

## 5.5. Category F5 Radio Controlled Electric Powered Model Aircraft

Rules modified **25<sup>th</sup> October 2006** to make all launches within the working time and to scale the motor penalty depending on the motor, # cells and model weight.

Rules modified **12<sup>th</sup> November 2006** to:

- a) Correct the error I made regarding the landing points – they were meant to be the same as for 7 cell glider ie. 25 points maximum.
- b) The rules have also been modified to make it clear that if LiPo cells are used then the number of cells is multiplied by three (3) to calculate the motor penalty.

Rules modified **24<sup>th</sup> November 2006** to use battery pack weight instead of voltage/cell count and the LiPo constant is thus set to 2.

### 5.5.1. General Rules for Electric Powered Models

#### 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. 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 power pack 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

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

Maximum weight ..... 5 kg

Loading ..... 12 to 75 g/dm<sup>2</sup>

The power source shall not exceed a maximum of 42 volts.

#### 5.5.1.4. The competitor may use three (3) model aircraft in F5J. The competitor may combine the parts of the model aircraft during the contest, provided the resulting model aircraft conforms to the rules.

### 5.5.10. F5J – R.C. Thermal Duration Electric Gliders

#### 5.5.10.1. Competition requirements:

5.5.10.1.1. The radio shall be able to operate simultaneously with other equipment at 20 kHz spacing. When the radio does not meet this requirement, the working bandwidth (max. 50 kHz) shall be specified by the competitor.

5.5.10.1.2. For the sake of randomness of the starting order among the successive rounds, each competitor must enter **two** different transmitter frequencies with 20 kHz minimum spacing. The competitor can be called to use either of these frequencies during the contest, so long as the call is made at least 1/2 hour prior to the beginning of a round to the pilot.

#### 5.5.10.2. Cancelling of a Flight and Disqualification

**The flight is annulled and recorded as zero if:**

5.5.10.2.1. If the pilot uses a model aircraft not conforming to the rules. In the case of intentional or flagrant violation of the rules, in the judgment of the Contest Director, the competitor may be disqualified.

5.5.10.2.2. If the model aircraft loses any part during the flight time, except when this occurs as the result of a mid-air collision with another model aircraft.

5.5.10.2.3. The losing of a part during landing (i.e. contact with the ground) is not taken into account

- 5.5.10.2.4. If the model aircraft was already used by another competitor at the same contest
- 5.5.10.2.5. If the pilot uses more than two helpers
- 5.5.10.2.6. If any part of the model aircraft does not come to rest and remain at rest within 100 metres from the designated landing spot.
- 5.5.10.2.7. If in contrast with the declaration of the competitor the model aircraft had a power source for the motor with a voltage exceeding 42 volts.
- 5.5.10.2.8. The model aircraft is controlled by anyone other than the competitor.
- 5.5.10.2.9. If the model aircraft touches either the competitor or his helper during landing manoeuvres, no landing points will be given.

**5.5.10.3. Competitors and Helpers**

- 5.5.10.3.1. Each competitor is allowed a **maximum** of two helpers.

**5.5.10.4. The Flying Site**

- 5.5.10.4.1. The competition must be held on a site having reasonably level terrain, which will minimise the possibility of slope and wave soaring.
- 5.5.10.4.2. The flying site shall include landing spots, one for each competitor in a group.
- 5.5.10.4.3. The centres of the landing circles must always be marked. At the discretion of the Contest Director, marks indicating the circumference of the circles may be omitted and replaced by the use of other means of measuring, such as a tape, to check distances from the centre of the circles.

**5.5.10.5. Safety Rules**

- 5.5.10.5.1. No part of the model aircraft must land or come to rest within the designated safety area.
- 5.5.10.5.2. The model aircraft must not be flown at low level (below 3 meters) over the safety area.
- 5.5.10.5.3. Every single action against the safety rules will be penalised by deduction of 100 points from the competitor's final score. Penalties shall be listed on the score sheet of the round in which the infringement(s) occurred.

