

Human Powered Flight

**Rules and Regulations
for**

**THE KREMER HUMAN-POWERED
AIRCRAFT FOR SPORT**

THE ROYAL AERONAUTICAL SOCIETY

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The Royal Aeronautical Society

KREMER HUMAN-POWERED AIRCRAFT COMPETITION FOR SPORT RULES AND REGULATIONS

The purpose of this competition is to direct interest in Human-Powered Aircraft towards the design for production and ongoing development of aircraft suited to athletic competition. In particular it is necessary to specify and design aircraft able to operate in normal reasonable weather conditions, as encountered in the United Kingdom.

It is anticipated that a Human-Powered Aircraft for Sport will differ in several respects from aircraft previously designed and flown successfully in calm conditions. As a potential sporting event, it is considered important that the general public are informed and develop interest in the progress of this type of Human-Powered Aircraft.

The competition is organised by The Royal Aeronautical Society, Human-Powered Aircraft Group Committee (The Organisers). It is open to entrants worldwide.

The prize of 100,000 pounds will be awarded to the first entrant successfully demonstrating a Human-Powered Aircraft, in accordance with these Rules and Regulations. No other prizes will be awarded by the Royal Aeronautical Society.

Human-Powered Aircraft for Sport (HPAS)

1.1) The HPAS shall be designed with the following attributes:

- a) Safe operation at low altitudes near the ground, with a potential for flight at moderate altitudes as the technology evolves.
- b) Athletes intending to fly the HPAS can train themselves ab-initio in calm conditions, and progressively fly the aircraft in more typical wind conditions, as specified for the competition.
- c) Suitable for small batch production, or for assembly from kit form. Simplicity of the HPAS is important both in minimising first cost and in coping with repair or replacement.
- d) Quickly dismantled or assembled from its major components to facilitate transport by road and for storage, and thus for use in sporting events.

1.2) The entrant is required to satisfy the Organisers at the time of entry that the design embraces these attributes in accordance with the Rules.

1.3) For the purpose of this competition, the event in which the HPAS is required to compete is directed at speed around a closed circuit. The event may be staged over land or water, at the discretion of the entrant.

1.4) As a potential sporting event, it is considered important that the general public are informed and develop interest in the progress of HPAS, and accordingly the competition attempts must be open for public observation.

The Aircraft

- 2.1) The HPAS must meet any Airworthiness Requirement defined for such aircraft, as and when such requirements are established.
- 2.2) The HPAS shall not use any lighter than air gas for the purpose of generating lift, or as a buoyancy aid.
- 2.3) The HPAS shall be a fixed wing aircraft. It shall be flown and powered by one person, relying solely on his/her own muscular effort for propulsion. No energy storage device or electric cell may be used for propulsion or lift.
- 2.4) An onboard source of electric power is permitted for the sole purpose of control, including auto-stabilisation and propeller governing.
- 2.5) The whole machine shall stow into a roadworthy vehicle supporting a weatherproof container not longer than 8.0 m (26.24 ft) internally.
- 2.6) No part of the aircraft or its means of launching may be discarded at take-off. The entire aircraft shall complete an attempted official flight without touching the ground.
- 2.7) No communication or external assistance may be given to the pilot or to the aircraft during the flight.
- 2.8) The aircraft shall demonstrate its facility to land safely at the completion of each attempted official flight.

The Competition Course

- 3.1) The course shall be established by the entrant at a place open to the public for observation, within the United Kingdom. The course location, with details of its authorisation for use, including arrangements for the protection of the public, shall be notified to the Organisers, and receive their approval before any flying commences at that location.
- 3.2) The competition course shall comprise an equilateral triangle (60 degree corners), with side lengths of 500 m (1640 ft). At each corner a clearly visible marker shall be erected. The course shall be defined over an essentially flat surface on land, or over water.
- 3.3) The Course shall have one leg aligned approximately with the currently prevailing wind direction at the commencement of an attempt. A start and finish line shall be established close to the middle of this side, for clockwise flights. The start and finish line shall be extended beyond the opposite corner of the course, for anti-clockwise flights, (see diagram of the course).
- 3.4) During each attempted official flight, the wind strength shall be recorded. The mean wind speed measured over the duration of each flight at a height not more than 10m above ground level, shall be shown to be not less than 5.0 m/sec (16.4 ft/sec or 11.2 mph).
- 3.5) Lighter winds or conditions of relative calm, in which the wind strength is less than 5.0 m/sec (16.4 ft/sec or 11.2 mph) for a period of 20 seconds or more, are unacceptable.

3.6) For the purpose of compliance with 3.4) and 3.5) above, a recording anemometer will be provided by the Organisers, and it shall be set up within the triangular course, and located at a point agreed by the Judges. It will be capable of continuously recording wind speed with an accuracy of 5%, verified by an independent authority in the United Kingdom.

3.7) This recording anemometer will be placed at the disposal of the Judges during each attempted official flight. The Judges will retain the readings for any official flight, and take charge of the recording anemometer, pending its re-verification by the independent authority.

Official Flights

4.1) An entrant wishing to attempt an official flight shall notify the Organisers in advance, giving details of proposed time and location and shall make all necessary arrangements relating to the competition course, the operation of flights, the attendance of the Judges, and observation by the public.

4.2) Upon making an attempt, it will be deemed unsuccessful or official by the Judges. Details of an official attempt must be submitted to the Organisers within an elapsed time of one month, for ratification. Submissions will be treated strictly in order of receipt by the Organisers.

