

# AERIAL SCRAMBLE

Indiana Science Olympiad; unmodified/updated

1. **Description:** At the tournament, teams will assemble and test fly up to two rubber-powered monoplanes using the AMA Alpha. Only the materials of each unopened kit may be used on the aircraft. Teams can provide their own rubber motors that will not exceed 2 grams each. Note that for regional competitions, competitors bring two unopened kits for inspection and their use.

**Team of Up to:** 2 Students **Impound:** None **Time: 60 Minutes Total.** Organizers will schedule hour time slots to compete. *First 30 minutes* to complete primary check-in, model assembly and trim flight testing. *Final 30 minutes* for 2 official flights within a 4 minute scheduled window in the same sequence of each team's initial arrival.

## **2. Event Parameters:**

a. Teams may bring their own tools in one clear sided container (w/ a footprint no more than 12" X 12" approximate). **Items allowed-** are winders, assembly tools, fixtures (freestanding from airplanes), sandpaper, cutting boards, adhesive systems, thread, pins, tape, wax paper, rubber o-rings for motors, rubber motors, clay and logbook.

**Not Allowed-** Extra Wood or Foam Plastic Materials.

Wax paper must be used to cover any and all work surfaces. ***Any teams not using a cutting board for cutting will receive a 20% deduct on their final score.***

b. At the State and National Competitions, Organizers will provide all airplane kits for officials to distribute.

c. Students will be allowed a minimum of 20 minutes before their official time-slot window to build and test their models. Multiple models can fly in this period.

d. Each team is responsible for their work site. Any debris must be disposed of, the site cleaned and inspected before official flights are attempted.

e. Teams will be allowed to attempt two (2) official flights for scoring.

## **3. Construction Parameters:**

a. At the State and National competitions, students will choose two kits for their team from a provided selection of unopened AMA Alpha kits.

b. At the regional competitions, competitors will bring two unopened ALPHA kits for inspection and their use.

c. **Only those materials found as part of the two kits will be allowed in the model assembly.** Glue, tape, pins or clay ballast may be added by teams and are considered as parts of each model.

d. The stock kit rubber motor may be replaced by other rubber elastic loops.

e. Total mass must be more than 8.0 grams and cannot exceed 15.0 grams for each model without motor.

f. The wingspan cannot exceed 42.0 CM

g. Airplanes must use the propeller provided in the kit and not exceed 136cm in diameter.

h. The rubber motor cannot exceed 2 grams. Motors may have rubber o-rings and be lubricated after check-in.

i. Airplanes will be labeled in such a way that they can be identified by the students in reference to their logbooks.

## **4. The Competition:**

a. The event must be held indoors. Tournament officials must announce the room dimensions (approximate length, width and ceiling height) in advance of the competition. Tournament officials and Event Supervisors are urged to minimize the effects of environmental factors such as air currents. Rooms with minimal ceiling obstructions are preferred over very high ceilings.

b. **PRIMARY Check-In:** Once competitors enter the cordoned off competition area, they must-

1) Sign-in and then be scheduled, in sequence of their arrival, the first through last time-slot window for official flights and receive/inspect their two airplane kits. Event supervisors will designate the dispersal of these kits.

2) **Teams will then submit their First-Aid Kit and Tool kit for inspection (see 2a above).** Students must show officials that they have a first-aid kit (minimum of 3 band aids) or deduct 10% from final score.

- 3) The team members remain in the competition area until their official flights are completed. No outside assistance is allowed.
- 4) Teams will assemble up to two airplanes from the two kits and proceed to test/trim fly their models. The first thirty minutes of the hour include check-in, model construction and flight trimming.
- 5) *At the Event Supervisor's Discretion:*
  - Multiple flights may occur simultaneously.
  - Test Flights may occur throughout the contest but will yield to official flights.
  - Teams ready to start official flights during first 30 minutes may do so at supervisor's discretion.
  - No test flights will occur in the final half-hour of the event's last period, except for teams that declare a trim flight during their 4-minute flight period.
6. A self-check inspection station may be made available to competitors for checking their airplanes prior to the Secondary Check-in for their official flights.
7. Competitors may use any kind of winder, but electricity may not be available.

**c. SECONDARY Check-in:** Competitors must present up to two airplanes, their logbook, and up to 6 motors for inspection during the Secondary Check-In immediately prior to their 2 official flights. **Logbooks must describe 4 tasks that were used in either model construction or test flying the model and may contain data prior to the competition.**

- 1) Timers must follow and observe teams as they are winding their motors. All motors that meet specifications will be collected by timers at check-in and will be available to the teams for their official flights. Note that any additional motors needed during official flights must be inspected before use.
- 2) Teams may make up to a total of two (2) official flights using 1 or 2 airplanes.
- 3) After the **Secondary Check-in**, teams must be given a 4 minute flight window starting when their first flight (trim or official) is launched. Any flight beginning within the 4 minute period will be permitted to fly to completion.
- 4) Competitors may make adjustments/repairs/trim flights during their 4-minute period. Before their launches, competitors must indicate to the Timers whether a flight is either **an official or trim flight**. A flight is considered official if a team fails to notify Timer(s) of the flight's status. Teams will not be given extra time to recover or repair their airplanes outside of their 4 minute window.
- 5) Time aloft for each flight starts when the model leaves the competitor's hands and stops when any part of the airplane touches the floor, the lifting surfaces no longer support the weight of the model (such as the airplane landing on a girder or basketball hoop) or the judges otherwise determine the flight to be over.
- 6) Event Supervisors are strongly encouraged to utilize 3 Timers on all flights. The median flight time in seconds to the precision of the device used, recorded by the 3 Timers, is the official time aloft per flight.
- 7) In an unlikely event of a collision with another airplane, a team may elect a re-flight. The decision to re-fly may be made after the airplane lands. Timers are allowed to delay a launch to avoid a possible collision. The 4-minute period does not apply to such a flight.
- 8) Timers must record (the median w/ 3 timers) each official flight time.

**4. Scoring:** The final score is made by adding the two flight times together. Ties will be broken by the longest single official flight time per team.

Recommendations to Teams-

- a. Any component of the kit may be utilized as part of the final design.
- b. Models constructed using methods to make them lighter without sacrificing strength have the potential to fly longer (lighter wing-loading).
- c. . Use o-rings to manage wound rubber motors.
- d. It is recommended that each team bring a trash bag to clean-up their work area.