

#### 4.4. CLASS F2D - COMBAT MODEL AIRCRAFT

##### 4.4.1. Definition of a Combat Event

A combat event is a contest during which eliminating heats are followed by a final in which two competitors with their model aircraft fly in the same circle at the same moment for a predetermined time, the object being to cut a streamer attached on the longitudinal centre line of the opponent's model aircraft, points being awarded for each cut taken.

##### 4.4.2. Definition of a Combat Model Aircraft

- a) Model aircraft in which the propulsion energy is provided by a piston motor(s) and in which lift is obtained by aerodynamic forces acting on surfaces which remain fixed in flight, except for control surfaces.
- b) The longitudinal centre line shall be defined as the axis of the propeller in case of a single engine model aircraft and the axis of symmetry in the case of multi-engine model aircraft.

##### 4.4.3. Combat Site

A combat site must consist of three concentric circles which shall be marked on the ground.

- a) The pilot circle: radius 2 metres.
- b) The flight circle: radius 20 metres.
- c) The pitting circle: radius 22 metres.

The flight and pitting circles must be laid out on grass. The pilot circle may be laid out on grass or any other material. The area between the 20 and 22 metre circles is called the pitting area.

During active combat periods the pilot and his mechanic(s), officials, team managers and others within the boundary of the designated combat flying area must wear a safety helmet, with a fastened chinstrap, strong enough to withstand the impact of a flying combat model aircraft.

To avoid the catching of the opponent's lines the protruding parts of the helmet must be covered. No communication using electronic devices is allowed between the pilot and mechanics/persons outside.

##### 4.4.4. Competitor

The pilot, who shall be the entrant and known as the competitor, may employ a maximum of two mechanics in any one heat. (In exceptional circumstances of wet or extremely windy weather, an additional helper may be used as a streamer holder and must perform no other function for the duration of that combat period).

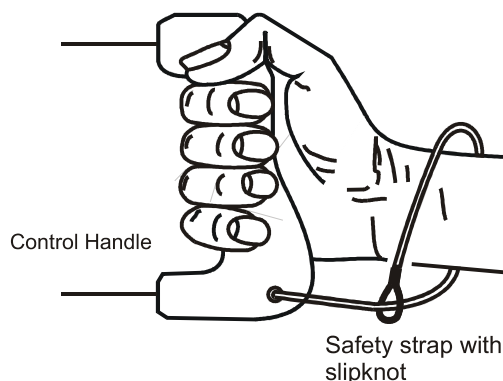
For World and Continental Championships, the mechanics (helpers), a maximum of six other than team members or the team manager (or assistant team manager), must be registered for no more than one national team, from the beginning of the competition throughout to the end.

##### 4.4.5. Characteristics

- a) Maximum loading:  $100 \text{ g/dm}^2$   
Maximum swept volume of motor(s):  $2,5 \text{ cm}^3$
- b) Line length:  $15,92 \pm 0,04 \text{ m}$   
Minimum line diameter:  $0,385 \text{ mm}$  (no minus tolerance)  
Two multi-strand control lines must be used. No free ends capable of entangling an opponent's lines, and no line splices, are permitted. Open connection connectors are not allowed.
- c) Engines with glow plug ignition shall have their exhaust port(s) connected to silencer(s) (one or two), consisting of a simple chamber with one circular cross-section, rearmost outlet aperture of 6 mm diameter (1) or 4,2 mm diameter (2) opposing the exhaust port connection.  
The minimum total volume of the exhaust system shall be  $12,5 \text{ cm}^3$ . In the case of two exhausts, each silencer shall have a minimum volume of  $6 \text{ cm}^3$ .  
The maximum total length of the exhaust system from exhaust port(s) of the cylinder to and including outlet(s) is 15 cm. One pressure tap directly connected to the fuel tank, of 2 mm maximum diameter is allowed. No other openings or vents are allowed.

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- d) The motor shall be naturally aspirated via a single round venturi with a maximum effective diameter of 4 mm.
- e) Any interconnecting chamber between the air intake and the induction port of the motor shall have a maximum volume of 1,75 cm<sup>3</sup>. This clearly prohibits sub-piston induction for supplementary air intake.
- f) A safety wire with a minimum diameter of 0,5 mm must be attached between the control system and the engine(s). The engine(s) must always stay connected to the lines.
- g) A safety strap connecting the competitor's wrist to the control handle must be provided by the competitor and worn at all times while his model aircraft is flying. The strap should be as shown in the sketch i.e. it should be attached to the wrist with a loop and sliding knot so that if the handle is released it will tighten itself securely around the wrist. The point of attachment at the handle is up to the discretion of the pilot.



