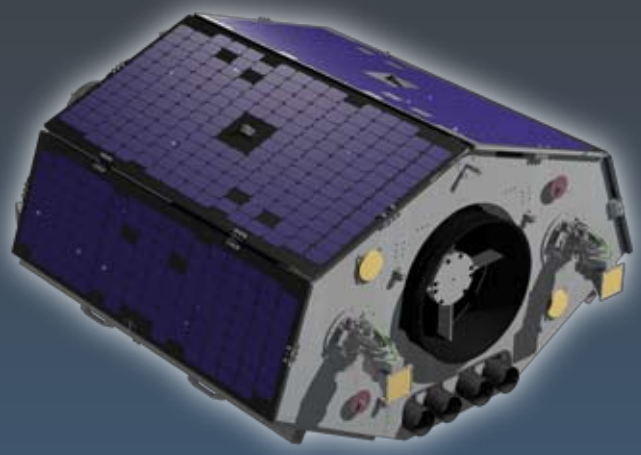
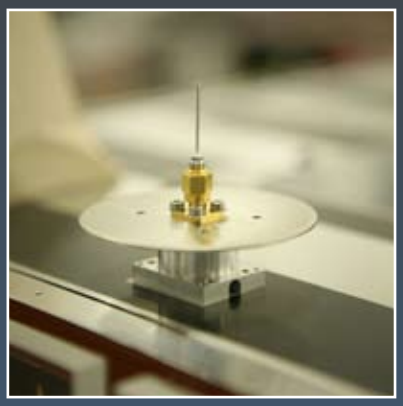
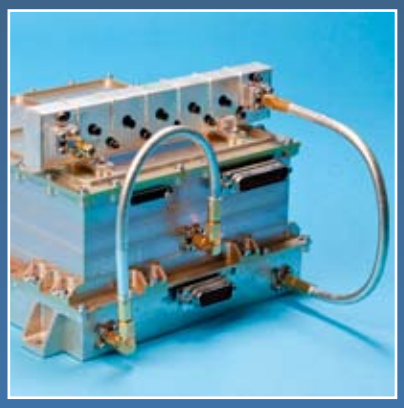
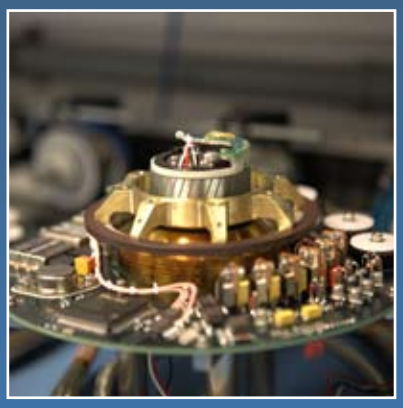








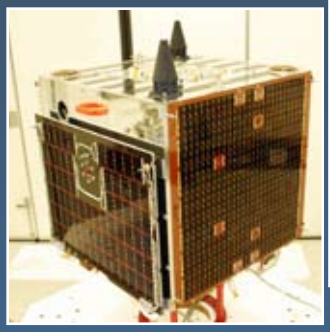
Subsystem Products

Fly the subsystems we fly!

SURREY
SATELLITE TECHNOLOGY LTD

Surrey Satellite Technology Ltd (SSTL) is the world's leading small satellite company, delivering operational space missions for a range of applications including Earth observation, science and communications. The Company designs, manufactures and operates high performance satellites and ground systems for a fraction of the price normally associated with space missions.

We manufacture the majority of our systems and subsystems used in our missions. They are available to order and have been used extensively on a range of small and larger third party missions.



