



FLIGHT ENDURANCE

OVERVIEW

Participants analyze flight principles with a rubber band powered model aircraft.

PURPOSE

Build, fly, and adjust (trim) a model to make long endurance flights inside a contained airspace. Any model design is acceptable if the model complies with the event specifications. All models are to be built and test flown before the event date.

Every year it's amazing all over again when students demonstrate their mastery of this event by flying planes in graceful arcs around an indoor space. It doesn't always go that way, but when it does, it's beautiful.

ELIGIBILITY

Entries are limited to two (2) individuals per chapter.

TIME LIMITS

- A. Entries must be started and completed during the current school year.
- B. Participants are provided a minimum of thirty (30) minutes for trim flights at the event site.

ATTIRE

Business Casual dress as described in Competitive Events Attire is the minimum requirement.

PROCEDURE

- A. Participants report to the event coordinator at the time and place stated in the conference program.
- B. Participants then proceed to the flying site for trim flying. Models are evaluated for specification compliance during the trim session. Time allotted for the trim portion may be extended according to the number of participants and site scheduling.
- C. Participants have two (2) opportunities to fly their models for official times. The times posted during the time trials are used to determine the sixteen (16) top combined times.



- D. Participants attend a pilot's meeting to review the sequence for making the official flights.
- E. In an orderly fashion, participants wind their models and proceed to a group timer for permission to fly.
- F. Participants place their models on the floor and wait for the signal to release from the timer. Timing begins when the model rises off the ground.
- G. Flight time ends when models hit the floor/ground or when they come to rest on an obstruction.
- H. No repairs are allowed after time trials begin.
- I. Each participant has the times of two (2) official flights recorded by the timer.
- J. Following the second flight, the sixteen (16) top combined times' models are placed on their notebooks for the next step in evaluation.
- K. Notebooks and boxes of the sixteen (16) finalists are reviewed for discrepancies or infractions.
- L. Ties are broken by determining the longest single flight time.

REGULATIONS

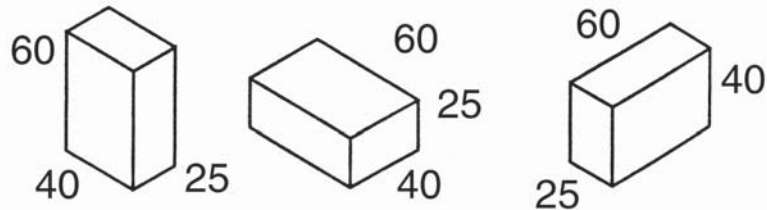
- A. All documentation must be computer-generated on 8½" x 11" paper and contained in a notebook [a standard three (3)-ring binder]. Each notebook must include a flight log (see official sample that follows) with the previous ten (10) flights signed off by the participant's advisor and a written report organized to explain these specific points:
 1. The technical attributes of the design and a description and identification of parts
 2. The modifications and an explanation of why each was developed
 3. A technical review of the flight log that explains the trim adjustments and modifications required to improve endurance. Experts from the Academy of Model Aeronautics (AMA) and the National Free Flight Society (NFFS) may scrutinize this information for validity.

Flight Log

| Member name: | | | Dates: | | |
|--------------|------------|------------|----------------|-----------------|------------------|
| Flight # | # of winds | Time aloft | Flight pattern | Trim adjustment | Advisor sign off |
| #1 | | | | | |
| #2 | | | | | |
| #3 | | | | | |
| #4 | | | | | |
| #5 | | | | | |
| #6 | | | | | |
| #7 | | | | | |
| #8 | | | | | |
| #9 | | | | | |
| #10 | | | | | |

B. The aircraft and its parts *must* be contained in a flight box that does not exceed 25cm x 40cm x 60cm.

The flight box is required and is intended to protect the plane in transit.




C. Materials include the following:

1. Models are to be made of wood and tissue paper for fuselage and flying surfaces (wings, fin and stabilizer). No plastic foams, films, or condenser paper are allowed.
2. Models use a commercially available plastic propeller or propeller assembly: minimum of 140mm to a maximum of 170mm in diameter. Trimming or thinning propellers is allowed to achieve balance and/or to reduce weight.
3. Fuselage dimension: minimum of 300mm in length measured with prop assembly attached.
4. Wingspan: maximum of 50cm horizontally projected, wing chord 12cm projected.
5. Rubber motor: maximum weight of motor is one (1) gram, including the O-ring. No length measurement is made. Spare motors are allowed during the official flights. One rubber O-ring

may be used on the rubber motor loop at the motor hook end for easier handling of wound motors.

6. Model weight: minimum of 7 grams, maximum of 21 grams. Models are weighed without motors attached. Clay is permitted for trim ballast. (Model is weighed with clay ballast.)
 7. Steel wire may be used only for propeller shaft, motor hook, and landing gear.
 8. The two wheels must be a minimum of 15mm in diameter of plastic or wood and they must roll.
- D. Acceptable flight support equipment includes the following:
1. Mechanical rubber motor winders (Electricity may not be available at every site.)
 2. A winding stooage may be used to anchor the model while its motor is being wound.
- E. The landing gear must support the airplane without sagging in its rested position.

