed rounds	Determines the ranking of pilots classified 29... n
Semi-Final	Top 28 pilots of preliminary part of competition	2	Sum of normalized points of each of the two rounds plus the normalized result of the preliminary part of the competition. Dropping the lowest of any of these 3 results, only if there were 2 semi-final rounds completed.	Determines the ranking of pilots classified 15..28
Final	Top 14 pilots of semi-final part of competition	2	Sum of normalized points of each of the two rounds plus the normalized result of the semi-final part of the competition. Dropping the lowest of any of these 3 results, only if there were 2 final rounds completed.	Determines the ranking of pilots classified 1..14

The finals to determine the individual classification are only required for World and Continental Championships.

If the competition is interrupted, the final individual classification will be determined by counting all completed rounds and by calculating according to the table above.

All scores for each round will be normalised by awarding 1000 points to the highest scoring flight. The remaining scores are then normalised to a percentage of the 1000 points in the ratio of actual score over the score of the winner of the round. If only one round is possible then the classification will be based on that one round.

For example:

$\text{Points}_{(X)} = \text{Score}_{(X)} \text{ divided by } \text{Score}_{(W)} \text{ multiplied by } 1000$

Where  $\text{Points}_{(X)} = \text{Points awarded to competitor X}$

$\text{Score}_{(X)} = \text{Score of competitor X}$

$\text{Score}_{(W)} = \text{Score of winner of the round}$

Points (x) should be calculated to at least two decimal places and recorded (truncated) to two places after decimal point.

Ties for any of the first three places will be broken by counting the highest throwaway score. If the tie still stands a "sudden death" final must take place within one hour of the end of the scheduled final rounds.

The team classification for World and Continental Championships is established at the end of the competition (after the final flights) by adding together the numerical final placings of the three team members using the full list of competitors unless there is a fourth member of the team (who must always be a junior) in which case it will be the three best placed members. Teams are ranked from the lowest numerical scores to the highest, with complete three-competitor teams ahead of two-competitor teams, which in turn are ranked ahead of one-competitor teams. In case of a tie, the best individual placing decides the team ranking. (Ref: *CIAM General Rules*, C.15.6.2 i))

**5.4.12. Judging**

At Continental and World Championships the organiser must appoint a panel of five judges for each round/flight line. When the entry exceeds 55, two flight lines must be used. The judges must be of different nationalities and must be selected from the current CIAM list of international judges. When using two separate panels, the organiser is allowed to use two judges of the same nationality, one on each panel. Those selected must reflect the approximate geographical distribution of teams participating in the previous World Championship with the final list approval by the CIAM Bureau.

At least 20% but not more than 40% of the judges must not have judged at the previous World Championships.

For the preliminary rounds the final score of each flight is obtained by deleting the highest and lowest scores for each manoeuvre from the five judges. This also applies for semi final and final rounds if only one flight line is used. If two flight lines were used for the preliminary rounds, for the final and semi final rounds ten judges shall be used while dropping the two lowest and two highest scores for each manoeuvre. At open or other International Competitions the number of judges may be reduced to a minimum of three with no throwaway scores.

- a) There shall be training flights for judges with a debriefing session immediately before a Continental or World Championships.
- b) The scoring system must be organised in such a way that the competitors and the spectators can clearly see the scores awarded by all judges after each flight. The score sheet notation must be written by the judges themselves.

#### 5.4.13. Organisation

TRANSMITTER & FREQUENCY CONTROL (See Volume *CIAM General Rules*, Section C, Paragraph C.16.2). When all transmitters are of the spread spectrum type a transmitter impound is not required.

##### FLIGHT ORDER

The flight order for the first preliminary round will be determined by a random draw, taking into account that frequency will not follow frequency and team member will not follow team member of the same team. The flight order for preliminary rounds two, three and four will start at the first, second and third quarter of the initial order. The flight order for the first semi final round will be established by a random draw. The flight order for the second semi final round will start at the first half of the initial order. The flight order for the first final round will be established by a random draw. The flight order for the second final round will start at the first half of the initial order.

##### PREPARATION TIME

A competitor must be called at least 5 minutes before he is required to enter the start circle. A start circle 2m in diameter will be provided away from the flight line, spectators, competitors and model aircraft (see FIGURE 5.4.A). When the previous competitor's flight time reaches 6 minutes the flight line director can give the signal to start the engine. In the case of electric motors, the battery must not be connected before signal has been given. The competitor is given 5 minutes to start the engine and make last minute adjustments. The model aircraft may only be hovered in the start circle up to 2m and must not be rotated beyond 180° left or right relative to the competitor. If the model aircraft is rotated beyond 180° the flight is terminated. The competitor in the start circle must reduce his engine's speed to an idle when the preceding competitor has completed the penultimate manoeuvre. If the competitor is not ready after the 5 minute preparation time, he is allowed to complete his adjustments in the start circle; however, his flight time will have started at the end of the 5 minute interval.

