



*11th Annual CubeSat Developers ' Workshop
23-25 April, 2014*

Nano-Satellite Launch Adapter System (NLAS) – Overview

NLAS Objectives, Relevance & Schedule

Nano-Satellite Launch Adapter System (NLAS)

Objectives:

- Increase the access to space by having the capability to deploy 8x 3U, 4x 6U or a combination of nano-satellites (1U, 1.5U, 2U, 3U, 6U)
- Provides a modular platform with a configurable sequence and schedule for deploying multiple secondary nano-satellite payloads from launch vehicles

Relevance/Impact:

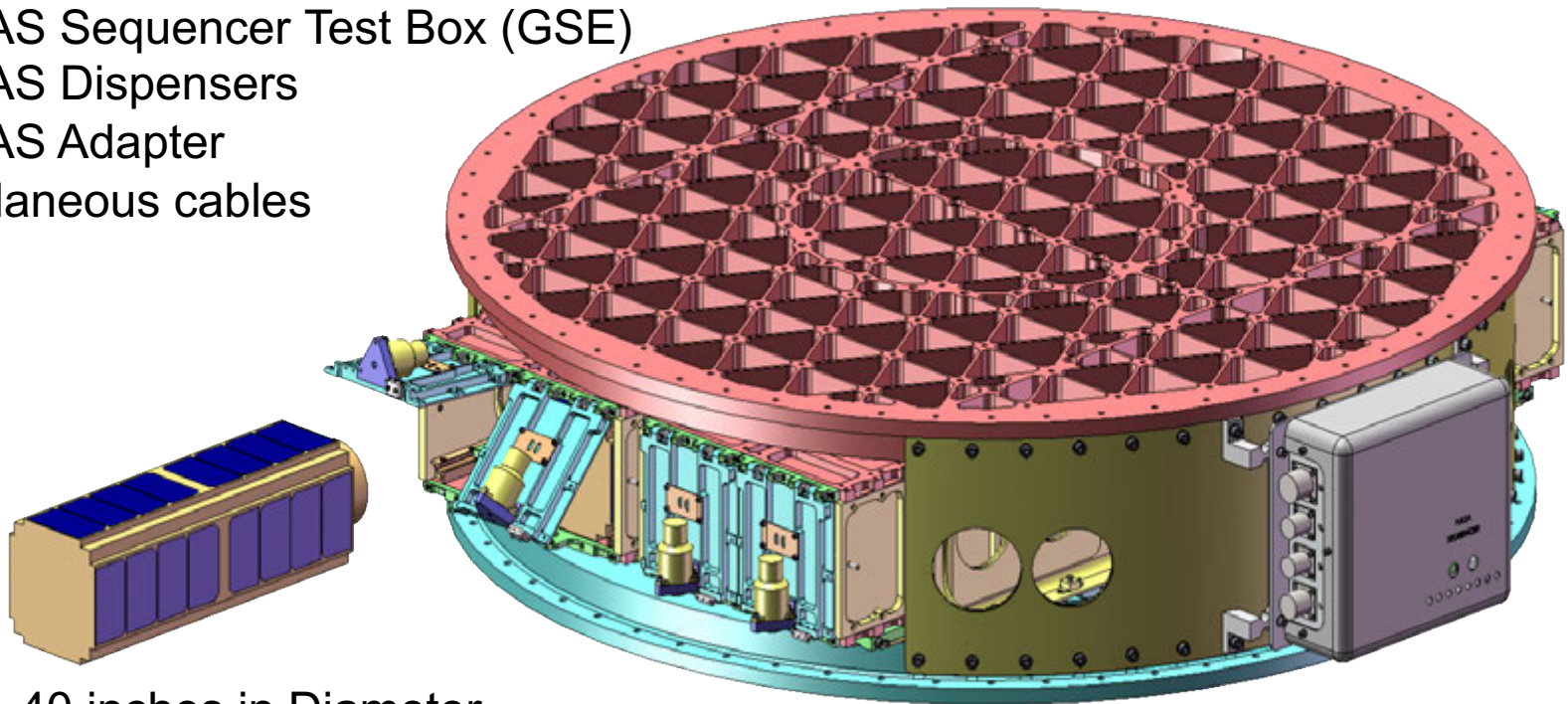
- NLAS provides the manifest and access to space capabilities for a variety of secondary nano-satellites that are able to perform space science, including Astrophysics, Exobiology, Heliophysics, Earth Science and possibly even Planetary Science.
- NLAS also enables the flight demonstration of new technologies in the space environment by providing a greater number of opportunities for access to space and hosting of these technologies on nano-satellite platforms.