What we offer

- **Flight-proven subsystems**
- **Complete avionics suite composed of heritage subsystems**
- **Modular and scalable designs for single string or redundant systems**
- Up to 7 years design life
- User manual, environmental and functional test reports, interface description and full warranty
- Manufacture to ECSS standards
- 28V unregulated power supply
- Compatibility with various data interfaces including CAN, RS422, RS485, and Spacewire
- SSTL is an ISO9001:2008 and ISO14001:2004 certified company

Our difference

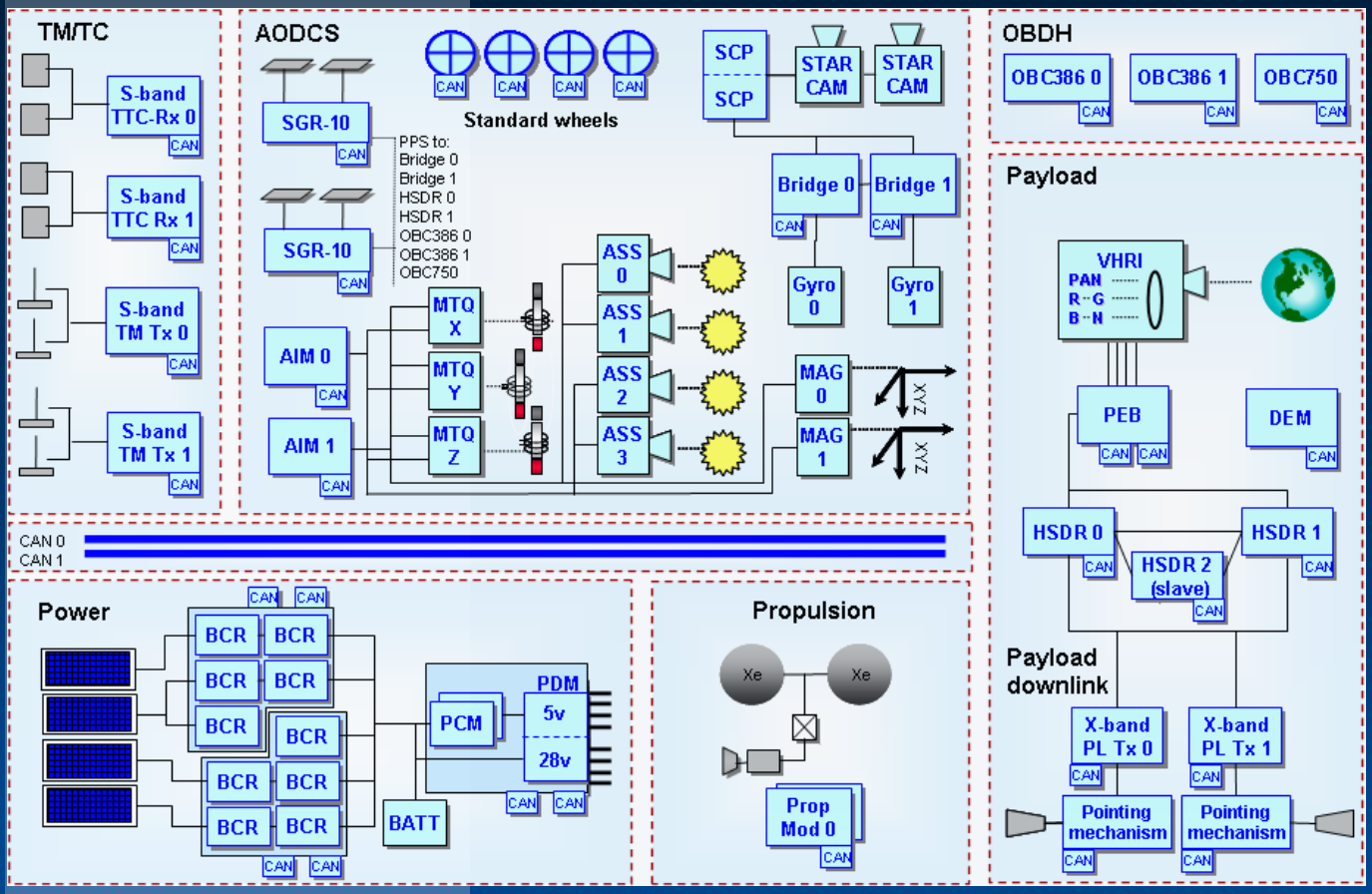
SSTL develops subsystems and avionics in-house giving us control over risk, cost, performance and schedule. We can offer short lead-times and we have the flexibility to fulfil tailored requirements to meet numerous applications.
SSTL subsystems are used on all SSTL missions. We have the capability and experience to assist customers in subsystem integration.

