



# FAI Sporting Code

*Fédération  
Aéronautique  
Internationale*

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## Section 4 – Aeromodelling

# Volume F5 Radio Control Electric Powered Model Aircraft

2010 Edition

Effective 1st January 2010

- F5A - ELECTRIC AEROBATICS
- F5B - ELECTRIC MOTOR GLIDER
- F5C - ELECTRIC HELICOPTERS
- F5D - ELECTRIC PYLON
- F5E - ELECTRIC SOLAR MODEL AIRCRAFT (Provisional)
- F5F - ELECTRIC 4 CELL MOTOR GLIDERS (Provisional)
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- ANNEX 5 D - F5C JUDGES' GUIDE
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FOR ALL THE ANNEXES, REFER TO THE SEPARATE DOCUMENT ENTITLED "VOLUME F5, RADIO CONTROLLED ELECTRIC POWERED MODEL AIRCRAFT, ANNEXES 5A-5E"

## **FEDERATION AERONAUTIQUE INTERNATIONALE**

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1 FAI Statutes, Chapter 1, para. 1.6

2 FAI Sporting Code, General Section, Chapter 3, para 3.1.3.

3 FAI Statutes, Chapter 1, para 1.8.1

4 FAI Statutes, Chapter 5, para 2.1.1; 2.4.2; 2.5.2; 2.7.2

5 FAI Bylaws, Chapter 1, para 1.2.1

6 FAI Statutes, Chapter 2, para 2.4.2.2.5,

7 FAI Bylaws, Chapter 1, para 1.2.3

8 FAI Statutes, Chapter 5, para 5.1.1; 5.5; 5.6

9 FAI Sporting Code, General Section, Chapter 3, para 3.1.7

10 FAI Sporting Code, General Section, Chapter 1, paras 1.2. and 1.4

11 FAI Statutes, Chapter 5, para 5.6.3

12 FAI Bylaws, Chapter 1, para 1.2.2

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# VOLUME F5

## SECTION 4C – MODEL AIRCRAFT – F5 – ELECTRIC POWERED

### Part Five – Technical Regulations for Radio Controlled Contests

Class 5.5 - Electric Powered Model Aircraft

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Annex 5 E - Rules for World Cup Events

**Note: Annexes 5A-5E are in a separate document called "Volume F5, Radio Control Electric Powered, Annexes 5A-5E".**

**THIS 2010 EDITION INCLUDES THE FOLLOWING AMENDMENTS MADE TO THE 2009 CODE**

**These amendments are marked by a double line in the right margin of this edition**

Paragraph	Plenary meeting approving change	Brief description of change	Change incorporated by
5.5.1.5	2009	New paragraph for limiter checking & re-number subsequent paragraphs.	Technical Secretary on behalf of Emil Giezendanner, F5 S-C Chairman
5.5.4.5		Clarification of counting legs and signalling & re-number subsequent paragraphs	
5.5.4.6		Score-keeping device	

Four-Year Rolling Amendments for Reference			
Paragraph	Plenary meeting approving change	Brief description of change	Change incorporated by
5.5.1.4	2008	Energy Limiters.	Technical Secretary Apr 2008
5.5.2.2.j		Annulled scores re energy limiters.	
5.5.2.5.		Energy Limiters.	
5.5.4.1		F5B: Definitions - battery change.	
5.5.4.15.5.4.1.d		F5B: Repair of battery packs.	
5.5.4.1.e	n/a	Added text for clarity	F5 S-C Chairman
5.5.4.1.f	2008	F5B: Starting order for other competitions.	Technical Secretary Apr 2008
5.5.6.2.a		F5D: Model weight.	
5.5.6.2.b		F5D: Batteries.	
5.5.6.2.c		F5D: Energy limiter & battery change.	
5.5.8.1		F5F: Technical Specification change - batteries.	
5.5.4.1 b) & c)	2007	New paragraph c) for F5B: definition, model aircraft specifications and number of battery packs. Re-number subsequent paragraph	Emil Giezendanner F5 S-C Chairman
5.5.6.2 b)		F5D: technical specifications, battery	
5.5.6.3 d)		F5D: delete chin strap	
5.5.6.5 a)		F5D: delete "caller" & "mechanic"	
5.5.6.7 a)		F5D: defined when timing begins	
5.5.6.9 b)		F5D: deleted timing sentence as consequence of above	
5.5.6.7 d)	F5D: defined action after a crash		
5.5.4.2	n/a	F5B corrected paragraph title	Technical Secretary Nov 2007
5.5.5.4		Added paragraph title and updated diagram	
5.5.6.2.b	n/a	Re-order the paragraph for clarity	Jo Halman Technical Secretary Dec 2006
5.5.6.3		Identify the sub-paragraphs by alpha for clarity	
5.5.2.2	n/a	English language changes for clarity	
5.5.3.2.d			
5.5.6.3 a, b, g			
5.5.3.1 a)-b)	2006	Paragraph definition and spec; weight limit changed.	F5 S-C Chairman 13/09/06
5.5.3.2 b)		Final round procedure modified.	
5.5.3.2 d)		Flight box and landing field size modified.	
5.5.3.3 b)		Manoeuvre distance changed	
5.5.3.4 b)		Table, K-Max values modified.	
5.5.3.5 B		Table, row 7a added, "Knife edge flight circle". manoeuvre	
5.5.3.6	n/a	Consequential: diagram changed ref 5.5.3.2 d).	
5.5.5.3 a)	2006	Max rotor diameter definition	
5.5.6.2 b)		SubC phrase deleted.	
5.5.6.3 b)-g)		New para b) added and subsequent paras re-numbered.	

## **RULE FREEZE FOR THIS VOLUME**

With reference to paragraph A.12 of Volume ABR:

In all classes, the two-year rule for no changes to model aircraft/space model specifications, manoeuvre schedules and competition rules will be strictly enforced, but in step with the World Championship cycle of each category. This means that in Volume F5:

- (a) changes can be next agreed at the Plenary meeting 2010 for application from January 2011;
- (b) provisional classes are not subject to this restriction.

The only exceptions allowed to the two-year rule freeze are genuine and urgent safety matters, indispensable rule clarifications and noise rulings.

# VOLUME F5

## PART FIVE – TECHNICAL REGULATIONS FOR RADIO CONTROLLED CONTESTS

### 5.5. CATEGORY F5 - ELECTRIC POWERED MODEL AIRCRAFT

#### 5.5.1 GENERAL RULES

##### 5.5.1.1 Definition of Electric Powered Model Aircraft

Model aircraft in which lift is generated by aerodynamic forces acting on surfaces remaining fixed in flight except control surfaces and which performs manoeuvres controlled by the pilot on the ground, using radio control, or by rotating surfaces in case of helicopters. The power pack for the electric motor may not have any fixed connection to the ground or another model aircraft in the air. Recharging of the powerpack during flight by solar cells is permitted.