HANDLE & SAFETY STRAP FIGURE

- h) The model aircraft shall not carry any artificial aid to assist the cutting of the streamers.
- i) The model aircraft shall be equipped with a device specially designed to retain the streamer which shall be fitted on the longitudinal centre line and sufficiently strong so that the streamer does not become detached under normal flying conditions.
- j) Standard fuel shall be supplied by the organisers to the following formula: 10% nitromethane 20% castor oil lubricant (first pressing) 70% methanol. Fuel shall be mixed by volume.

**Note:** Fuel for compression ignition engines is not restricted.

- k) Each model aircraft must be equipped with an engine shut-off device that stops the engine automatically if a fly-away occurs. The shut-off can be inactive at take-off, as long as it becomes active before combat starts. Once active, the device must remain functional for the entire time the model aircraft remains airborne. The device may only be used to stop the engine.

**Note:** Rule 1.3.2. Section 4C, Sporting Code Volume ABR, does not apply to engine-stop devices in class F2D as the device may be electronic and controlled via the lines or wireless.

*Rule B.3.1.a Section 4B, Sporting Code Volume ABR, does not apply to class F2D.*

#### 4.4.6. Technical Verification

To be tested before each heat:

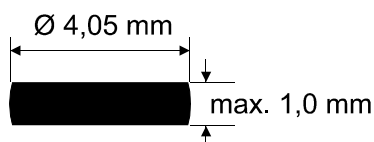
- a) Each set of lines must be checked for length and diameter.

The line length is measured from the inboard face of the grip of control handle to the longitudinal centre line of the model aircraft.

A pull test shall be applied to the assembled handle(s), control lines and model aircraft. The pull test shall be equal to 20 kgf.

The processing officials or judges may ask the competitor to change the lines if there is any doubt about the line quality, such as kinks, curls, stress or rubbing marks.

- b) The intake opening shall be checked with a simple plug gauge (diameter 4,05 mm) per the following sketch:



- c) The outlet of the silencer(s) shall be checked with a simple plug gauge (diameter 6,05 mm for one silencer and 4,25 mm for two silencers) per the following sketch:



- d) Demonstration of the engine shut-off device may be required by the judges before each heat. Additional demonstrations may be requested by the judges after the heat.
- e) The safety strap(s) and safety wire(s) may be pull tested with a load equal to 20 kgf.

4.4.7. **Number of Model Aircraft**

- a) Only one model aircraft specification certificate is required for each design of model aircraft presented by each competitor.
- b) Each competitor shall be permitted a maximum of two model aircraft, two handles, two pairs of lines and two engines in each combat heat. If the reserve model aircraft is used, the streamer or its remaining parts must be transferred to the reserve model aircraft. The handle plus lines for the reserve model aircraft must be placed just outside the pilot circle.
- c) Engines, control lines or handles may not be replaced or interchanged during the combat period.

4.4.8 **Streamer**

The streamer shall consist of double weight crepe paper (80 g/m<sup>2</sup>) or any replacement of equivalent strength, not less than 3 m nor more than 3,5 m long and 3 +/- 0,5 cm wide, fixed to a sisal (or any replacement of equivalent strength) string of 2,75 m minimum length.