SSTL can also provide ad-hoc engineering support to help our customers achieve a successful mission.

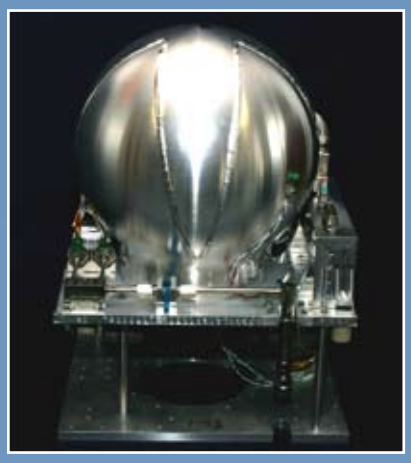
Complete Satellite Suite

Flight-proven dual redundant Avionics Suite

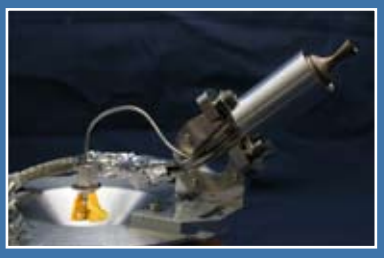
SSTL can deliver a complete suite of spacecraft subsystems. As the configuration is used on various missions, this assures interoperability between units. It also provides a cost effective solution when considering the overheads in purchasing and interconnecting individual items. Suites can be tailored for specific missions and applications.



Propulsion System Suite



Hot gas systems based on Xenon or Butane and SSTL's electrically heated thruster. These systems provide high performance in a small volume, and minimise handling, propellant loading and shipping costs. These propellants prevent contamination of instruments, solar arrays and thermal surfaces, and allow the use of simple thermal management systems. These propulsion systems include electronic controller and firmware.

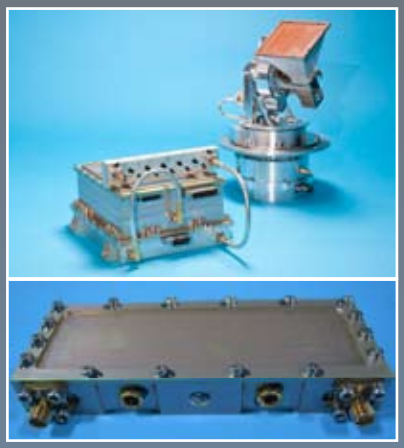


Applications

- Orbit circularisation & control
- Constellation phasing management

Flight-proven subsystems

X- and S-band Downlink Suite



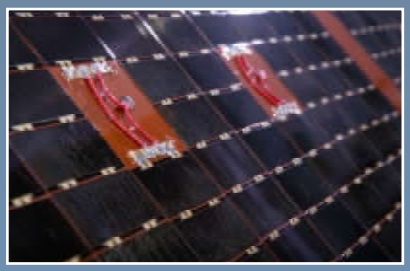
A complete X-band downlink suite for maximising and managing downlink capacity on a small spacecraft.

SSTL X-band downlink suite consists of:

- High speed data recorder
- X-band transmitter
- Antenna pointing mechanism
- X-band horn antenna

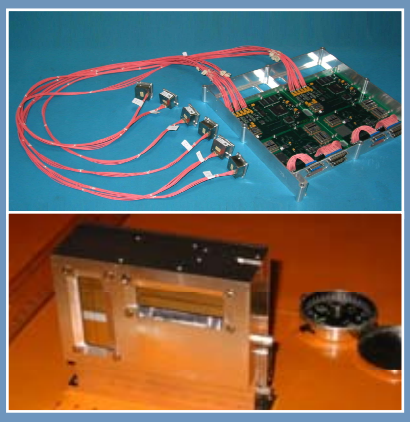
We can also provide a complete S-band communications suite for telecommand, telemetry, and payload downlink. Patch antennas or Isoflux quadrifilar helix antennas for different coverage requirements included.

Power Management Suite



A complete solution to power generation, storage, conditioning and distribution for LEO missions up to 1.6kW. Internally redundant, scalable power conditioning and switching. SSTL can also provide solar panel design, lay down, testing and consultancy services.