##### FLIGHT TIME

The flight time of 9 minutes for the preliminary flights and 8 minutes for semi final and final flights begins when the competitor's model leaves the start circle with the permission of the flight line director and the judges. If the allotted time expires before a manoeuvre is completed, that manoeuvre and all remaining manoeuvre(s) will be scored zero.

##### RESTRICTIONS

After starting the model aircraft in the start circle the model aircraft must be flown at 2m to the helipad along the model entry path shown on the Contest Area Layout (Figure 5.4.A). The pilot may test hover the helicopter on the helipad and reposition it, before announcing the start of the first manoeuvre, to accommodate wind conditions. If the engine stops the flight is terminated.

After the flight: In case of electric motors, the battery must be disconnected before the pilot brings the helicopter over the judging line.

##### INTERRUPTION OF A COMPETITION

If the wind component perpendicular to the flight line exceeds 8ms/s for a minimum of 20 seconds during a flight, the competition must be interrupted. The flight will be repeated and the competition continued as soon as the wind subsides below the criterion. If the wind does not subside before the round is completed, the entire round will be dropped. The determination will be made by the organiser with concurrence of the FAI Jury.

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**5.4.14. Manoeuvre Schedules****FLIGHT PROGRAM**

The flight program consists of manoeuvre schedules P and SF/F for the years 2020 - 2021. The P schedule consists of nine (9) manoeuvres and the SF/F schedule consists of eight (8) manoeuvres (see ANNEX 5D - F3C MANOEUVRE DESCRIPTIONS).

**PERFORMANCE OF THE SCHEDULES**

The competitor must stand in the 2m circle (labelled P in Figure 5.4.A - F3C Contest Area Layout) located 6m in front of the centre judge. Before the start of the first manoeuvre the pilot may fly or carry the model to the helipad. If the model is flown to the helipad then it must be flown at a height of 2 m (for safety reasons.) Alternatively, the helper may carry the model aircraft to the helipad.

The model aircraft may face left or right but must be parallel with the judges' line.

Each hovering manoeuvre ends with a landing on the helipad and after each landing the model aircraft may be repositioned (but maintains same direction) prior to the next takeoff. After completing the hovering manoeuvres the competitor is allowed one free pass to set up for the flying sequence.

All aerobatics manoeuvres must be performed in an airspace that will allow them to be clearly seen by the judges. This airspace is defined by a field of view up to 60° above the horizon and between lines 60° to the right and left of judges 1 and 5. The non-observance of this rule will be penalised by a loss of points.

The aerobatics manoeuvres must be performed in a smooth flowing sequence, with a manoeuvre performed on each pass before the judges. There are no restrictions on turnaround manoeuvres.

The competitor must perform each listed manoeuvre only once during a flight. The competitor or his caller must announce the name (number) and start and finish of each manoeuvre. A manoeuvre performed out of sequence will result in a zero score for that manoeuvre only. Before the autorotation manoeuvre the competitor is allowed another free pass to accommodate a possible change in wind direction.

