

Safety and Failure Analysis for Deployment and Recovery

Safety Officer: Sierra Fitzgerald

Deputy Safety Officer: Jarrett Harper

Failure Mode Analysis – Deployment System

Hazard: Launch Instability

Probability: Low

Possible Causes: Insufficient forward velocity at point of departure from guide rail; improper airframe design

Effect: Errant flight path

Mitigation: Safety inspection of frame before launch and simulation to assess forward velocity at launch

Failure Mode Analysis – Recovery System

Hazard: Premature Deployment

Probability: Low

Possible Causes: Poor airframe airflow design for barometric altimeter

Effect: Interrupted flight path; additional flight stresses

Mitigation: Safety inspection of possible cracks, non-designated openings

Hazard: Airframe Damage on Deployment

Probability: Low

Possible Causes: Poor airframe design or weak structure

Effect: Zippered body tube; cracked body

Mitigation: Reinforced airframe with carbon fiber

Hazard: Failure to deploy both Parachutes

Drogue parachute is deployed by booster section charges that go off when either of a pair of redundant flight computers (barometric flight computer and accelerometer flight computer) detect rocket has reached apogee.

Probability: Very Low

Possible Causes: Complete failure of electronics; ejection charge firing failure; ejections too small

Effect: Rapid descent of rocket under drogue-only fall which results in high speed impact that increases chances of frame damage and property or personal damage.

Mitigation: Redundant flight computers using differing apogee event mechanisms allows one flight computer to compensate for the failure of the other flight computer.

Hazard: Partial Deployment of Security System

Drogue parachute is deployed by booster section charges that set off when either of a pair of redundant flight computers (barometric flight computer and accelerometer flight computer) detect rocket has reached apogee.

Probability: Low

Possible Causes: Complete failure of electronics; ejection charge firing failure; ejections too small

Effect: Primary Main Chute Charge fails to go off.

Mitigation: Redundant flight computers using differing apogee event mechanisms allows one flight computer to compensate for the failure of the other flight computer.