

EARTH OBSERVATION SENSOR CHARACTERIZATION

Transportable illumination source for on-orbit
sensor performance measurements



Space-based electro-optical and infrared (EO/IR) sensors are critical to missions, but on-orbit validation of performance is costly and difficult.

As a scalable, fully integrated calibration system, CROSSBOW™ provides a transportable, ground-based solution that improves data integrity, increases mission confidence, extends operational life, and reduces reliance on costly alternatives.

CROSSBOW precision tracking and robust command and control (C2) provides a controlled, repeatable calibration environment from the ground. CROSSBOW supports:

- On-orbit sensor calibration & validation through mission life
- Space domain awareness operations
- System installation & field alignment

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CAPABILITY OVERVIEW

Owned by the Space Dynamics Laboratory (SDL), CROSSBOW integrates industry-standard tools to employ multiple laser types for characterization. This enables accurate object tracking in geosynchronous orbit (GEO) and beyond.

Co-boresighted, multispectral collimated beams illuminate on-orbit sensors to support:

- Radiometric & geometric calibration
- Optical interference characterization
- Performance validation under emulated signal conditions

FEATURES & BENEFITS

Multi-spectral laser coverage

- VIS, SWIR & MWIR sources
- Electronically tunable SWIR-MWIR capability
- Diverse mission profile & sensor support

High-fidelity signal emulation

- Variable temporal & intensity profiles
- Realistic operational conditions simulation
- Sensor responsiveness/accuracy validation

Precision pointing & alignment

- Co-boresighted alignment lasers
- Far-field beam alignment with pointing, acquisition & tracking (PAT) camera
- Calibration accuracy for reduced systematic error

Transportable & field-deployable design

- Modular, ground-based architecture
- Flexible deployment across test/operational environments

Advanced calibration & testing

- EO/IR sensor calibration
- Optical interference (OI) characterization
- Detection/reporting algorithm development

SPECIFICATIONS

- Two electro-optical PAT systems, each including:
 - Four refractive transmission collimators
 - Laser sources rack (modular laser suite)
 - Command & control (C2) rack with integrated power, control & data acquisition



Deployed CROSSBOW system.
Image courtesy of NGA/R&D.

OPERATIONAL INFRASTRUCTURE

CROSSBOW has a dedicated observatory dome platform at US Air Force Academy (Colorado Springs, CO) via a Cooperative Research and Development Agreement (CRADA).

SDL's proven expertise in the following capabilities enables CROSSBOW's success:

- Deep EO/IR calibration expertise spanning design, test & on-orbit operations
- End-to-end mission support, from ground to on-orbit validation & performance analysis
- Operational credibility, enabling sustained calibration campaigns & data collection
- Secure, mission-assured systems that incorporate cyber-resilient architectures

Questions? Contact:

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