

#### 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 engined 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 two concentric circles which shall be marked on the ground.

- a) The flight circle: radius 20 metres
- b) The centre (piloting) circle: radius 2 metres.

The flight circle must be laid out on grass. The centre piloting circle may be laid out on grass or any other material having a maximum radius of 4 metres.

All personnel such as officials, competitors, including those not flying, team managers, helpers etc within the boundary of the flying site must wear protective headgear when active flying is going on.

##### 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 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. During active combat periods, the pilot and his mechanic(s) must wear protective headgear fitted with an effective retaining strap.

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 the flying circle.

##### 4.4.5. Characteristics of a Combat Model Aircraft

Maximum surface area: ..... 150 dm<sup>2</sup>

Maximum weight: ..... 5 kg

Maximum loading: ..... 100 g/dm<sup>2</sup>

Maximum swept volume of motor(s): ..... 2,5 cm<sup>3</sup>

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 outlet aperture of 8mm (1) or 5,65 mm (2) diameter(s) opposing the exhaust port connection. The minimum total volume of the exhaust system shall be 12,5 cm<sup>3</sup>. In the case of two exhausts, each silencer shall have a minimum volume of 6,0 cm<sup>3</sup>. The maximum total length of the exhaust system from exhaust port(s) of the cylinder to and including outlet(s) is 15 cm.

The motor shall have a maximum effective venturi diameter of 4,00 mm (see 4.4.6.d for field verification). A safety wire with a minimum diameter of 0,5 mm must be attached between the bellcrank bolt (axle) and the engine(s) so as to withstand a minimum pull load of 100 N.

The model aircraft shall not carry any artificial aid intended to assist the cutting of the streamers. 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 shall not become detached under normal flying conditions.

Standard fuel shall be supplied by the organisers to be used for practice (minimum 0,5 ltr) and competition (sufficient to complete rounds) to the following formula: 10% nitromethane 20% castor oil lubricant (first pressing) 70% methanol. A reasonable charge may be made for the fuel.

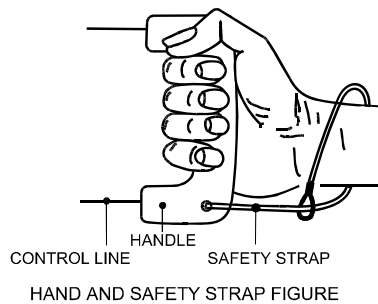
**Note:** Fuel for compression ignition engines is not restricted.

Rule B.3.1. Section 4B does not apply to class F2D.

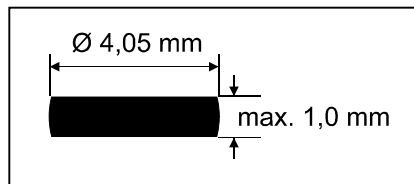
The models must be equipped with an engine shut-off device that activates if a fly-away occurs. The device must remain functional for the entire flight period and must be repaired or replaced before take-off if it becomes non-functional during the match.

#### 4.4.6. Controls - Technical Verification

- a) Line length: The length of the control lines must be 15,92 +/- 0,04 m. It is measured from the inboard face of the grip of control handle to the longitudinal centre line of the model aircraft.
- b) Control System: two multi-strand control lines of a minimum diameter of 0,385 mm (no minus tolerance) must be used. No free ends capable of entangling an opponent's lines, and no line splices, are permitted. 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 (*overleaf*) i.e. it should be attached to the wrist with a loop and sliding knot so that if the handle is released it tightens itself securely around the wrist. The point of attachment at the handle is left to the discretion of the pilot.



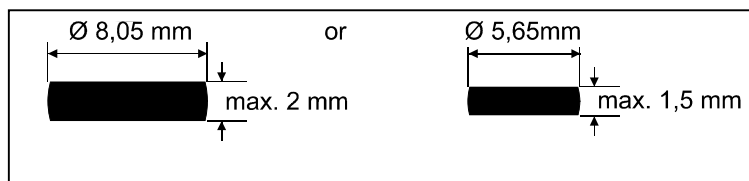
- c) Line Tests: Before each heat any sets of lines which may be used must be checked for length and diameter. A pull test shall be applied to the assembled handle(s), control lines and model aircraft for all equipment to be used in that heat. The pull test shall be equal to 150 N. However the processing 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.
- d) The motor shall be naturally aspirated via a single round intake. For field verification before a flight this intake opening shall be checked with a simple plug gauge per the following sketch:



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.

