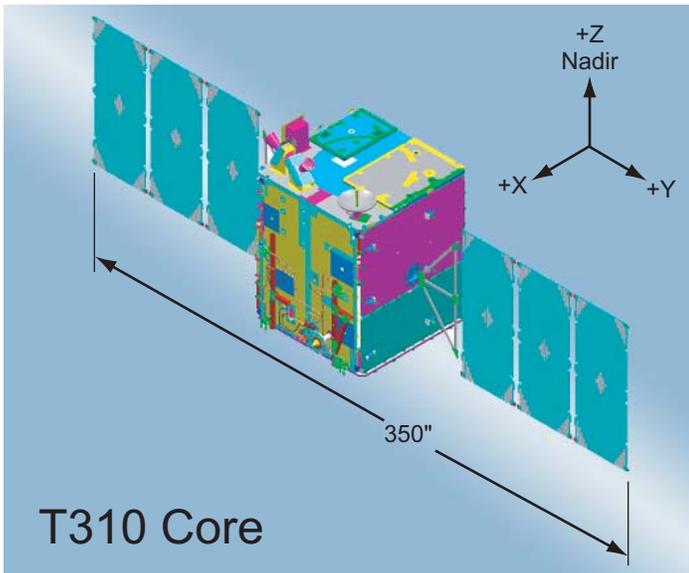


# Rapid Spacecraft Development Office

## T310 Spacecraft



T310 Spacecraft with  
GeoLITE Payload



Preparing GeoLITE for  
Transport to Launch Site

*The T310 is an advanced, high-performance, three-axis stabilized satellite that is modular and expandable to support a wide range of mission-specific instruments. The T310 core spacecraft is a build-to-print reproduction of the TRW-built GeoLITE spacecraft, which was launched in May 2001. The T310 was specifically designed to satisfy missions requiring an extremely stable, low-jitter platform with precision pointing capability. The T310 is capable of flying in any geosynchronous orbit and is easily adaptable to low-earth orbit applications.*

### Key System Features

- Reproduction of GeoLITE spacecraft
- All components available and flight qualified
- Modular design
  - Allows easy adaptation and growth
  - Allows for parallel AI&T tasks
- Compatible with Delta-II LVs (or larger)
- Propellant capacity: 893kg at 4:1 blowdown ratio
- Earth-oriented, three-axis stabilized, zero momentum bias attitude control subsystem
- Lightweight, high-stiffness composite structure
- Peak-power tracker, battery clamped power system with high-efficiency silicon (17%) solar arrays
- Dual-mode, pressure-regulated propulsion system with eight 1-lbf and four 10-lbf thrusters
- R3000 on-board computer (capable of 10 MIPS)
- 9-year design life
- SGLS compatible S-band transponder
- Core bus dimensions: 70" x 70" x 84" (x,y,z)

### Payload Accommodations

- Performance calculated for geosynchronous orbit, inclination less than  $\pm 5.7$  deg, eccentricity  $\leq 0.01$
- Payload mass up to 267 kg for Delta-II launch (max structure capability of 550 kg of payload)
- Payload power up to 560w orbit average at EOL
- Attitude control
  - Control: 47 asec Roll/Pitch, 87 asec Yaw, (3 Sigma)
  - Knowledge: 43 asec Roll/Pitch, 86 asec Yaw, (3 Sigma)
  - Jitter:  $< 0.001^\circ$  above 3 Hz per axis
  - Stability:  $< 0.001$  deg/sec, roll; 0.002 deg/sec pitch/yaw
- Offers MIL-STD-1553B and RS-422 payload interfaces
- Power interface: Fused, relayed, unregulated 22 to 38.6 Vdc
- Data storage: 1.4 Gbits EOL each prime and redundant
- Total throughput capacity is 10 MIPS
- OBC SRAM is 2 MB and EEPOM is 1 MB
- Downlink rate: 1024 Kbps at GEO
- Provides UTC time to payload with 256-millisecond accuracy

