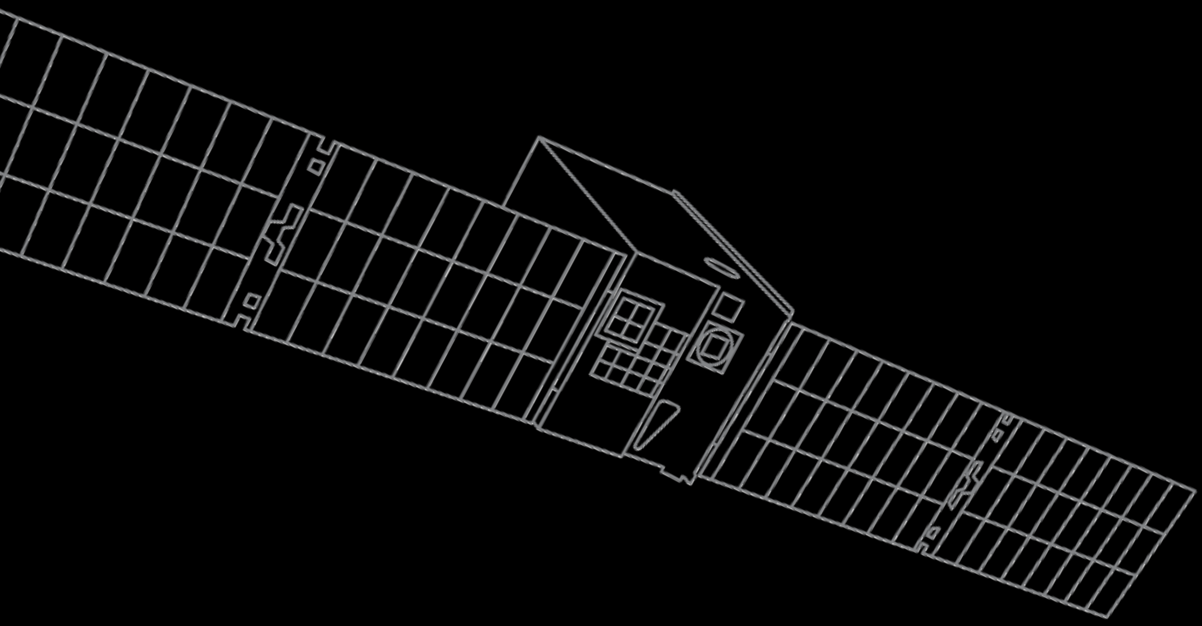
BLUE CANYON
TECHNOLOGIES

BLUE CANYON

SPACECRAFT BUSES,
SYSTEMS & SOLUTIONS



SPACE AWAITS

Reliable. High performance. Flight proven.

Blue Canyon Technologies is ready to adapt our standard products to your unique mission needs, solving the toughest challenges in space.

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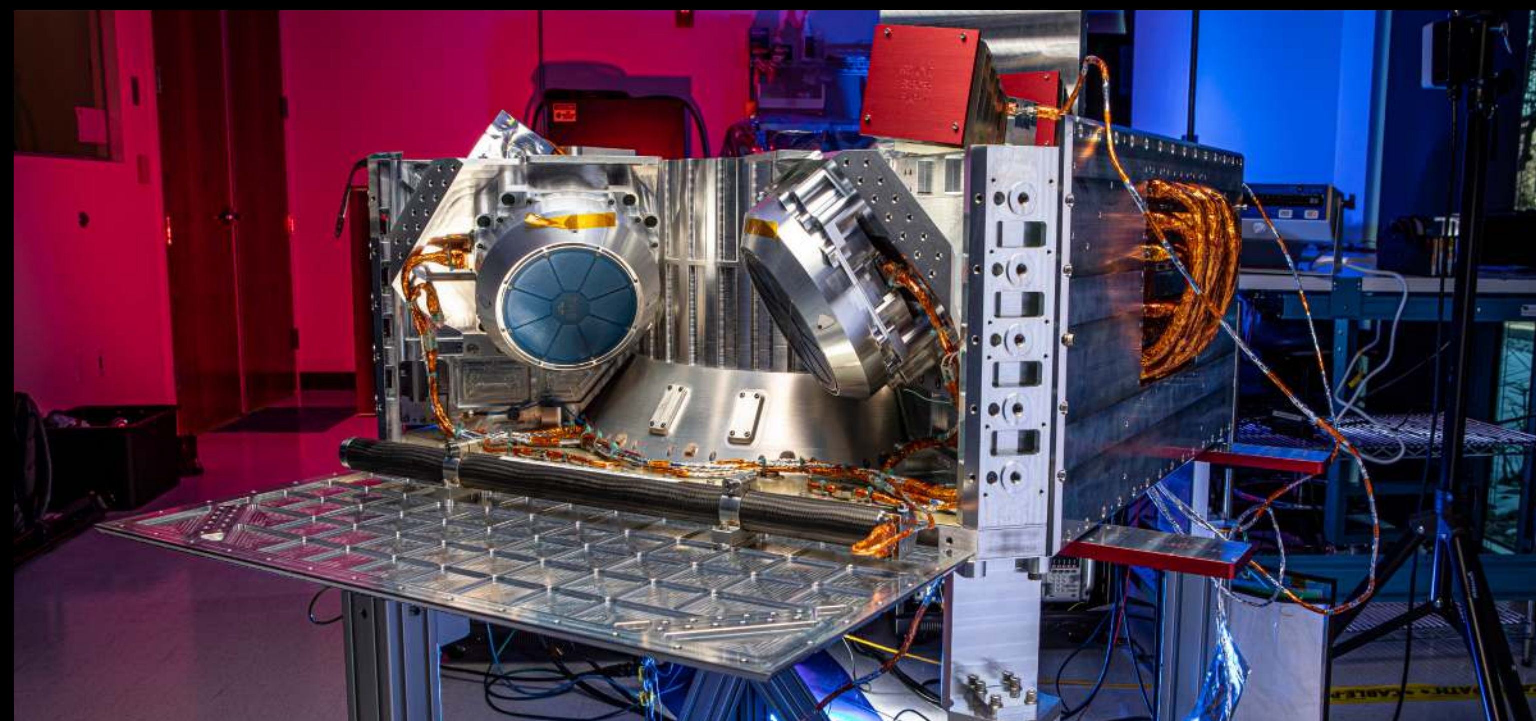
WHO WE ARE

As part of RTX, Blue Canyon Technologies is an end-to-end spacecraft manufacturer and leading provider of turnkey small satellite solutions, including spacecraft buses, components and mission services. Our attitude determination and control components are one-of-a-kind, allowing for industry-leading precision pointing accuracy.

No matter the mission, our affordable spacecraft systems and components meet the needs of commercial, civil and government customers. With cost-efficient, flight-proven, high-performing and highly reliable spacecraft solutions, we support all types of space missions, from university-led science exploration to national defense satellite constellations.

Our hardware is robust, resilient, and radiation-tolerant, solving the toughest challenges in space. We have experience with missions that require secure communications, including Type-1 hardware encryption. Inside 135,000 square feet of state-of-the-art facilities, we craft cutting-edge spacecraft and subsystems for VLEO, LEO, GEO, Lunar and interplanetary missions.

With high-volume manufacturing, highly integrated bus platforms and flexible ground software, every step of our process is designed to maximize your payload mass and volume on-orbit while minimizing overall mission costs.



TECHNICAL CAPABILITIES

Blue Canyon Technologies is widely recognized for demonstrating world-class technical performance on small, cost-constrained and high-volume systems. This reputation is rooted in a wide variety of mission and product type successes, including:

- Arcsecond-class on-orbit pointing systems across our suite of small satellites.
- On-orbit operations in VLEO, LEO, GEO, Lunar and deep space missions, including attitude control systems on the first interplanetary CubeSats.
- An impressive flight heritage of more than 90 years on-orbit for spacecraft, 151 years for avionics assemblies and 3,100 years of components.
- Mission successes span optical imaging, commercial SAR, exploration astronomy, autonomous formation flying, weather observation, communications, defense applications and more.
- Six of the last seven AIAA Smallsat Missions of the Year award winners leveraged Blue Canyon hardware.

Our technical team brings decades of combined smallsat and traditional space experience to every spacecraft subsystem and program phase, enabling Blue Canyon to successfully optimize low-cost and short-schedule programs.

