




NASA Flight Opportunities
**19 Million Miles Away:
Infusion of a Flight Tested Technology Enabling Deep-Space Communications**
Scott Green, Ph.D., Controlled Dynamics Inc.
Danielle McCulloch, NASA's Flight Opportunities program
Community of Practice Webinar Series – March 6, 2024
Session will start at 10 a.m. PT – Please mute your microphone and turn off your camera

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Welcome to the Community of Practice Webinar Series!


First, a bit of housekeeping...

- Please mute your microphone and turn off your camera
- Today's session will be recorded
- Recordings for this and all future sessions will be posted on the Flight Opportunities website
- Please engage!
 - Use the chat throughout the session to ask questions

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National Aeronautics and Space Administration 

Welcome to the Community of Practice Webinar Series!


Flight Opportunities hopes these webinars will enable researchers, program staff, and flight providers to connect informally and share information

- Designed to distill and share the most important lessons learned to:
 - Increase the impact of suborbital flight tests
 - Transfer best practices
 - Optimize the experience of current and prospective program participants
- Part of a broad effort to capture, organize, and communicate lessons learned by suborbital researchers
- An opportunity to hear from subject matter experts on best practices for preparing for suborbital flight tests

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Join us for future Community of Practice webinars!

Subscribe to our newsletter for updates on future webinars!

https://www.nasa.gov/directorates/spacetech/fli_ghtopportunities/newsletter

Future webinars


- Webinars are held 1st Wednesday of each month at 10 a.m. PT
- Topics will be announced in the Flight Opportunities newsletter and website
- Session recordings will be posted on the Flight Opportunities website
- Let us know session topics you would like to see covered

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Today's Speakers



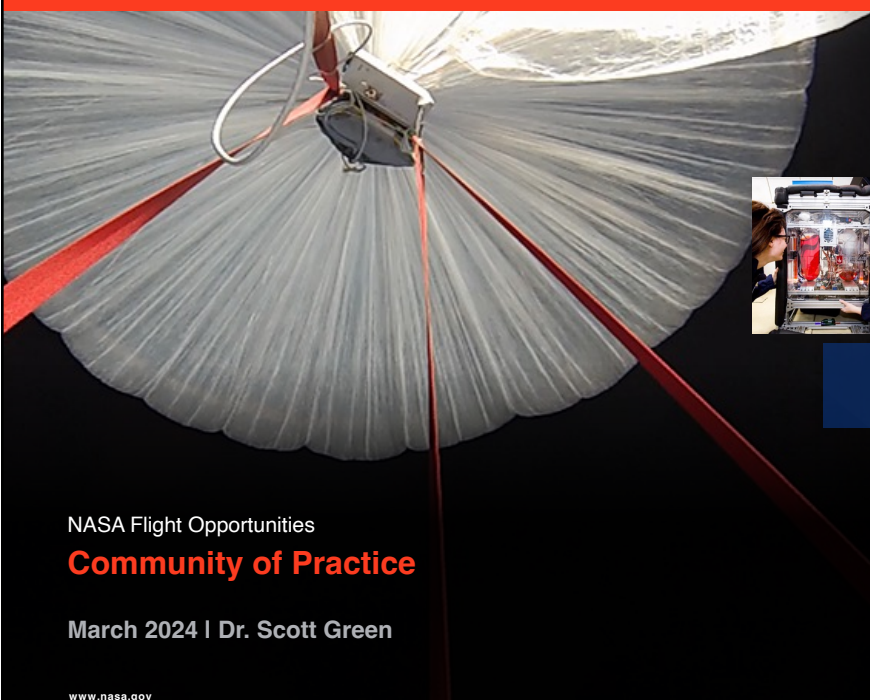
Dr. Scott Green
Principal Engineer | Co-Founder
Controlled Dynamics Inc.





