

Near Field Infrared Experiment

missile phenomenology data collection satellite

Features

- 494 kg (1089 lbm) at Launch
- 503 W EOL Solar Array, Body Mounted
- 495 km (267 naut mi) Circular Orbit @ 49.0° Incl
- Three-Axis Stabilized, Zero Momentum Biased
- IR and Visible Light Sensor Payload
- Laser Communication Terminal Payload
- Includes Two Mission Operation Centers
- Two-Year Design Life

The Near Field Infrared Experiment (NFIRE) is the key component of our Kinetic Energy Boost Phase research program which began with a study and mission system engineering of approaches for boost phase intercept of ICBMs. Sponsored by the Missile Defense Agency (MDA), NFIRE will gather near field, high resolution phenomenology data that will assist in development of boost phase intercept systems. NFIRE will also assess the viability of a laser communications system for missile defense applications.

NFIRE is composed of a low-Earth orbiting satellite with an onboard Track Sensor Payload (TSP) and TESAT Laser Communication Terminal (LCT), plus two ground-based Mission Operations Centers (MOCs). General Dynamics is the system integrator, and is also responsible for design and manufacture of the spacecraft bus, environmental testing, payload integration, configuration of the MOCs, and a year of on-orbit operations support. General Dynamics also leads the Mission Assurance and Systems Engineering Integrated Product Teams (MAIPT and SEIPT).

The spacecraft design is a derivative of several previous General Dynamics programs, including the Miniature Sensor Technology Integration (MSTI) series, the Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI), Coriolis, and the Swift Gamma Ray Observatory. Upgrades to the heritage driven design include the use of a cPCI architecture for C&DH over previous VME designs, allowing the use of the high performance RAD750 processor.

The TSP is a derivative of a MSTI-3 sensor with the addition of a Long-Wave Infrared (LWIR) sensor and improved tracking capability. The LCT payload provides a very high speed, coherent optical data link with the ground or another satellite.



A Minotaur launch vehicle will carry the NFIRE space vehicle to its 495 km circular observation orbit from the Wallops Flight Facility, Wallops Island, VA.

The MOC and operations design utilizes our AstroRT™ Data Acquisition and Control System with NFIRE mission-unique software. The Engineering MOC will be located at the General Dynamics facility in Gilbert, AZ.

NFIRE has an organizational structure with no prime contractor, so General Dynamics has successfully established participative, “badgeless” relationships with numerous other government agencies and contractors for mission operations, launch operations, communications, and ground support.

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Performance Characteristics*

General	<p>Dimensions, Stowed w/PL: 2.65 m x 1.31 m dia (8.69 x 4.30 ft) Orbit: 495 km (267 naut mi) @ 49.0° inclination Propellant On Board: Blowdown hydrazine, 114 kg capacity Reliability/Life (predicted): 0.85 @ 2 years Launch Vehicle: OSP Minotaur</p>
Mass & Power	<p>Launch Mass: 494 kg (1089 lb) Bus Mass: 248 kg (547 lb) Bus Power: 230 W in cruise mode Solar Array: Triple junction GaAs, body mounted, 503 W EOL Battery: 16 amp-hr NiH₂ CPV</p>
C&DH	<p>Single string, functionally redundant, RAD750 CPU Modular architecture with cPCI backplane 40 Gbit solid state recorder for science data storage</p>
ADCS	<p>3-axis stabilized, Zero Momentum Biased (ZMB) On-board attitude determination with star trackers, IRUs, and GPS Pointing Accuracy (3σ): 360 arcsec Pointing Knowledge (3σ): 14.8 arcsec Ephemeris Accuracy (3σ): 19 meters</p>
Structure & Thermal	<p>Aluminum primary bus structure Externally mounted components for easy access Riveted aluminum frame with honeycomb panels Passive cold-biased thermal system, thermostatically-controlled heaters</p>
Comm Links	<p>SGLS Narrowband DL: 40.96 kbps SOH SGLS Narrowband UL: 2 kbps commands, AFSCN X-Band Wideband PL Data DL: 51.2 Mbps, USN SGLS Wideband PL Data DL: 1.024 Mbps, AFSCN, TCP/IP Auxiliary SGLS Wideband UL Receiver: 1.024 Mbps, TCP/IP</p>
Instrument Info	<p>Track Sensor Visible spectrum, Si CCD Long Wave Infrared, HgCdTe (MCT) hybrid Medium and Short Wave Infrared, InSb Laser Communications Terminal 5" aperture full hemisphere pointing Mass: 30 kg Power Consumption: 130 W Optical data rate: to > 5 Gbps Modulation: BPSK Detection: Coherent, homodyne</p>

*Data reflects actual performance or current best estimates
as of the release or revision date shown below

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1440 N. Fiesta Boulevard • Gilbert, AZ 85233 • 480-892-8200 • FAX 480-892-2949 • www.gdc4s.com/space
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