##### 5.5.1.2 Builder of the Model Aircraft

Rule B.3.1. of Section 4b (builder of the model aircraft) is not applicable to category F5.

##### 5.5.1.3 General Characteristics of RC Electric Powered Model Aircraft F5

(For helicopters see para 5.5.5.3)

Maximum total area                      150 dm<sup>2</sup>

Maximum weight                              5 kg

Loading                                      12 to 75 g/dm<sup>2</sup>    (for Pylon see para 5.5.6.2)

- a) The power source shall consist of any kind of rechargeable batteries (or secondary cells), the maximum no load voltage must not exceed 42 volts. In case the voltage is measured, this shall be done at the moment the preparation time for the pilot starts. After the measurement has been taken, the pilot is allowed 5 minutes preparation time as per 5.5.2.4.
- b) Battery specifications in F5B, F5D and F5F are written in the special rules of these classes.
- c) Mechanical or chemical modification of the individual cells, e.g. to reduce their weight, is not allowed except that insulation sleeves of individual cells may be changed.
- d) Any device for the transmission of information from the model aircraft to the pilot is prohibited.

##### 5.5.1.4 Energy Limiter

In classes where an energy limit is defined an energy limiter device must be used. The energy limiter cuts off the motor when the given energy limit is reached. The energy limiter is located in the electric circuit between the battery and the motor. The interruption must either persist permanently or for a defined period of time.

##### 5.5.1.5 Procedure for Limiter Checking

- a. The general procedure of limiter checking follows B.17. in Section 4B, General Rules for International Contests.
- b. The check shall be carried out immediately after landing. All limiters/loggers shall be tested using the same method.
- c. The organiser will check if the limiter is correctly connected to RX, LiPo pack and ESC. There must not be any type of "jumper" present in the RX cable or on the current sensor.
- d. The limiter in each model should be provided with cables and 6 mm connectors, so that it can easily be checked in series with the checking system. In cases where the limiter device has other types of connectors, the competitor must provide adapters to match the 6 mm connectors used by the organiser.
- e. JR/Futaba connectors should be provided on the limiter, or adapters, so that the receiver output and ESC input connections can be made to the test unit.
- f. A variable current load should be used, simulating, as far as possible, a typical flight.

- g. The organiser shall use SM UniLog or similar devices as energy counters for measurements in each category.
- h. A tolerance of 2% on the measurement of the limit is permitted.
- i. The competitor may check his limiters prior to and during the contest, but he must provide a fully charged lithium battery as a power source.

#### **5.5.1.6 Number of Model Aircraft**

The competitor may use two model aircraft, three in pylon, in the contest. The competitor may combine the parts of the model aircraft during the contest, provided the resulting model aircraft conforms to the rules and that the parts have been checked before the start of the contest.

#### **5.5.1.7 Competitor and Helper**

Each competitor must operate his radio equipment personally. Each competitor is permitted two helpers and the team manager.

### **5.5.2 CONTEST RULES**

#### **5.5.2.1 Definition of an Official Flight**

During a two (2) minute starting period, the competitor is allowed an unrestricted number of attempts, hand launches or starts from the ground. An attempt starts when the model aircraft is released by the competitor or his helper(s). After the first attempt, it is no longer allowed to take another model aircraft. The timekeeper will start his stopwatch at each attempt. After two minutes, no further launching or takeoff is allowed and the flight is being considered as official, the model aircraft being airborne or not. The pilot may repeat a second two-minute starting period only if:

- a) The competitor cannot perform a flight due to outside interference verified by the organiser.
- b) No scoring was made for reasons outside the control of the competitor.

In such cases, the flight may be repeated at any other time decided by the Contest Director.

#### **5.5.2.2 Cancelling of a Flight and Disqualification**

The flight is annulled:

- a) If the pilot uses a model aircraft that does not conform to the FAI rules. In the case of intentional or flagrant violation of the rules, in the judgement of the Contest Director, the competitor may be disqualified.
- b) If the model aircraft loses any part during the flight time. The losing of a part during landing (i.e. contact with the ground or another obstacle) during the flight due to a collision with another model is not taken into account;
- c) If the model aircraft was already used by another competitor at the same contest;
- d) If the pilot uses more than two helpers;
- e) If any part of the model aircraft does not come to rest and remain at rest within 100 metres from the landing spot. For powered gliders, this rule applies only after the duration and landing task has started.
- f) If for powered gliders the duration and landing task has not been started and also the landing does not occur on the designated flying side of the security line and within 100 m from the intersection of that line with Base A or B.
- g) If in contrast with the declaration of the competitor the model aircraft carried more than the allowed number of cells as power source for the motor or the voltage exceeds 42 volts.
- h) The competitor is disqualified if the model aircraft is controlled by anyone other than the competitor.
- i) If the model aircraft touches either the competitor or his helper during landing manoeuvres, no landing points will be given.
- j) If an infringement of energy limitation rules occurs the result of that round is discarded.

### 5.5.2.3 Organisation of the Contest

For transmitter and frequency control see Section 4b, Para B.8.

The official in charge will issue the transmitter to the competitor only at the beginning of his preparation time, according to 5.5.2.4.

### 5.5.2.4 Organisation of Starts

The competitors shall be combined in groups, in accordance with the radio frequencies used, to permit as many flights simultaneously as practical. The combination is organised in such a way that, as far as possible, there are no pilots of the same nation or team in one group. The flying order of different groups is also established in accordance with the frequencies used. The competitors are entitled to five minutes of preparation time before they are called for the start.

### 5.5.2.5 Processing of Energy Limiters

The organiser of an event has to provide power supply equipment for energy limiter processing. The competitor must have the ability to check his limiters prior to and during the contest.

### 5.5.2.6 Judging

The organiser must appoint a panel of at least three judges of different nationalities who are selected from the official CIAM Judges List.

**Note:** These General Rules and Contest Rules are applicable to the F5 Classes Aerobatics (5.5.3.), Motor Gliders (5.5.4.), Helicopters (5.5.5.) and Pylon Race (5.5.6.).

## 5.5.3 CLASS F5A ELECTRIC POWERED AEROBATIC MODEL AIRCRAFT

### 5.5.3.1 a) Definition

These rules for contests with electric powered aerobatic model aircraft will use the advantages and peculiarities of the electric powered propulsion. The contests could take place on sport fields and recreation areas.

