

# SSTL Small Satellites: Modular Microsatellite



The SSTL microsatellite platform employs a flexible modular design capable of supporting a wide range of missions in low Earth orbit. The microsatellite combines a comprehensive range of flight-proven technologies and demonstrated tailor-made services at a low cost. These platforms have been applied to Earth Observation, Communications and Technology Demonstration missions for civil and military use. SSTL has designed, built, launched and operated 14 microsatellites. The microsatellites are operated in orbit from SSTL's own mission control and operations ground station at the University.

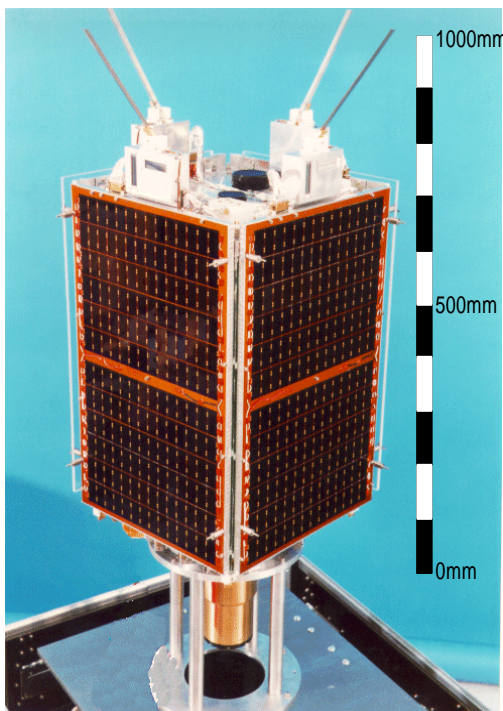
## The SSTL Microsatellite

The SSTL microsatellite has been designed and built to an innovative and highly modular design to meet the need for satellites that can be readily adapted to accommodate different payloads and mission objectives - rapidly and at low cost.

Despite their relatively small size and mass, the SSTL microsatellites are extremely capable. State-of-the-art, powerful on-board computers and sophisticated data handling systems enable complex housekeeping and payload operations to be carried out in orbit safely and with a high degree of autonomy. Coupled with extensive solid-state mass data storage, the on-board computers are able to provide an advanced processing capability for payload data not yet available on larger, more conventional satellites. Reliability in orbit is achieved by the use of a highly integrated, layered system architecture - with operational redundancy provided, wherever possible, via alternative technologies rather than by straight duplication. This is further enhanced by the ability to reload and re-programme the spacecraft software whilst in orbit thus enabling the satellite to benefit from software upgrades throughout its operational life.

## Features

- **Modular Design** allows the use of previously qualified systems whilst maintaining flexibility
- **Rapid Development** - ready-to-launch 15 months from contract signing
- **Low Cost** - SSTL commercial approach and experience in small satellites
- **Payload Flexibility** - Modular trays, Earth Observation and External areas available
- **Launcher Compatibility** allows the bus to be launched on a wide variety of launchers
- **Heritage** - 12 microsatellites based on the bus have been launched. SSTL has launched 15 small satellites in total
- **Ground Segment** - SSTL can offer fully compatible ground station and mission control centre as well as training



*SSTL Modular Microsatellite*

## Applications

- Earth Observation - Meteorology, Environmental
- Store & Fwd Communications
- Science & Technology
- Civil and Defence

## Spacecraft

- 50 - 70 kg total
- 15 - 35 kg payload mass
- 400 - 1400 km orbit altitude
- Compatible with Ariane, Cyclone, Delta, Athena, Taurus, Zenit etc.
- Design Life of 3 years or more. Proven to over 10 years operation

## Qualification

- Flown on the following Missions: UoSAT-3, -4, -5, KITSAT-1, S80/T, HealthSat, POSat, FASAT-Alfa, CERISE, FASAT-Bravo, TMSAT, CLEMENTINE
- Due for Launch: TiungSat, PICOSat, Tsinghua-1

