Cygnus Capture Install Qualify

mams, ossraw at LAB1O2, ER1, Lockers 3,4;[135.28 −10.68 132.12]
10.0000 sa/sec (1.00 Hz)

mams_accel_ossraw, LAB1O2, ER1, Lockers 3,4, 1.0 Hz (10.0 s/sec)

ossraw[90.0 0.0 0.0]

Start GMT 29−September−2013, 272/07:30:00.010

GMT 29−September−2013, 272/hh:mm
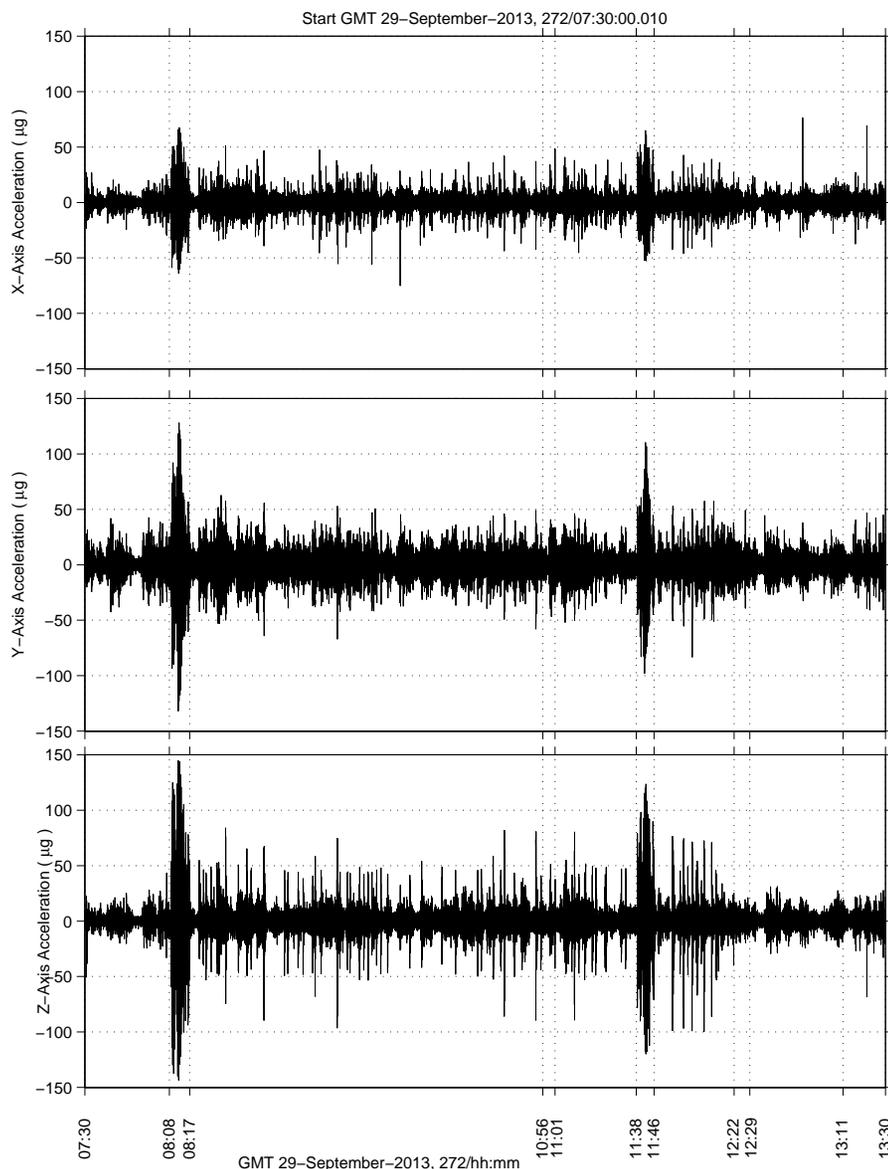
Description	
Sensor	MAMS ossbtmf 0.0625 sa/sec, 0.01 Hz
Location	LAB1O2, ER1, Lockers 3,4
Plot Type	Acceleration vs. Time

Notes:
- See the last page for background details.
- This plot of MAMS acceleration vs. time data marks a few significant events relative to Cygnus capture and install.
- The plot here shows that between 08:08 and 08:17, the ISS was maneuvered to the capture attitude.
- The plot on the next page shows a zoom-in for the capture event.
- The plot here shows that between 11:38 and 11:46, the entire ensemble was maneuvered to berthed TEA.
- The plot here shows that between 12:29 and 13:11, thrusters were disabled in order to finally install Cygnus to the nadir port of the Harmony node on the ISS.