General rules 5.5.1 and Contest rules 5.5.2 are applicable except otherwise stated.

#### b) Model aircraft specifications

Maximum weight 3 kg

### 5.5.3.2 Organisation of F5A Contests

#### a) Starting Order

The starting order for the first round will be established by random draw. The starting order for the second round will follow the inverted ranking list. In each case, frequency will not follow frequency and team members will be separated by at least one competitor. The starting order for the final round will be established by a second random draw

#### b) Number of Flights

Competitors will have at least three preliminary flights with the same schedule. If more than two flights are flown, the lowest score will be discarded. The top ten or the first third of the competitors of ranking list, whichever is less, after the three preliminary rounds, will fly in addition one final. The final round consists of one music compulsory freestyle flight.

#### c) Number of Attempts

Each competitor is entitled to one attempt for each official flight and there is an official flight when an attempt is made whatever the result.

#### d) Course Layout

The course layout depends on the size of contest site and consists of a box of 110 by 75 by 75 metres. The competitor while flying must stay in the middle of base b of the box on the spectator side. Judges must be seated 3 to 5 metres behind the competitor. Base b is also the safety line. The landing field is 25 to 50 m and parallel to base b.

e) Definition of an Official Flight

During a two (2) minute starting period, the competitor is allowed an unrestricted number of attempts (hand launches or on undercarriage). It is allowed to use the second model aircraft. After the two minute limit, no further take-off may happen and the flight is considered as official, whether the model aircraft is airborne or not.

f) Execution Time

The flight must be completed in 6 minutes including the 2 minute starting period. If the model aircraft lands after 6 minutes, 50 points will be deducted from the score. The same penalty is given, if the music is longer than 6 minutes. Time starts with an audio signal or with the beginning of the music (decision by the flightline director) and ends when the model aircraft touches the ground.

g) Classification

The addition of the 2 best preliminary flights and the average of the two final rounds will count for the final classification.

### 5.5.3.3 Schedule of Manoeuvres

a) Composition of Schedule

Each competitor chooses for his preliminary flights a maximum of 8 and for the final flight a maximum of 12 manoeuvres out of the catalogue (5.5.3.4). The schedules for the preliminary flights must be provided by the competitors and collected by the organiser one hour before the first round will begin. The turn-around manoeuvres are free and must not be printed. The schedule for the final flights must be printed by the competitors, together with his music cassette to the organiser after the results of the preliminary rounds are displayed. The choice of the music is free.

b) Execution of Manoeuvres

The manoeuvres must be executed in the centre of the box in front of the judges during an uninterrupted flight in the order in which they are listed by the competitor. Each (centre) manoeuvre must be performed between approximately 25 and 75 metres in front of the competitor. Rolls and knife edge flights must be executed along a line parallel to base b, other manoeuvres can be flown also perpendicular to base b. Each manoeuvre starts and ends in a horizontal line on the same heading.

### 5.5.3.4 Judging

a) Judges Panel

The organiser must appoint a panel of four or five judges, for international competitions preferably of different nationalities and who are selected from the official CIAM Judges list.

Before every competition there shall be a briefing for the judges. Also warm-up flights shall be flown by a competitor that is determined by a random draw and is not in the first five of the flight order.

*cont/...*

b) Marking System

Each flight will be awarded by each judge with marks between 0 and 10 as follows:

Principles of judging	Preliminary flights		Final flight Freestyle	
	K max	Max Points	K max	Max Points
Precision of each manoeuvre, perfection	50 (max 12 manoeuvres)	500		
Overall impression (including turn-arounds, take-off and landing) display of manoeuvres landing in- or outside of the landing field	50 (45 without landing gear)	500 (450)	50 (45)	500 (450)
Harmony, rhythm, and gracefulness			10	100
<b>TOTAL</b>	<b>100 (95)</b>	<b>1000 (950)</b>	<b>60 (55)</b>	<b>600 (550)</b>

**5.5.3.5 A - Turn-around manoeuvres**

a) Principle

Turn-around manoeuvres connect one centre manoeuvre with the following centre manoeuvre. They are free and shall be combinations of all possibilities of manoeuvres or parts of manoeuvres. I.e. Turns Humpty Bumps, Loops, Spins, etc.

b) Positioning

All turn-around manoeuvres shall be flown inside the box. The turn-around manoeuvres and the centre manoeuvres must be separated by a horizontal line a minimum of 10 metres.

c) Judging

The turn-around manoeuvres must not be judged separately. The performance of this manoeuvre will count for the overall impression. Also flying outside of the box will downgrade the overall look.

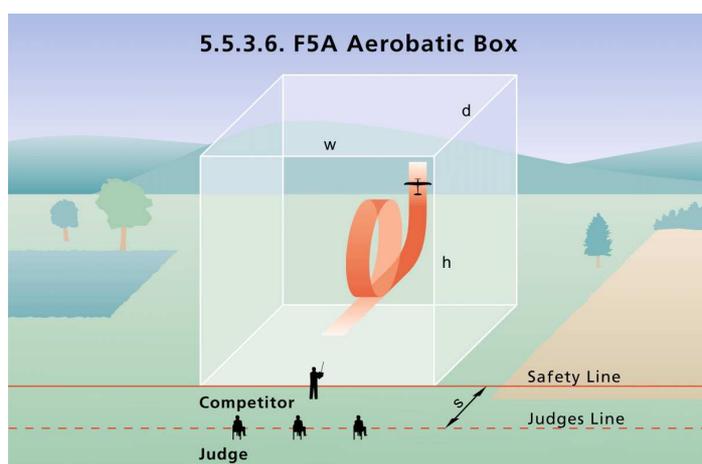
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### 5.5.3.5 B - Manoeuvres

