DEFENCE AND SPACE

STOS

Star Tracker Optical Stimulator

Ground Support & User Equipment

As a leading provider of space equipment, Airbus has developed and advanced product called STOS (Star Tracker Optical Stimulator). This cutting edge technology enable precise stimulation of optical sensors by simulating stars, dynamic attitudes, protons impacts, dazzling effect… With over 20 years of continuous improvement, STOS is a mature product that has already established its presence across all continents. Elevate your space mission with Airbus' STOS and experience unparalleled performance and reliability in optical sensor stimulation.

AIRBUS

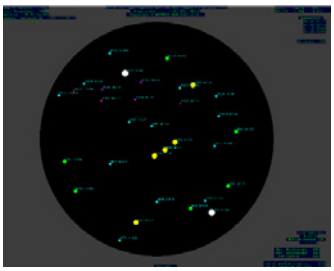
KEY FEATURES

Application fields
- Development and characterisation of a new sensor (star sensors or even navigation cameras)

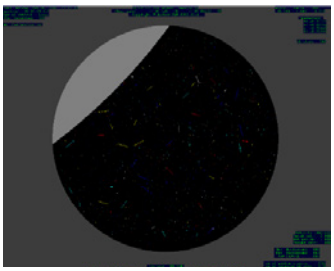
Attitude Control System validation
- STR modes and functions checking
- Open and closed loop tests
- Synchronous stimulation of 4 optical heads with various alignment

Spacecraft integration
- Functional tests with complete hardware in the loop (open and closed loops)
- Equipment or S/C thermal vacuum (TVAC) tests
- Equipment or S/C EMC tests,
- Final Sign test

A powerful planetarium to stimulate star sensors

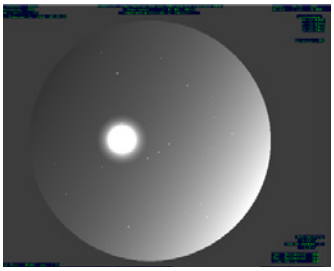


Orion's belt constellation (demo view)



with part of the earth in the FOV and impacts of proton particles

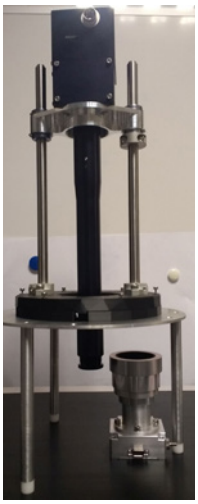
Perfect image



with the moon and sun's stray light

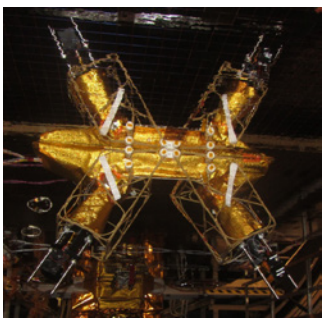
Principle

Starting from attitude commands, a calculator builds the sky images which are displayed by an optical system (OMA) mounted in front of each optical head. The OMA-D version works like a dynamic planetarium while the OMA-S version displays static scene.



A hardware compatible with most sensors in the market

STOS can sustain thermal cycling in vacuum conditions during several weeks.

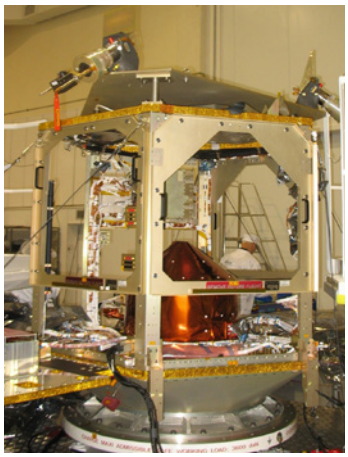


OVERALL CHARACTERISTICS

Display	LCOS microdisplay technology with standard DVI /HDMI video input interface. 225Hz image refresh rate with 1280 x 1024 pixel resolution
PC / Software	STOSPilot application is running under Windows XP or W7 on a standard PC. Distance between PC and STR can be as long as 20m (65 ft) or even more if required.
Local and remote control	Dynamics can be defined either locally (through dialog boxes or command files for complex dynamics) or remotely (for close loop testing, attitude commands can be sent with a refresh rate up to 128 Hz through a standard Ethernet link)
Stars	Any sensor catalogue containing star position and instrumental magnitude can be used. Useful range is as at least 4.5 magnitudes large. In this range, maximum typical error is usually lower than 0.2 mag. Offset is adjusted by software (brightest star is usually set around magnitude1.5 so that the faintest star is about magnitude 6.0).
Field of view	FOV is optimized for 25 deg in diameter which is compatible with most STR in the market.
Alignment	Residual bias is lower than 0.001 deg after fine alignment is performed.
Star position	Error in star positioning is less than 0.005 deg for more than 90% of stars.
Dynamics	Motions up to 18 deg /s can be simulated. No constraint on acceleration.
Synchro /Delay	In remote control mode, the typical delay between command reception and the corresponding image update is around 60 ms. Thanks to internal attitude buffering and temporal interpolation, when commands are periodic there is no time jitter.
Planets & large bodies	Planets, satellites, debris or even ISS station or part of the Earth can be simulated like additional stars (up to 32) or extended objects masking stars located behind (up to 16).
Moon, Sun, Stray light	Specific moon and sun stray light models are provided. Sun and direction can be remotely controlled to generate adequate background stray light. The earth can also be simulated to mask stars located behind. It is also possible to use external background images.
Protons	Impact of protons in image degradation (direct or streak impacts) is dynamically simulated with up to 8192 events per image.
Temperature	-10°C to 35°C (14°F to 95°F) in ambient pressure conditions (1 bar) -5°C to 20°C (23°F to 68°F) in vacuum conditions
Humidity	5% to 90% (non-condensing)
Cleanness	sensor optics and baffle are protected. Compatible with use in clean-room.
Weight & dimensions	<2 kg (total weight to be mounted on top of baffle) with typical dimensions Æ0.2m, length 0.35m

The Opto-mechanical Assembly (OMA)

The optical system (OMA) produces the collimated images thanks to an "image display unit" (high resolution monitor or microdisplay) and the necessary optics. Various opto-mechanical configurations are proposed, depending on the sensor optical configuration (field of view, entry pupil size and position, baffle size …), and on the type of tests to be run (static or dynamic simulations, open or closed loop tests). Usually, thanks to a simple mechanical adaptation, the same OMA can be used to stimulate different sensors.



STR testing during Observation spacecraft integration

- Light weight allows direct mounting on STR baffle
- Alignment is simple and made by software.
- More than 120 units already built in different configurations.

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