High Eccentric Resistive Overload (HERO) Device Demonstration during Parabolic Flight

Problem Statement

- To meet the requirements of NASA's exploration missions, advanced exercise concepts that conform to the medical operations and vehicle constraints much be designed and fabricated.
- The equipment is important to:
  - Maintain strength and endurance to perform in-mission objectives
  - Maintain psychological health of the crew
  - Maintain physiologic conditioning for safe return to Earth

Technology Development Team

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Proposed Flight Experiment

Experiment Readiness:

- The hardware assembly is mostly complete, but lab testing has not occurred and protocols have not been developed. The system will be ready to fly by March 2013.

Test Vehicles:

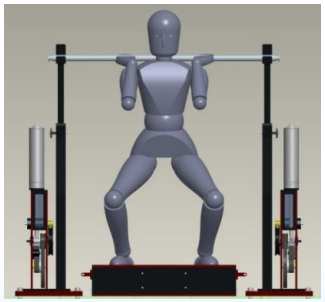
- The requested platform is a parabolic aircraft.

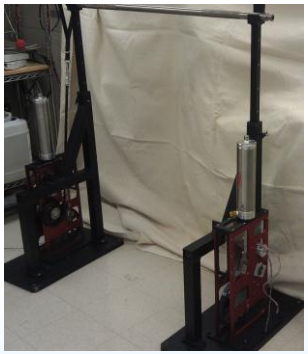
Test Environment:

- The device has not been previously tested in a relevant (0g) environment. No previous opportunities have been requested by the project.

Test Apparatus Description:

- The test apparatus is a resistive exercise device which will bolt-mount to the floor of the aircraft. Two steel frames support the subject load device cable and the air cylinders that provide the load. Human test subjects will use the device to perform a suite of resistive exercises currently performed onboard the ISS.





Technology Maturation

- The HERO device is currently at TRL 5.
- Human subject testing in a ground laboratory will be completed by December 2012. The ground testing along with the parabolic flight will mature the technology to TRL 6.
- Currently, the project is slated to launch to the ISS in 2016, but a re-phasing of ISS resources may accelerate the schedule to 2014. This is the project deadline for technology maturation.

Objective of Proposed Experiment

- The objective of the experiment is for human-in-the-loop test of the exercise device during an exercise prescription.
- Collected data will include force, displacement, video, and software performance. The data will allow the project to:
  - Verify system performance
  - Validate computational models
  - Test data systems and operations

Technology Area: TA06 – Human Health, Life Support and Habitation Systems