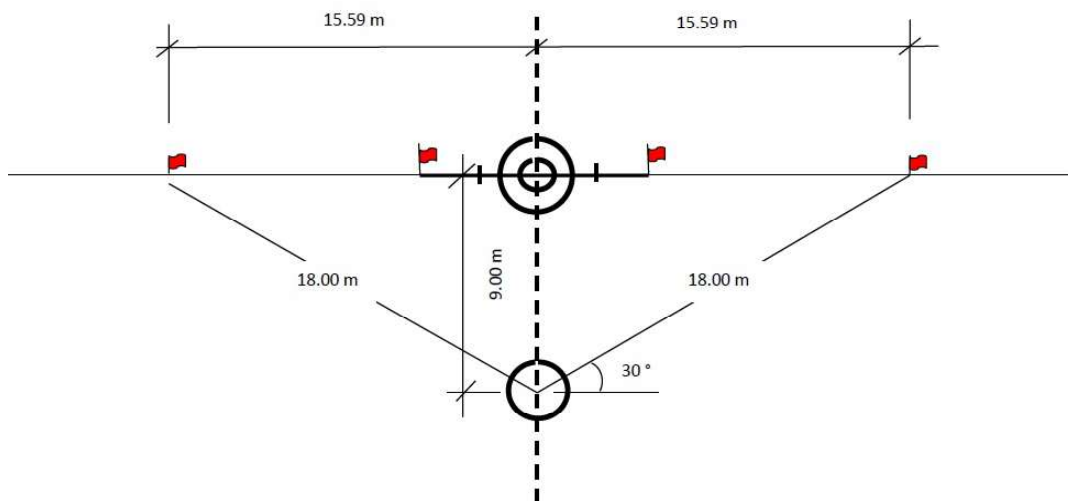
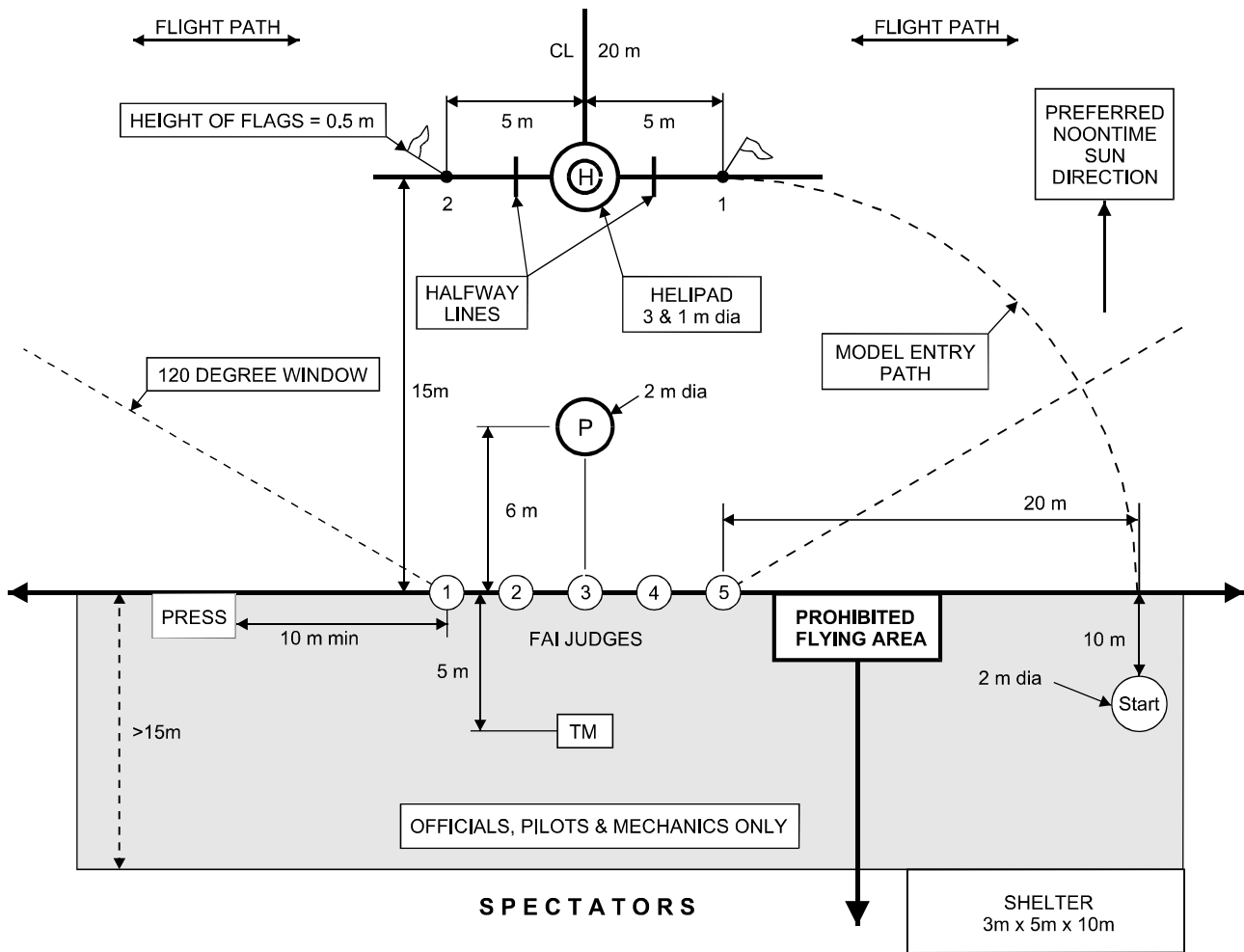
**5.4.15. Manoeuvre Descriptions and Diagrams**

Refer to ANNEX 5D

**5.4.16. Judges' Guide**

Refer to ANNEX 5E

**FIGURE 5.4.A - F3C CONTEST AREA LAYOUT**



Marking the 120 ° sector for the pilot with flags