## Contact



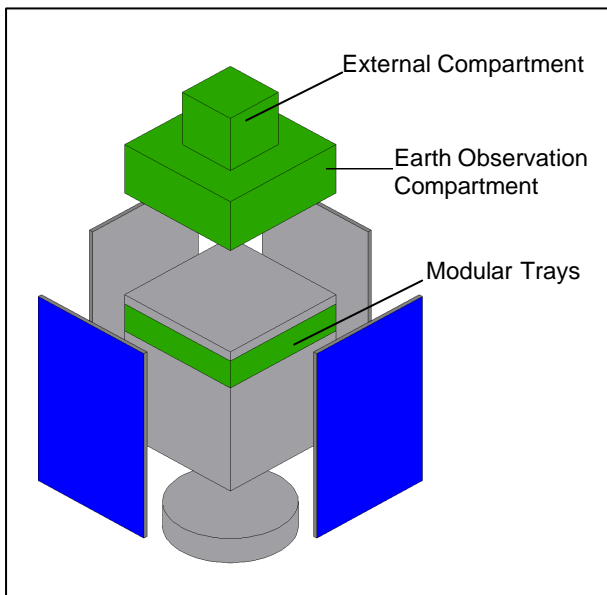
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## Issue Number & Notice

SSTL-0001-02. 15-06-2000. This data sheet is not contractual and can be changed without any notice. Please contact SSTL (see above) for further information.

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## Associated Products and Services

- **Payload Expertise** - SSTL has extensive experience in payload procurement, design, assembly, integration and testing. SSTL has also already flown a number of its own, commercially available, imagers and communications payloads amongst others.
- **Ground Support** - Assembly, integration and test of the microsatellite is fully supported by SSTL-manufactured Electrical Ground Support Equipment (EGSE). The EGSE is also used for final checkout of the microsatellite at the launch site prior to launch.
- **Launch Support** - SSTL is expert at sourcing low cost launch opportunities and providing launch support for secondary payloads and has acquired launch experience with Delta, Ariane 4, Dnepr, Tsyklon and Zenit.
- **In-Orbit Commissioning & Operations** - Operations, or back-up operations, may be carried out from SSTL site in the Surrey Space Centre where SSTL have commissioned 13 spacecraft and operate and monitor spacecraft. SSTL has experience in Ground Segment provision and training.

## Platform and Payload Specifications

<b>Mission Timeline</b>	Contract to Launch Readiness	15 months
	Design Life	typically three years or more
	Maximum lifetime	Mission dependent - UoSAT buses have operated for over 10yrs
<b>Physical</b>	Dimensions (stowed)	690x360x360mm
	Deployed antennas	843x582x582mm
	Mass	<70kg
<b>Power</b>	Solar Panels	Four body mounted GaAs cell panels @36W each
	Peak Power	50W
	Battery	10cell 7Ah NiCd battery
<b>ADCS</b>	Dual Redundancy	BCR, Power conditioning & distribution modules
	Sensors	Sun sensors, magnetometers in 3 axes (x2)
	Actuators	Gravity gradient boom, magnetorquer in three axes (x2)
<b>Navigation</b>	Attitude	Nadir pointing, yaw control; or 3-axis OM bias option
	Pointing knowledge ( $3\sigma$ )	$\pm 1^\circ$ roll & pitch; $\pm 3^\circ$ yaw
	Pointing Capability	$\pm 5^\circ$ of nadir roll, pitch & yaw
<b>Command &amp; Data Handling</b>	NORAD	$\pm 1$ km: updated NORAD TLE weekly (also GPS option)
	Processor	Dual redundant: 80386EX, 25MHz with coprocessor
	Memory	Expandable: 32 to 128MB RAM per processor
<b>Communications</b>	Operating System	In-orbit reprogrammable
	Uplink	Dual redundant 9k6 CPFSK VHF Space Ops. Band
	Downlink	Dual redundant 9k6 & 38k4 CPFSK UHF Space Ops. Band
<b>Operations Scheduling</b>	Antennas	One per downlink antennas on +Z face; On +Z & -Z faces for each uplink.
	On board Whole Orbit Data surveys	1s sampling programmable
	On board clock	Updated daily via groundstation, $\pm 0.1$ s; or GPS option
<b>Payload Accommodation</b>	Tray Module	Up to three tray modules: total volume of 350x350x76mm
	Earth Observation Compartment	250x220x146mm
	External	250x220mm
<b>Payload Data Interface</b>	Central	Hardwired digital and analogue command and status lines
	Network	Dual redundant CAN 1Mbps packet (ISO-11898, 11519-1); RS422 & RS485 options
<b>Payload Power Supply</b>	Power Supply	Numerous switched and hardwired from unregulated 28V bus

affordable access to space