Any venturi insert designed to accomplish this must be positively retained so that it may not accidentally become dislodged during the heat.

- e) The silencer(s) on the glow engines shall have a round exhaust the rearmost end of which will not admit a 8,05 mm (one silencer) or 5,65 mm (two silencers) diameter plug gauge(s).



Silencer measurements will also measure:

- 1) the volume of the silencer by filling with an appropriate liquid (oil or other);
- 2) inspecting the silencer's internal compartment to determine if it is truly "simple", i.e. it is an empty container with no internal components, a single exhaust opening and one allowable pressure tap directly connected to the fuel tank, of maximum diameter 2 mm. No other openings or vents are allowed.
- f) 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.

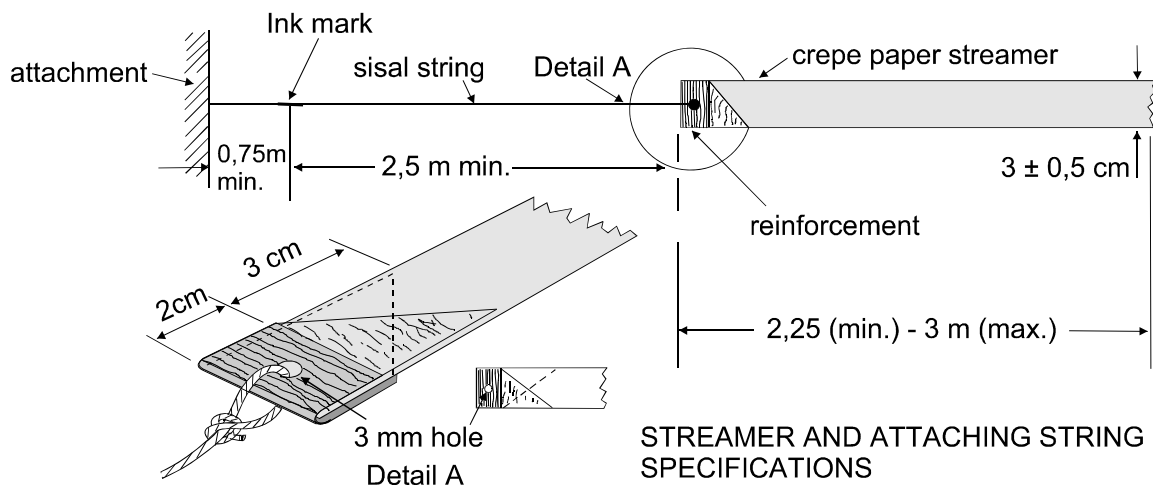
#### 4.4.7. Number of Model Aircraft

- a) A competitor may have processed a maximum number of model aircraft equal to twice the number of heats a competitor may have to fly (excluding re-flights). 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. Handle plus lines for the reserve model aircraft must be placed just outside the centre circle.
- c) Engines, control lines and 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 2,25 m or more than 3 m long and 3 +/- 0,5 cm wide, fixed to a sisal string of 2,5 m minimum length. All streamers must be of the same length. There shall be a clearly visible ink mark 2,5 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 metre.

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).



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. Method of Starting

- 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) The motor(s) must be started by flicking the propeller by hand.
- d) A first signal, given by the Circle Marshal, shall signify the beginning of the 60 seconds period when the mechanic(s) or the pilot have the opportunity to start, run and adjust their motors.
- e) A second signal, given by the Official Timer, shall signify the beginning of the combat period on or after which the model aircraft may be launched.
- f) From the moment the Official Timer has given the signal to launch the combat heat lasts for four minutes.
- g) 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 commence.
- h) Combat may begin after a restart signal from the Circle Marshal following an interruption when one or both model aircraft have been grounded. 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.

