### Vehicle Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Length (in)</td>
<td>113</td>
</tr>
<tr>
<td>Diameter (in)</td>
<td>6.079, 4.014</td>
</tr>
<tr>
<td>Gross Lift Off Weigh (lb.)</td>
<td>27.31</td>
</tr>
<tr>
<td>Airframe Material(s)</td>
<td>Blue Tube, Kraft Phenolic,</td>
</tr>
<tr>
<td></td>
<td>Fiberglass, Aluminum</td>
</tr>
<tr>
<td>Fin Material and Thickness (in)</td>
<td>Fiberglass, .125</td>
</tr>
<tr>
<td>Coupler Length/Shoulder Length(s) (in)</td>
<td>6in/4in dependent on diameter</td>
</tr>
</tbody>
</table>

### Motor Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Brand/Designation</td>
<td>Cesaroni Technology L730-P</td>
</tr>
<tr>
<td>Max/Average Thrust (lb.)</td>
<td>273.6/165.9</td>
</tr>
<tr>
<td>Total Impulse (lbf-s)</td>
<td>621.4</td>
</tr>
<tr>
<td>Mass Before/After Burn (lb.)</td>
<td>4.95/1.98</td>
</tr>
<tr>
<td>Liftoff Thrust (lb.)</td>
<td>130.5</td>
</tr>
<tr>
<td>Motor Retention Method</td>
<td>54mm Aero Pack motor retainer</td>
</tr>
</tbody>
</table>

### Stability Analysis

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center of Pressure (in from nose)</td>
<td>78.214</td>
</tr>
<tr>
<td>Center of Gravity (in from nose)</td>
<td>63.802</td>
</tr>
<tr>
<td>Static Stability Margin (on pad)</td>
<td>2.37</td>
</tr>
<tr>
<td>Static Stability Margin (at rail exit)</td>
<td>2.41</td>
</tr>
<tr>
<td>Thrust-to-Weight Ratio</td>
<td>6.07</td>
</tr>
<tr>
<td>Rail Size/Type and Length (in)</td>
<td>144</td>
</tr>
<tr>
<td>Rail Exit Velocity (ft/s)</td>
<td>82.1</td>
</tr>
</tbody>
</table>

### Recovery System Properties

#### Drogue Parachute

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer/Model</td>
<td>Fruity Chutes</td>
</tr>
<tr>
<td>Size/Diameter (in or ft)</td>
<td>24in Elliptical</td>
</tr>
<tr>
<td>Altitude at Deployment (ft)</td>
<td>apogee/5280ft</td>
</tr>
<tr>
<td>Velocity at Deployment (ft/s)</td>
<td>0</td>
</tr>
<tr>
<td>Terminal Velocity (ft/s)</td>
<td>65.18</td>
</tr>
<tr>
<td>Recovery Harness Material</td>
<td>Strap Nylon</td>
</tr>
<tr>
<td>Recovery Harness Size/Thickness (in)</td>
<td>0.5in</td>
</tr>
<tr>
<td>Recovery Harness Length (ft)</td>
<td>21.84</td>
</tr>
</tbody>
</table>

#### Harness/Airframe Interfaces

| Links                                | 1) U-Bolt on Transition tube, 2) Top and bottom links of Tender Descender |

### Recovery Electronics

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altimeter(s)/Timer(s) (Make/Model)</td>
<td>Perfectflite Stratologger CF</td>
</tr>
<tr>
<td>Redundancy Plan and Backup Deployment Settings</td>
<td>Two altimeters, redundant ejection charges, two tender descenders</td>
</tr>
</tbody>
</table>

### Recovery Electronics

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rocket Locators (Make/Model)</td>
<td>TeleGPS</td>
</tr>
<tr>
<td>Transmitting Frequencies (all - vehicle and payload)</td>
<td>923 MHz</td>
</tr>
<tr>
<td>Ejection System Energetics (ex. Black Powder)</td>
<td>Black Powder</td>
</tr>
<tr>
<td>Energetics Mass - Drogue chute (grams) Primary</td>
<td>4</td>
</tr>
<tr>
<td>Backup</td>
<td>4</td>
</tr>
<tr>
<td>Energetics Mass - Main chute (grams) Primary</td>
<td>0.5</td>
</tr>
<tr>
<td>Backup</td>
<td>0.5</td>
</tr>
</tbody>
</table>
**Payload**

<table>
<thead>
<tr>
<th>Payload 1 (official payload)</th>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Deployment design consists of a black powder charged system as opposed to the previously put forth pneumatic piston system for PDR. A loose bulkhead in between the transition and payload sections of the airframe will push up against wooden posts glued in between the gears in the wheels in the rover once the black powder is ignited, effectively separating the two sections. Next, the ejection subsystem design maintains the same scissor lift design described in PDR, with minor changes such as removing a servo, adding metal cross-members to the scissor links, and using laser-cut plastics being made to promote ease and improvement of assembly. The current movement subsystem design also features essentially the same cylindrical rover model outlined in PDR, with slight variations like moving from a partially to fully-enclosed frame made for improved durability and easier manufacturing. Finally, the solar subsystem design described in PDR remains mostly unchanged, with modifications in sizing of solar cells and panels, polycarbonate pieces, and the hood of the rover as well as removing a servo due to weight and volume restrictions.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Payload 2 (non-scored payload)</th>
<th>Overview</th>
</tr>
</thead>
</table>

**Test Plans, Status, and Results**

<table>
<thead>
<tr>
<th>Ejection Charge Tests</th>
<th>Sub-scale ejection charge tests, four two-gram black powder charges evenly split above and below the main parachute, took place the day of the subscale launch and were successful.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Sub-scale Test Flights</th>
<th>Sub-scale Test Flight took place December 16th at Livermore Unit NAR (LUNAR). Altitude of 4366ft was reached and a successful two stage recovery was completed along with successful electronics readings. Minor damage were dealt to the parachutes from the black powder charges.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Full-scale Test Flights</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution</td>
<td>UC Berkeley</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Milestone</td>
<td>CDR</td>
</tr>
<tr>
<td>Additional Comments</td>
<td></td>
</tr>
</tbody>
</table>