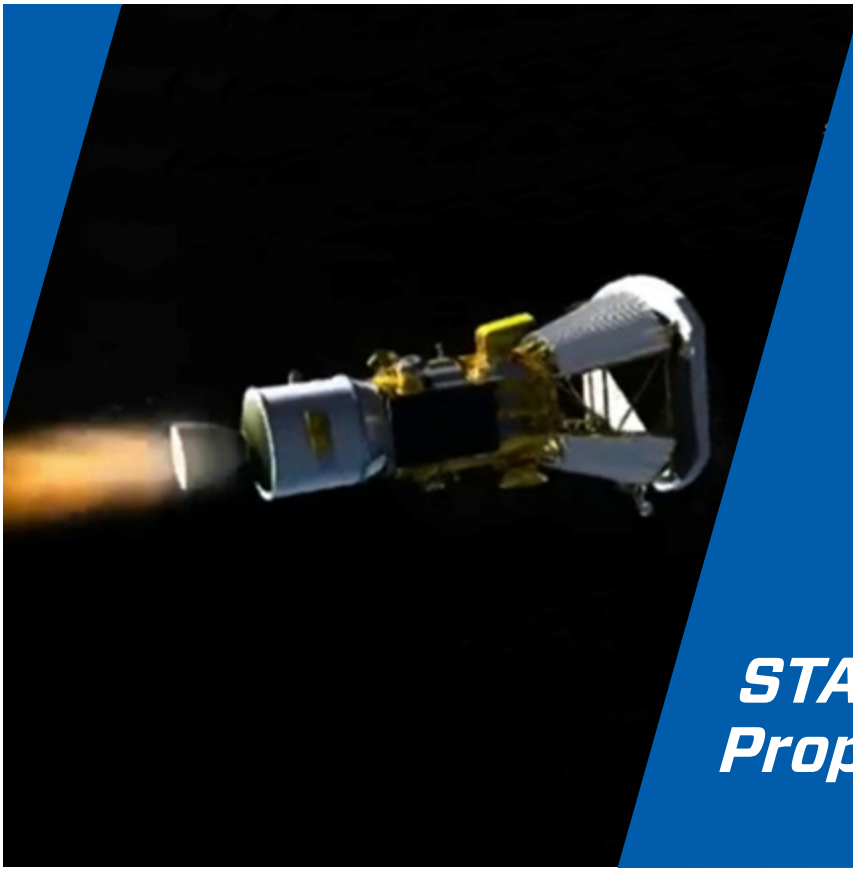


THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN



STAR™ Space Propulsion and Stages

Northrop Grumman's family of space motors has supported the Department of Defense (DoD), NASA and commercial spacecraft manufacturers for decades, providing Earth escape, orbit transfer, orbit insertion and retro propulsion. Options include basic propulsion subsystems and fully integrated autonomous stages.

Product Features and Benefits

- Very high mass fraction
- Very high reliability
- Design flexibility
- Space storable propellants
- Spin- and three-axis stabilized stage options

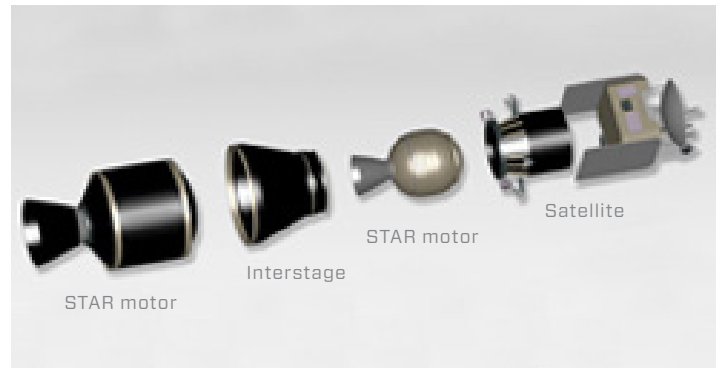
Applications

The STAR™ family of motors and stages has served as upper stages for Northrop Grumman Pegasus and Minotaur launch vehicles as well as variants of the Titan, Atlas and Delta. NASA exploration spacecraft missions to the Moon, Venus, Mars and Pluto have highlighted the motors reliability and suitability for long duration space missions. Satellite orbit insertion applications include the GPS Block I/IA and Block II/IIA/IIR/IIM spacecraft, as well as numerous other DoD, civil and commercial communications, weather and remote sensing spacecraft.

Qualification and Production Data

A large number of STAR motor variants ranging from a few pounds to over 10,000 pounds have been developed over the years and flown in support of over 2,500 missions. Designs can be modified for program-specific requirements.

STAR™ Motor/Stages Features	STAR 5C	STAR 15G	STAR 24	STAR 27H	STAR 37GV	STAR 48BV
Total impulse, lb _f -sec	1,252	50,210	126,000	219,195	637,760	1,303,700
Effective specific impulse, lb _f -sec/lb _m	268.1	281.8	282.9	291.4	290	292
Maximum thrust, lb _f	455	2,800	4,420	5,250	15,250	17,490
Burn/action time, sec	2.8/2.94	33.3/36.4	29.6/31.1	46.3/47.3	49.0/50.2	84.1/85.2
Weight loaded, lb _m (includes propellant)	9.86	206.6	481	810.9	2,390	4,780
Propellant mass fraction	0.46	0.85	0.92	0.92	0.92	0.93
Diameter, in.	4.77	15.04	24.5	27.3	35.2	49
Length, in.	13.43	31.57	40.5	48.7	66.2	81.7



Example of a STAR motor satellite configuration

For more information contact:

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