**5.5.10.6. Contest Flights**

- 5.5.10.6.1. The competitor will be allowed a minimum of three (3), preferably more, official flights.
- 5.5.10.6.2. The competitor will be allowed to make **multiple** attempts at each official flight.
- 5.5.10.6.3. There is an official attempt when the model aircraft leaves the hands of the competitor or those of a helper with the motor running.
- 5.5.10.6.4. In the case of a second or other attempt, the result of the last attempt made will be the official score.
- 5.5.10.6.5. All second or subsequent attempts may only occur **after** the model has landed **on the ground**.

**5.5.10.7. Reflights**

**The competitor is entitled to a new working time if:**

- 5.5.10.7.1. the model in flight collides with another model in flight.
- 5.5.10.7.2. the attempt has not been judged by the official time-keepers.

The new working time is to be granted to the competitor according to the following order of priorities:

- 1) in an incomplete group, or in a complete group on additional launching/landing spots;
- 2) if this is not achievable, then in a new group of several (minimum 4) reflights;
- 3) if this is also not achievable, then with his original group at the end of the ongoing round.

In priority-case 3, the better of the two results of the original flight and the reflight will be the official score, except for the pilots who are allocated the new attempt. For those the result of the repetition flight is the official result. A competitor of this group who was not allocated the new attempt will not be entitled to another working time in case of hindering.

### 5.5.10.8. Organisation of the Flying.

#### 5.5.10.8.1. Rounds and Groups

- 5.5.10.8.1.1. The flying order for the initial qualifying rounds shall be arranged in accordance with the transmitter frequencies in use to permit as many simultaneous flights as possible. A **minimum of 6** and preferably 8 to 10 competitors should be scheduled for each group where possible.
- 5.5.10.8.1.2. The flying order shall be scheduled in rounds sub-divided into groups.
- 5.5.10.8.1.3. The flying order shall be determined by a system that **minimises** situations where competitors fly together more than once.

#### 5.5.10.8.2. Flying in Groups

- 5.5.10.8.2.1. Competitors are entitled to five minutes **preparation time**, which is counted from the moment his/her group is called to take position at the designated launching area, to the start of the group's working time.
- 5.5.10.8.2.2. The **working time** allowed to each competitor in a group shall be of exactly **ten (10) minutes** duration.
- 5.5.10.8.2.3. The organisers will positively indicate the **start of a group's working time, by audible signal**.
- 5.5.10.8.2.4. An **audible signal** will be given when **eight (8) minutes** of the group's working time has elapsed.
- 5.5.10.8.2.5. The **end of the group's working time** will be indicated by **audible signal**, as for the start.
- 5.5.10.8.2.6. The competitor may not have their model launched until the start of working time has been indicated.
- 5.5.10.8.2.7. Competitors may use what ever motor run they feel is necessary to achieve their desired flight time.
- 5.5.10.8.2.8. The model must be **landed** before an additional motor run is used (another attempt).
- 5.5.10.8.2.9. Any model aircraft **airborne** at the completion of the working time must land immediately.
- 5.5.10.8.2.10. If the pilot wants to make another **attempt** at the task, then they must first land their model. Timing will start again. The score for this attempt will be the score entered for the heat.
- 5.5.10.8.2.11. Otherwise (no nomination of an attempt); If the motor is re-started in the working time, **timing will stop** and **zero landing points** will be awarded.

#### 5.5.10.9. Landing

- 5.5.10.9.1. The pilot and only **one** helper are allowed inside the 15 m radius landing circle.
- 5.5.10.9.2. After landing, competitors may retrieve their model aircraft before the end of their working time providing they do not impede other competitors or model aircraft in their group.

#### 5.5.10.10. Scoring

- 5.5.10.10.1. Two watches are used to **time**:
  - 1) the **total flight time** from when the model is launched until either:
    - a) the model aircraft first touches the ground; or
    - b) the model aircraft first touches any object in contact with the ground; or
    - c) the completion of the group's working time.
  - 2) the model's **motor run** from when the model is **launched** until the motor is switched off.
- 5.5.10.10.2. The **flight time in seconds** shall be recorded to **one decimal place**.
- 5.5.10.10.3. the **motor penalty** shall be calculated by multiplying the motor run by the motor "scale factor".