	Basic Manoeuvre	K	Option 1	K	Option 2	K	Option 3	K
1	Loopings positive (min. 2)	2	With roll(s)	3	With snap	4	Rosette	7
2	Loopings negative (min. 2)	3	With roll(s)	4	With snap	5	Rosette	8
3	Square Looping	3	With 2 half rolls	4	With 4 half rolls	5	With 4 full rolls	6
4	Cuban-Eight	3	Horizontal square eight	4	Vertical square eight	5	Vertical square eight with two half rolls	6
5	Roll(s)	2	Two rolls	3	Slow roll	4	2 rolls in opposite	5
6	Pointed roll (min.2 points)	3	4-points	4	8-points	5	4-reverse point roll	6
7	Knife edge flight	3	Reversed with half roll	4	Reversed with full roll	5	Reversed with ½ snap	6
7a	Knife edge flight circle	6	Knife edge flight eight on a horizontal plane	7	Knife edge flight looping	8	Knife edge flight eight on a vertical plane	9
8	Rolling circle with 4 half rolls	4	With 4 full rolls	5	With 4 full rolls in opposite	7	With one roll	8
9	Spin	1	3 turns	2	2 turns in opposite	3	3 turns inverted	4
10	Immelmann	2	Combined with half rolls	3	Combined with full rolls	4	Combined with roll and snap	5
11	Humpty bump positive	2	Humpty bump negative	3	Humpty bump negative or positive combined with half and pointed rolls	4	Humpty bump negative or positive combined with roll(s) and snap	5
12	Torque rolls (min. 1)	3	Two	5	Three	6	More than three	8
13	Top hat positive with 2 half rolls	3	Positive with full rolls	4	Negative with half or pointed rolls	5	Negative with full roll and snap	6
	Stall Turn	2	With half rolls up and down	3	With full rolls up and down	4	With roll up and snap down	5

See Annex 5.A for Manoeuvre Drawings

### 5.5.3.6 F5A Aerobic Box



w = 110 m  
d = 75 m  
h = 75 m  
s = 3-5 m

## 5.5.4 CLASS F5B - ELECTRIC POWERED MOTOR GLIDERS

### 5.5.4.1 Definition

- a) Definition: This contest is a multi-task event for RC Electric Powered Motor Gliders including two tasks:

- 1) Distance
- 2) Duration and landing

These two tasks are executed without interruption in one flight. A minimum of two and a maximum of 8 flights must be flown. If more than three flights are flown, the lowest score of each competitor will be discarded.

- b) Model Aircraft specifications:

Minimum weight without battery	1000 g
Minimum surface area	26.66 dm <sup>2</sup>
Type of battery	Lithium Polymer
Maximum number of only serial cells Cells in parallel are not permitted.	6
Minimum weight of battery pack	450 g
Maximum weight of battery pack	600 g
Limitation of energy by an electronic limiter that stops the motor	max 1750 Watt-min
The limiter is checked by the organiser during the contest.	

- c) Maximum number of battery packs to enter the contest: 1 pack per 2 rounds; 1 pack for reflights.
- d) Repair of battery packs is permitted providing the cells used in the repair come from battery packs that were checked at the start of the contest for that pilot.
- e) Starting order for World and Continental Championships : the starting order for the first round will be established by random draw. For the next rounds the starting order will follow the reversed ranking list. Frequency will not follow frequency and team member will not follow team members.
- f) Starting order for other competitions:

The starting order for the first round will be established by random draw.

The number of pilots is then divided by the number of rounds giving "x" result.

For each subsequent round, the first number "x" of pilots in the starting order moves to the end of the starting order

Example:

Given that there are 24 pilots and four rounds then the calculation results in 6.

The starting order for the rounds would then be as follows:

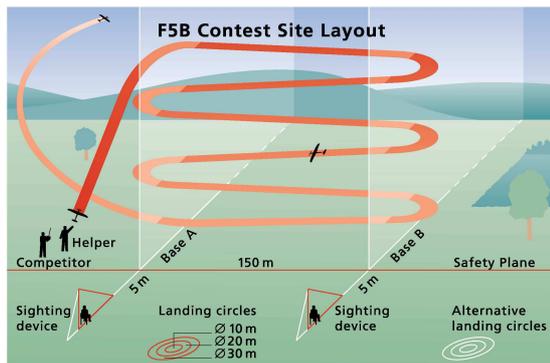
- |          |  |
|----------|--|
| Round 1: | Starting order 1-24.   |
| Round 2: | Starting order – the first six pilots move to the end of the starting order which is now 7-24 and 1-6.   |
| Round 3: | Starting order – the first six pilots move to the end of the starting order which is now 13-24 and 1-12  |
| Round 4: | Starting order – the first six pilots move to the end of the starting order which is now 19-24 and 1-18. |

#### 5.5.4.2 Course Layout and Organisation

- Two imaginary vertical planes at a distance of 150 m from each other determine the turnlines and are named Base A and Base B. A safety plane is established perpendicular to these planes. The safety plane is endless. The sighting devices used to detect the crossing of the Bases A and B are placed at a distance of 5 m from the safety plane.
- For landing, the organiser must provide three concentric circles 30, 20 and 10 m in diameter, located at a place on the field where no danger of collision exists with model aircraft simultaneously flying either the distance.

#### 5.5.4.2 F5B Contest Site Layout

Base B can either be to the left or right of Base A.



#### 5.5.4.3 Scoring

- For each flight the total score is compiled by adding the partial score A and B for each competitor;
- The individual result of each round is normalised to the points of the best competitor of that round.

$$P_{\text{round}} = 1000 \times \frac{\text{Individual points}}{\text{Points of the best competitor}}$$

The normalised points shall be recorded to the first decimal number.

- In order to decide the winner when there is a tie, the best discarded flight shall be taken into account.

#### 5.5.4.4 Launching

- Before launching, the competitor has to show to his timekeeper how he controls his motor(s) on his transmitter (on, off, reversing);
- The launch will occur behind the safety line within 10 m from Base A.
- The model aircraft is released into flight directly from the hands of the competitor or his helper, without assistance. The model aircraft shall not be launched from a height greater than the flier's normal reach above the ground.

#### 5.5.4.5 Distance Task

- This task begins when the model aircraft releases hand-launched and ends after 200 seconds. Time of release is to be taken by one timekeeper.

This task must be carried out with at least two climbs with motor running however no more than ten climbs with the motor running are allowed. No points will be awarded for the legs completed after an eleventh or more climb with motor running.

*cont/...*

The competitor has to decide how much time he will use for each climb (motor run) and how much for gliding.

- b) When after stopping the motor the model aircraft first crosses the Base A in the direction of Base B, counting of the legs begins. The model aircraft must complete as many legs as possible from the starting point Base A to the Base B and return;
- c) Restarting the motor stops counting the legs, as does the expiration of the 200 seconds.
- d) A timekeeper announces to the competitor when his model aircraft crosses the Base A and Base B. The absence of a signal will indicate that the model aircraft has failed to correctly cross the base. The instruments used to check the crossing of the vertical plane must assure the parallelism of such planes.

During the scoring in this task, flying with any part of the model aircraft on the forbidden side of the safety plane will give ZERO points for the whole flight, distance and duration.