4.3) At the commencement of the proceedings the HPAS shall be removed from its transporter, and assembled ready for flight with crew onboard and ready to start, within an observed time of 30 minutes. The first attempted flight may then commence at the instruction of the Judges, on that day.

4.4) The HPAS shall take-off starting from rest, and may be assisted by not more than two ground personnel. The assistants are permitted only to stabilise the aircraft to the point of take-off. The assistants may not cross the start line.

4.5) The aircraft shall be observed to cross the starting line at a clear height of not less than 5 m (16.4 ft). It shall continue to navigate the course without touching the ground, and to pass entirely clear of each marker outside the triangular course. The flight terminates when observed to cross the finishing line at a height not less than 5.0 m (16.4 ft).

4.6) One circuit of the course shall be flown in each direction, using the appropriate start/finish line as shown in the course diagram. The crew of the aircraft shall be the same person for each flight. He/she may remain on the ground to recuperate between the flights, for a time not exceeding one hour.

4.7) Each flight will be timed by the Competition Judges, observing the nose of the aircraft to cross the start/finish line. Two stopwatches will be used and the recorded times averaged, provided that those times do not differ by more than one second, otherwise the higher time will be recorded.

4.8) Two flights in opposite directions around the course must be completed within a total (for both flights taken together) flying time of 7.00 minutes. The flying speed required to attain this is at least 10 m/sec (about 33 ft/sec or 22 mph).

4.9) Upon successful completion of the two flights, and when the judges are ready, the pilot will leave the aircraft and it shall be dismantled and stowed in its road transporter all within an ob-

served time of 30 minutes.

Competition Judges

5.1) The Judges will be appointed by the Royal Aero Club, in the United Kingdom, who will establish procedures and operate within their practices for judging Kremer Competitions, with such adjustments as they see fit in relation to these Rules and Regulations.

5.2) The Judges will scrutinise and observe all attempts made in the competition and decide whether they are unsuccessful or official in accordance with these Rules. Establishing arrangements with the Judges to attend, in advance of an attempt, will be the responsibility of the entrant.

5.3) The Judges will exercise their powers within the general provisions of the FAI Sporting Code, which includes, amongst other things, provisions covering the use and administration of drugs.

5.4) Compliance with all provisions of these Rules and Regulations in all respects shall be a necessary precondition of any attempt being judged official. The decision of the Judges shall be final and binding upon the entrant.

Entry Procedure

6.1) Entry forms are available from the Organisers, at The Royal Aeronautical Society, Human Powered Aircraft Group, 4 Hamilton Place, London W1V 0BQ. The entry fee to accompany the completed entry form will be 250 presented in Sterling or by equivalent international bank draft.

6.2) The entry shall include a 1/20 scale three-view engineering drawing of the aircraft, depicting it assembled with leading dimensions, and as stowed for transportation.

6.3) The entry must be accompanied by an outline of proposed technical features of the HPAS, including the provisions for control and flight in the wind conditions defined for the competition, estimates of weight, lift and drag, and a prediction of performance.

6.4) Individuals or groups intending to make an entry, are recommended to advise the Organisers at the earliest opportunity as outlined by 6.2) and 6.3) above, to establish that the proposed entry is acceptable in respect of the attributes required of an HPAS.

Limitations

7.1) The Organisers reserve a right to refuse an entry where, for any reason in their opinion, the entry is found to not conform, or to be inadequately defined. If the entry is not acceptable any entry fee, less administrative charges, will be refunded within three months of its receipt. Otherwise the Organisers shall not be liable for any costs whatsoever incurred by an entrant whose entry is refused.

7.2) All entrants enter and participate in the competition at their own risk, and they are entirely responsible for the safety of the aircraft and for any injury caused to any persons (including themselves) or to any property (including the aircraft). The Organisers shall have no responsibility for inspecting or approving the aircraft or the arrangements from the point of view of safety.

7.3) Accordingly the entrant agrees, by entering the competition, to indemnify the Organisers against any claims which may be made against the Organisers by any person in connection with the aircraft or its operation for the purpose of the competition. Such indemnity shall be provided in a sum not less than 5 million, and will additionally indemnify the Ministry of Defence, or other owner of land where the Course is established, to their satisfaction.

7.4) Furthermore the Organisers accept no responsibility, either to the entrant or to the spectators or to other third parties, for the suitability of the course or the safety of persons or property, and the entrant shall bear full responsibility for such suitability and safety, except in respect of the recording anemometer.

7.5) Neither the Organisers, nor the Royal Aero Club shall have any liability to the entrant in respect of any failure of the Judges to attend, or any other act or omission of any Judge.

7.6) The entrant shall be responsible for all costs and expenses incurred by the Judges in carrying out their official business in relation to the competition, and it is for the entrant to make such prior arrangements in this respect with the Judges as the entrant thinks fit.

7.7) In all matters concerning the interpretation of the Rules and Regulations, the decision of the Organisers is final and binding upon the entrant.

7.8) The Organisers reserve a right to terminate the competition at any time in the future as considered appropriate, subject to giving all accepted entrants one years notice in writing.

7.9) The Organisers have no present intention to terminate the competition before 1 January 2010, but if the prize has not then been won, the Organisers reserve a right to apply part or all of the prize fund to reward entrants who have demonstrated significant progress in the development of Human Powered Aircraft for Sport.

Course Diagram