**4.4.10. Termination of the Contest**

- a) The Circle Marshal shall give an acoustic signal to terminate the combat heat four minutes after the signal to launch, i.e. five minutes after the first signal to run and adjust motors.
- b) The same acoustic signal shall be given if the heat has to be terminated due to disqualification of one or both competitors or for any other reason.
- c) The Circle Marshal shall signal both pilots to fly level and anti-clockwise and to cease combat when both streamer strings have been cut. If one pilot has only the string remaining he may request the circle marshal instruct both pilots to fly level and anti-clockwise and to cease combat. This decision may not be reversed, once made.

**4.4.11. Method of Scoring**

- a) Scoring shall commence from the signal to launch and continue for the four minute period.
- b) 100 points shall be awarded for each distinct cut off 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.
- c) A cut must contain at least one part of the streamer. A cut that contains string alone will not count.
- d) Should the string become detached from the model aircraft while airborne the competitor shall be penalised by 100 points and must immediately on a signal from the Circle Marshal land and replace the streamer. Ground time will be counted from the moment of such a signal being given. 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.
- e) One point shall be awarded for each whole second that a model aircraft is airborne during the four minute period.
- f) Each whole second of stay on the ground of the model aircraft shall be penalised by 1 point. In the case of a model aircraft fly-away, with or without lines, this ground time shall commence from the moment of such fly-away (see 4.4.12.b)).
- g) Each warnable offence (see 4.4.14.) shall be penalised by the deduction of 40 points from the competitor's score.
- h) Should the mechanic(s) damage the streamer, or the model aircraft cut its own streamer, whilst the model aircraft is on the ground the mechanic(s) must replace it with a new streamer. If they launch the model aircraft without so replacing it, the competitor shall be penalised by 100 points. Ground time will be counted while the model aircraft is airborne with the damaged streamer.
- i) In the case of a line tangle where the circle marshal estimates the tangle cannot be cleared, he can require both pilots to land immediately. Ground time for both pilots will start from the circle marshal's signal. After the models have landed the heat will continue as normal.

**4.4.12. Attempts**

Only one attempt will normally be allowed to complete a combat heat except for when:

- a) A streamer breaks or fails to unfurl from the rolled state.
- b) In the event of a model aircraft fly-away, where the engine shut-off device has worked properly as a result of the lines having been severed by his opponent's model aircraft, lines or engine, in which the model aircraft and streamer may not be retrievable due to the distance flown, the circle

marshal asks the affected pilot whether he wants a new attempt or not. The affected pilot must respond immediately, without consulting others about the status of the heat. If the pilot wants to continue the flight he must use a new full-length streamer.

The pilots should be informed before the beginning of the competition where the fly-away area is defined. This area should be clearly defined by the organisers.

- c) In the event of a line tangle resulting in the control line(s) breaking and only one model aircraft being grounded, making it impossible to clear the line tangle.
- d) If, as a result of a line tangle, an opponent's model aircraft cuts its own streamer in flight or the streamer, unless only string remains, becomes wrapped around the model aircraft and/or the lines, the heat shall be re-flown.

#### 4.4.13. **Conduct**

- a) A pilot must remain inside the centre circle while his model aircraft is flying except at the moment of release of his model aircraft by the pitman.
- b) During the combat period each competitor (and his pit crew) shall be watched by at least one member of the F2D panel of judges specifically assigned to him, in addition to the Circle Marshal, to ensure that they behave in a fair manner according to the rules.
- c) After a mid-air collision the heat shall continue as if both model aircraft had landed, subject to articles 4.4.15.c), e), k), l), and m).

#### 4.4.14. **Offences**

The following are warnable offences and shall attract the appropriate penalties (4.4.11.g):

- a) if a pilot steps outside the centre 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. One penalty only will be incurred for each offence even if more than one mechanic is involved;
- c) if the mechanic(s)/pilot do not immediately, or after a line disentanglement, withdraw a grounded model aircraft to outside the 20 metre circle prior to servicing it;
- 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 4 minute 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) i) if the silencer falls off during the flight or ceases to operate, the pilot must land immediately and replace the silencer, 100 points penalty.  
ii) If, as a result of a mid-air collision, the silencer is detached and the model aircraft remains airborne, the heat may continue but the silencer must be replaced on landing before the model aircraft can be used again.
- g) In case of rough flying style, bad behaviour in line tangles or similar, the Circle Marshall and/or judges may give the pilot a warning attracting a penalty of -100 points, unless it is considered severe where a disqualification should be given (subject to 4.4.15).