Regime:	Vibratory
Category:	Vehicle
Source:	Cygnus Capture Install

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Cygnus Capture Install
Quantify

mams, ossraw at LAB1O2, ER1, Lockers 3,4;[135.28 −10.68 132.12]
10.0000 sa/sec (1.00 Hz)

mams_accel_ossraw, LAB1O2, ER1, Lockers 3,4, 1.0 Hz (10.0 s/sec)

ossraw[90.0 0.0 0.0]

Start GMT 29−September−2013, 272/07:30:00.010

GMT 29−September−2013, 272/hh:mm
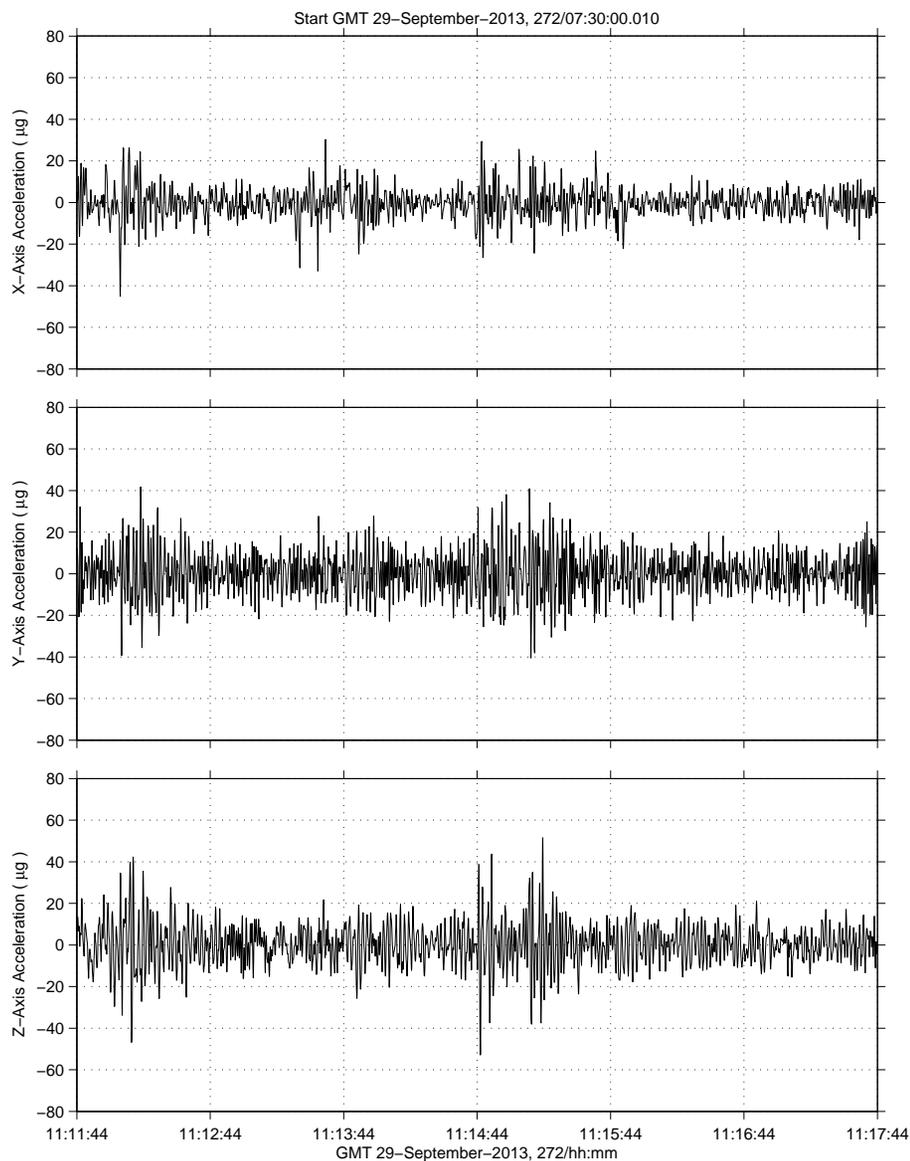
Description	
Sensor	MAMS ossbtmf 0.0625 sa/sec, 0.01 Hz
Location	LAB1O2, ER1, Lockers 3,4
Plot Type	Acceleration vs. Time