- e) The competitor, his helper(s) and the team manager must remain at Base A until the distance part of the flight is completed. Nobody, other than the Base B signal operator, may stay in the B line and give signals.
- f) Every completed leg will be awarded 10 points. When the model aircraft fails to complete at least one leg after either of the first two climbs, 30 points will be deducted from the score of this task;

After 200 seconds of this task, which will be indicated by an audio signal, the duration task begins immediately.

#### **5.5.4.6 Duration and Landing Task**

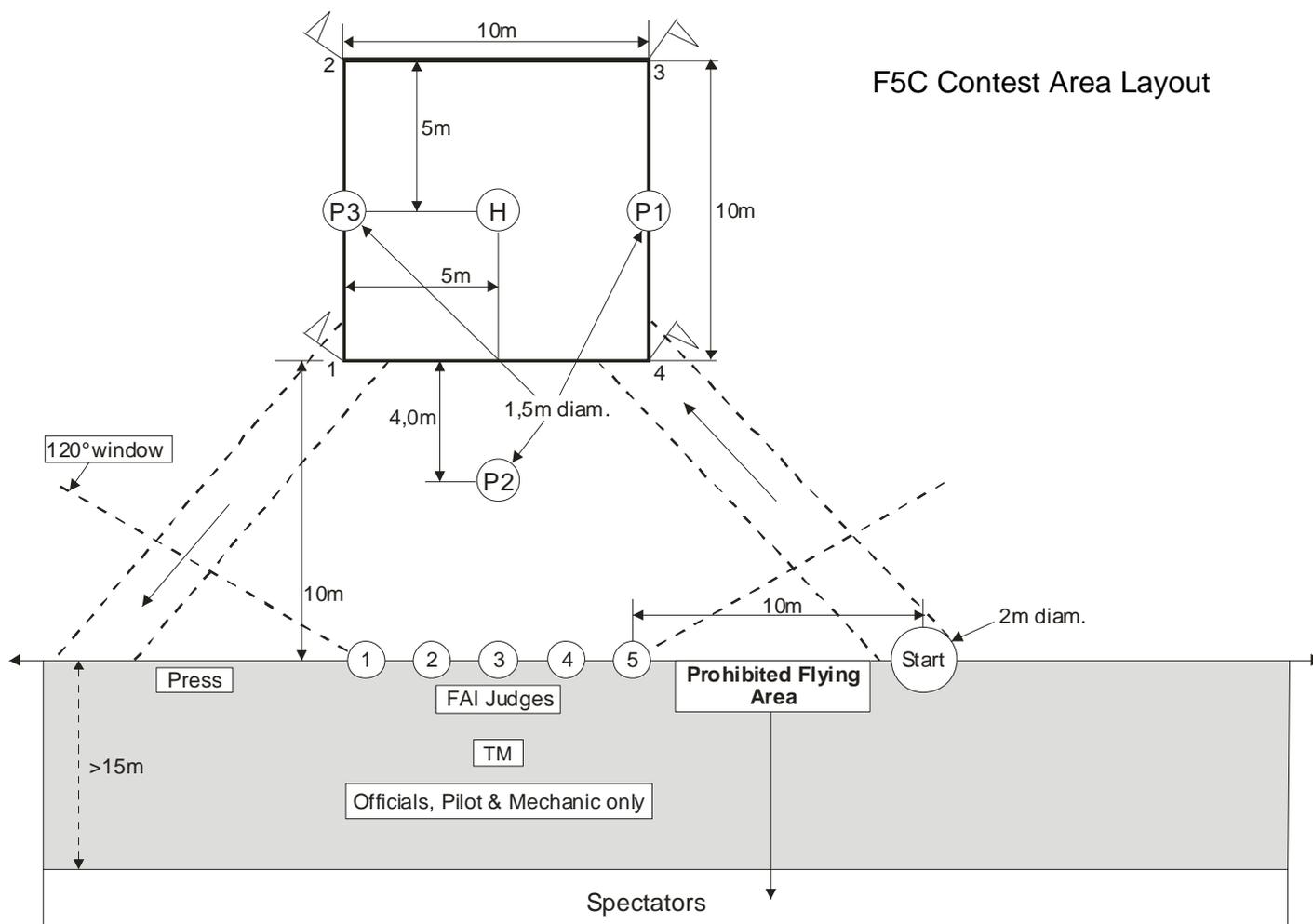
- a) This task must be completed within 600 seconds from the moment the audio signal is given.
- b) The competitor has to decide how much and how often he will switch on the motor.
- c) The duration task score-keeping device keeps track of the motor run time as well as the glide time. Duration task scoring ends when the model aircraft comes to rest after landing.
- d) Duration time is cumulative and one point will be awarded for each full second the model aircraft is gliding with the motor off.
- e) One point will be deducted for each full second flown in excess of 600 seconds.
- f) Additional points will be awarded for landing; when the model aircraft comes to rest in the 30 m circle, 10 points will be given while coming to rest in the 20 m circle gives 20 points, and when coming to rest in the 10 m circle 30 points will be given. The distances are measured from the centre of the circle to the nose of the model aircraft.
- g) No additional points will be awarded if the landing occurs more than 630 seconds after beginning of this task (as per 5.5.4.6.a)).

#### **5.5.4.7 Site**

The competition must be held at a site having reasonable level terrain with a reasonable low probability of slope or wave soaring.



### 5.5.5.4 F5C Contest Area Layout



### 5.5.5.5 Number of helpers

Each competitor is allowed only one mechanic/caller. The mechanic/caller must announce the name, start and finish of each manoeuvre. He may inform the pilot of wind direction, remaining flight time, proximity to prohibited areas and intrusions into the flight area. The mechanic/caller must not act as a coach and is not allowed to operate the radio equipment of the competitor.

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

### 5.5.5.6 Number of Model Aircraft

The number of model aircraft eligible for entry is two (2). Model aircraft 1 and 2 may only be exchanged within the start box...

### 5.5.5.7 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 10 placing or twenty per cent (whichever is greater) of the competitors are entitled to three fly-off flights. At national and Open International competitions the preliminary/fly-off system is not mandatory.

### 5.5.5.8 Definition of an Official Flight

There is an official flight when the competitor is officially called. The flight may be repeated at the Contest Director's discretion when for any unforeseen event 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, battery or radio failures are not considered to be outside the control of the competitor). In such cases the flight may be repeated immediately after the attempt, during the same round or at the end of the round, at the discretion of the Contest Director.

