

**Royal Aeronautical Society  
General Aviation Group / Light Aircraft Association**

**Cockpit Design Competition 2011**

**Background**

1. Light aircraft that are certified in the aerial work and public transport category, typically those used for flying training, have gained their certificates of airworthiness through an appraisal, among other factors, of their cockpit ergonomics – the man/machine interface. Even so, ergonomic errors can often be identified. However, designers and builders of Permit to Fly aircraft are relatively unconstrained in their choice of cockpit proportions, crash protection, warnings of malfunction and flight and engine instrumentation. This freedom of choice, coupled with the wide range of cockpit equipment available, is not universally used to achieve a satisfactory cockpit working environment. Consequently, some cockpits can be seen as degrading the pilots' visual lookout and physical comfort while flying, and to impose difficulties of equipment operation, warning of malfunction, and slow response to air traffic control and other radio instructions. Assessment of the overall degree of degradation resulting from a given design is largely subjective. However, there is little doubt that general improvements in the pilots' working environment could be achieved in a number of Permit to Fly

aircraft. It follows that these improvements are likely to have a beneficial effect on operational efficiency, and hence flight safety.



*2009 Competition Winner Sam Lee (right) with General Aviation Group Chairman John Edgley*

**Aim**

2. The Cockpit Design Competition aims to stimulate thought on cockpit design, pilot comfort, ease of interpretation and operation of the flight and engine instruments by the pilot, rapid identification of malfunction warnings, canopy reflections that may affect clear external vision, weight, and anthropomorphic range and crashworthiness. Side-by-side seating for two pilots should be assumed.

**Scope of the Submission**

3. In their submission, competition entrants should cover the following:
- a. It should be possible and comfortable for a pilot to taxi and fly the aircraft from either cockpit seat without restriction
  - b. Thoughts and suggestions for a high standard of cockpit crashworthiness should be included and explained
  - c. The cockpit should accommodate pilots of different physical size, the range of height, reach, and thigh and leg length should be stated in the submission
  - d. Simplicity and intuitive equipment operation in the following areas would be highly regarded by the judges:

- Flight instruments showing pitch, roll, yaw, turn rate, IAS, Altitude/Height, Rate of Climb/Descent, and Heading (Magnetic and True)
- Interpretation in bright sunlight of Electronic Flight Instrument and Engine Instrument Displays (EFIS)
- Functional selection buttons and switches that require normal skills to identify and operate with minimum risk of error, or need for overconcentration in high workload situations, or when out of flying practice.

- e. Navigation equipment, including GPS and Mode S Transponder
- f. Radio for Air Traffic Control and Emergency Communication
- g. Cockpit ventilation and canopy demisting
- h. Canopy locking. Not more than two controls with positive unlock/lock indication, within easy reach and view of the pilots.
- i. It should not be possible to taxi or take off with the fuel cock off
- j. Quick access to all panel mounted instruments and controls and the ability to change individual instruments and equipments rapidly without special tools
- k. Standby flight instruments if EFIS displays are used
- l. Combined weight of all cockpit equipment and seats, excluding upholstery, but including crashworthiness measures
- m. Emergency egress from either side of the cockpit
- n. Ease of fitting and adjustment of the pilots' safety harness.

4. Competition entrants would be expected to produce detailed drawings and models to support their ideas. Their efforts should be aimed at two-seat amateur built aircraft in the maximum all up weight range 450kg – 600kg and fitted with three axis flight controls.

### **Weather Conditions - Operations**

5. The integrity and function of the cockpit instruments and equipment should be considered as suitable for operation under UK regulations for VFR flight, but should be capable of development for IFR flight with minimum changes. Such changes that are necessary should be explained in the submission.

### **Relevant Literature and Reports**

6. Entrants are expected to carry out their own research of the relevant literature and reports that are available on the subject of cockpit ergonomics, the design of flight instruments and crashworthiness. A list of the references used should be included with the submission.

7. The submission proposal should meet any relevant requirements included in the EASA Publication Certification Specifications – Very Light Aircraft (CS-VLA)

### **Regulations**

8. Comments and suggestions on the requirements laid down in CS-VLA should also be included in the submission.

## Information for Entrants

1. Competition submissions will be judged by a panel appointed by the General Aviation Group / Light Aircraft Association. No appeals against decisions made by this panel will be accepted. The panel reserves the right not to select competition winners if, either, insufficient entries are received to encourage a viable competition, or no entry is submitted that justifies the awards.
2. Entrants should arrange delivery of their submissions to the following address, so that they are received no later than Friday 21 October 2011:

**RAeS GA Group / LAA Cockpit Design Competition 2011**

Light Aircraft Association  
Engineering Department  
Turweston Aerodrome  
Nr Brackley  
Northants  
NN13 5YD

3. Entries may be submitted in the form of models or some other method suitable for review visually, and supported by written descriptions and accompanying analysis. Weights should be estimated. Alternatively, the presentation of a submission may be in DVD/CD or memory stick format combined with, or as an alternative to, a written and model based submission.
4. No limit is placed on the scope or technical depth of a submission, but descriptions and analysis should not be longer than is necessary to make clear what is being proposed.
5. A first prize of £1,000.00 and a second prize of £500.00 will be awarded for the entries judged to be the two most meritorious submissions.
6. Marks will be allotted out of 1,000 in the following proportions:
  - a. Ease of Pilot Interpretation and Operation in the Air and on the Ground – 500
  - b. Cockpit Comfort and Crashworthiness – 300
  - c. Cockpit Weight, including Flight and Engine Instrument Displays, Associated Cabling and Power Sources - 200
7. Queries on the above or any other relevant aspect of the competition should first be directed to the RAeS Conference & Events Department:

Gemma Crabb  
Conference & Events Organiser  
Royal Aeronautical Society  
No.4 Hamilton Place  
London  
W1J 7BQ

[gemma.crabb@aerosociety.com](mailto:gemma.crabb@aerosociety.com)

Tel: +44 (0)20 7670 4372



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Entry Form

Name of Entrant:.....

Organisation (if applicable): .....

Address: .....

.....

.....

Email: .....

Telephone: ..... Fax: .....

This entry is from an Individual / Group (private, university, industry) \*

\* delete as applicable

Signed: .....

**Please return this form and your full submission to:**

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