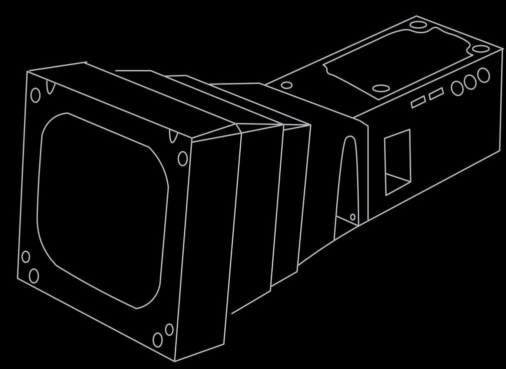
Our core spacecraft components provide best-in-class performance to cost ratios. Blue Canyon Reaction Wheels (in all sizes) support exquisite optical missions, our arcsecond-class star tracker meets demanding requirements for astronomy and other missions, and our turnkey guidance, navigation and control systems provide industry-leading smallsat pointing accuracy, geolocation, propulsion control and other capabilities.

Blue Canyon's new Control Moment Gyroscopes (CMGs) enable a disruptive leap in spacecraft agility and data collection capacity and meet every stringent control and stability requirement at unprecedented smallsat SWaP-C.

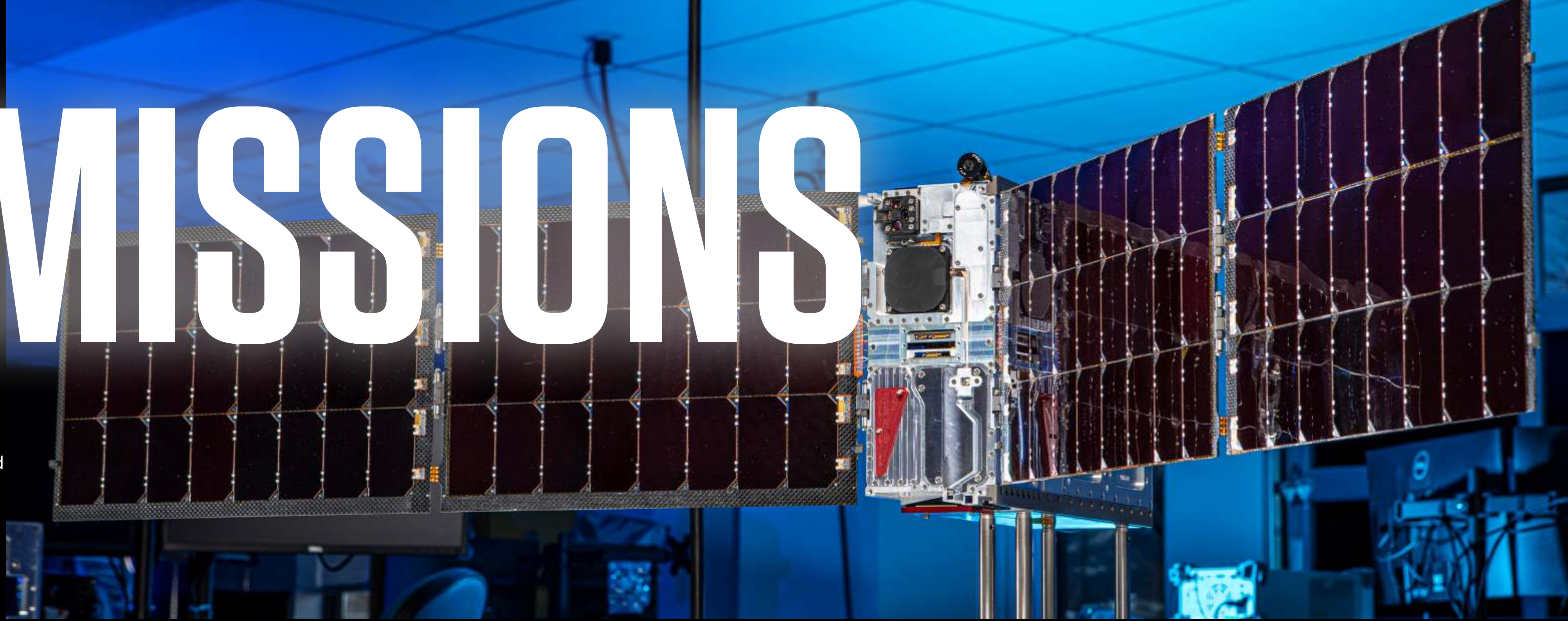
Both our standard CubeSat and minisatellite platforms support a wide variety of mission types and orbits, having successfully supported missions in VLEO, LEO, GEO and cislunar space. Our spacecraft leverage our vertically integrated portfolio to provide leading on-orbit performance at low cost. Blue Canyon small satellites have been especially successful at controlling large deployable payloads, hosting and guiding novel thruster systems, integrating payload and bus control autonomous logic and supporting other cutting-edge technologies.

We minimize bus SWaP-C to maximize payload capabilities and, when desired, customer-provided software autonomy applications can “fly” Blue Canyon buses under the supervision of our flexible and powerful autonomous bus fault protection.

Since the first flight of Blue Canyon hardware in 2015, generational enhancements to our product portfolio have provided ever-increasing resistance to radiation-induced upsets. Most of our products are now in their third or fourth generation, advancing in technical performance, radiation tolerance, manufacturability and overall capability with each iteration. Further advances both incremental and disruptive are on the horizon and drive our expectation that Blue Canyon's technical solutions will continue to expand what's possible.



OUR MISSIONS



With reliable, high-performing and flight-proven turnkey spacecraft products and solutions, we continue to meet the needs of commercial, civil and defense customers. To show you just what we're capable of, we've included a small sample of our spacecraft missions:

CUBESATS

AGILE MICROSATELLITE (AMS)
MIT Lincoln Laboratory
- **Objective:** First-of-its-kind mission that demonstrated that a CubeSat can positively control attitude in very low Earth orbit.
- **Provided:** XB6 CubeSat bus, Mission Operations

ARCSTONE
NASA Langley Research Center
- **Objective:** Provide accurate measurements of lunar spectral reflectance to significantly improve lunar calibrations standard.
- **Provided:** XB6 CubeSat bus, System Integration and Test, Spacecraft Operations

ASCENT
Air Force Research Laboratory
- **Objective:** Successfully demonstrated mission of a small satellite in Geostationary orbit.
- **Provided:** XB12 CubeSat bus

CAT
Johns Hopkins Applied Physics Laboratory (APL)
- **Objective:** Demonstrated sponsor payload performance in CubeSats flying in formation using differential drag to maintain spacing.
- **Provided:** Two XB3 CubeSat buses

CLICK A (CubeSat Laser Infrared Crosslink)
MIT | NASA Ames Research Center
- **Objective:** Successfully demonstrated technological advancements in optical communication, pointing in particular.
- **Provided:** XB3 CubeSat bus, Mission Operations Support

CLICK B / C
MIT | NASA Ames Research Center
- **Objective:** Conduct a demonstration of full-duplex optical communication crosslink with small spacecraft, plus the capability to gauge their relative distance and location in low Earth orbit.
- **Provided:** Two XB3 CubeSat bus, Mission Operations Support

CIRCE
US Naval Research Laboratory and Defence Science and Technology Laboratory UK
- **Objective:** CubeSats flying in tandem formation in low-Earth orbit to measure the ionosphere and radiation environment space from multiple vantage points.
- **Provided:** Two XB6 CubeSat bus, Mission Operations

CUBERRT
Ohio State University | NASA
- **Objective:** Observed, detected and mitigated radio frequency interference for microwave radiometers.
- **Provided:** XB6 CubeSat bus, Mission Operations

CUTE (Colorado Ultraviolet Transit Experiment)
CU Boulder Laboratory for Atmospheric and Space Physics
- **Objective:** Observed distant exoplanets by traveling in front of their stars and determined some materials in the atmospheres.
- **Provided:** XB6 CubeSat bus

EZIE (Electrojet Zeeman Imaging Explorer)
John Hopkins APL | NASA Goddard
- **Objective:** Image the magnetic fingerprint of the auroral electrojets using Microwave Electrojet Magnetogram (MEM) instruments.
- **Provided:** Constellation of three XB6 CubeSat buses, Mission Operations

HALOSAT
University of Iowa | NASA's Wallops Flight Facility
- **Objective:** Successfully measured soft X-ray emissions from the halo of our Milky Way galaxy.
- **Provided:** XB6 CubeSat bus, Mission Operations