# T310 Key Subsystem Characteristics

## Thermal Control

- Flight-proven techniques
- Dedicated radiators for battery, avionics, and payloads

## Propulsion

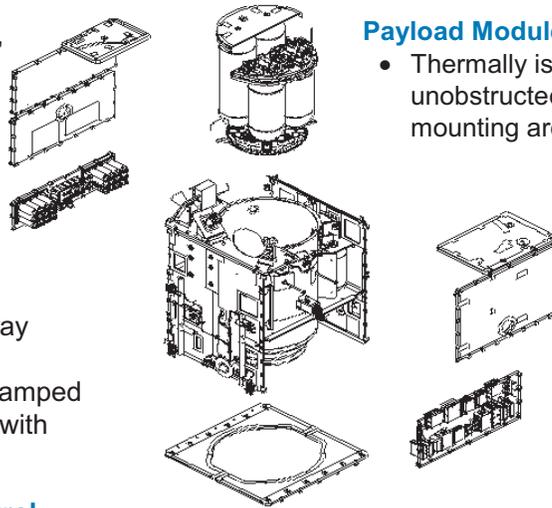
- Dual-mode biprops
- Thruster locations minimize contamination effects
- 893 kg propellant capacity

## Electrical Power

- High-efficiency silicon solar array
- 65 Amp-hour NiH<sub>2</sub> battery
- Peak-power tracked, battery clamped Planar flat-folding solar arrays with taperule hinges

## Attitude Determination and Control

- Stellar-inertial attitude reference
- Three-axis stabilized, zero-momentum bias



## Payload Module/Nadir Platform

- Thermally isolated payload interface provides unobstructed FOVs and internal payload mounting areas

## Structure and Mechanisms

- Lightweight, modular, high-stiffness composite structure

## C&DH

- Flight-proven S-band RF comm
- 1.4 Gbit EOL SSR
- Redundant, 10-MIP R3000 OBC
- MIL-STD-1553 data bus

## Spacecraft

Modular design allows for parallel integration of the payload, avionics, and propulsion modules. Module configuration allows easy access to all components for integration and test.

Activities	Year 1												Year 2															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
Major Milestones	♦ ATP		♦ MDR												♦ IRR				♦ PER									

## T310 Mass and Power

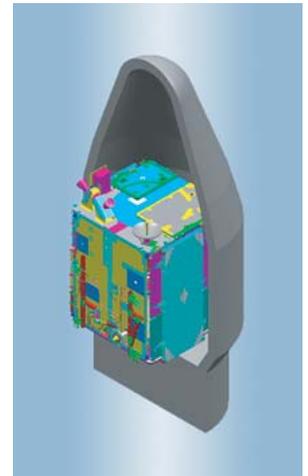
Subsystem	Mass, kg	Avg. Load W
Structure	236	—
Thermal	53	69
Propulsion	116	123
Electrical Power/Losses/Battery Charging	135	306
Harness	66	—
ACS	36	69
C&DH/TT&C	31	55
Balance Weight	43	—
<b>Total SC</b>	<b>716</b>	<b>622</b>
Propellant	893*	—
<b>Payload</b>	<b>267**</b>	<b>560</b>
<b>Total Launch - Delta II</b>	<b>1876</b>	<b>1182</b>

\* Propellant raises orbit to GEO in 7 days  
 \*\* Structural limit = 550kg

## T310 Performance

Performance Characteristic	Units	Capability
Spacecraft Bus Mass	kg	716
Spacecraft Bus Power (includes losses and charging)	W	622
Payload Mass	kg	267
Payload Power (EOL)	W	560
Battery Size	amp-hr	65
Propellant Mass Capability	kg	893
Downlink Rate	Kbps	1024 @ GEO
Data Storage (EOL)	Gbits	1.4
Pointing Knowledge - R/P/Y	arcsec, 3 sigma	43 Roll/Pitch 86 Yaw
Pointing Accuracy - R/P/Y	arcsec, 3 sigma	47 Roll/Pitch 87 Yaw

## T310 in Delta - II



Successful T310/GeoLITE Launch

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