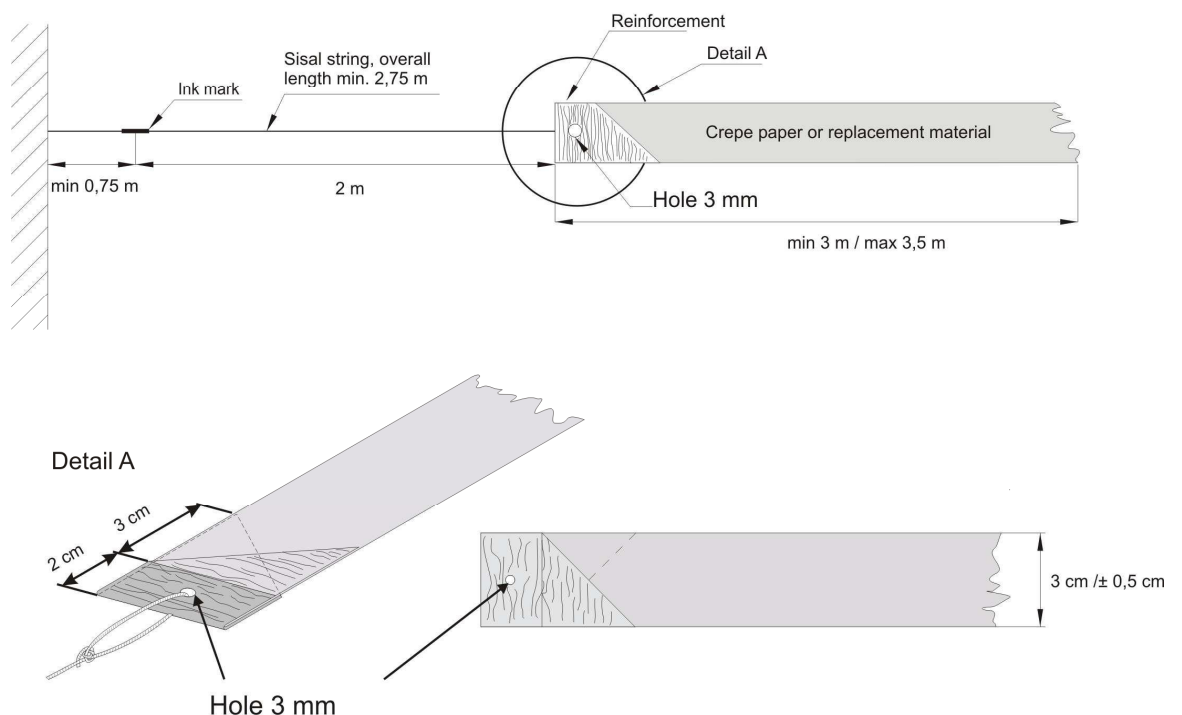
All streamers must be of the same length.

There shall be a clearly visible ink mark 2 m from the junction of the string and streamer.

The streamer shall be attached to the model aircraft in such a way that the ink mark is level with, or behind, the rearmost portion of the model aircraft (see sketch). The attachment part of the string shall have a minimum length of 0,75 m.

The attachment end of the streamer shall be reinforced on either side by tape approximately 2 cm wide affixed diagonally to the length of the streamer with one at right angles to the other and extending for a maximum of 5 cm. An additional fibre/fabric reinforced tape 2 cm wide is affixed across the streamer (see detail below).

F2D Streamer and Attaching String Specifications



The colour of the streamer must be different for the two competitors in the heat. Each pilot/pit crew shall be issued with a streamer at the start of the heat by the judge assigned to that competitor. A second streamer will be available from this judge when needed.

#### 4.4.9. The Heat from Start to Finish

- a) All signals shall be both acoustic and visual.
- b) During the starting period the launching positions must be separated by at least a quarter of a lap. The first named competitor in the draw shall have the choice of streamer colour and the other the choice of starting position
- c) It is the responsibility of the pilot/mechanics to make sure the streamer is unrolled before take-off.
- d) The motor(s) must be started by flicking the propeller by hand.
- e) A first signal, given by the Official Timer, shall signify the beginning of the 30 seconds period when the mechanic(s) or the pilot have the opportunity to start, run and adjust their motors.
- f) A second signal, given by the Official Timer, shall signify the beginning of the combat heat period on or after which the model aircraft may be launched.
- g) From the moment the Official Timer has given the signal to launch, the combat heat lasts for a maximum of 4 minutes.
- h) When the Circle Marshal is satisfied that each model aircraft has completed two level laps, anti-clockwise, separated by approximately half a lap, he will give a signal that combat may begin.
- i) Following an interruption when one or both model aircraft have been grounded, combat may restart after a signal from the Circle Marshal. This signal shall be given as soon as the Circle Marshal is satisfied that there is approximately half a lap separation between the two model aircraft.
- j) If, after a mid-air collision, no streamer can be found and the streamer retaining device is missing or bent, then, with the permission of the judges, it is acceptable to continue the heat without replacing the streamer.
- k) Only the streamer/string may be moved around the circle by the mechanics/pilot. Models in the pitting area may not be moved, other than to maintain a safe distance of approximately 5 metres from the opponent's mechanics. Under conditions of heavy wind, the Judges can allow models with a non-running engine to be moved to a safer starting position.
- l) When moving around the circle the mechanics/pilots must be on the outside of the pitting circle. Within the flight circle, mechanics may only move radially inward and outward. Within a pit crew/team's pitting area they are free to move around and also to choose where to enter and step out of the pitting circle.
- m) If, as a result of a mid-air collision, the silencer is detached and the model aircraft remains airborne, the heat may continue. After a landing, however, the silencer must be replaced before the model aircraft can be used again.
- n) The Circle Marshal will monitor the conduct of both pilots, and shall issue a yellow card warning to any pilot who uses a rough or unsafe flying style, causes line tangles, or displays unsportsmanlike behaviour. Each yellow card issued (a maximum of three for each pilot, per competition) shall be officially recorded and retained for the remainder of the competition. Initial and subsequent offences during a competition are to be penalised in accordance with 4.4.12A and 4.4.12C, respectively. If the first yellow card incident is considered severe, the pilot shall also be disqualified for the offence.