AOCS Suite



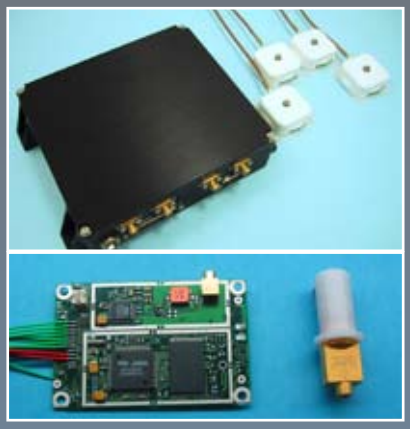
A flexible configuration of attitude control sensors, actuators and control software to meet pointing requirements for cost effective LEO missions.

- 3-axis gyros, sun sensors, magnetometers, star trackers
- Reaction wheels, magnetic torquers
- GPS receivers
- Electronic controllers
- Standard and/or custom control system software

Also ask us about

Payload support systems and instruments
Solar array drive mechanisms
Control moment gyros
Longer life subsystems

SGR family GPS Receivers



The SGR receiver family comprises several variants to monitor satellite position, velocity and provide accurate time.

Applications

- Navigation for LEO missions
- Orbit and position determination
- Multiple antenna attitude determination
- Accurate timing and synchronisation
- Payload data time stamping
- Post-manoeuvre orbit determination

1, 2 or 4 active patch antennas included.

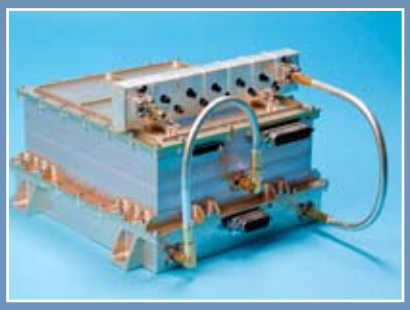
High Speed Data Recorder

A range of modular data-storage solutions in 16GBytes or 128GByte blocks, providing over 5Gbps processing capability each. The units support uploadable software applications such as specialist data processing and compression.

Applications

- Part of a payload downlink chain in LEO spacecraft
- Earth Observation and Science missions
- Data storage and on-board data processing

X-band Transmitter



A high speed payload downlink transmitter, with switchable data rates between 10-300Mbps, and various modulation formats.

SSTL also offers S-band transmitters for TTC and store-and-forward applications with the same flexible configurations as the X-band version.

On-board Computer OBC 695

Single board computers with on-orbit reprogrammable software capability. The OBC695 is designed for single-string operation in failure critical and harsh environments. The OBC750 is designed for cold or hot redundant configurations and is based on a high speed “powerPC” processor.

Antenna Pointing Mechanism with high gain X-band Antenna

An enabling technology for efficient data downlinking in small satellites.

Applications

- LEO high speed payload downlink
- Earth Observation Missions
- Space Science Missions
- Agile spacecraft

The Antenna Pointing Mechanism possesses the flexibility to accommodate alternative antenna solutions, mechanical interfaces, packaging and can also be used as a solar array drive mechanism.

Star Trackers

Star trackers provide precise satellite orientation in support of payload pointing. Two variants are targeted at lowest cost, and best performance requirements.

Star trackers comprise separate processing unit and sensor head, providing 3-axis attitude estimation and lost-in-space capability. Each star camera can be configured as a single string, dual redundant or cross-strapped variant.