LINK XVI
Viasat and Air Force Research Laboratory Space Vehicles
- **Objective:** Tested as a network relay with the use of a Link 16 terminal on a small satellite in low-Earth orbit.
- **Provided:** XB12 CubeSat bus

PREFIRE
NASA Jet Propulsion Laboratory

- **Objective:** Seeks to reduce uncertainty in polar energy fluxes, the processes that influence them, and, with improved modeling, the societal implications of polar climate change.
- **Provided:** Two XB6 CubeSat buses

RAVAN
Johns Hopkins University Applied Physics Laboratory

- **Objective:** Successfully demonstrated a radiometer and paved the way for constellation Earth radiation budget mission.
- **Provided:** XB3 CubeSat bus, Mission Operations

SLINGSHOT
The Aerospace Corporation

- **Objective:** First-ever BCT-built 12U bus carrying 19 payloads to low-Earth orbit. Mission demonstrated the accessibility of integrating numerous payloads into a single interface.
- **Provided:** XB12 CubeSat bus, Mission Operations

SPARCS (Star-Planet Activity Research CubeSat)
Arizona State University

- **Objective:** Monitor the flares and sunspot activity of low-mass stars in the far- and near-ultraviolet to assess space environment of orbiting planets.
- **Provided:** XB6 CubeSat bus

STARLING
NASA Ames Research Center

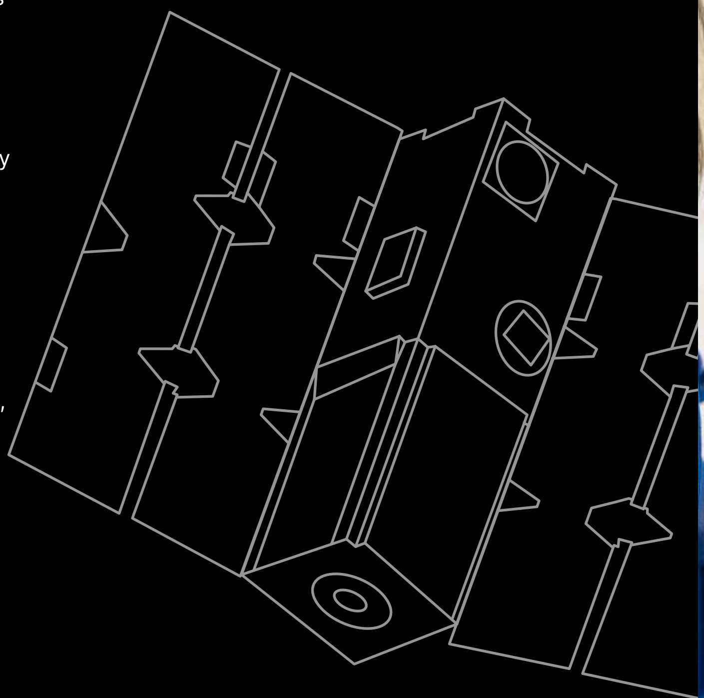
- **Objective:** Successful demonstration mission proving the capability of affordable, autonomous, distributed spacecraft missions, or swarms, in low-Earth orbit.
- **Provided:** Constellation of four XB6 CubeSat buses, Mission Operations

TEMPEST-D
Colorado State University

- **Objective:** Demonstrated radiometer that will provide temporal observations of cloud and precipitation process in a future constellation.
- **Provided:** XB6 CubeSat bus, Mission Operations

TROPICS NASA CUBESAT CONSTELLATION
MIT Lincoln Laboratory

- **Objective:** Provided rapid-revisit passive microwave measurements over low-latitude tropical regions.
- **Provided:** Constellation of seven XB3 CubeSat buses, Mission Operations



MICROSATELLITES & MINISATELLITES

BLACKJACK
Defense Advanced Research Projects Agency (DARPA)

- **Objective:** Demonstrate global persistent coverage through operation of one or more payloads from up to six Department of Defense mission areas in low-Earth orbit.
- **Provided:** Constellation of four Saturn Class buses

GNOMES
PlanetiQ

- **Objective:** Commercial satellite constellation dedicated to weather, climate and space weather.
- **Provided:** Custom bus

HELIOSWARM
NASA Ames Research Center

- **Objective:** Explore the three-dimensional dynamic mechanisms controlling the physics of plasma turbulence in the heliosphere.
- **Provided:** Swarm of eight Venus Class buses

INCUS
Colorado State University and Jet Propulsion Laboratory

- **Objective:** Provide the first tropics-wide investigation of the evolution of the vertical transport of air and water by convective storms.
- **Provided:** Constellation of three Venus Class buses

METHANESAT
MethaneSAT, LLC

- **Objective:** Provide global, high-resolution quantification of methane emissions from oil and gas facilities and measure surface-level methane emissions from other sources of human-triggered methane emissions.
- **Provided:** Saturn Class bus

ORACLE-M
Air Force Research Laboratory

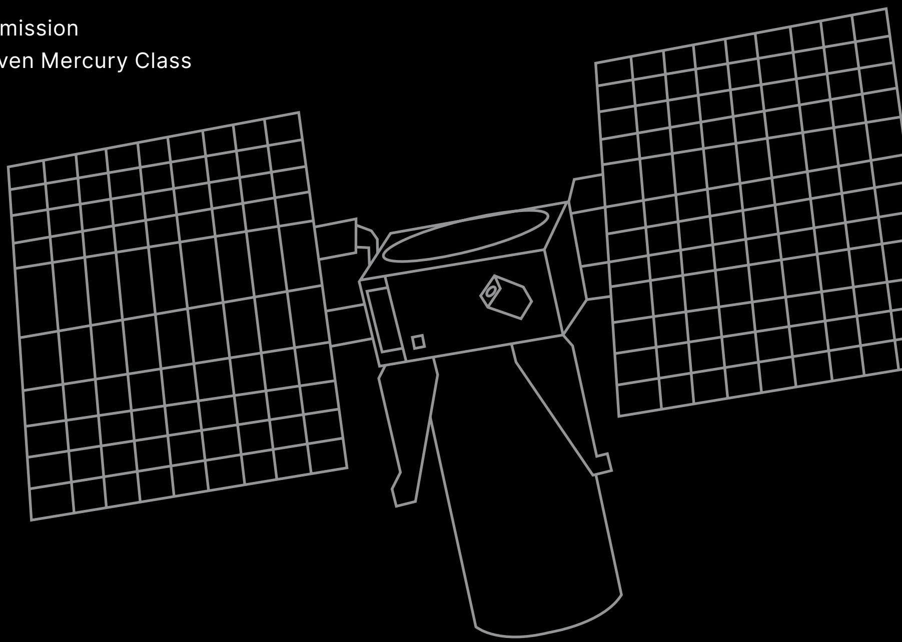
- **Objective:** Demonstrate extraordinary mobility between orbital regimes in a small spacecraft with a useful space domain awareness payload.
- **Provided:** Custom ESPA-Grande bus

R3D2
DARPA and Northrop Grumman

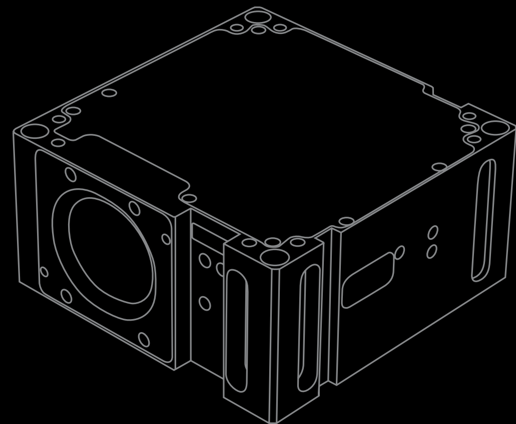
- **Objective:** To space-qualify a new type of Kapton membrane reflect array antenna.
- **Provided:** Venus Class bus

ZEUS
Government

- **Objective:** Highly successful mission
- **Provided:** Constellation of seven Mercury Class buses



TO THE MOON & BEYOND



Blue Canyon Technologies has provided on-orbit operations in VLEO, LEO, GEO, Lunar and deep space missions, including attitude control systems on the first interplanetary CubeSats.