#### 4.4.15. **Cancellation of the Flight**

An entrant will be eliminated from the heat and his opponent declared the winner, subject to 4.4.12.c), if:

- a) he deliberately attacks the streamer of his opponent's model aircraft prior to the Circle Marshal's signal to commence;
- b) his model aircraft fails to become airborne within two minutes of the signal to launch;
- c) 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;
  - iii) functional engine shut-off device;
  - iv) running engine;
- d) he interferes with his opponent, or forces his opponent to leave the centre circle;
- e) while a competitor's model is not airborne and his opponent is flying or ready to fly, he leaves any parts of his model or lines in the centre circle without an immediate attempt to clear them;
- f) he attacks his opponent's streamer without his own, or the remaining parts, attached to his model aircraft;

- g) he is not present at his allotted flight time, unless he has the express permission of the Circle Marshal and the team manager of his opponent;
- h) he leaves the centre circle, intentionally while his model aircraft is flying, or 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;
- i) he or any of his mechanics does not wear a protective helmet according to 4.4.4;
- j) he flies in such a manner as to inhibit his opponent, or his opponent's pit crew, from clearing any line entanglement;
- k) he flies other than level in an anticlockwise direction when only his model aircraft is airborne and there is no line entanglement. Sudden or rough manoeuvres are not allowed.
- l) 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;
- m) for any other flagrant breach of the rules such as attacking his opponent's model instead of the streamer;
- n) he releases the handle and the safety strap separates from handle or wrist or he removes the safety strap, for any reason, while the model aircraft is flying;
- o) his model aircraft(s) does (do) not conform to para. 4.4.5 or the handle does not conform to paragraph 4.4.6.b;
- p) 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;
- q) if the streamer becomes detached from the streamer retaining device during combat, but not as a result of the mid air collision;
- r) if the model aircraft lands with no streamer string and the streamer retaining device is missing or bent, but not as a result of a mid-air collision;
- s)
  - i) if the mechanic or pilot leaves the model (inboard wing tip) more than 0,5 metre outside the flying circle
  - ii) if the mechanics jump over the opponent's model aircraft(s) and lines kept within the pitting area;
- t) if the pilot fails to land (subject to 4.4.14f);
- u) the pilot's aircraft takes off without a complete and operating silencer or a working engine shut-off device;
- v) if a mechanic carries a model aircraft and lines over an opponent's model aircraft or pit crew
- w) if one or both opponents are guilty of either
  - a) causing line tangles; or
  - b) a "sawing" action on the line(s)
 he or they may be disqualified at the discretion of the Circle Marshal.
- x) if, during a line tangle where one or more models remain airborne, his mechanic(s) enters the flying circle without explicit permission of the Circle Marshall.
- y) In the event of a flyaway where the engine shut-off device does not activate

#### 4.4.16 **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 4.4.16.j)) from the competitors remaining in the competition.
- e) In the event of an unmatched competitor remaining in any round, that competitor shall be matched with the first competitor drawn (subject to 4.4.16.j)) in the next round and if he is not first eliminated in each successive round, unless such time as there is again an unmatched competitor remaining in a round. At that time these two competitors shall be matched (subject to 4.4.16.j)) to complete that round.
- f) Individual and team standings will be based on the number of heats won. Losses will not be subtracted.

- g) In the event of a tie for second or third place (both cannot happen) fly them off using the above procedures except allowing only one loss during the fly-off.
- h) In the event of a two way tie for third remaining after a fly-off for second, match them with the winner to take third.
- i) 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 5 points or less.
- j) 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.
- k) 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).

#### 4.4.17. **International Team Classification**

- a) 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.
- b) The competitors "win" scores, not counting fly-offs, shall be added for the participants of each nation.
- c) The team classification is established by taking the total scores, obtained in 4.4.17.b) above, of the three best scoring members of the team 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.

#### 4.4.18. **Judges and Timekeepers**

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. Three timekeepers/scorers, efficiently briefed about their task and trained on the field during the practice flights, shall be allotted to each competitor for World and Continental Championships, two for open internationals. They are only responsible for the competitor's score. If required, they can ask the advice of the judge/circle marshal.