5.5.10.10.4. the motor “scale factor” is calculated thus:

$$\frac{\text{Weight in grams of the model's powerpack} \times \text{battery type constant} \times C}{\text{The model's weight} \times \text{motor type}}$$

where the motor type is equal to 1 for a brushless motor, 1.5 for a brushed rare earth magnet motor, 2 for a ferrite 540 or 600 type motor and 4 for a ferrite speed 400 type motor.

“C” (=16) is a constant used to set the “scale factor” equal to 1 for a typical speed 400 model.

(Astro Mini Challenger, RTF weight 640 gm, Pack weight 160 gm (7 x GP1100s)

The “Battery type constant” is equal to 1 for NiMH (or NiCad) cells and is equal to 2 for LiPo cells.

5.5.10.10.5. A penalty of **ten (10) points** will be deducted from the flight score for **overflying the end** of the group's **working time**. **Note:** even if the timing of the flight has stopped, if the aircraft is still air-borne, then the penalty **will** apply.

5.5.10.10.6. A **landing bonus** will be awarded in accordance with distance from the landing spot marked by the organizers according to the following tabulation:

Distance from the spot in meters	Points awarded
<= 3	25
<= 6	20
<= 9	15
<= 12	10
<= 15	5
> 15	0

5.5.10.10.7. The distance for landing bonus is measured from the model aircraft nose at rest to landing spot allocated to the competitor by the organisers.

5.5.10.10.8. **No landing bonus points will be awarded** if the model aircraft touches either the pilot or his helper during the landing manoeuvre.

5.5.10.10.9. The competitor who achieves the highest **aggregate of points** will be the group winner and will be awarded a corrected score of **one thousand (1000) points** for that group.

Aggregate points = Flight points + landing points – motor penalty – working time penalty

5.5.10.10.10. The remaining competitors in the group will be awarded a corrected score based on their percentage of the group winner's total score before correction (i.e. normalised for that group) calculated from their own total score as follows:

$$\frac{\text{Competitors own score multiplied by 1000}}{\text{Highest points total scored the in group (before correction)}}$$

**5.5.10.11. Final Classification**

5.5.10.11.1. If **three (3) or less** rounds are flown, the aggregate score achieved by the competitor will be the sum of his/her scores for those three rounds. If **more than three** rounds are flown, then his/her **lowest score** will be discarded before determining his/her aggregate score.

5.5.10.11.2. In the event that **two or more** competitors have the same aggregate score, final positions of those competitors shall be determined by their respective position in the discarded round; the higher positioned competitor being awarded the higher final position.

### 5.5.10.12. **Advisory Information for organizers** (these are **not** rules!)

#### 5.5.10.12.1. **Organisational Requirements**

- 5.5.10.12.1.1. The organisers shall ensure that each competitor has no doubt about the precise second that the group's working time starts and finishes.
- 5.5.10.12.1.2. **Audible** indication may be by automobile horn, bell or public address system etc. It must be remembered that sound does not travel far against the wind; therefore the positioning of the audio source must be given some thought.
- 5.5.10.12.1.3. To be a fair contest, the minimum number of fliers in any one group is **four (4)**. As the contest proceeds, some competitors may be obliged to drop out for various reasons. When a group occurs with three (3) or fewer competitors in it, the organisers move up a competitor from a later group, ensuring if possible, that he/she has not flown against any of the others in previous rounds and of course that his/her frequency is compatible.

#### 5.5.10.12.2. **Time-keeper Duties**

- 5.5.10.12.2.1. Organisers must make sure that all who are to act as timekeepers are fully aware of just how important their duties are and to make certain that they are conversant with the rules particularly those that require quick positive action in order not to jeopardize a competitor's chances in the contest.
- 5.5.10.12.2.2. The organisers must ensure that an official is nominated to note any competitor who overflies the end of the group's working time.