In 2022, Blue Canyon provided XACT attitude control systems and XB1 avionics solutions on eight of the 10 CubeSats that were secondary payloads to the NASA Artemis I mission. After the conclusion of the Apollo program more than 50 years ago, we're proud to have been part of the return to lunar exploration.

Some of the missions that demonstrate our Lunar, deep space and interplanetary capabilities include:

MarCO
NASA JPL

Destination: Mars
Objective: Accomplished a successful mission that demonstrated miniature spacecraft technology in deep space.
Provided: XACT-15

LICIACube
Argotec | Italian Space Agency

Destination: Asteroid Dimorphos
Objective: Capture imagery of the intentional collision of DART with its target asteroid.
Provided: XACT-50

ARTEMIS I MISSIONS

ARGOMOON
Argotec

Destination: Earth
Objective: Took historically significant photography of the Artemis I mission.
Provided: XACT-15

BIOSENTINEL
NASA Ames Research Center

Destination: Heliocentric
Objective: Detected, measured and correlated the impact of space radiation in living organisms.
Provided: XACT-15

CuSP (CubeSat to Study Solar Particles)
Southwest Research Institute

Destination: Interplanetary
Objective: Heliophysics.
Provided: XACT-15

EQUULEUS
University of Tokyo / JAXA

Destination: Sun-Earth Lagrange Point 2 (L2)
Objective: Trajectory control experiment in cis-lunar region, imaging of Earth's plasmasphere, lunar impact flash observation, measurement of dust environment in cislunar region.
Provided: XACT-15

LunaH-MAP
Arizona State University

Destination: Lunar orbit
Objective: Mapped hydrogen around Lunar South Pole.
Provided: XB1 Avionics

LUNAR FLASHLIGHT
NASA JPL

Destination: Lunar Orbit
Objective: Mapping for volatiles.
Provided: XACT-50, Solar Array

NEA SCOUT
NASA Marshall Space Flight Center

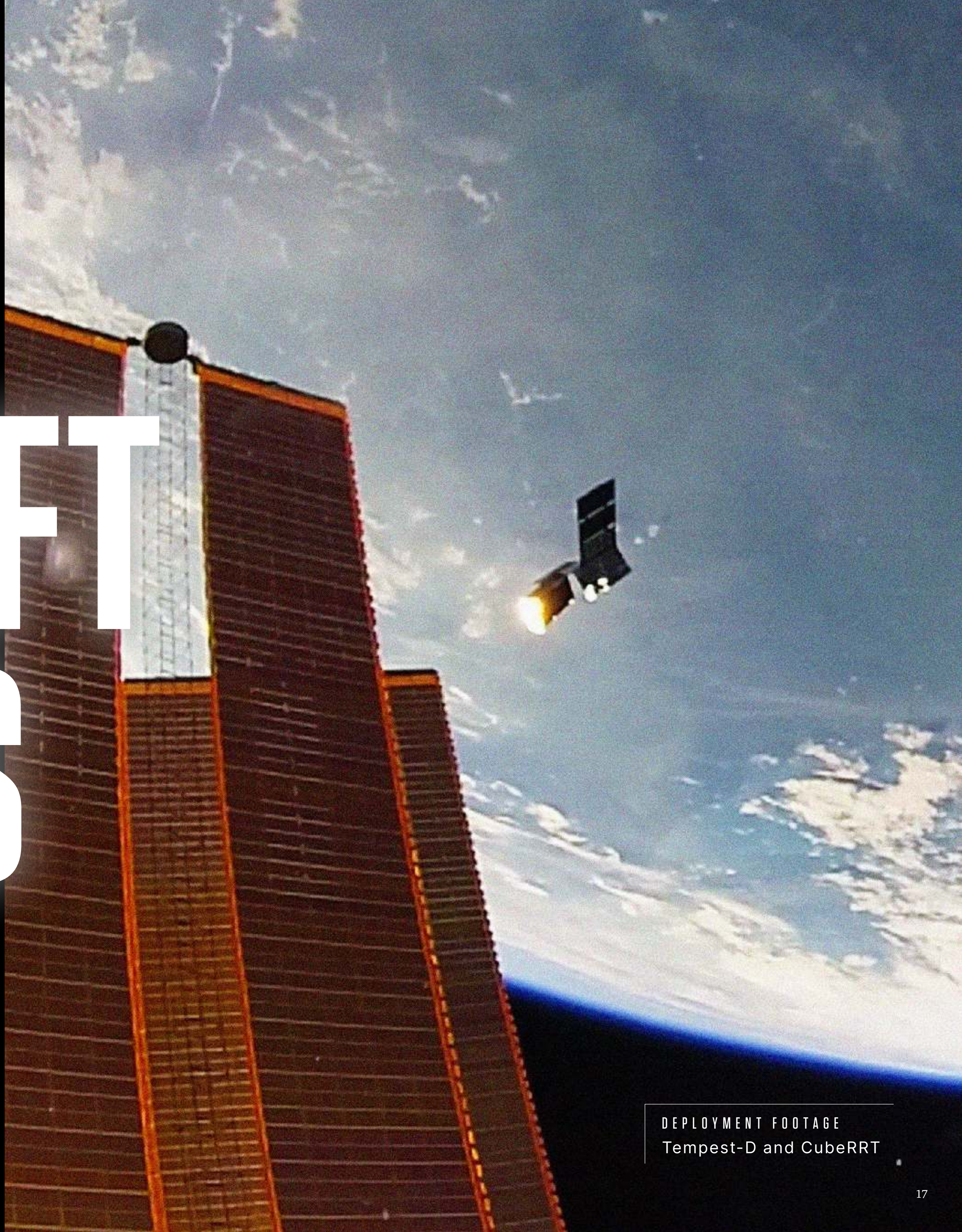
Destination: Interplanetary
Objective: Flyby of an asteroid with solar sail propulsion
Provided: XACT-15

OMOTENASHI
AeroAstro

Destination: Lunar Surface
Objective: Demonstrated nano-lander
Provided: XACT-15

SPACECRAFT SOLUTIONS

Our family of spacecraft offers complete end-to-end solutions for your mission needs. Featuring an extremely precise, highly powerful integrated spacecraft bus platform – ranging from a 3U CubeSat to an ESPA-Grande minisatellite – our versatile systems are built to accommodate any and all types of missions. With robust power systems, secure data handling and resilient performance, our suite of solutions are time-tested and proven-reliable, even under the harshest conditions. Get ready for a new era of peak performing, cost-efficient spacecraft solutions.



DEPLOYMENT FOOTAGE
Tempest-D and CubeRRT

XB3 SPACECRAFT

CLASS
3U

POINTING ACCURACY
±0.003 deg (1-sigma) for 2 axes, 1 Tracker

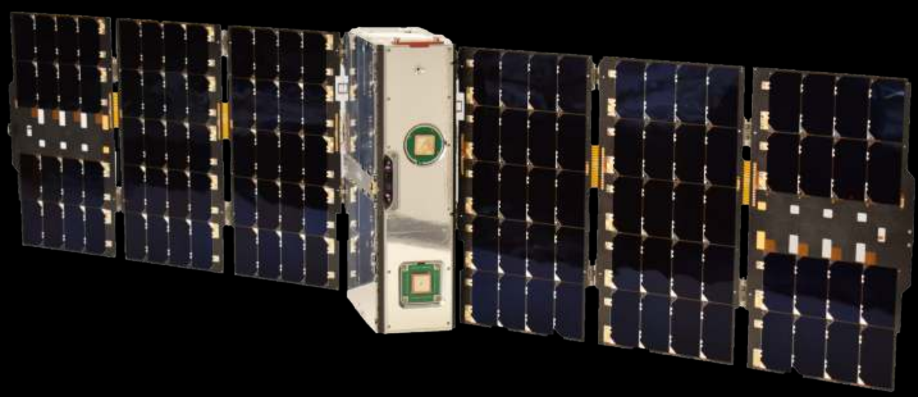
SOLAR ARRAY POWER
27 W

AVAILABLE PAYLOAD VOLUME
1.5U (typical)

ENERGY STORAGE
6.8 Ah

ORBIT ALTITUDE / ORBIT LIFETIME
LEO > 5 years | GEO/Lunar/Deep Space > 2 years

XB6 SPACECRAFT



CLASS
6U

POINTING ACCURACY
±0.002° (1-sigma), 3 axes, 2 Trackers

SOLAR ARRAY POWER
92 W - 108 W

AVAILABLE PAYLOAD VOLUME
4U (typical)

