

HELICOPTER DRAFT RULES 17

1. DESCRIPTION: Prior to the tournament teams design, construct, and test free flight rubber-powered helicopters to achieve maximum time aloft.
A TEAM OF UP TO: 2 IMPOUND: None TIME: 8 minutes
2. EVENT PARAMETERS:
 - a. Teams bring up to 2 helicopters. Teams may bring any tools and their flight log.
 - b. Event Supervisors will provide all measurement tools and timing devices.
3. CONSTRUCTION PARAMETERS:
 - a. Helicopters may be constructed from published plan(s), commercial kits and/or a student's design.
 - b. Participants must not use any components with pre-glued joints or pre-covered surfaces.
 - c. A flat balsa wood disc, large enough to cover a dime, must be the upper most part of the helicopter, the part that would touch a flat ceiling first during the flight.
 - d. Any materials except Boron filaments may be used in construction of the helicopter.
 - e. Total mass of the helicopter throughout the flight, excluding the rubber motor, must be 3.00 g or more.
 - f. The helicopter may use up to three fixed pitch rotors, not exceeding a maximum diameter of 30.00cm. There is no maximum limit on the number of blades, that contribute lift by rotating on a common path around a vertical axis. There must not be any other lifting surfaces.
 - g. Participants must construct the rotors themselves. Commercially available rotors or propellers must not be used in whole or part. Commercial rotor thrust bearings may be used.
 - h. Participants may use any type of winder, but electricity may not be available.
 - i. The helicopter must be powered by rubber motor(s) of any mass. Motor(s) must be removable from the helicopter for check-in. Motors may be lubricated before and/or after check-in. Officials need not mass the motors.
 - j. Each helicopter must be labeled so the event supervisor can easily identify to which team it belongs.
 - k. Participants must be able to answer questions regarding the design, construction, and operation of the device per the Building Policy found at www.soinc.org.
4. THE COMPETITION:
 - a. The event will be held indoors. Tournament officials will 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 participants enter the cordoned off competition area to trim, practice, or compete, they must not receive outside assistance, materials or communication. Participants violating this rule will be ranked below all other teams. Spectators will 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 three 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 throughout the contest but must yield to any official flight
 - 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 events last period, except for teams that declare a trim flight during their 8-minute flight period.
- e. A self-check inspection station may be made available to teams for checking their helicopters prior to being checked by the event supervisor.
- f. Teams must present their event materials (helicopter(s), motor(s), and log got inspection immediately prior to their 2 official flights.
- g. All motors that meet specifications will be collected at check-in and will be re-issued to the team only for the 8-minute Flight Period. Event supervisors are strongly urged to return flight logs after inspection. Timers will follow and observe teams as they are winding their motors.
- h. After check in the teams 8-minute Flight Period starts when their first flight (trim or official) begins. Any flight beginning within the team's 8 minute period will be permitted to fly to completion. Teams may make adjustments/repairs/trim flights during their official 8-minute period. Teams must declare to the Timers before any launches during their Flight Period whether it is an official flight or trim flight. If teams do not indicate the flight type before the launch, it must be considered official. Teams must not be given extra time to recover or repair their helicopters.
- i. Teams may make up to a total of 2 official flights using 1 or 2 helicopters.
- j. Time Aloft for each flight starts when the helicopter leaves the participant's hand and stops when any part of the helicopter touches the floor, the rotors no longer support the weight of the helicopter (such as the helicopter landing on a girder or basketball hoop) or the Timers determine the flight to be over.
- k. Event supervisors are strongly encouraged to utilize 3 Timers on all flights. The middle value of the 3 Timers must be the official Time Aloft for that flight, recorded in seconds to the precision of the device used.
- l. Participants must not steer the helicopter during flight.
- m. In the unlikely event of a collision with another helicopter, a team may elect a re-flight. The decision to re-fly may be made after the helicopter lands. Timers are allowed to delay a launch to avoid a possible collision. The eight-minute period does not apply to such a flight.
- n. The supervisor must review with teams ALL data being recorded on the score sheet/spreadsheet

5. SCORING:

- a. The base score is the Team's longest single flight time. Ties will be broken by the longest non-scored flight time.
- b. Once a team has been re-issued their motors, prior to the testing period, for their official flights, a timing official will start their stopwatch. If their first helicopter flight is launched within 3 minutes of the return of motors a 5% bonus is awarded. If a flight period begins more than 6 minutes after the return of motors, 10% will be deducted from the final score.
- c. Teams with a helicopter with non-coaxial rotors whose axes of rotation are separated by at least the radius of the rotors(e.g., Chinook or Poasecki style) must have their recorded flight time multiplied by 2.5 for scoring purposes.
- d. A bonus of 10% of the flight time will be added to the flight time of a helicopter that has each rotor marked with a black marker on at least one blade covering the area between the leading and trailing edges and between the outermost and next inboard rib. Black tissue is permitted. If no ribs are present, the whole surface must be black.
- e. Teams with incomplete flight logs must have 10% of their flight time deducted from each flight.
- f. Teams without flight logs must have 30% of their flight time deducted from each flight.
- g. Teams that violate a rule under "CONSTRUCTION PARAMETERS" or "THE COMPETITION" that does not have a specific penalty must be ranked after all teams that do not violate those rules.