Notes:
- See previous page for context.
- This plot of MAMS acceleration data is a zoom-in of the previous page's plot near the time of Cygnus capture at about 11:15.
- Notice particularly the perturbations on the Z-axis.

Regime:	Vibratory
Category:	Vehicle
Source:	Cygnus Capture Install

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Cygnus Capture Install
Quantify

mams, ossraw at LAB1O2, ER1, Lockers 3,4;[135.28 −10.68 132.12]
10.0000 sa/sec (1.00 Hz)
ossraw[90.0 0.0 0.0]

mams_accel_ossraw, LAB1O2, ER1, Lockers 3,4, 1.0 Hz (10.0 s/sec)

Start GMT 29−September−2013, 272/07:30:00.010

GMT 29−September−2013, 272/hh:mm
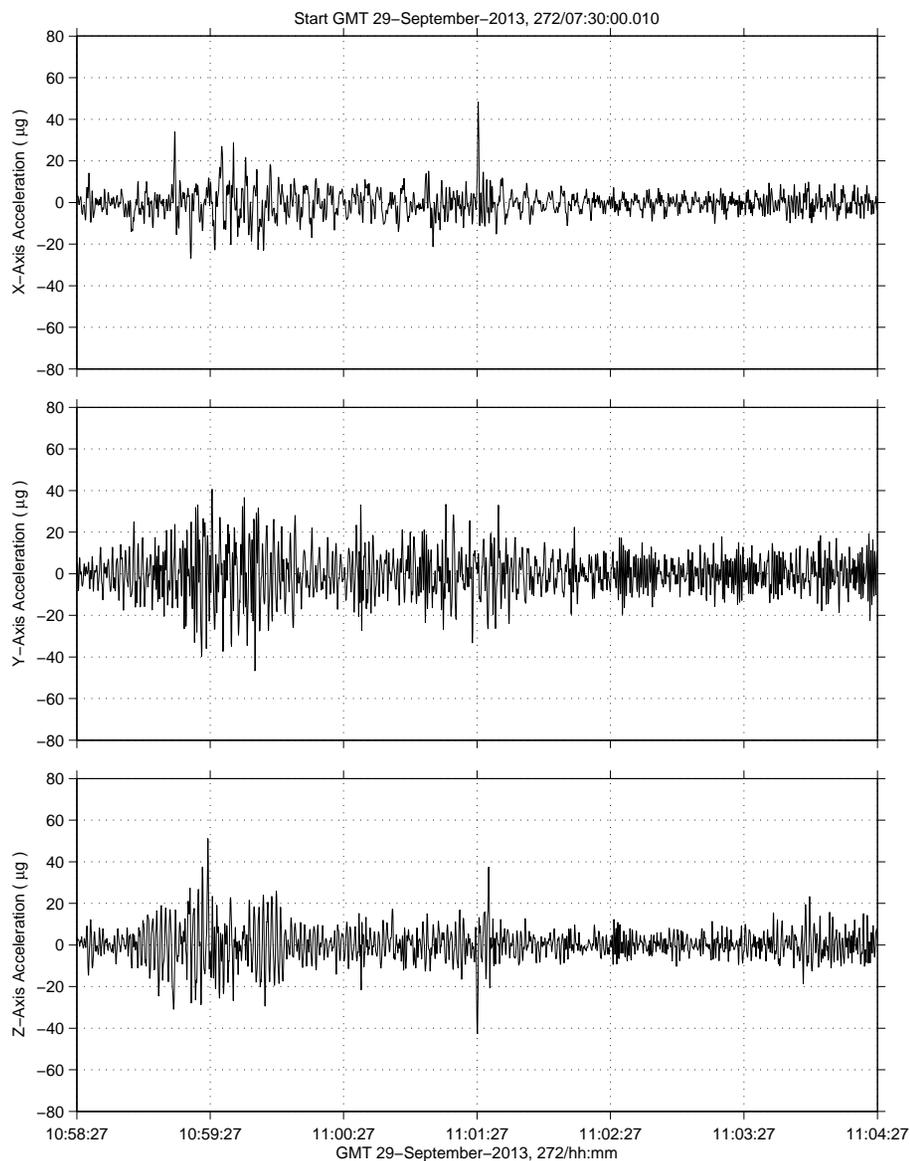
Description	
Sensor	MAMS ossbtmf 0.0625 sa/sec, 0.01 Hz
Location	LAB1O2, ER1, Lockers 3,4
Plot Type	Acceleration vs. Time