Applications

- LEO missions and constellations
- 3-axis control systems
- Agile spacecraft

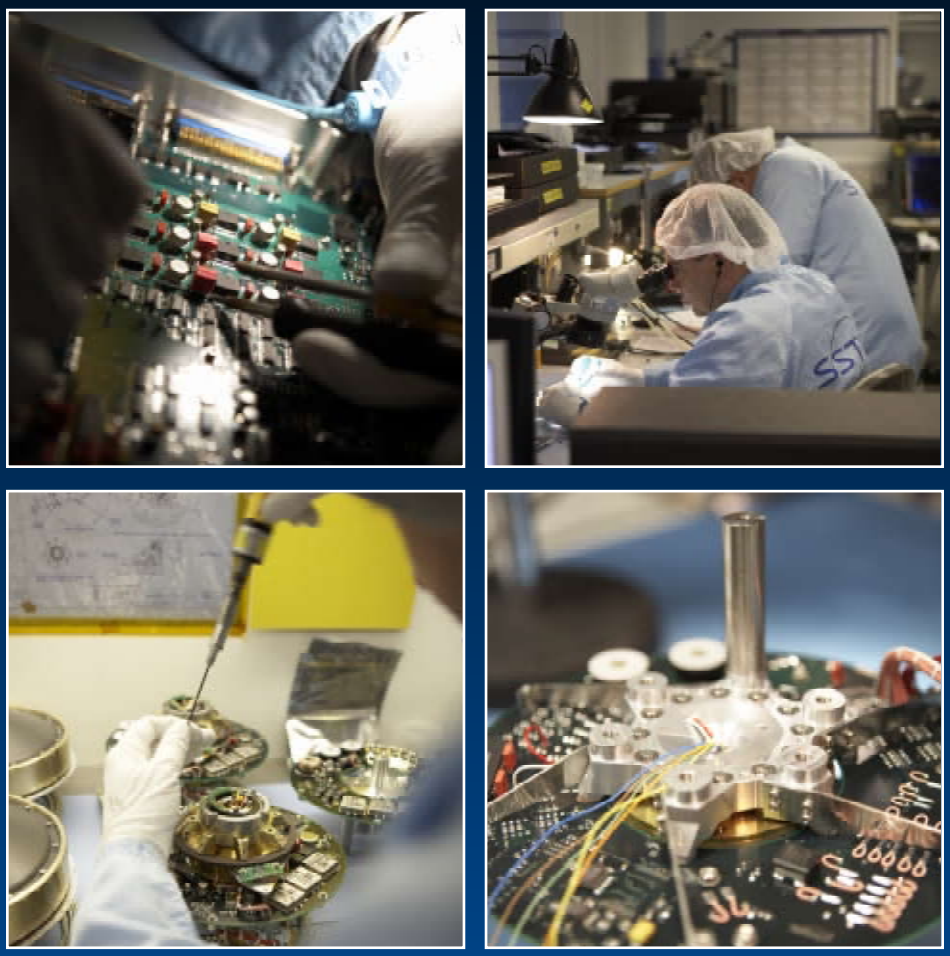
Reaction Wheels

A range of wheels with different torque capabilities, designed for long life LEO missions. These are particularly suited to Earth Observation missions where low noise performance is essential.
All wheels feature an integrated electronic controller, and include internal control software to support speed, torque and current control modes.

SSTL is an active supplier of small satellite subsystems to third party missions. SSTL has experience working with prime contractors in many successful space missions.

SSTL's extensive flight heritage is proof that its subsystems capabilities meet the demands of an ever-changing market.