### 5.5.5.9 Scoring

Each manoeuvre is given a score between 0 and 10 (including half) points by each judge. This score is the multiplied with the K- factor of the manoeuvre. A new score sheet is issued for 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. 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 5.5.5.4.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 overflights. Competitors overflying 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 electric powered helicopter as stated in 5.5.5.3.;
- b) the competitor does not deliver his transmitter to the impound or operates his transmitter during a round without permission;
- c) the competitor starts his model aircraft outside the start box;
- d) the competitor gets his transmitter from the impound before he is officially called.

### 5.5.5.10 Classification

After the completion of four official (preliminary) rounds, the best three scores will be used to determine the team standings. The top 10 or twenty per cent (whichever is greater) of all competitors (rounded up in the case of an odd number) then compete in three fly-off rounds to determine the final individual classification. The results of the best three preliminary rounds (normalised to 1000 points) will count as one score. This score, plus the three fly-off scores provide four scores with the best three to count for the final individual classification. The fly-offs to determine the individual classification are required only for Continental and World Championships. If the competition is interrupted during the preliminary rounds, the final classification will be determined by counting all completed preliminary rounds and dropping the lowest. If the competition is interrupted during the fly-off rounds, the final individual classification will be determined by counting all completed rounds plus the results from the preliminary rounds. All scores 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 based on that one round.

For example:

$$\text{Points}_{(x)} = \frac{\text{Score}_{(x)}}{\text{Score}_{(w)}} \times 1000$$

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

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

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

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" fly-off must take place within one hour.

### 5.5.5.11 Judging

At Continental and World Championships the organiser must appoint a panel of five judges for each round. The judges shall preferable be of different nationalities and be elected from a list of

persons who are approved by the National Airports Control and the CIAM. The final score of each flight is obtained by deleting the highest and lowest scores for each manoeuvre from the five judges. 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 spectators can clearly see the scores awarded by all judges after each flight. The score sheet notation must be written by the judges themselves.

#### **5.5.5.12 Organisation**

TRANSMITTER AND FREQUENCY CONTROL (See Section 4b, Paragraph B.8)

##### **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 rounds two, three and four will start at the first, second and third quarter of the initial order. The flight order for each fly-off round will be established by a separate random draw.

##### **FLIGHT PREPARATION**

A competitor must be called at least five minutes before he is required to enter the start box. A start box two metres in diameter will be provided away from the flight line, spectators, competitors and model aircraft (see Figure 5.5.5.4A). For security reasons, the battery pack must be connected only when the model aircraft is in the start box. When the previous competitor's flight time reaches five minutes the flight line director gives a signal. The competitor is given five minutes to make last minute adjustments. The model aircraft may be hovered in the start box only up to eye level and must not be rotated beyond 180 degrees left or right relative to the competitor. If the model aircraft is rotated beyond 180 degrees the flight is terminated. If the competitor is not ready after the five minutes preparation time, he is allowed to complete his adjustments in the start box; however, his flight time will have started at the end of the five minutes interval. When the previous competitor has terminated his last manoeuvre, the flight line director gives the signal that the competitor may leave the start box. He or his helper may carry the model aircraft directly to the central helipad.

##### **FLIGHT TIME**

The flight time of nine minutes begins when the competitor leaves the start box with the permission of the flight line director and the judges or if the five minute preparation time has ended. If the allotted time expires before the schedule is completed, the remaining manoeuvre(s) will be scored zero and the competitor is required to land his model aircraft as soon as possible.

##### **RESTRICTIONS**

The competitor may carry or fly his model aircraft directly to (and land on) the central helipad after he leaves the start box. If the model aircraft is not carried by the competitor or his helper, it must be flown with the skids or landing gear at eye level without practising manoeuvres (no rotations beyond 180 degrees relative to the competitor). Once the model aircraft is on the central helipad, no more adjustments are permitted and the flight must be started.

**cont/...**

### 5.5.5.13 Manoeuvre Schedules

The flight program for each round consists of a maximum of six (6) manoeuvres out of the 18 proposed in the following two lists. The pilot must select two manoeuvres from list 1 (hovering manoeuvres) and two manoeuvres from list 2 (aerobatic manoeuvres). Two more manoeuvres may be selected from list 1 and/or list 2. Each manoeuvre is assigned a K-factor to be used as multiplication factor for the scores between 0 and 10 given by the judges (see 5.5.5.9. Scoring).

#### List 1 (hovering manoeuvres)

11: Hovering, 5 seconds	K = 1
12: Lateral hovering	K = 2
13: Tail-in Circle	K = 3
14: Hovering M	K = 3
15: Vertical Triangle	K = 4
16: Node	K = 4
17: Pirouette	K = 4
18: 4-point Pirouette	K = 5
19: Nose-in circle	K = 6

#### List 2 (aerobatic manoeuvres)

21: Horizontal flight	K = 1
22: Horizontal circle, radius 25 m	K = 2
23: Looping,	K = 3
24: Landing with 180 degree Turn	K = 3
25: Pushover	K = 4
26: Split-S	K = 4
27: Autorotation	K = 4
28: Roll	K = 5
29: Autorotation with 180 degree turn	K = 6

See Annex 5.B for F5C Manoeuvre drawings.

### 5.5.5.14 Performance of the Schedules

At the beginning of each flight, when the pilot or his helper has prepared the model aircraft on the central helipad, the judges are informed of the manoeuvre numbers and names in the order the pilot plans to fly them. The order announced at the beginning of the flight is determined by the pilot respecting the following rules:

- All hovering manoeuvres must be in one sequence.
- All aerobatic manoeuvres must be in another sequence.
- The order of the two sequences is determined by the pilot.
- Once the order of the manoeuvres is announced to the judges and the flight has started, it may not be changed.
- The pilot may select different manoeuvres for every round.

For any of the manoeuvres, the competitor must stand in the 1,5 metre circle (labelled P1 - P3 in Figure 5.5.5.4A, Contest Area Layout) assigned to the corresponding manoeuvre (see Description of Manoeuvres in Annex 5 B). The pilot may choose to stand somewhere else (two (2) points downgrade) and he may also follow the model aircraft (score divided by two (2)). See Annex 5C.

The pilot must execute each announced manoeuvre only once during a flight. The name (number) and start and finish of each manoeuvre must be announced by the competitor or his caller. A manoeuvre performed out of sequence will result in a zero score for that manoeuvre.

Before the start of the first hovering manoeuvre the competitor must land the model aircraft on the central helipad and reposition it once. The model aircraft may face left or right but must be parallel with the judges' line. The manoeuvres must be executed as announced before starting the flight. If the model aircraft is repositioned between hovering manoeuvres the next manoeuvre will receive a zero score.