*Note: Yellow cards are cumulative throughout the competition.*

*1st yellow card = 40 point penalty  
or disqualification from the heat for a more serious offence.*

*2nd yellow card = disqualification from the heat.*

*3rd yellow card = disqualification from the heat.*

- o) The Circle Marshal shall give an acoustic signal to terminate the combat heat:
  - i) 4 minutes after the signal to launch (10 seconds countdown).
  - ii) if both streamer strings have been cut and the pilots have been asked to fly level and anticlockwise, and to cease combat (10 seconds countdown).
  - iii) if one pilot has only the string remaining and requests to cease combat the Circle Marshal should instruct both pilots to fly level and anti-clockwise (10 seconds countdown).

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- iv) if the heat has to be terminated due to disqualification of one or both competitors or for any other reason.

The pilot(s) must stop their motor(s) and land after the heat is terminated.

#### 4.4.10. **Scoring**

- a) Scoring shall start at the signal to launch and continue during the heat (maximum 4 minutes).
- b) 100 points shall be awarded for each distinct cut of the opponent's streamer. There is a cut each time the model aircraft, propeller or lines fly through the opponent's streamer resulting in particle(s) becoming detached from the streamer. A cut that contains only string does not count.
- c) Two points shall be awarded for each second that a model aircraft is airborne during the heat.
- d) Each penalty point given (See 4.4.12) shall be subtracted from the competitor's score.
- e) In the event of a tie score in any heat, that heat shall be re-flown. A heat is considered a tie if the score difference is 10 points or less.

#### 4.4.11. **Reflights**

A reflight may be granted:

- a) In the event of a line tangle and only one model aircraft being grounded, making it impossible to clear the line tangle.
- b) If, as a result of combat, a model aircraft cuts its own streamer/string or the streamer/string becomes wrapped around the model aircraft and/or the lines (unless only string remains).
- c) at the discretion of the Judges/Circle Marshal if an unfair or unsafe situation occurs and none of the pilots/mechanics can be blamed.

If flying, the pilot(s) must stop their motor(s) and land after the decision of a reflight.

#### 4.4.12. **Penalties and Disqualifications**

##### **A. A competitor will receive a penalty of 40 points:**

- a) If he steps outside the pilot circle with one foot while his model aircraft is airborne.
- b) If the mechanics enter the flying circle at an oblique angle or cut across the flying circle to reach a downed model aircraft or run around the circle within the pitting area, one penalty only will be given for each offence even if more than one mechanic is involved.
- c) If the mechanic(s)/pilot do not immediately, or after a clearing a line tangle, withdraw a grounded model aircraft to the pitting area prior to servicing it. It is not allowed to service the model or remove the streamer until any line tangle is cleared.
- d) If the model aircraft is launched prior to the starting signal.
- e) If the mechanic(s)/pilot allows both engines to be running at the same time during the flight period.  
Brief bursts, not longer than 10 seconds to warm the engine with a prime or to clear a flood is permitted. Running the engine from the tank is not permitted.
- f) When he receives his first yellow card (Subject to 4.4.9.n.).

##### **B. A competitor will receive a penalty of 100 points:**

- a) If the streamer does not cleanly unfurl upon launching the model aircraft.
- b) If the mechanic(s) damage the streamer or allow the model aircraft to cut its own streamer whilst still on the ground, and launch the model without replacing the streamer.
- c) If the string (with or without the streamer) becomes detached from the model aircraft while airborne but not as the result of a mid-air collision.
- d) If the silencer falls off during the flight or ceases to operate.

In all these cases the pilot, on a signal from a Judge, must immediately land and unfurl the streamer or replace the streamer or replace the silencer. The watches should be stopped at the moment the model lands. The Judges will measure and deduct the time between the decision to land and when the model lands.