NLAS System Overview

Nano-Satellite Launch Adapter System includes:

- 1x NLAS Sequencer
- 1x NLAS Sequencer Test Box (GSE)
- 4x NLAS Dispensers
- 1x NLAS Adapter
- Miscellaneous cables



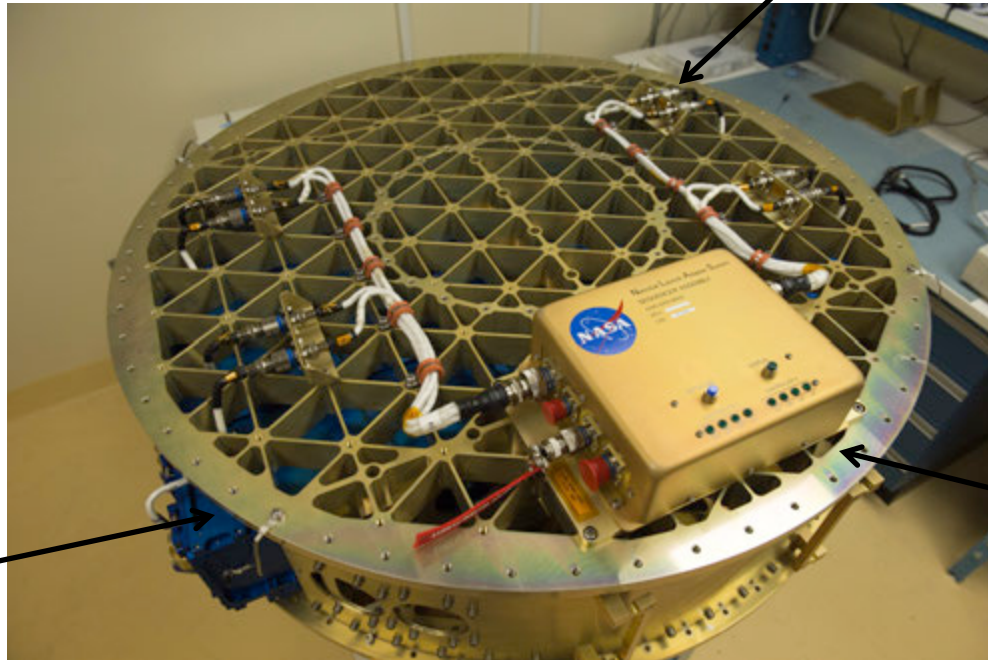
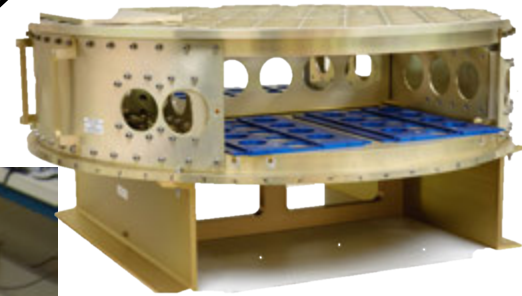
Adapter: ~40 inches in Diameter

System mass: ~ 95kg (excluding payloads)