ENERGY STORAGE
6.8-20.4 Ah

ORBIT ALTITUDE / ORBIT LIFETIME
LEO > 5 years | GEO/Lunar/Deep Space > 2 years

XB12 SPACECRAFT

CLASS
12U

ENERGY STORAGE
6.8-20.4 Ah

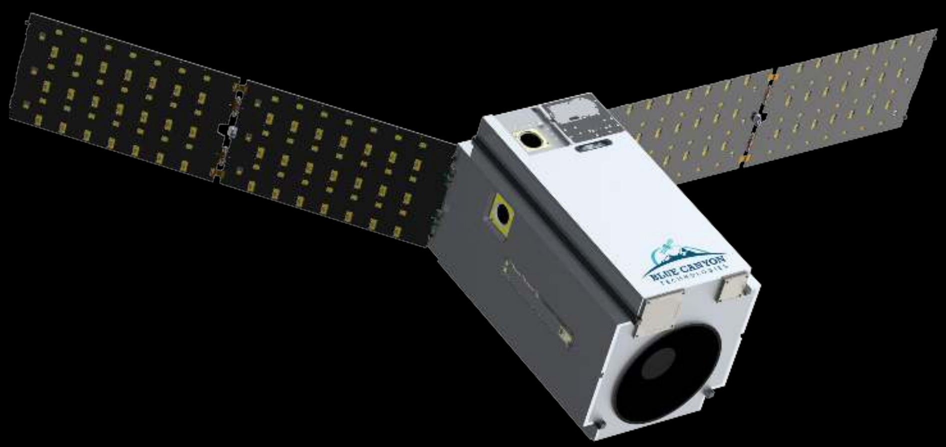
POINTING ACCURACY
±0.002° (1-sigma), 3 axes, 2 Trackers

ORBIT ALTITUDE / ORBIT LIFETIME
LEO > 5 years | GEO/Lunar/Deep Space > 2 years

SOLAR ARRAY POWER
92 W - 108 W

AVAILABLE PAYLOAD VOLUME
8U (typical)

XB16 SPACECRAFT



CLASS
16U

ENERGY STORAGE
6.8-20.4 Ah

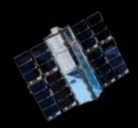
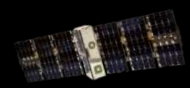
POINTING ACCURACY
±0.002° (1-sigma), 3 axes, 2 Trackers

ORBIT ALTITUDE / ORBIT LIFETIME
LEO > 5 years | GEO/Lunar/Deep Space > 2 years

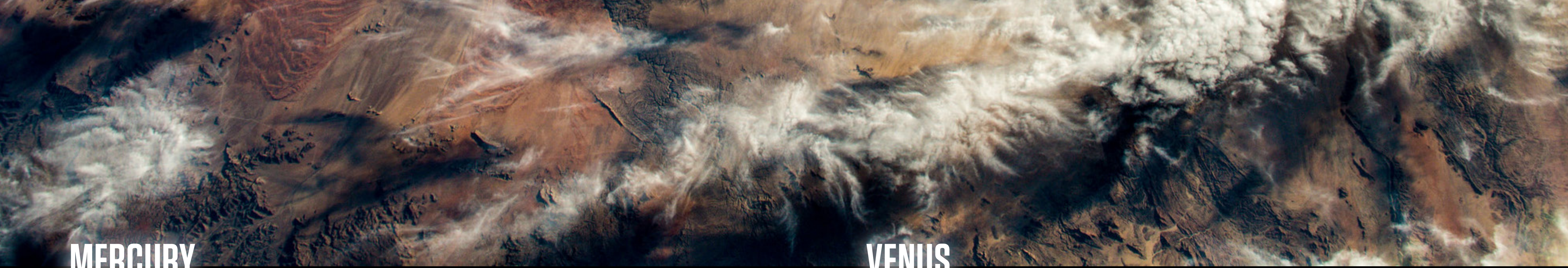
SOLAR ARRAY POWER
92 W - 108 W

AVAILABLE PAYLOAD VOLUME
12U (typical)

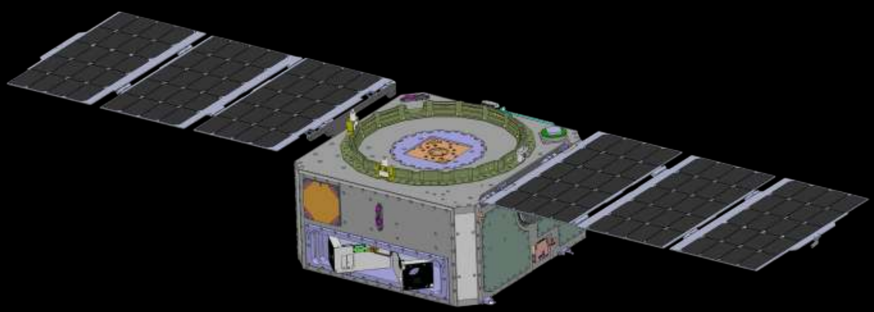
CUBESAT SUMMARY

	XB3	XB6	XB12	XB16
CLASS	3U	6U	12U	16U
AVAILABLE PAYLOAD VOLUME	1.5U (typical)	4U (typical)	8U (typical)	12U (typical)
POINTING ACCURACY	±0.003 deg (1-sigma) for 2 axes; ±0.007 deg (1-sigma) for 3rd axis	±0.002 deg (1-sigma) 3 axes, 2 Trackers	±0.002 deg (1-sigma) 3 axes, 2 Trackers	±0.002 deg (1-sigma) 3 axes, 2 Trackers
POINTING STABILITY	1 arc-sec over 1 sec	1 arc-sec over 1 sec	1 arc-sec over 1 sec	1 arc-sec over 1 sec
AGILITY	> 10 deg/sec	> 6 deg/sec	> 5 deg/sec	> 3 deg/sec
ORBIT KNOWLEDGE	4m, 0.05 m/s			
DATA INTERFACES	UART (3.3 V, 2.5 V LVDS, RS422, RS485), SpaceWire, 3.3 V In/Out			
ONBOARD DATA STORAGE	4GB with expandable beyond for the 6U, 12U and 16U (by adding the high speed data recorder)			
ENERGY STORAGE	6.8 Ah	6.8 – 20.4 Ah	6.8 – 20.4 Ah	6.8 – 20.4 Ah
SOLAR ARRAY POWER	27W	92W - 108 W	92W - 108 W	92W - 108 W
PROPULSION	Multiple electric and chemical propulsion systems available			
PAYLOAD POWER	3.3 V, 5.0 V, 12 V, 28 V (available in 6U, 12U, 16U)			
LEO UPLINK	Nominal 100 Kbps, CCSDS formatting			
LEO DOWNLINK	S-Band 2Mbps standard	S-Band 2 Mbps standard X-Band up to 10 Mbps	S-Band 2 Mbps standard X-Band up to 10 Mbps	S-Band 2 Mbps standard X-Band up to 10 Mbps
ORBIT ALTITUDE / ORBIT LIFETIME	LEO > 5 years | GEO/Lunar/Deep Space > 2 years			



MERCURY
CLASS



CLASS
11.732″ Light Band

POINTING ACCURACY
±0.002° (1-sigma), 3 axes, 2 Trackers

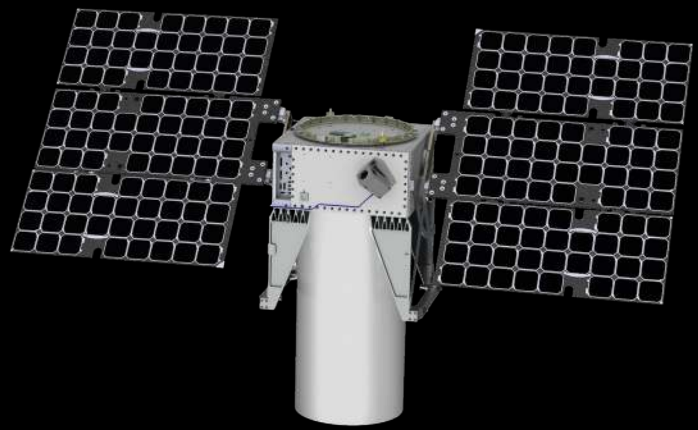
SOLAR ARRAY POWER (BOL)
SADA articulated Arrays 108 W

