

Payload Isolation for Microgravity Research

Scott A. Green, David J. Schenck, John T. Harduvel, Brian T. Weltmer, Bernie J. Javier, Amy L. Zamuner

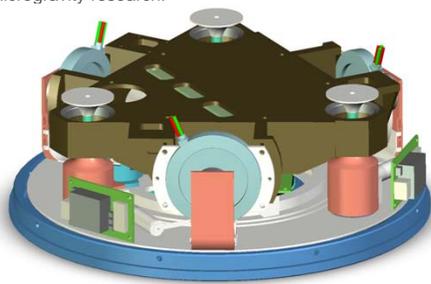
Controlled Dynamics Inc., Huntington Beach, California, USA

Introduction

The Vibration Isolation Platform (VIP) from Controlled Dynamics Inc. (CDI) provides a sustained microgravity environment to research payloads flying on orbital and suborbital vehicles.

Approach

The VIP is a payload mounting interface which includes **active stabilization** and **6-DOF non-contact isolation**. During launch, re-entry, and landing, the research payload is mechanically secured to the vehicle. During parabolic coast or in orbit, the research payload is automatically released on a 6-DOF free-floating platform. The payload is caged to follow the low-frequency inertial motion of the host vehicle, but otherwise left undisturbed to float freely in the sway space of the VIP. A "µg OK" discrete signal is provided to the payload when the acceleration environment is acceptable for conducting microgravity research.



Use VIP for Research

CDI teams with researchers and launch providers for proposals to CASIS, ROSES, Flight Opportunities, etc.

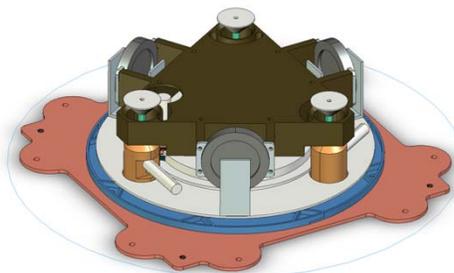
CDI provides payload integration services between the research payload and the host vehicle. Services include:

- **VIP hardware** for isolation of the research experiment from the milli-g flight environment of the host vehicle.
- **Standard interface** to the research experiment (power, data, mount, autonomous operation, etc.) regardless of the host vehicle selected for flight.
- **End-to-end support** for integration, ground testing and safety reviews of the flight payload.
- **Flight environment** pre-flight predictions and post-flight characterization from inertial sensor measurements.
- **Custom services** include experiment packaging design, custom power/data interface, custom umbilical design, prescribed environments (acceleration, rotation, stirring, etc.), custom tuning (frequency specific attenuation, minimum acceleration, minimum rotation, pump/fan disturbance cancellation, etc.).

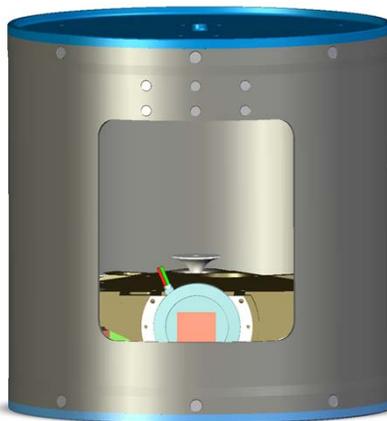
Use on Orbital/Suborbital Vehicles



VIP inside a Middeck Locker

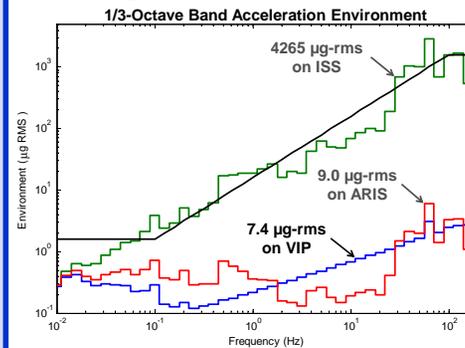


VIP on Masten Xaero Interface Plate

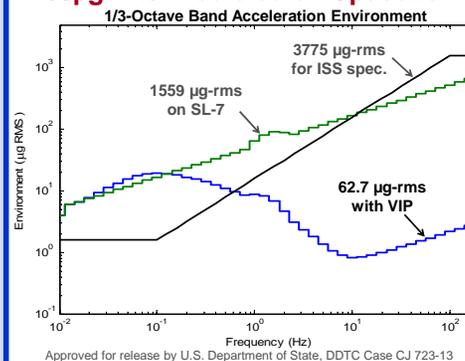


VIP inside SpaceLoft® PTS10 Module

<8µg-rms Predicted on ISS



<63µg-rms Predicted on SpaceLoft®



Ready for Flight Opportunities

The VIP is currently undergoing demonstration flights on sRLVs under NASA's Flight Opportunities Program. CDI has three VIP systems available to provide high-quality microgravity environments to any interested researchers.

Acknowledgements

VIP prototype development was funded by NASA's Space Technology Mission Directorate; Contract NND12AD71C.

Contact Information

Controlled Dynamics Inc. (CDI)
18141 Beach Boulevard, Suite 170
Huntington Beach, CA 92648

PI: Scott A. Green, Ph.D.

Cell: 714-475-9467

Email: sgreen@controlled-dynamics.com