Payload capacity: 24U

NLAS Elements During I&T

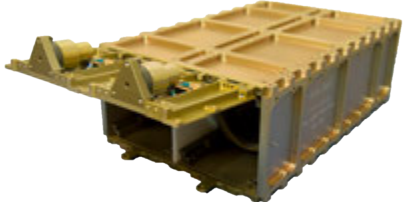
NLAS Adapter



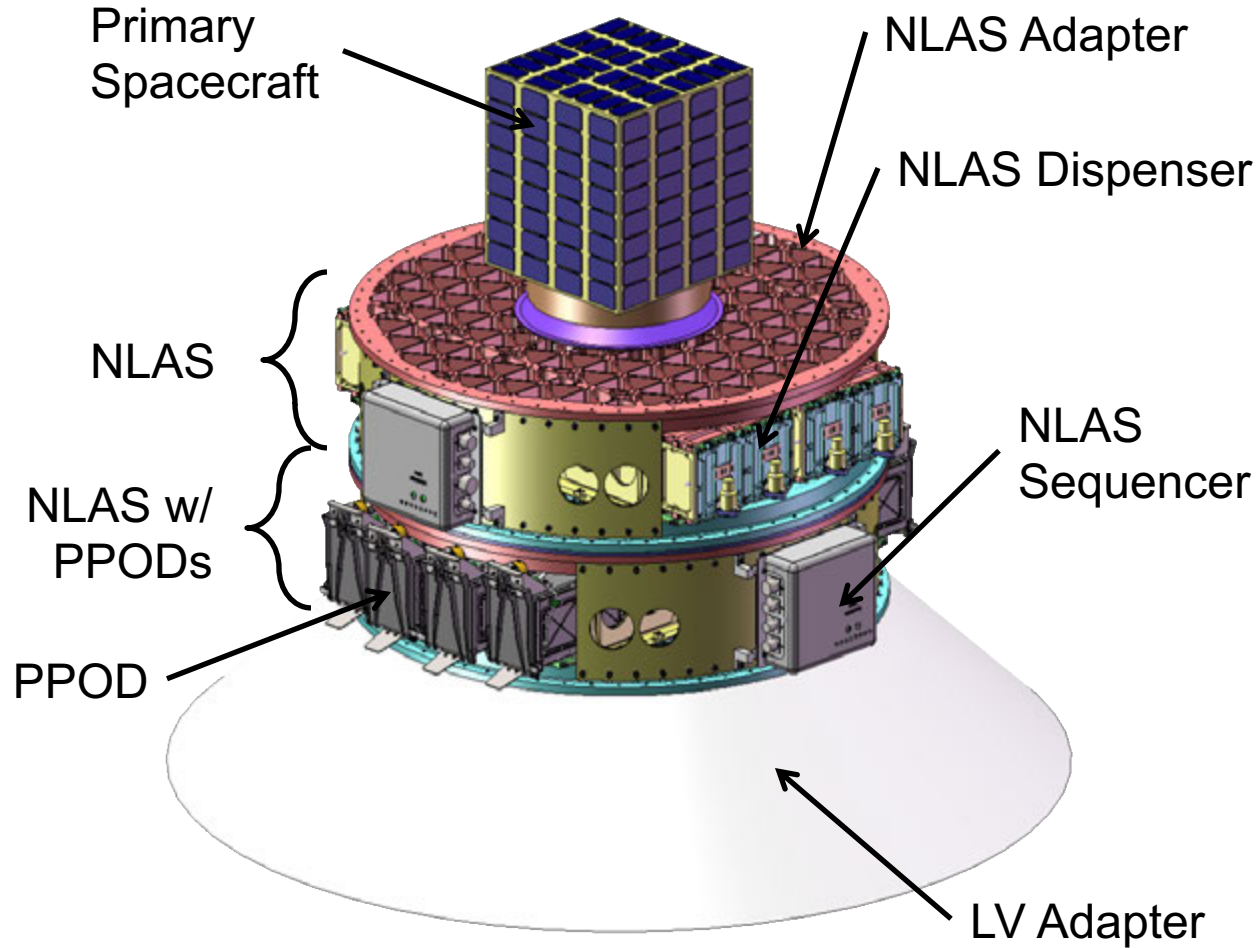
NLAS Sequencer



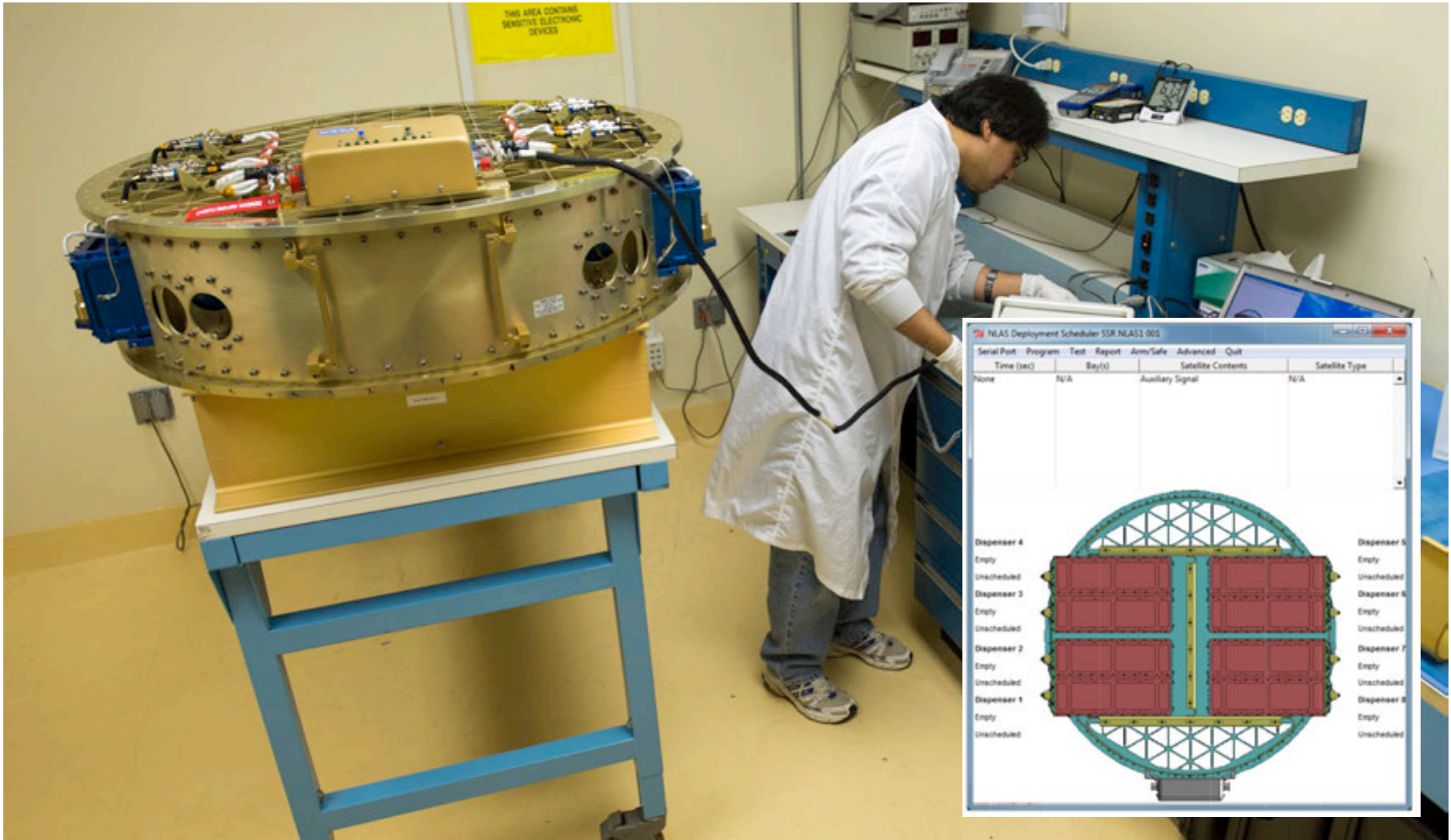
NLAS Dispenser



Example of 2x NLAS In A Launch Vehicle Stack

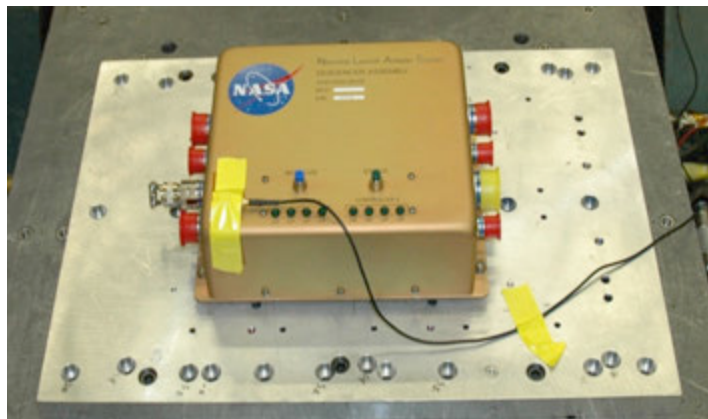


NLAS During I&T (Programming Sequencer)