ENERGY STORAGE
20.4 Ah

ORBIT ALTITUDE / ORBIT LIFETIME
LEO(> 5 years), GEO (> 2 years), Deep Space (> 2 years)

PAYLOAD VOLUME
14.0″ X 17.0″ X 17.0″ (launch dependent)

VENUS
CLASS



CLASS
ESPA-Standard or larger
15″ launch vehicle interface

POINTING ACCURACY
±0.002° (1-sigma), 3 axes, 2 Trackers

SOLAR ARRAY POWER (BOL)
Two wing: 444 W
One wing: 222 W

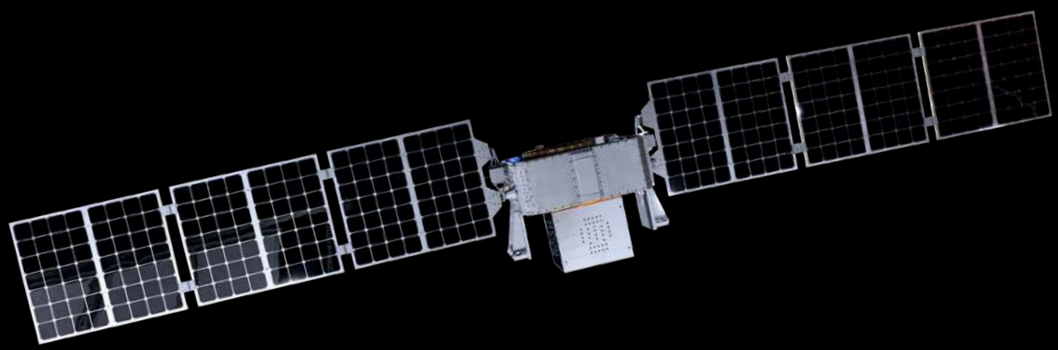
PAYLOAD MASS CAPABILITY
70 kg

ENERGY STORAGE
10.2 Ah

ORBIT ALTITUDE / ORBIT LIFETIME
LEO (> 5 years), GEO (> 2 years), Deep Space (> 2 years)

PAYLOAD VOLUME
20.5″ X 16.4″ X 27.0″ (1 array)
17.0″ X 16.4″ X 27.0″ (2 array)
Larger volume available depending on launch vehicle

SATURN
CLASS



CLASS
ESPA-Grande or Equivalent
24” launch interface standard, other options available

POINTING ACCURACY
±0.002° (1-sigma), 3 axes, 2 Trackers

SOLAR ARRAY POWER (BOL)
Two wing: 1082 W

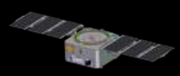
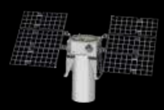
PAYLOAD MASS CAPABILITY
Standard Rideshare: 200 kg
Specialty applications and options: up to 350 kg
*CG and MOI dependent

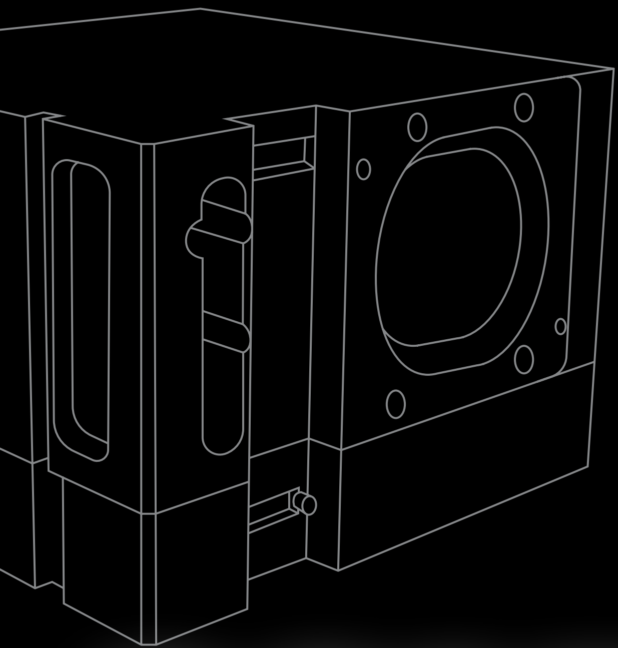
ENERGY STORAGE
1 wing: 27.2 Ah
2 wing: 54.4 Ah

ORBIT ALTITUDE / ORBIT LIFETIME
LEO (> 5 years), GEO (> 2 years), Deep Space (> 2 years)

PAYLOAD VOLUME
30.0” X 30.0” X 40.0” (typical)
Larger volume available within rideshare envelope and in dedicated launch vehicle fairings

MICROSAT & MINISAT SUMMARY

	 MERCURY CLASS MICROSAT	 VENUS CLASS MICROSAT	 SATURN CLASS MINISAT
CLASS	11.732” Light Band	ESPA-Standard or larger 15” launch vehicle interface	ESPA-Grande or Equivalent 24” launch interface standard, other options available
POINTING ACCURACY		±0.002° (1-sigma), 3 axes, 2 Trackers	
SOLAR ARRAY POWER (BOL)	SADA articulated Arrays 108 W	One wing: 222 W Two wing: 444 W	1082 W
PAYLOAD MASS CAPABILITY	40 kg	70 kg	Standard Rideshare: 200 kg Specialty applications and options: up to 350 kg *CG and MOI dependent
ENERGY STORAGE	20.4 Ah	10.2 Ah	54.4 Ah
ORBIT ALTITUDE / ORBIT LIFETIME		LEO (> 5 years), GEO (> 2 years), Deep Space (> 2 years)	
PAYLOAD VOLUME	14.0” X 17.0” X 17.0” (launch dependent)	20.5” X 16.4” X 27.0” (1 array) 17.0” X 16.4” X 27.0” (2 array) Larger volume available depending on launch vehicle	30.0” X 30.0” X 40.0” (typical) Larger volume available within rideshare envelope and in dedicated launch vehicle fairings
PROPULSION		Multiple electric and chemical propulsion systems available	



COMPONENTS

For more than a decade, Blue Canyon's high-precision, technically advanced solutions have disrupted the space market by demonstrating how lower-cost small satellites are an effective alternative for any number of different sized buses and technologies.

Our star-tracker-based attitude control systems have achieved the absolute highest possible pointing accuracy for our entire suite of spacecraft. These award-winning systems – as well as our power components – are available as a standalone purchase or as part of our system solutions. In fact, six of the last seven AIAA Smallsat Missions of the Year award winners leveraged Blue Canyon hardware.

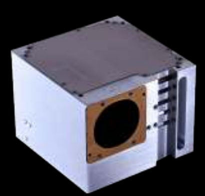
ATTITUDE CONTROL

ATTITUDE CONTROL SYSTEMS

Blue Canyon has nearly 100 XACT and FleXcore products on-orbit, supporting numerous successful customer missions. Get a reliable, high-performance design compatible with a wide range of satellite configurations, all from the most accurate stellar-based attitude solutions. A powerful processing core, coupled with low-noise reaction wheel assemblies and star trackers, enable a new generation of peak-performance, cost-efficient miniaturized spacecraft.

XACT-15

No matter the mission, the XACT is up to the task. Our integrated attitude control solution enables CubeSats to point with the absolute highest accuracy – much higher than that of previously available systems.



XACT-50

No matter the mission, the XACT is up to the task. Our integrated attitude control solution enables CubeSats to point with the absolute highest accuracy – much higher than that of previously available systems.

XACT-100

Even the largest CubeSats can be agile with the support of our largest reaction wheels and torque rods with customizable orientations, while still maintaining a minimal form factor.