Product	Supplied to	Quantity
GPS receivers	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Sapphire, ADS-1B, Kz-1	20
	NSPO	1
	Orbital (DART)	3
	AeroAstro (STPSat, STP-SIV)	2
	ISRO	5
	ATK (TACSAT-3)	2
	USAFA (FalconSat-5)	1
	SpaceHab	1
	ESA (Proba-1)	1
	VNIIEM (Kanopus 1,2,3)	3
	MSI (ORBCOMM Generation 2)	19
	Ball Aerospace (ORS, STPSat-3)	2
	TAI (Gokturk-2)	4
	NASA (Firefly)	1
	Alenia (Agile)	3
	SRRL	1
	SpaceDev	4
Torque rods	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Sapphire, ADS-1B, Kz-1	60
	Magellan Aerospace (Scisat, Cassiope)	6
	USAFA (FalconSat-3)	3
	VNIIEM (Kanopus 1,2,3)	9
	ESA (Proba-1)	3
	Suparco (BADR-B)	3
	TUB (Maroc-TUBSAT)	3
	QinetiQ (STRV-1 a,b,c,d)	12
	CSIRO (Fedsat)	3
Magnetometers	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Sapphire, ADS-1B, Kz-1	60
	VNIIEM (Kanopus 1,2,3)	6
	Suparco (BADR-B)	2
	CSIRO (Fedsat)	2
	International customer	3
Sun sensors	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Sapphire, ADS-1B, Kz-1	72
	VNIIEM (Kanopus 1,2,3)	12
	Suparco (BADR-B)	4
	CSIRO (Fedsat)	4
Inertial sensors	TAI (Gokturk-2)	2
	GIOVE-A, N2	4
Reaction wheels	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Sapphire, ADS-1B, Kz-1	103
	USAFA (FalconSat-3)	1
	DLR (Rosetta Lander)	1
	VNIIEM (Kanopus 1,2,3)	24
	International customer	8
Star trackers	International customer	5
	BILSAT-1, Beijing-1, CFESAT, RapidEye (x5), Kz-1	13
Propulsion systems	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Kz-1	17
	ESA (Proba-2)	1
On board computers	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Sapphire, ADS-1B, Kz-1	41
	USAFA (FalconSat-2)	2
	VNIIEM (Kanopus 1,2,3)	6
	CSIRO (Fedsat)	1
	ESA (Proba-1)	1
	BAE (Chandrayaan-1)	2
S-band TMTC	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Sapphire, ADS-1B, Kz-1	20
	USAFA (FalconSat-2)	2
	CSIRO (Fedsat)	2
	Orbital (Spartan)	4
	UoRome (UNISAT)	2
	Orbital (AcrimSat))	4
	DTU (Oersted)	2
S-band patch antennas	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Sapphire, ADS-1B, Kz-1	>20
	DLR (GRACE, CHAMP, TerreSAR, Tandem-X)	14
	CSIRO (Fedsat)	4
	CNES (Rosetta, Proba-1)	10
	Suparco (BADR-B)	1
	TUB (Maroc-TUBSAT)	4
	DTU (Oersted)	4
	Orbital (AcrimSat))	4
	International customer	10
	QinetiQ (TOPSAT)	1
	Orbital (GALEX)	4
X-band downlink	Orbital (GALEX)	3
	CONAE (SAC-C)	3
	Beijing-1, RapidEye (x5), N2, UK-DMC2	10
Power systems and solar panels	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, GIOVE-A, RapidEye (x5), Deimos-1, UK-DMC-2, N2, NX, Sapphire, ADS-1B, Kz-1	20
	USAFA (FalconSat-2)	2
	VNIIEM (Kanopus 1,2,3)	3
	CSIRO (Fedsat)	1
	QinetiQ (STRV-1 a,b,c,d)	4
	Suparco (BADR-B)	1
	ESA (Proba-1)	1
Battery systems	USAFA (FalconSat-2)	2
	VNIIEM (Kanopus 1,2,3)	3
	CSIRO (Fedsat)	1
	QinetiQ (STRV-1 a,b,c,d)	4
	NLR (SLOSHSAT)	1
	AMSAT (Phase-3D)	1
	AMSAT-IT (Itamsat)	1
	AMSAT-IL (Techsat)	1
Radiation monitors	AMSAT (Phase-3D)	1
	GIOVE-A	1
Separation systems	QinetiQ (STRV-1 a,b,c,d)	4
	N2	1
Antenna pointing mechanism	N2	2
Solid state data recorders	AISAT-1, UK-DMC-1, BILSAT-1, NigeriaSat-1, TOPSAT, Beijing-1, CFESAT, Deimos-1, UK-DMC-2, N2, NX, Kz-1	26



Changing the economics of space

SURREY SATELLITE TECHNOLOGY LTD

For international enquiries:

Surrey Satellite Technology Ltd
Tycho House, 20 Stephenson Road,
Surrey Research Park, Guildford, GU2 7YE, UK

Tel: +44 (0)1483 803803 | **Fax:** +44 (0)1483 803804
Email: sub-systems@sstl.co.uk | **www.sstl.co.uk**

SURREY SATELLITE TECHNOLOGY US LLC

For US enquiries:

Surrey Satellite Technology US LLC
8310 South Valley Highway, 3rd Floor
Englewood, CO 80112, USA

Tel: +1 303 790-0653 | **Fax:** +1 303 792-2386
Email: sub-systems@sst-us.com | **www.sst-us.com**

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