



Maryland Engineering Challenges™ 2009

Cargo Airplane Guide



Challenge Sponsors:

AIAA: American Institute of Aeronautics and Astronautics
(Baltimore Section)

Glenn L. Martin Maryland Aviation Museum

Levels:

NEW! Middle School: Grades 6-8

High School: Grades 9-12

Each level will be judged separately

Important Dates:

Coaches' Information Workshop:

Thursday, November 20, 2008

4:00-7:00 p.m.

Hands-On Workshop:

January 2009

Date and time TBA

Registration Deadline:

Friday, February 6, 2009

4:00 p.m.

Written Report Due:

Friday, February 6, 2009

4:00 p.m.

Competition Date:

Saturday, February 21, 2009

9:00 a.m. – 2:00 p.m.

Snow Date:

Saturday, March 21, 2009

9:00 a.m. – 2:00 p.m.



All Cargo Airplane workshops and competitions will be held at the Education Center of the Glenn L. Martin Maryland Aviation Museum. Directions will be sent to teams prior to the competition.

For more information on registration or general questions, please contact Melinda Brantel Cané at mcane@thebmi.org or 410-727-4808 ext. 120.

The Challenge:

Students will design and construct an electrically-powered model aircraft to fly a tethered flight of at least one lap without cargo, followed by a second flight of one lap carrying as much cargo as possible. Both laps will use power supplied by a power pole, limited by the maximum output of the transformer, Kelvin Digital Power Supply 841386 (Rated 0-20 Volts at 2 Amps).

For more information on engineering requirements, please contact Tom Milnes at thomas.milnes@jhuapl.edu

Engineering Team Requirements:

Each team may consist of 1 to 10 students

Design & Construction Standards:

- The team must use a Kelvin 850647 Electric Motor, one of which is supplied in each kit.
- Contestants may substitute their own propeller for the one in the kit.
- Contestants are responsible for building wings, fuselage, and cargo.
- No lighter-than-air devices are permitted.
- Cargo may not have lift-increasing or drag-reducing properties for the airplane as a whole.
- The motor must be installed in the airplane so as to be visible to the judges on the day of the competition.
- Electrical connection to power pole is via telephone wall jack and wire. Electrical polarity for power pole is **black - , red +, green -, yellow +**
- Length, width, height must all be less than 3 feet.
- NO COMMERCIAL KITS are permitted.

Performance Guidelines:

- The airplane must fly a successful lap while tethered, first with plane empty, then with cargo.
- Power must be supplied by the Kelvin Power Pole 850747 and Kelvin Digital Power Supply 841386 provided by the judges.
- No more than two minutes will be allowed for any attempt.

Evaluation Standards:

- A lap will be considered successful when the plane flies at least as high as the pylon pivot point continuously for a complete circle.
- Tethers must be long enough so that the distance from the pylon's center point to the plane's centerline is at least 10 feet when the plane is tethered.
- THE JUDGES HAVE FULL AUTHORITY TO INTERPRET THE LETTER AND SPIRIT OF THE RULES

This challenge involves four main components: the design and construction of the project, a written report, an oral report, and the performance demonstration.

DESIGN REPORT

Competition value: 20 points

ORAL REPORT

Competition value: 20 points

DESIGN & CONSTRUCTION

Competition value: 30 points.

PERFORMANCE DEMONSTRATION

Competition value: 30 points

An outline of what is required for each of these components and guidance on preparing for the competition is given in the appropriate Guides to Entry, which should be read in connection with this document. The Guides to Entry also gives detailed requirements for the design report at the Middle or High School levels.

Supplies and Prizes:

Each registered team may request a kit containing one motor and one propeller as described above; additional motors or propellers may be purchased for a small fee. Contact the BMI for information.

The AIAA (Baltimore Section) will award cash prizes to the 1st, 2nd, and 3rd Place Teams for both the Middle and High School Levels.

GOOD LUCK TO YOUR TEAM
at the Maryland Engineering Challenges

From the Baltimore Museum of Industry
the American Institute of Aeronautics and Astronautics (Baltimore Section)
and the Glenn L. Martin Maryland Aviation Museum