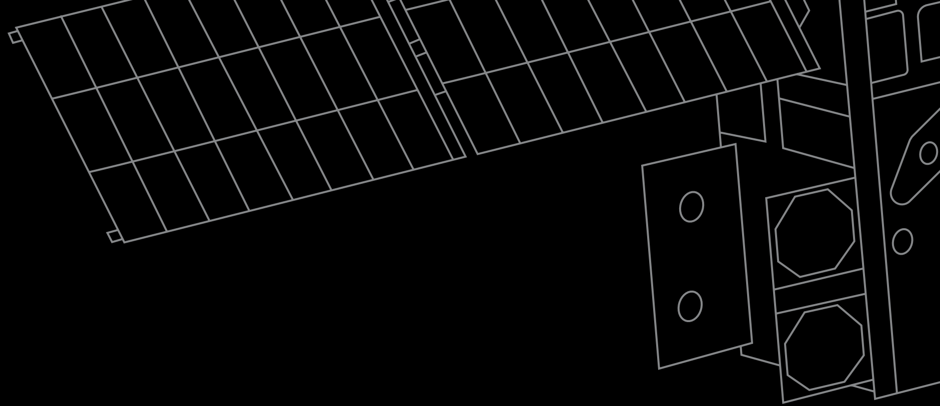
FLEXCORE

For a highly capable, cost-efficient attitude control system compatible with minisatellites, look no further than the Blue Canyon Technologies FleXcore. The FleXcore features three-axis stellar attitude determination in a modular package. Add on specialized, optimized capabilities to minimize maneuver time and to maximize your spacecraft's usage. Built-in, flexible commanding allows for multiple pointing reference frames: Inertial, LVLH, Earth-fixed, Solar and even customized profiles. Precise three-axis control is provided by low jitter reaction wheels, torque rods and integrated control algorithms. Software is available to support simulation, system integration, and customization of the ACS functionality.

Now in its third generation, FleXcore 3.1 maintains the low-cost, high-performing standards that we're known for, while streamlining the customer experience and improving reliability.

FEATURES INCLUDE:

- XACT-based electronics and control software with external sensors and actuators
- Low-cost and high-performance attitude control solution
- Modular system fits multiple missions
- Supports multiple externally-mounted star trackers
- Scalable to a wide range of bus sizes
- Compatible with BCT family of reaction wheels and torque rods
- Supports LEO, GEO, and Deep Space missions

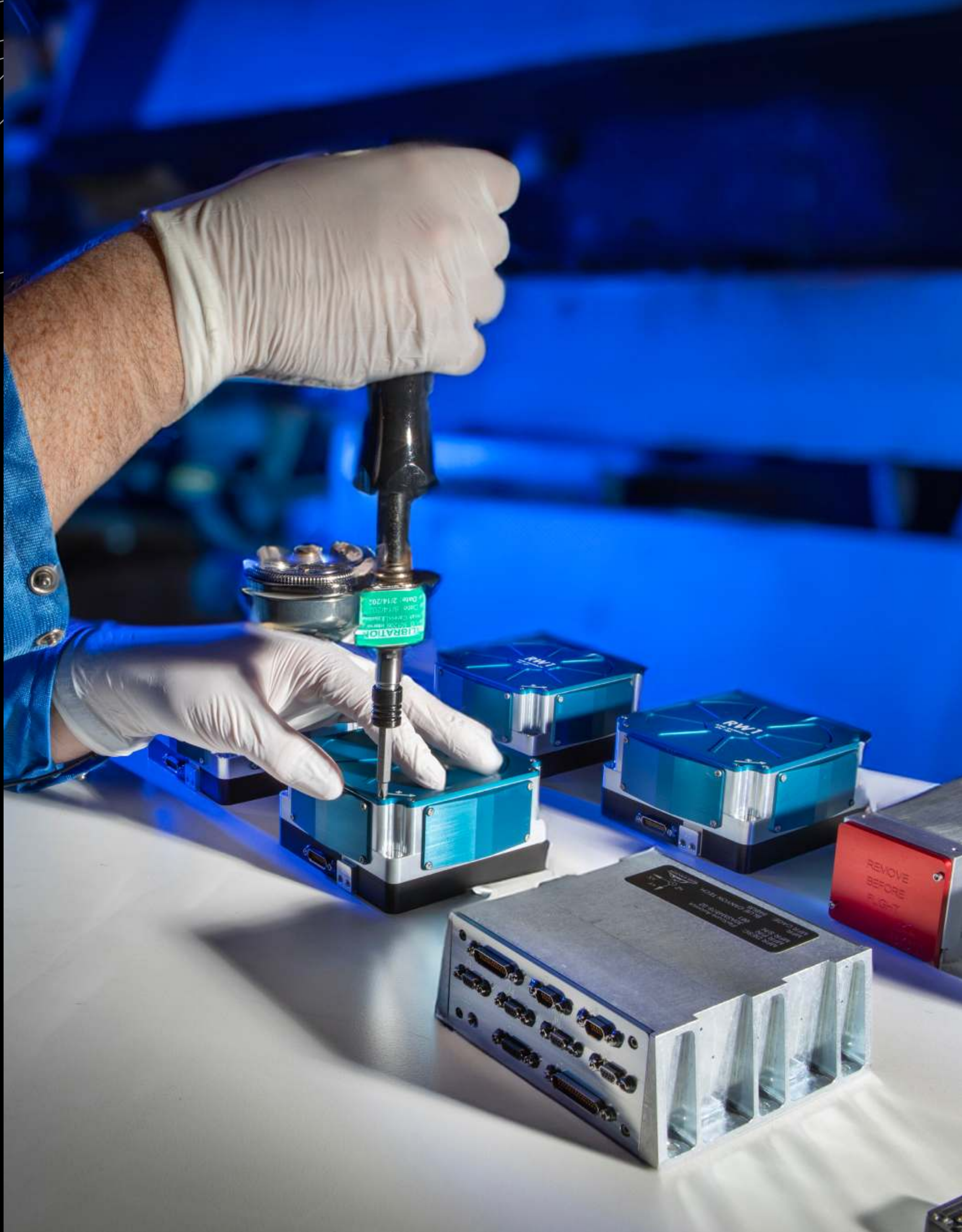


ACS SUMMARY

	 XACT-15	 XACT-50	 XACT-100	 FLEXCORE
TYPICAL POINTING ACCURACY (1-SIGMA)	±10 arcsec for 2 axes; ± 25 arcsec for 3rd axis	±10 arcsec for 2 axes; ± 25 arcsec for 3rd axis	±10 arcsec for 2 axes; ± 25 arcsec for 3rd axis	±7 for 3 axes, 2 Trackers
MASS	0.89 kg	1.23 kg	0.52 kg + 1 kg (wheels)	Configuration Dependent
DIMENSIONS	10 × 10 × 5 cm (0.5U)	10 × 10 × 7.54 cm (0.75U)	10 × 10 × 5 cm (0.5U) (not incl. external components)	< 12.1 × 11.4 × 4.9 cm (not incl. external components)
SUPPLY VOLTAGE	12 V	12 V	12 V	28 V
INTERFACE	RS-422			
SLEW RATE	Up to 10 deg/sec (4 kg, 3U CubeSat)	Up to 10 deg/sec (14 kg, 6U CubeSat)	Up to 10 deg/sec (25 kg, 12U CubeSat)	Application Dependent
DESIGN LIFE	> 10 years (LEO), > 5 years (GEO)			
MOMENTUM STORAGE	15 mNms per axis	50 mNms per axis	Up to 4x 100 mNms	Up to 4x RWp500: 500 mNms RW1: 1 Nms RW4: 4 Nms RW8: 8 Nms

KEY ADVANTAGES:

- Precise attitude knowledge and control
- Complete ACS in a micro package
- Low jitter reaction wheel design
- User-friendly software supports simulation, integration and customization



STAR TRACKERS

STAR TRACKERS

Our flight-proven, high-performing and reliable star trackers are compatible across spacecraft platforms and suited even for the most challenging and sensitive missions.

The industry-trusted Blue Canyon Technologies Nano Star Tracker is qualified beyond GEVS level environments, giving our customers a low SWaP-C solution with stunning capabilities. The turnkey starlight-in, quaternion-out system integrates easily and tracks down to 7.5 magnitude.

With an on-board star catalog of more than 20,000 stars, our tracker is the ideal fit for standalone missions or constellations.