 Read the General Rules and Regulations in the front of this book for information that applies to all of TSA's competitive events.

EVALUATION

Evaluation is based on the duration of flight, written report, flight log and flight box. A bonus of ten (10) seconds is added to the flight time per flight if the airplane successfully lands on its wheels and comes to a rest on its wheels.

NOTES

The Academy of Model Aeronautics (AMA) welcomes your inquires and may have suggestions and technical information that may further your knowledge and interest in model aircraft. Here's how to contact the AMA:

AMA
5161 E. Memorial
Muncie, Indiana 47302
phone 765.287.1256 (Education Department)
fax 765.289.4248
www.modelaircraft.org
www.webwings.org

The National Free Flight Society (NFFS) is another organization that offers help to individuals who seek information concerning model building and flight technology. Learn more on the web at www.freelflight.org.

FLIGHT ENDURANCE EVENT COORDINATOR INSTRUCTIONS

PERSONNEL

- A. Event coordinator
- B. Assistants, three (3)
- C. Evaluators, three (3)
- D. Timekeepers, three (3)

MATERIALS

Coordinator's notebook, containing:

- A. Event guidelines, four (4) copies
- B. Official rating forms
- C. List of entries with finalist report
- D. List of evaluators/assistants
- E. Flight score sheets
- F. Marking pens (felt tip, fine point)
- G. Stop watches, three (3)
- H. Electronic gram scale
- I. 610mm metric rulers, two (2)
- J. Results envelope

PROCEDURE

- A. Upon arrival at the conference, report to the CRC room and check the contents of the Coordinator's notebook. Review the event guidelines and check to see that enough evaluators/assistants have been scheduled.
- B. Inspect the area(s) in which the event is being held for appropriate set-up, including room size, chairs, tables, outlets, etc. Notify the event manager of any potential problems.
- C. One (1) hour before the event is scheduled to begin, meet with your evaluators/assistants to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.

- D. For participants who violate the rules, the decision either to deduct twenty (20) points or to disqualify the entry must be discussed and verified with the evaluators, event coordinator and a CRC manager. Secure the initials of the coordinator and manager on the rating form.
- E. Check in participants and evaluate models for special compliance during the scheduled trim session (completed flight log inspected).
- F. Secure models in the holding area so models remain safe until the scheduled time for the official flights.
- G. Distribute list of entrants assigned to each designated evaluator/timer.
- H. Each flight is recorded to the nearest one tenth (.1) of a second. After the second flight, the times are added together. Up to three (3) groups may fly simultaneously in the assigned area for the event with consideration for the safety of models and participants.
- I. The notebooks, models and flight boxes of the sixteen (16) top combined times are judged. Models showing deviations may be disqualified.
- J. Each notebook is rated with a factor ranging from 1.01 (low) to 1.20 (high). This factor is multiplied by the total of the two (2) official flights to determine the final ranking of 1-10.
- K. Secure the signatures of all evaluators on the official rating form after they have reviewed it.
- L. Complete and submit the finalist report, which includes a ranking of the ten (10) finalists, and all related forms in the results envelope to the CRC room.
- M. If necessary, manage security and the removal of materials from the event area.

FLIGHT ENDURANCE

2007 & 2008 OFFICIAL RATING FORM

HIGH SCHOOL

| TEAM/CHAPTER ID# | | | | | | | | | | | | | |
|---|--|--|--|--|--|--|------------------|--|--|--|--|--|--|
| EVALUATIVE CRITERIA | | | | | | | | | | | | | |
| Flight #1 (time) | | | | | | | | | | | | | |
| Flight #2 (time) | | | | | | | | | | | | | |
| Landing bonus (10 seconds per flight) | | | | | | | | | | | | | |
| FLIGHT TOTAL | | | | | | | | | | | | | |
| Notebook 1.01 for no flight log or report 1.20 for best accurate report and flight log | | | | | | | | | | | | | |
| SUBTOTAL (To calculate, multiply notebook factor by flight total.) | | | | | | | | | | | | | |
| Rules violation (must be initialed by coordinator and manager)minus 20 pts. | | | | | | | | | | | | | |
| TOTAL | | | | | | | | | | | | | |
| Comments: | | | | | | | | | | | | | |
| I certify these results to be true and accurate to the best of my knowledge. | | | | | | | | | | | | | |
| <u>Documentation and display evaluator</u> | | | | | | | | | | | | | |
| Printed name: _____ | | | | | | | Signature: _____ | | | | | | |
| <u>Presentation/interview evaluator</u> | | | | | | | | | | | | | |
| Printed name: _____ | | | | | | | Signature: _____ | | | | | | |