Danielle McCulloch
Program Manager
NASA's Flight Opportunities program

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NASA Flight Opportunities
Community of Practice
March 2024 | Dr. Scott Green

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CDI's Isolation Platform Technology Development

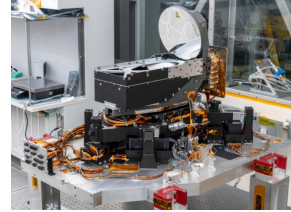
from *Flight Opportunities* to *CASIS ISS* to *DSOC Tech Demo on Psyche*



77S Vibration Isolation Platform
9 sRLV flights
2012-2019



Programmable Isolation Mount
Operational on ISS Inc. 51/52
2017



Isolation & Pointing Assembly
DSOC Tech Demo on Psyche
2023-present

6 March 2024

Contact: sgreen@controlled-dynamics.com

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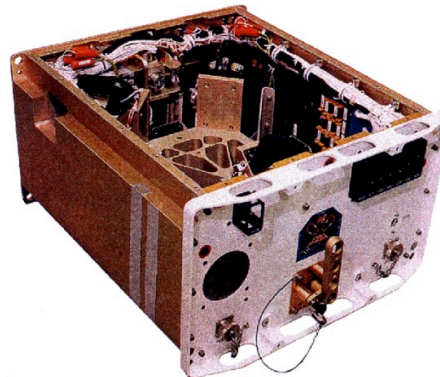
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1995 STABLE – World's First Microgravity Isolation System

Controlled Dynamics Inc.



**Astronaut Fred Leslie operates
STABLE on STS-73/USML-02 mission
October 1995**



**Suppression of Transient Acceleration by
Levitation (STABLE)**

Developed at McDonnell Douglas by:
D.L. Edberg (Cal Poly Pomona)
J.T. Harduvel (Controlled Dynamics Inc)
D.J. Schenck (Controlled Dynamics Inc)

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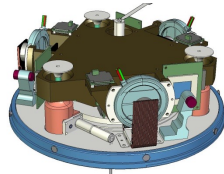
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2012 Payload Isolation for Microgravity Research on sRLVs

Controlled Dynamics Inc.



2012 sRLVs



Vibration Isolation Platform

- **Goal:** Affordable access to sustained μg environments
 - TA-12: Microgravity Vibration Isolation
 - TA-08: Instrument Pointing, Tracking, & Stabilization
- **Approach:** Free-floating isolation of research payloads on manned & unmanned sRLVs
 - μg & μrad environments during freefall/coast
 - Autonomous operation (power & moding)
 - Suitable for sRLVs, parabolic flights, orbital vehicles
- **Development Path:**
 - NASA Game Changing Opportunities contract
 - Derivative of Shuttle-proven technology
 - Mature through Flight Opportunities suborbital flights

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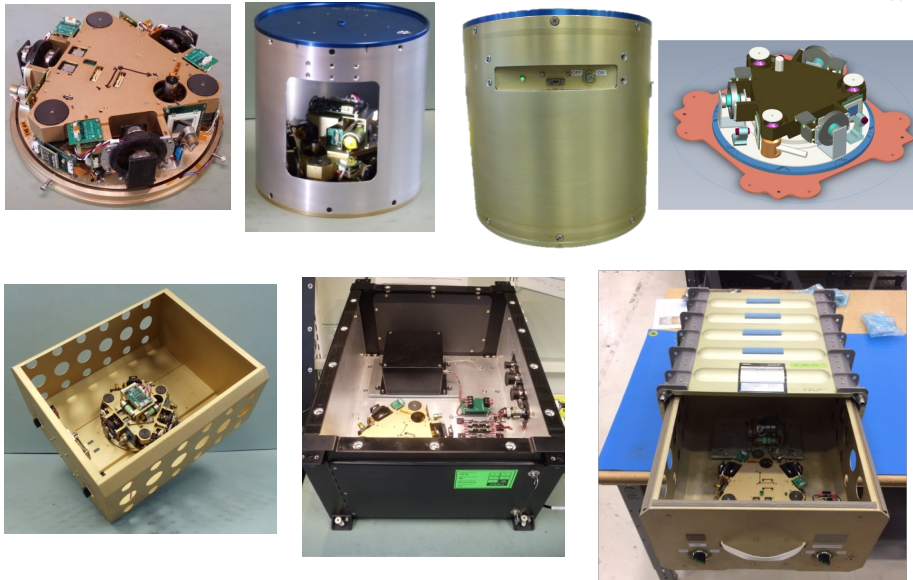
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Developed an Assortment of Payloads for FOP sRLVs

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Concept of Operations – SpaceLoft 7 Flight data

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t = 175sec
 xdd = 0.35mg
 ydd = -0.17mg
 zdd = -2.5mg
 Roll = -0.2deg
 Pitch = 2.7deg
 Yaw = 0.2deg
 dx = -0.06cm
 dy = 0.18cm
 dz = -0.06cm

Microgravity

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Flight Opportunities Suborbital Flights to Mature Tech