Notes:
- The timeline for Cygnus capture and install does not callout anything in particular at around 11:01:27, but this zoom-in of MAMS data shows a jolt on the XZ-plane at that time, which is in the window of time attributed to robotic capture activities.

Regime:	Vibratory
Category:	Vehicle
Source:	Cygnus Capture Install

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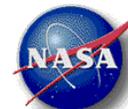
Cygnus Capture Install Quantify

Description	
Data Set	ISS radgse 0.0625 sa/sec, 1.0 Hz
Plot Type	Acceleration vs. Time
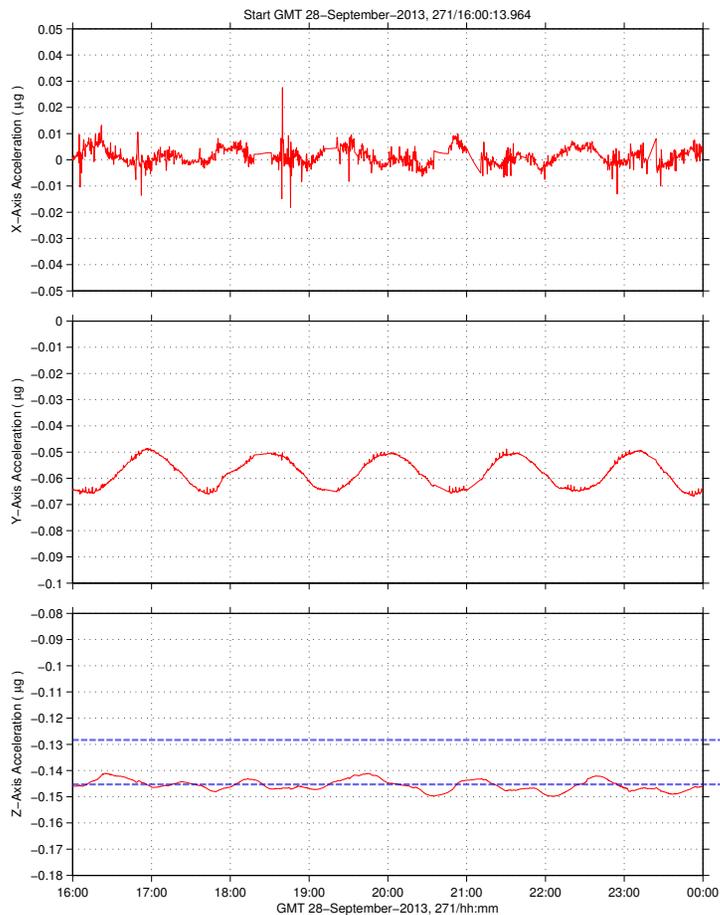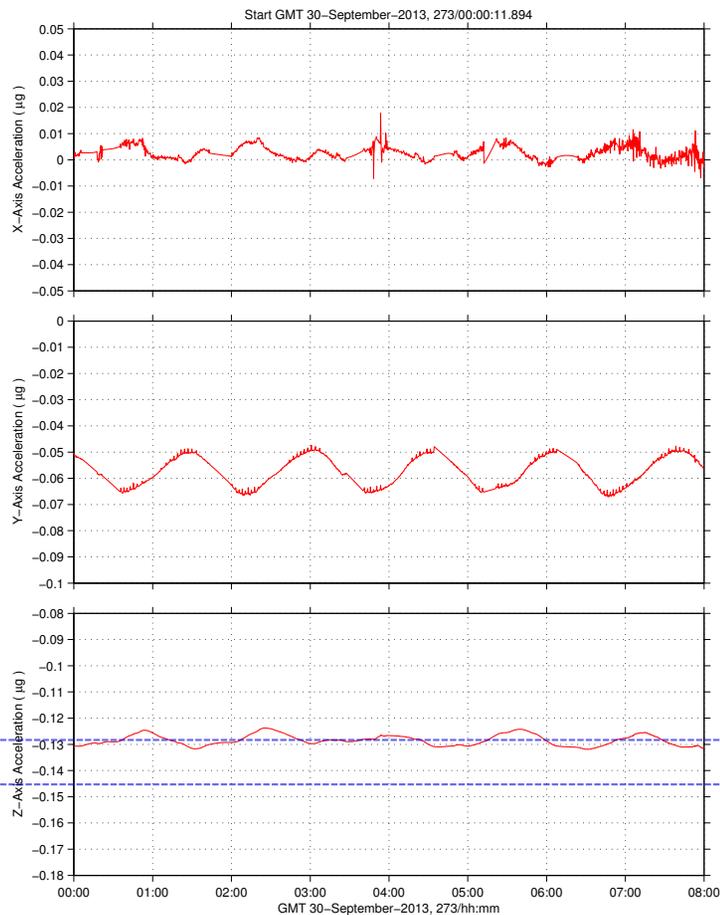
This zoom-in plot of quasi-steady accelerations serves to quantify the major impact on the microgravity environment after installing the visiting cargo vehicle. It shows little change on either the X-, or Y-axis, but shows a change on the Z-axis of about 0.015 ug. This change is ostensibly due to the shift in center-of-mass for the new configuration.

