



Eagle-1M™

*Innovative Plug-and-Play
Rapid Response
Spacecraft*



THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN

Eagle-1M™ Spacecraft

The Eagle-1M spacecraft is a multi-mission spacecraft bus built by Northrop Grumman that employs a Modular Open System Architecture, using Plug-and-Play technology to allow rapid manufacturing, integration and testing. This open architecture allows various payload modules to plug into a central spacecraft processor by means of a standardized technology, much like the way peripherals can be plugged into computers via USB ports. The reduction in complexity results in a spacecraft that is much more cost effective, modular and reconfigurable than typical space vehicles in this class. It also allows space programs to focus more resources on the payload, the heart of the mission.

The Eagle-1M bus is derived from the Modular Space Vehicle (MSV) program, which is the first spacecraft to implement Space Plug-and-Play Avionics (SPA) standards developed by an industry consortium in conjunction with the Air Force Research Laboratory and the Department of Defense Operationally Responsive Space office.

The Eagle-1M bus can accommodate late definition of multiple payload types for a wide variety of missions including:

- Communications
- Tactical persistent intelligence, surveillance and reconnaissance
- Position, navigation and timing
- Space situational awareness
- Weather and science

The accelerated 20-month schedule includes developing, building and delivering the bus for payload integration and space vehicle integration and test. The bus is designed to be assembled and integrated with the payload in a matter of days rather than months. The Eagle-1M bus affordably provides responsive space capabilities that fit the more immediate needs of today's environment.

Eagle-1M Specifications

Payload Mass	>175 kg
Payload Power	500 W average, or 1200 W peak (short duty cycle)
Payload Data Interface Type	SPA SpaceWire, additional formats can be implemented
Pointing Knowledge	90 arcsec (3σ)*
Pointing Control	0.05° (3σ)
Agility: Rate	2°/sec
Agility: Acceleration	>0.03°/sec ²
Orbit Position Knowledge via GPS	+/- 90m (3σ)
Design Life	3 years
Propulsion Type, Capability (delta V)	200 m/sec modular add-on option
Bus delivery	20 months
Other Options	Wideband comm, 12 arcsec pointing knowledge
* Higher performance available using payload data	

Optimal Eagle Spacecraft and Launch Vehicle Matching

The diagram illustrates the optimal matching between Eagle spacecraft models and launch vehicles. Eagle-1M, Eagle-2, and Eagle-3 are shown in the top row, while Eagle-S is in the top right. Below them, the launch vehicles are arranged in two rows. Eagle-1M, Eagle-2, and Eagle-3 are primarily compatible with the Minotaur I, Taurus 3210, Minotaur IV, and Delta II launch vehicles. Eagle-S is compatible with the Falcon 9, Falcon Heavy, and EELV launch vehicles. The Antares launch vehicle is also shown but does not have a corresponding Eagle spacecraft model shown next to it.

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