NLAS Sequencer

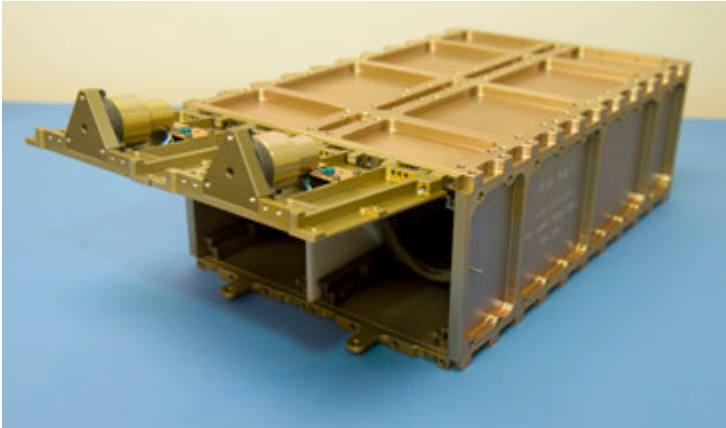
Successfully flown on 19 November 2013



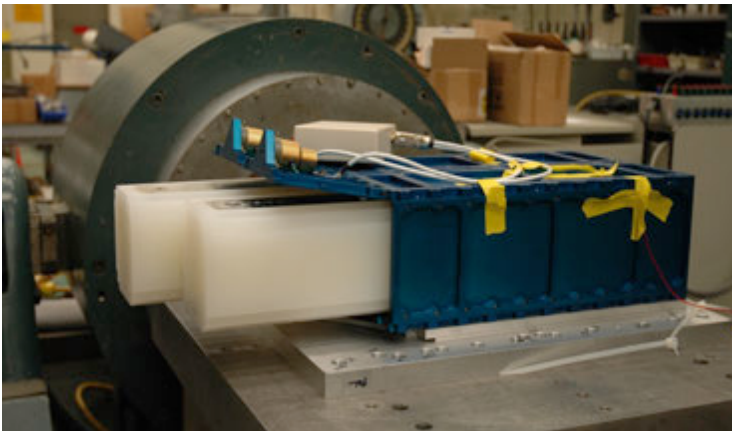
- Size: ~10 x 8 x 3.7 inches
- Mass: ~1.9kg
- Fully programmable time sequence for all outputs from 1 second to 6 hours
- Single input signal from launch vehicle
- 8x Output signals for PPOD or NLAS Dispensers actuators
- 1x Auxiliary output for additional device or “Daisy Chaining” of Sequencers
- Internally powered (~2 month standby power, 6+ hour operational power)
- LED status indicators
- Redundant controller boards
- Redundant output pulses
- Hardware and software noise rejection for LV input signal
- Remove & connect before flight inhibits
- Patent pending, licensing available