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**C. A competitor will be disqualified from the heat:**

- a) If he flies with a model that does not conform to 4.4.5.
- b) If his model aircraft fails to become airborne within two minutes of the signal to launch.
- c) If he attempts to fly a model aircraft which at the time of launch does not have a:
  - i) strong effective control mechanism;
  - ii) secure engine attachment
- d) If he deliberately attacks the streamer of his opponent's model aircraft prior to the Circle Marshal's signal to start combat.
- e) If he interferes with his opponent, or forces his opponent to leave the pilot circle.
- f) If, while his model is not airborne and his opponent is flying or ready to fly, he leaves any parts of his model or lines in the pilot circle without an immediate attempt to clear them.
- g) If he attacks his opponent's streamer without his own, or the remaining parts, attached to his model aircraft (Except for 4.4.9.j).
- h) If he is not present at his allotted flight time, unless he has the express permission of the Event Director.
- i) If he intentionally leaves the pilot circle, while his model aircraft is flying.
- j) If he leaves the pilot circle without informing his opponent of his intention to do so when his model aircraft is grounded for a purpose other than to pick up the lines of the reserve model aircraft or to allow his model aircraft to be serviced.
- k) If he flies in such a manner as to inhibit his opponent, or his opponent's pit crew, from clearing any line tangle.
- l) If he flies other than level in an anti-clockwise direction when only his model aircraft is airborne and there is no line tangle. Sudden or rough manoeuvres are not allowed.
- m) If he fails to clear any line tangle prior to launching his reserve model aircraft unless both he and his opponent have informed the Circle Marshal that they have agreed to continue the heat without clearing the line tangle. In this event the Circle Marshal must agree to the continuation, only doing so when he is satisfied that it is safe to continue.
- n) If he releases the handle and the safety strap separates from the handle or wrist or he removes the safety strap, for any reason, while the model aircraft is flying.
- o) If he interferes to cause a ground hit of, or collides with, his opponent's model aircraft that clearly has no streamer left and flies level in anticlockwise direction without any manoeuvres to chase and attack.
- p) If, during a line tangle where one or both models remain airborne, his mechanic(s) enters the flying circle.
- q) If a mechanic jumps over the opponent's model aircraft and lines kept within the pitting area.
- r) If, in the event of a flyaway, his engine shut-off device does not activate.
- s) When he receives his second or third yellow card.
- t) For any other flagrant breach of the rules.

**4.4.13 The use of Video equipment**

The Organiser/Judges may use video recording equipment to monitor the pilots and the pilot circle. At the discretion of the Judges/Circle Marshal the officially recorded video can be used as a judging tool.

**4.4.14 Individual and Team Classification**

- a) The contest shall be run as a knockout tournament.
- b) The competitor who obtains the highest score in points shall be the winner of each heat.
- c) A competitor shall be eliminated from the competition when he has lost two heats.
- d) Each round shall be randomly drawn (subject to 4.4.14.e)) from the competitors remaining in the competition.

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- e) Previous opponents and competitors of the same nationality shall be drawn apart if possible with competitors of the same nationality to fly against each other only if there are no remaining opponents.  
Defending champions, not members of their national team, are considered as individuals not possessing any specific nationality.
- f) In a round with an odd number of competitors the non-flying competitor will fly twice in the following round, in the first heat and in the last heat (if the number of competitors permit it and he is still in the contest).
- g) Each competitor shall be ranked according to his number of wins, not counting fly-off heats, with the fly-off heats being used to establish second and third place as necessary.
- h) In the event of a tie for second or third place, the equal placed flyers shall take part in a fly off, during which they shall be allowed only one loss. In the event of a tie for third place after a fly-off for second place then there shall be a new fly-off for third place.
- i) A specific junior final tournament will be organised if juniors are at the same placing (tie) in the general tournament, in order to define who is first, second and third for the specific individual placing and will have no influence on the general individual placing (no change in the team classification).
- j) The competitors' "win" scores, not counting fly-offs, shall be added for the participants of each nation.
- k) The team classification is established by taking the total scores, obtained in 4.4.14.g) above, of the three best scoring members of the team and adding them together. In the case of a team tie, the team with the lower sum of place numbers, given in order from the top, wins. If still equal, the best individual placing decides. Complete three-competitor teams are ranked ahead of two- competitor teams which, in turn, are ranked ahead of single competitor entries.

#### 4.4.15. **Judges and Timekeepers**

- a) The organisers shall appoint a panel of three judges who shall be selected from a list of persons proposed by National Airsport Controls for their proficiency and experience and approved by the CIAM. The judges must have at least one language in common. At World and Continental Championships and other limited entry international competitions, the judges must be of different nationalities. In open international competitions the judges must be of at least two nationalities and only two of them must be approved by CIAM. At World Cup and other Open International Competitions one of the judges and the Circle Marshal can be the same person.
- b) Three timekeepers/scorers shall be allocated to each competitor for World and Continental Championships, two for Open Internationals.