

# SNAP-1 Propulsion System



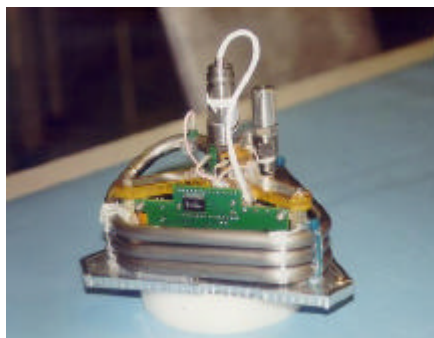
**SSTL's SNAP-1 Propulsion System is designed for a variety of low-cost nanosatellite applications.**

Using a combination of proven space technology and an innovative low cost engineering approach SSTL have produced a liquefied gas propulsion system for nanosatellite class of spacecraft (<10 kg launch mass). The first application of this platform is the 6.5 kg SNAP-1 spacecraft.

Butane propellant is stored in a liquid state. It forms a self pressurising system, which means no regulation system is required. The liquid is vapourised, then fed to the central thruster. Butane is very well suited for this application as its low toxicity allows handling with significantly less safety infrastructure than traditional propellants.

## Features:

- Rapid concept to launch readiness in 6 months - launch date 28th June 2000
- Low cost parts and construction design
- Low power, volume, mass for easy integration on any platform
- Testing and PA plans available. Adaptable Environmental Testing, Acceptance Testing and PA plans



- Propulsion controllers and drive electronics fully integrated
- CAN bus control
- Spacecraft interface is 3 x M3 screws and a 9-pin electrical D-type connector
- All drive electronics are COTS (Commercial Off The Shelf)
- Low system pressure, maximum 4 bar
- Proof factor of 4 and minimum burst factor of 16

- Formed titanium tubing acts as propellant reservoir
- All joints are welded or contain double seals
- Isolation valve protects against thruster leakage
- Propellant was loaded in-house, at SSTL, hence no propulsion activities required during the launch campaign. The loaded propulsion module was shipped to launch site already integrated into the spacecraft
- The propellant storage volume can be increased by simply adding extra coils of tubing
- A performance increase can be obtained using ammonia as propellant



## Other SSTL Products

- **Resistojets** based on Water, Ammonia, Carbon Dioxide, Butane fuels.
- **Complete propulsion systems** based on cold gas, resistojet and hybrid rocket engine technology
- **ADCS equipment** including: star trackers; 3-axis quartz rate gyros; magnetometers; magnetorquers; reaction/momentum wheels.
- **Complete low cost small satellite solutions**, based on SSTL range of nano, micro, enhanced micro and mini satellites, including know-how transfer and rapid and affordable access to space
- **Sub-systems** (CD&H, Power, Communications, ODCS) and various **payloads**

## Specifications

- Propellant: 32.6 g of Butane
- Thrust: 45 mN @ 0 °C, 120 mN @ 40°C
- Impulse: 22.3 N sec max
- Storage pressure: Max. 4 bar abs @ 40°C
- Specific impulse: >60 sec
- System volume: 65 cm<sup>3</sup>, can be increased
- Upgrades: Can be loaded with 33 g of ammonia to give 34 Nsec of impulse
- Life duration: > 5 years

## Environmental

- Temperature (non-op): better than -20° to +50°C

## Power Supply

- Operating voltage: 7 to 12 Vdc
- Current: 500 mA nominal

## Physical Characteristics

- Interfaces: 3 x M3 screws & 1 x 9-pin D-type connector
- Dimensions: 170 mm sided triangular base x 100 mm height
- Dry mass: 422 g (including structure & drive electronics)

## Contact



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