NLAS Dispenser

Successfully flown on 19 November 2013

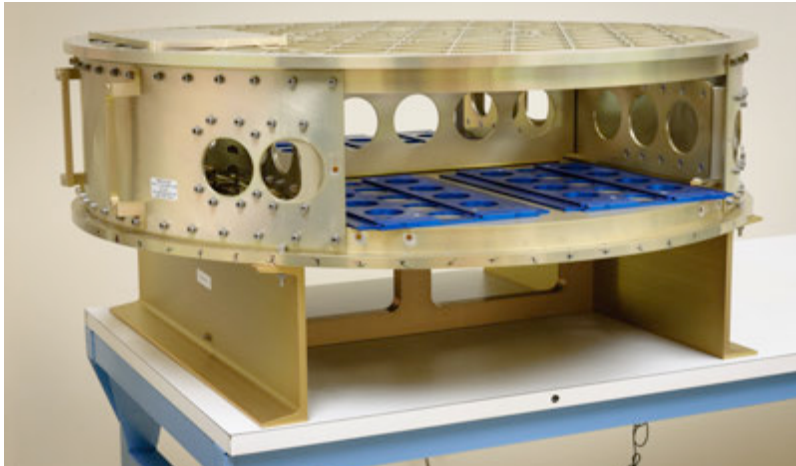


- Size: ~10.5 x 18.3 x 5.6 inches
- Mass: ~6.3kg 3U / 5.4kg 6U
- Spring energized deployer
- Reconfigurable design supports either two 3U bays or a single 6U bay
- Payload mass: 2x 6kg (3U) / 14.0 kg (6U)
- Ejection velocity: ~1.5m/s for 6.0kg 3U payload
- Resettable TiNi actuators with redundant triggers
- Multiple mounting orientations
- Tested operations at -18°C to +50 °C (0°F to +122°F)
- Shocked and Random Vib'd to GEVS
- Design release package available

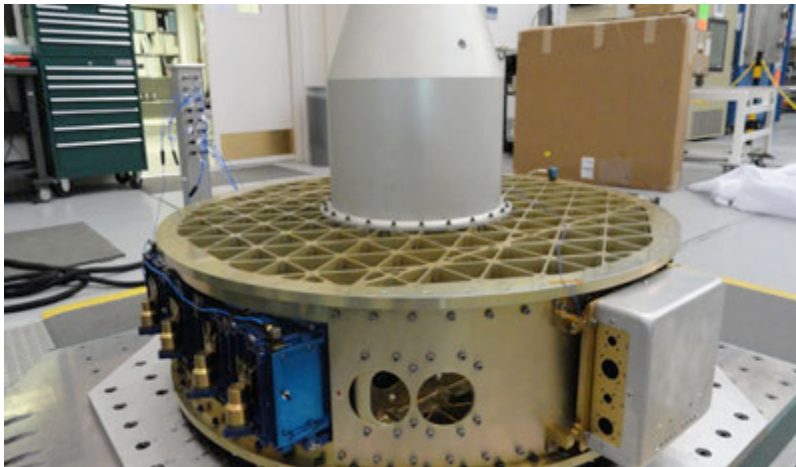


NLAS Adapter

Manifested for launch in CY2014



- Size: ~40 inches diameter x 10 inches
- Mass: ~63.3kg
- Interfaces to LV uppers stage and primary spacecraft
- Standard LV mating interfaces:
 - 38.81 inch diameter bolt circle
 - 15 inch diameter bolt circle
- Accommodates up to 24U of deployers:
 - 4x NLAS Dispensers,
 - 8x CalPoly PPODs,
 - Or a combination
- Mounting locations for NLAS Sequencers and miscellaneous cables
- Auxiliary mounting locations on Isogrid
- Stackable for multiple systems in a single launch



NLAS Status & Inventory

- **Successfully delivered April 2013:**
 - 1 NLAS Adapter
 - 3 NLAS Sequencers
 - 8 NLAS Dispensers
 - 1 NLAS Dispenser Test Article
- **Successfully flown 19th November 2013:**
 - 2 NLAS Sequencers
 - 4 NLAS Dispensers
- **Manifested for 2014**
 - 1 NLAS Adapter
 - 1 NLAS Sequencers
 - 3 NLAS Dispensers
- **Future flights**
 - 1x 6U NLAS Dispenser for EcAMSat
 - 1x 3U NLAS Dispenser (flight spare)
- **Support for future missions**
 - 1x NLAS EDU Sequencer
 - 1x NLAS EDU Dispenser
- **NLAS Sequencer Patent Pending**
- **NLAS Dispenser Release Package Available**



NLAS Elements Successfully flown on 19 November 2013. Sequencers commanded the deployment of 28 CubeSats