All aerobatic 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 degrees above the horizon and between lines 60 degrees 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 aerobatic 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. During the aerobatic manoeuvre sequence, the competitor is allowed only two passes before the judges without executing a manoeuvre (free passes). After the third free pass, all following aerobatic manoeuvres will be scored zero points.

### 5.5.5.15 Manoeuvre Descriptions - refer to Annex 5C

### 5.5.5.16 Judges' Guide - for the Class F5C, see Annex 5 D, F5D Judges' Guide

## 5.5.6. CLASS F5D - ELECTRIC POWERED PYLON RACING MODEL AIRCRAFT

### 5.5.6.1 General

General Rules 5.5.1. and Contest Rules 5.5.2. are applicable except where otherwise stated.

### 5.5.6.2 Technical Specifications

#### a) Model Aircraft

Minimum weight ready to fly:	1,000 g
Maximum surface loading	65 g/dm <sup>2</sup>

#### b) Battery

##### Battery Type: Lithium-Polymer

Minimum weight of battery pack:	200 g
Maximum weight of battery pack:	400 g
The weight of battery includes soldering, insulation, cables and connectors.	
Number of cells in serial connection:	up to 5 (S)
Cells in parallel are not permitted.	
Limitation of energy by an electronic limiter that stops the motor: max 1000watt-min.	

#### c) Energy Limiter

The interruption must persist for minimum period of 10 seconds. When the pilot has finished his race or has left the pylon course flight path the motor may be switched on again.

d) Each competitor may use a maximum of three model aircraft during the contest.

e) Any one model aircraft may not be used by more than one team, nor may roles be interchanged in a team.

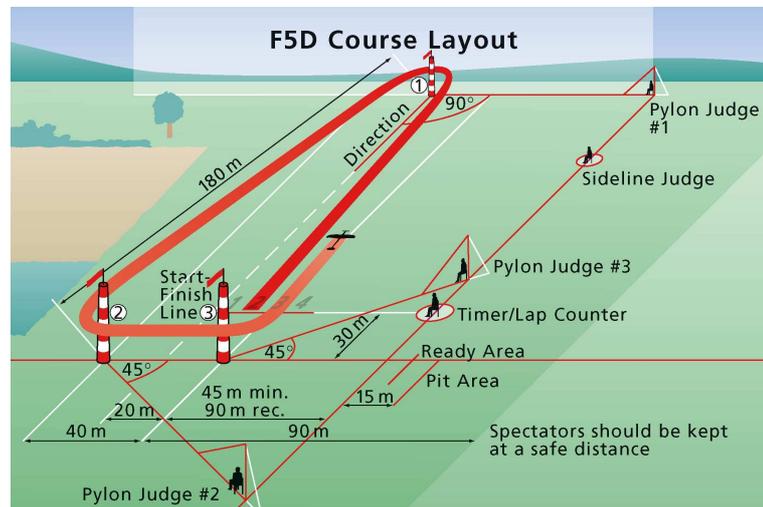
### 5.5.6.3 Safety Rules

- a) All officials (timekeepers, lap counters and pylon judges) must stay a minimum distance of 45 m outside the course on the spectators' side.
- b) The pilot and helper have to stay inside the pylon course from the first drop of the starter's flag until the last model of the heat has finished the race or has left the pylon course flight path.
- c) A Sideline Judge will be posted in the front on the pit area on the spectator side of the racing course. The Sideline Judge will record as an infringement, any over flight of the pit or spectator areas.
- d) All officials on the race course and all competitors must wear a crash helmet.
- e) The racecourse specification may be modified in the interest of safety.
- f) The contest director has the right to request any competitor to make a flight to demonstrate the airworthiness of his model aircraft and/or his ability to fly the aircraft around the course. If during the race, the contest director considers any model aircraft to be flying erratically, dangerously or so low as to endanger the other competitors, callers and officials, he may disqualify the competitor from that heat or from all heats and require the model aircraft to be landed immediately. Persistent flying below the top of the pylons may be considered dangerous.
- g) For transmitter and frequency control see Section 4b, Para. B.8. Heats shall be arranged in accordance with the radio frequencies in use to permit simultaneous flights. Each competitor has to introduce two different frequencies, distant of a minimum of 20 kHz, which he must be able to use on all his model aircraft entered in the contest.

cont/...

#### 5.5.6.4 Racing Course Specification

The triangular course will be laid out as follows: the distance between pylon No. 1 and No. 2 is 180 m. The distance between pylon No.1 and No. 3 is also 180 m. The distance between pylon No. 2 and pylon No. 3 is 40 m. The start/finish line is some 30 m from No. 3 in the direction of No. 1. The course is ten (10) laps with individual length of 400 m. Total distance length is 4 km. The race starts at the start/finish line. All takeoffs will be hand launched; no mechanical device will be used. The race is terminated at the start/ finish line 10 full laps later. The pylons must have a minimum height of 4 m and maximum of 5 m.



#### 5.5.6.5 Helper

- h) All competitors must be accompanied by only one helper (caller) for reasons of safety. The helper can be the team manager, another competitor from the same team, or a third party. The pilot or helper of one team may act as helper in one or more other teams.
- i) He may release the model aircraft at the start and give the pilot verbal information regarding the flying course of his model aircraft and official signals.
- j) In all cases the caller must be the holder of an FAI licence not necessarily issued by the NAC of the pilot and must have paid the entry fee.

#### 5.5.6.6 Officials

- a) Each competitor shall be assigned four (4) officials during each heat:
- b) One official, the timekeeper/lap counter will time the competitor's aircraft for the required ten laps. In doing so, he will count the laps flown and advise the pilot by visual or audio system when he has completed the necessary ten laps. He will keep the recorded time on his timing device until he has entered the time on the score sheet.
- c) At the No.1 pylon there will be one official as pylon judge and signaller for each competitor in the heat. The pylon judge/signaller will stand perpendicular to the direction of the course on the safety side of the course. Each pylon signaller will have a distinctive colour allocated, and the contest director will arrange for each model aircraft to be identified by one pylon judge - signaller before the start of every heat.
- d) The pylon judge - signaller will have his flag in a ready position, or his light off as the aircraft reach midcourse between No. 3 and No. 1 pylons, or earlier. At the instant the model aircraft draws level with the No.1 pylon he will briskly lower his flag or switch his light on. There will be no pilot's helpers at any of the pylons.
- e) Note: Signals may be coloured flags, lights or shutters.
- f) Pylon judge No. 2 is placed behind the base of the triangle at a safe distance in a 45 degrees angle to the line between pylon 2 and 3.

