

See General Rules, Eye Protection & other Policies on [www.soinc.org](http://www.soinc.org) as they apply to every event.

1. **DESCRIPTION:** Prior to the tournament teams design, construct, and test free flight rubber-powered monoplanes to achieve maximum time aloft.

**A TEAM OF UP TO:** 2

**IMPOUND:** None

**TIME:** 8 minutes

2. **EVENT PARAMETERS:**

- a. Teams **may** bring up to 2 airplanes, any tools, and their flight log.
- b. Event Supervisors must provide **dimes**, all measurement tools and timing devices.

3. **CONSTRUCTION PARAMETERS:**

- a. Airplanes may be constructed from published plans, commercial kits and/or a student's design. Kits must not contain any pre-glued joints or pre-covered surfaces.
- b. Any materials except Boron filaments may be used in construction of the airplane.
- c. Total mass of the airplane throughout the flight, excluding the rubber motor, must be **7.0 g** or more.
- d. The airplane must be a monoplane (one wing) and the horizontally projected wingspan must not exceed **40.0 cm**. The maximum wing chord (straight line distance from leading edge of wing to trailing edge, parallel to the fuselage) of the wing must be **6.0 cm** or less. The maximum horizontally projected stabilizer span is **25.0 cm**. The maximum allowable chord of the stabilizer is **5.0 cm**.
- e. The propeller assembly may be built by the competitor(s) or purchased pre-assembled. It may include a propeller, a shaft, a hanger, and/or a thrust bearing. Bushings may be placed in the propeller or thrust bearing to reduce wobble or friction. The propeller must be a single two-bladed propeller with a maximum diameter of **20.0 cm**. Variable-pitch propellers that include mechanisms to actively change the blade diameter or angle must not be used.
- f. A rubber motor not to exceed a mass of **1.5 g** (including any attachments such as O-rings) must power the airplanes and will be massed separately from the airplane. Motors may be lubricated before and/or after check-in.
- g. The airplane(s) must be labeled in such a way as to be easily identified by the event supervisor. At least one non-horizontal surface on the airplane (such as a fin or dihedral panel) must be covered in a non-transparent, non-white material so it can be identified at its maximum altitude.
- h. Students must be able to answer questions regarding the design, construction, and operation of the device per the Building Policy found on [www.soinc.org](http://www.soinc.org)

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 the Event Supervisor 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. Once competitors enter the cordoned off competition area to trim, practice, or compete they must not receive outside assistance, materials, or communication. Teams violating this rule must be ranked below all other teams. Spectators must be in a separate area.
- c. During inspection each team must present a flight log of recorded data. Data must include 6 or more parameters (3 required and at least 3 additional) for 10 or more test flights prior to the competition. The required parameters are: 1) motor size before windup, 2) number of turns on the motor at launch, 3) flight time. The team must choose 3 additional data parameters beyond those required (e.g. turns remaining after landing, estimated/recorded peak flight height, the motor torque at launch, etc.).
- d. At the Event Supervisor's discretion:
  - i. Multiple official flights may occur simultaneously according to the Event Supervisor's direction.
  - ii. Test flights may occur throughout the contest but must yield to any official flight.
  - iii. 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 8-minute flight period.

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- e. A self-check inspection station may be made available to competitors for checking their airplanes prior to check-in with the Event Supervisor.
  - f. Competitors may use any type of winder, but electricity may not be available.
  - g. Competitors must present their event materials (airplanes, motors, and logs) for inspection immediately prior to their 2 official flights. Timers must follow and observe teams as they are winding their motors. All motors that meet specifications will be collected at check-in and will be available to the team only for their official flights.
  - h. Teams may make up to a total of 2 official flights using 1 or 2 airplanes.
  - i. After check-in teams must be given an 8-minute Flight Period, starting when their first flight (trim or official) begins. Any flight beginning within the 8-minute period will be permitted to fly to completion. Competitors may make adjustments/repairs/trim flights during their official 8-minute period. Before their launches, competitors must indicate to the Timers whether a flight is official or a trim flight. A flight is considered official if a team fails to notify Timer(s) of the flight's status. Teams must not be given extra time to recover or repair their airplanes.
  - j. Time Aloft for each flight starts when the airplane leaves the competitor's hand and stops when any part of the airplane touches the floor, the lifting surfaces no longer support the weight of the airplane (such as the airplane landing on a girder or basketball hoop) or the judges otherwise determine the flight to be over.
  - k. 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.
  - l. Competitors must not steer the airplane during flight.
  - m. In the 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 eight-minute period does not apply to such a flight.
5. **SCORING:** The base score is the Team's longest single flight time. Ties will be broken by the longest non-scored official flight time.
- a. 10% of the flight time will be added to flight time of the airplane that has a colored panel on the wing that is at least the length of the wing chord and at least between 2 wing ribs.
  - b. At the state and national level, immediately after inspection, competitors **may attach up to 3 USD dimes** to their airplane, which will be available for inspection before competing. Flights receive a **50% bonus** to their flight time for each dime carried by the airplane during the flight (**i.e., 1.5x flight time for one dime, 2.0x for two, 2.5x for three.**) The coins must be removable (not permanently glued) and readily visible to officials for inspection. The airplane must still comply with all other construction and competition rules, in particular 4.j (flight time will stop if the coins fall off the airplane and hit the ground) and 3.c (the airplane must still have a mass greater than 7.0g without the coins).
  - c. Teams with incomplete flight logs must have 10% of their flight time deducted from each flight.
  - d. Teams without flight logs must have 30% of their flight time deducted from each flight.
  - e. Teams that violate a rule under "CONSTRUCTION" or "THE COMPETITION" that does not have a specific penalty must be ranked after all teams that do not violate those rules.

**Recommended Resources:** Reference and training resources including the **Wright Stuff CD (WSCD)** and the **Wright Stuff DVD (PROD)** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>

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