Z-axis delta = 0.015 ug

Regime:	Vibratory
Category:	Vehicle
Source:	Cygnus Capture Install

The commercial cargo craft, Cygnus, arrived at the International Space Station just after GMT 28-Sep-2013, 11:00. Cygnus was launched ten days earlier aboard an Antares rocket from NASA's Wallops Flight Facility in Virginia. Orbital Sciences, Cygnus' manufacturer, uploaded a software fix for a navigation data mismatch that occurred during its first approach on 22-Sep-2013. Cygnus was operating safely behind the space station by about 1,491 miles while mission managers and ground controllers tested the software patch and planned the second approach attempt. Station managers then gave their final approval, and Cygnus began a series of thruster burns towards the orbital laboratory. Expedition 37 Flight Engineers Luca Parmitano and Karen Nyberg watched and worked in tandem with Mission Control as the vehicle approached. Parmitano was in the cupola at the Canadarm2 controls monitoring its approach, while Nyberg was his back-up at the secondary robotics workstation inside the US Destiny laboratory. Cygnus' final demonstration objective was to point a tracking laser at a reflector on the Japanese Kibo laboratory. After this final objective was met, it moved to its capture point about 10 meters from the station, and Cygnus turned off its thrusters and operated in free drift. Parmitano maneuvered the Canadarm2 to grapple and capture Cygnus at about GMT 28-Sep-2013, 11:15. He used the Canadarm2 to move the cargo spacecraft to the nadir port of the Harmony node at GMT 28-Sep-2013, 12:44. Orbital Sciences is the second company to send a commercial cargo ship to the space station. SpaceX was the first company to send its own cargo ship with two successful commercial resupply missions and two successful demonstration missions.