- g) Pylon judge No. 3 is placed at a safe distance in a 45 degrees angle to the line between pylon 2 and 3 in the direction of pylon No. 1.
- h) The judges at the No. 2 and No. 3 pylons will record pylon cuts (infringement). At the end of each race the sideline and pylon Judges will inform the starter of any infringements by any competitor.
- i) The starter is in charge of each heat. He will first ensure that all competitors and officials are ready to commence. Each signaller will have a flag or light of a distinctive colour. The starter will arrange for each model aircraft to be identified by one signaller before the start of any heat. A radio operation check from each competitor will be made prior to identification.

#### **5.5.6.7 Starting Procedure**

- a) Starting positions in all races will be determined by draw with No.1 position being closest to the No. 2 pylon. Model aircraft will be flagged off the starting line at 1 second intervals with timing commencing when the model aircraft crosses the start/finish line for the first time.
- b) A maximum of one minute will be allowed after identification of all model aircraft of the heat at which point the race will commence. A competitor whose model aircraft is not ready to fly at the end of the one minute period, will be disqualified from the heat.
- c) No competitor shall be permitted to launch once the first model aircraft has passed the start/finish line heading from No. 1 to No. 2 pylon on the first lap and no time shall be given him for that heat.
- d) After the starting flag has dropped, any contact between model aircraft shall be considered a collision and the model aircraft involved leave the flight path immediately and land as soon as possible. The Contest Director is required to give such competitors a second opportunity to record a score in that round, provided that in his opinion the aircraft are still airworthy or the competitors have airworthy reserve model aircraft. If a competitor fails to stop racing immediately after the collision, then he will be disqualified from that round,
- e) A penalty will be incurred if the competitor releases the model aircraft before the drop of the starter's flag, cuts a pylon or flies outside the sideline. Two infringements constitute disqualification for that flight.

#### **5.5.6.8 Operation of the Race**

- a) A maximum of three (3) model aircraft per heat will be allowed.
- b) All laps are to be flown counter-clockwise with turns to the left.
- c) At the completion of the ten laps, the lap counter/timekeeper must immediately instruct the competitor to remove his aircraft from the course.
- d) In the event of a malfunction of the timing, lap counting, signalling or such equipment which is the responsibility of the organisers, the competitor(s) affected by such malfunction shall be given the opportunity to record a score for that round.
- e) The loss of any part of the model aircraft after the drop of the flag and before the motor stops disqualifies the model aircraft for that flight except as a result of a collision when Para. 5.5.6.7, d applies.

#### **5.5.6.9 Scoring**

- a) As many heats as practical will be flown but at least three.
- b) The flight of each model aircraft shall be timed with electronic stopwatch or timing device measuring to at least 1/10 second by a lap counter/timekeeper.
- c) The lap counter/timekeeper stops his stopwatch or timing device after ten laps have been completed by the competitor. The elapsed time of each competitor will be transmitted, supervised by the Contest Director (CD), from the stopwatch or timing device into the competitor's score sheet.
- d) At the completion of each heat, the pylon and side-line judges notify the CD as to which model aircraft have infringed. The CD then advises the person who is responsible for the

score sheet of those who will record the total number of infringements for each competitor on the individual score sheet.

- e) The score sheets are then processed by a scorer who will:
- if one infringement has incurred, add 10% of the flyer's time for ten laps to give the corrected time;
  - if two or more or intentional infringements were incurred, cancel the flight;
  - round the competitor's corrected time to the nearest 1/10 of a second.
- f) Points shall be awarded after each race as follows:
- the competitor's score is his corrected time in seconds to the first decimal place;
  - if a competitor fails to complete his flight or is disqualified the score shall be 200.
- g) The winner of the event is the competitor who has accumulated the lowest score after the conclusion of all heats. If four or more rounds are flown, each competitor's worst score shall be discarded. If nine or more rounds are flown, each competitor's worst two scores shall be discarded.
- h) If time permits, and there is no frequency conflict, ties for first, second and third place shall be resolved by a fly-off race. If not, the places are shared.

## 5.5.7 F5E – SOLAR POWERED MODEL AIRCRAFT (PROVISIONAL)

Same rules as F5B, except:

### 5.5.7.1 Model Aircraft Specifications

Power source            solar cells only

Maximum surface      75 dm<sup>2</sup>

Maximum voltage      42 V

No kind of buffer in the power system may be used.

### 5.5.7.2 Distance Task

The Distance Task must be completed within 600 seconds from the moment the model aircraft is hand launched.

## 5.5.8 F5F – 4 CELL MOTOR GLIDERS (PROVISIONAL)

Same rules as F5B except:

### 5.5.8.1 Model Aircraft Specifications:

Minimum weight (ready to fly)	1500g
Minimum surface area	36 dm <sup>2</sup>
Maximum surface loading	75 g/dm <sup>2</sup>

Type of battery Lithium Polymer

Maximum number of only serial cells 4

Cells in parallel are not permitted.

Minimum weight of battery pack: 300 g

Limitation of energy by an electronic limiter that stops the motor max 1300 watt-min.

The limiter is checked by the organiser during the contest.

Maximum number of battery packs to enter the contest: 1 pack per 2 rounds; 1 pack for reflights.

Repair of battery packs is permitted providing the cells used in the repair come from battery packs that were checked at the start of the contest for that pilot.

## 5.5.9 F5G – BIG GLIDERS (PROVISIONAL)

### 5.5.9.1 Definition

This contest is a duration and landing event for electric powered semi-scale gliders.

### 5.5.9.2 Model Aircraft Specifications:

Minimum wingspan	3.75 m
Maximum weight	7.5 kg

### 5.5.9.3 Duration and Landing Task

- a) The duration task consists of 600 seconds gliding time and 30 seconds additional (free) motor run time.
- b) The duration task starts from the moment the model aircraft is hand launched or started by a rubber catapult and ends with the first touch of the ground.
- c) If more than 60 seconds motor run time are used, one point will be deducted for each full second flown in excess of 600 seconds.
- d) The competitor has to decide how much and how often he will switch on the motor.
- e) Gliding time is cumulative and one point will be awarded for each full second the model aircraft is gliding.
- f) Additional points will be awarded for landing; when the model aircraft first touches the ground in one of the three concentric landing circles as follows:

30 m diameter circle	10 points
20 m diameter circle	20 points
10 m diameter circle	30 points

No additional points will be awarded if the landing occurs more than 630 seconds after beginning of this task.

---oOo---