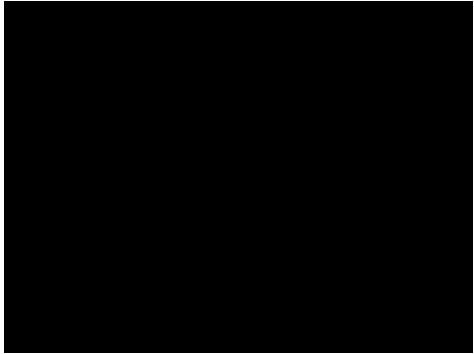
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Vibration Isolation Platform (VIP)
 SpaceLoft-7 June 2013
 SpaceLoft-9 October 2014
 Terrier/Orion 41.114 March 2016
 Blue Origin Flight #3 April 2016
 Blue Origin P6 July 2018
 SpaceLoft-11 Sept 2018
 SpaceShipTwo Dec 2018 & Feb 2019
 Blue Origin P7 Jan 2019

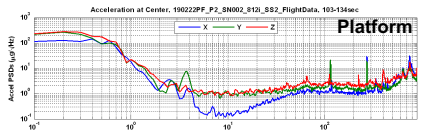
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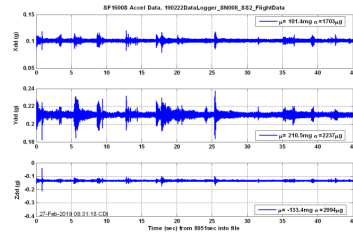
SpaceShip2 Unity Flight 22 Feb 2019



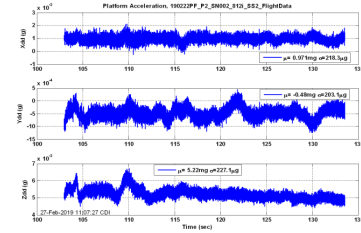
FreeFall on SpaceShip2 Unity flight 22 Feb 2019



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Can detect crew motion (Beth Moses) at Locker Base (~2mg-rms)

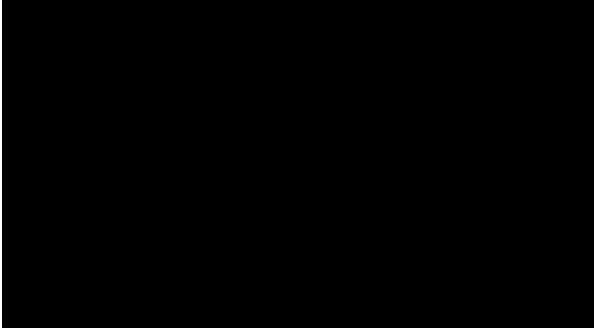


No evidence of crew motion on Isolation Platform (0.2mg-rms)

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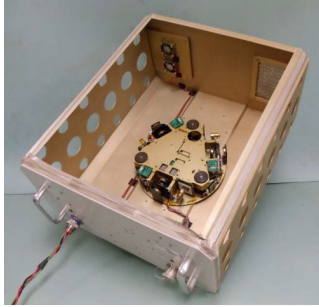


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From Flight Opportunities to ISS with CASIS



OpNom	Programmable Isolation Mount
Call Sign	Isolation Mount
HW Delivery	15 April 2016
Launch	OA-5; 17 October 2016
Increment	51/52
Location	Express Rack 7, Locker 5; U.S. Destiny Lab
Operational	2017 GMT 093 (install 4/3/17) to GMT 223 (removal 8/11/17); 130days
Return	SpX-12; 18 September 2017
Mass	5.6kg (12.5lbs)
Dimensions	56x43x25cm (22"x17"x10")
Power	16W nominal; 32W peek
Thermal	Forced air to Avionics Air Assembly (AAA)
Data	KU Forward to ground (no RIC interfaces)

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Thank you!

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<http://nasa.gov/flightopportunities>

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The slide features a dark blue background with a white footer. At the top left, it says "NASA FLIGHT OPPORTUNITIES". At the top right, there is the NASA logo and the text "National Aeronautics and Space Administration". The main content area has a large "Thank you!" in white. Below that, it provides the website URL "http://nasa.gov/flightopportunities" and the email address "NASA-FlightOpportunities@mail.nasa.gov". On the right side, there is a circular logo for the "FLIGHT OPPORTUNITIES PROGRAM" which includes the text "NASA AFRC ARC" and depicts a satellite, a rocket, and a planet. The footer contains the number "17" and the website "www.nasa.gov".