**Terminology**

- **Motor**: rubber band (thick vs. thin)
  - Must be removable for inspection
  - May be lubricated
- **Motor stick**: "body" of the helicopter; anchors rubber band
- **Rotors**: rotating surfaces (propellers)
  - Max of 3
  - Max diameter of 30.0cm
  - Must be home-made
- **Rotor shaft**: wire connecting moving rotor to rubber band
- **Rotor thrust bearing**: holds wire allowing it to freely rotate

**Common designs**

- One moving rotor, one fixed rotor
- Two moving rotors

**Rules/Specifications**

- Must weigh at least 3 grams (without rubber band)
- Kits are ok, but no pre-built parts
- No commercially available propellers
- Balsa wood disc (≥ dime) on the tip
- Rotors:
  - Home-made, max of 3, max diameter of 30cm-25cm
  - No max on # of blades or their width (chord)
  - **Single-bladed rotor**: max radius less than 15.0cm
- Motors must be rubber, removable
  - inspected but are not weighed
- Labeled with team name
- Flight logs
Flight logs
Six parameters for at least 10 flights prior to competition

- Required data parameters for each flight:
  1. Flight time
  2. Number of turns in motor before liftoff
  3. Motor size (length) before windup
- Some suggested parameters are:
  (pick 3 or add your own)
  • Torque at launch
  • Number of turns remaining after helicopter lands
  • Estimated peak flight height
  • Variance from starting point (how far your helicopter drifted)
- Don’t forget to label with team name

General Tips
- Lightweight but sturdy
- Practice launching
- Don’t do practice flights outside (use school gym)
- Winder 10:1 or 15:1 preferred
- O-ring to aid in transferring motor from winder
- Fast-drying glue:
  • Ambroid cement (easily softened with acetone)
  • Duco cement
  • CA glue (cyanoacrylate) – super glue
  • Bearings (i.e. teflon washers)
  • Good rubber (optional lubricant) – store in ziploc bag
  • Good balsa wood (not warped)

Competition
- 8 minute “Flight period”
  • Only 2 official flights using 1 or 2 helicopters
  • All flights official unless otherwise declared before launch
  • No extra time for repair/recovery
  • Only the better flight (out of the 2) will be scored.
  • Second is tie-breaker

Penalties

<table>
<thead>
<tr>
<th>Violation</th>
<th>Deduction</th>
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</thead>
<tbody>
<tr>
<td>Flight Logs are Incomplete</td>
<td>10% deduction from each flight time</td>
</tr>
<tr>
<td>Flight Logs are not turned in</td>
<td>30% deduction from each flight time</td>
</tr>
<tr>
<td>Building Violation</td>
<td>2nd tiered (scored below all legal devices)</td>
</tr>
</tbody>
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Materials/Resources
- Science Olympiad Student Center
  • http://scioly.org/wiki/index.php/Helicopters
- Endurance Flying Helicopter Models for Science Olympiad: Parlor Copter Helicopter Kit
  • http://loewenton.org/G1/science_olympiad/balsa-model-helicopter-kits.htm
  • A lot of good information on building, not just for buying materials
  • Uses outdated specifications
- YouTube