#### 5.5.10.12.3. **Matrixes**

**It is recommended that you use a matrix or some other method to ensure that each competitor has a chance to fly against as many of the competitors as possible over the competition. In doing this you are to try and minimize the number of times that they fly against the same competitor.**

**Ideally, each competitor would fly against each other competitor once, but this is not possible in practice.**

- 5.5.10.12.3.1. A matrix should be employed to minimise situations where any competitor flies against another more than once. It is recognised that, in practice, with certain numbers of competitors, or where more than three rounds are flown, a situation where a competitor flies against another more than once may be unavoidable. This must be kept to a minimum.
- 5.5.10.12.3.2. The method by which each competitor is given a contest number from the matrix is left to the organisers.
- 5.5.10.12.3.3. Once the contest has started, neither the matrix table nor contest numbers should be changed.
- 5.5.10.12.3.4. In order to minimize the time needed to run the contest, it is very important that the matrix which gives the minimum number of groups per round, with the maximum possible competitors in each group, will be selected, and the number of frequency groups adjusted accordingly.

**5.5.10.12.4. Frequency Groups**

5.5.10.12.4.1. Depending on the number of competitors in the contest and the frequencies available, the organisers will select a matrix and allocate the competitors into equally sized frequency groups according to their frequencies; reserve (dummy) places may be inserted into a frequency group at this stage. Each frequency group can comprise a number of different actual frequencies, but a frequency can only appear in one frequency group. These frequency groups are named “A”, “B”, “C” and so on, in the matrix tables that follow. At this stage, some competitors may have to change their radio frequencies in order to balance the numbers in each group.

5.5.10.12.4.2. Organisers can then assign a unique contest number to each competitor from the matrix for round 1 of the contest; the competitor must keep this number for the remainder of the contest (round 2, round 3,....).

For example, in a contest with 36 competitors, using matrix B, a competitor may be grouped into frequency group B and then given competition number 8.

He then flies in flying group 2 in round 1, in flying group 1 in round 2, in flying group 3 in round 3.

**5.5.10.12.5. The Matrixes**

Matrix (a) 25 Competitors, identified by their competitor's number (1 - 25), divided equally into 5 frequency groups (A, B, C, D, E). Each round divided into 5 flying groups (1, 2, 3, 4, 5).

Round 1						Round 2						Round 3					
Frequency Group						Frequency Group						Frequency Group					
Flight Group	A	B	C	D	E	Flight Group	A	B	C	D	E	Flight Group	A	B	C	D	E
1	1	2	3	4	5	1	1	7	13	19	25	1	1	12	23	9	20
2	6	7	8	9	10	2	6	12	18	24	5	2	6	17	3	14	25
3	11	12	13	14	15	3	11	17	23	4	10	3	11	22	8	19	5
4	16	17	18	19	20	4	16	22	3	9	15	4	16	2	13	24	10
5	21	22	23	24	25	5	21	2	8	14	20	5	21	7	18	4	15

Matrix (b) 36 competitors divided into 6 frequency groups (A, B, C, D, E, F). Each round divided into 6 flying groups ( 1, 2, 3, 4, 5, 6 ).

Round 1							Round 2						
Frequency Group							Frequency Group						
Flight Group	A	B	C	D	E	F	Flight Group	A	B	C	D	E	F
1	1	2	3	4	5	6	1	1	8	15	22	29	36
2	7	8	9	10	11	12	2	7	14	21	28	35	6
3	13	14	15	16	17	18	3	13	20	27	34	5	12
4	19	20	21	22	23	24	4	19	26	33	4	11	18
5	25	26	27	28	29	30	5	25	32	3	10	17	24
6	31	32	33	34	35	36	6	31	2	9	16	23	30

  

Round 3						
Frequency Group						
Flight Group	A	B	C	D	E	F
1	1	32	27	22	17	12
2	7	2	33	28	23	18
3	13	8	3	34	29	24
4	19	14	9	4	35	30
5	25	20	15	10	5	36
6	31	26	21	16	11	6

Note: See the FAI F3J rules for larger matrices