	STANDARD NST	MID EXTENSION NST	FULL EXTENSION NST
ATTITUDE KNOWLEDGE	Gen3: 1 asec (cross boresight); 10 asec (around boresight) Gen2: 6 asec (cross boresight); 40 asec (around boresight)		
TEMPERATURE	-20°C to +50°C (full performance)		
SOLUTION RATE	5 Hz		
SKY COVERAGE	> 99%		
LOST-IN-SPACE STAR IDENTIFICATION	< 4 sec (up to 1.5 deg/s)		
FIELD OF VIEW	10 × 12 deg		
SUPPLY VOLTAGE	5 V or 28 V		
PEAK POWER CONSUMPTION	< 1.5 W (5 V) or < 3.5 W (28 V)		
MASS	0.35 kg	0.45 kg	0.85 kg
DIMENSIONS	10 × 5.5 × 5 cm	17 × 8.5 × 7 cm	25 × 10 × 10 cm
BAFFLE SUN EXCLUSION ANGLE	45 deg	22 deg	17.5 deg
DESIGN LIFE	>10 years (LEO) | >5 years (GEO)		

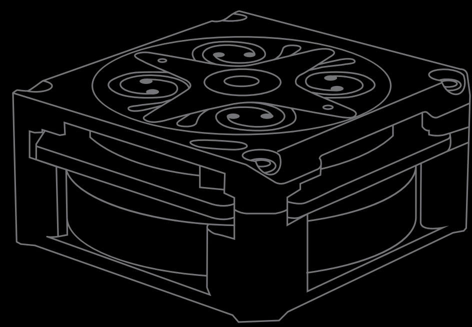
FEATURES INCLUDE:

- Nearly 500 star trackers manufactured with more than 150 on-orbit
- Low SWaP-C
- Tracks stars down to 7.5 magnitude
- On-board star catalog features more than 20,000 stars
- Lost-in-space star identification
- Shock test qualified
- EMI/EMC tested to MIL-STD-461
- User friendly RS-422 or RS-485 interface

REACTION WHEELS

REACTION WHEELS

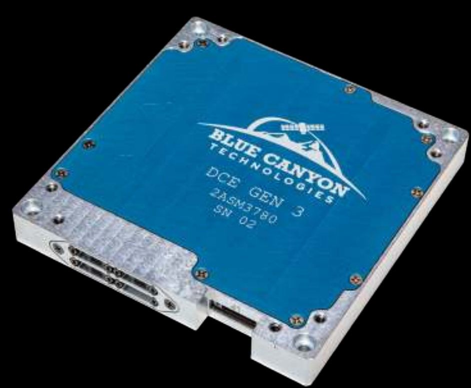
Our ultra-low disturbance reaction wheels feature an advanced lubrication system for long life and vibration isolation. With more than 2,000 wheels manufactured and hundreds on-orbit, our reaction wheels have supported missions ranging from very low Earth orbit to cislunar and interplanetary journeys.

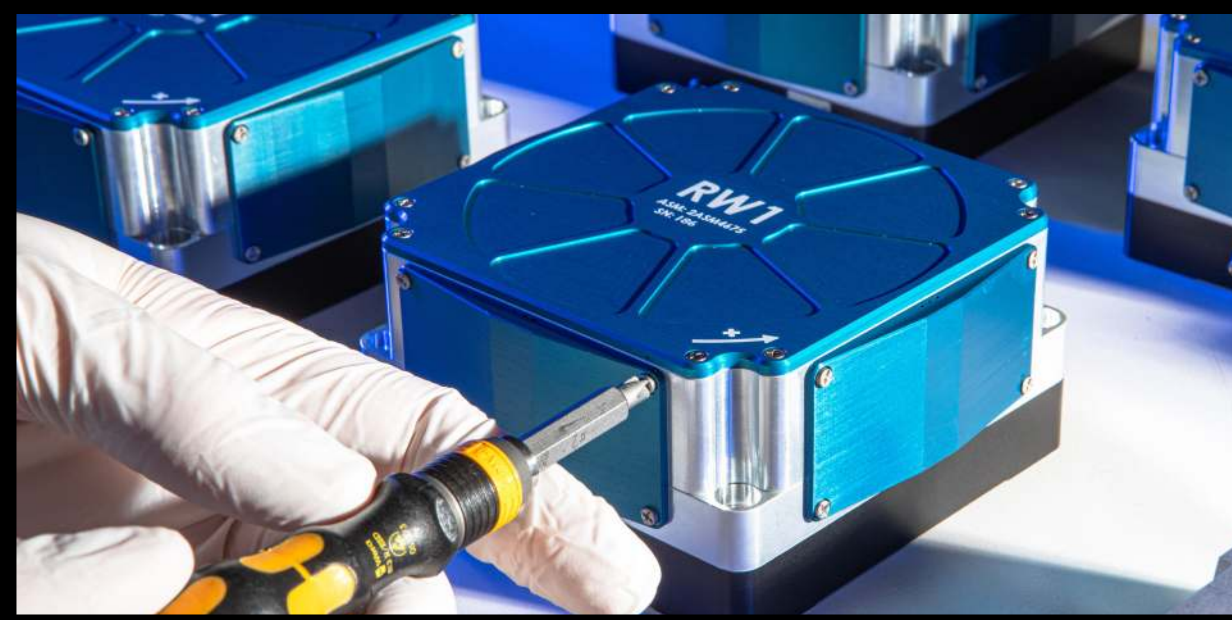


	 RWP015	 RWP050	 RWP100
MAX MOMENTUM	0.015 Nms	0.050 Nms	0.100 Nms
MAX TORQUE	0.004 Nm	0.007 Nm	0.007 Nm
MASS	0.13 kg	0.24 kg	0.33 kg
DIMENSIONS	42 × 42 × 19 mm	58 × 58 × 25 mm	70 × 70 × 25 mm
SUPPLY VOLTAGE	10 - 14 VDC	10 - 14 VDC	10 - 14 VDC
POWER @ MAX MOMENTUM	< 1 W	< 1 W	< 1 W
DESIGN LIFE	> 5 years	> 5 years	> 5 years

DRIVE CONTROL ELECTRONICS (DCE)

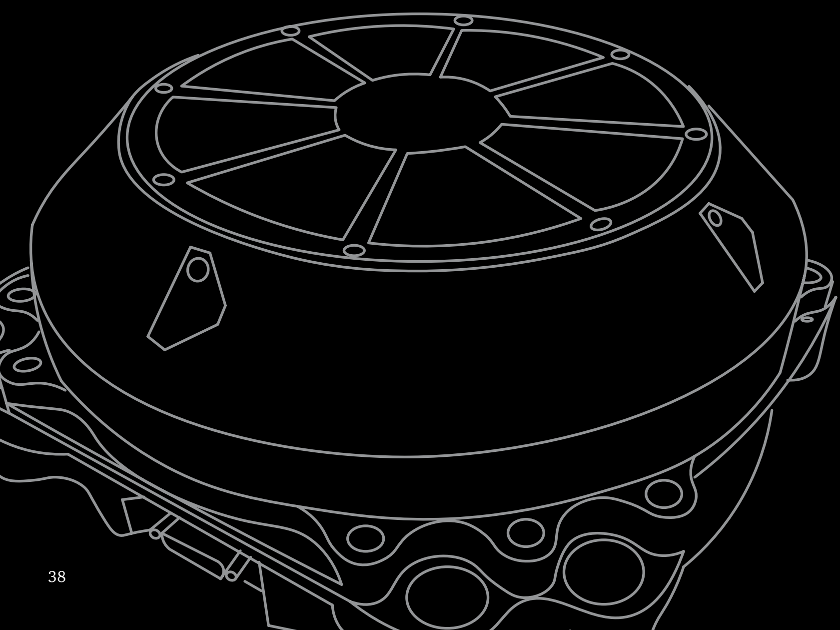
Blue Canyon Technologies Drive Control Electronics are sensor and actuator suites that include the necessary components to operate our reaction wheels and optional torque rods. The DCE is typically used with the RWp015, RWp050 and RWp100 reaction wheels, providing robust, configurable and high-performance software.





	RWP500	RW1	RW4	RW8
MAX MOMENTUM	0.50 Nms	1.0 Nms	4.0 Nms	8.0 Nms
MAX TORQUE	0.025 Nm	0.06 Nm	0.25 Nm	0.25 Nm
MASS	0.86 kg	1.1 kg	3.2 kg	4.4 kg
DIMENSIONS	110 × 110 × 38 mm	110 × 110 × 54 mm	170 × 170 × 70 mm	190 × 190 × 90 mm
SUPPLY VOLTAGE	22 - 34 VDC 28 - 34 VDC (full performance)	22 - 34 VDC	22 - 34 VDC	22 - 34 VDC
POWER @ MAX MOMENTUM	< 6 W	< 14 W	< 10 W	<10 W
DESIGN LIFE	> 10 years	> 10 years	> 10 years	> 10 years
PROTOCOL	RS-422			



CONTROL MOMENT

CONTROL MOMENT GYROSCOPES

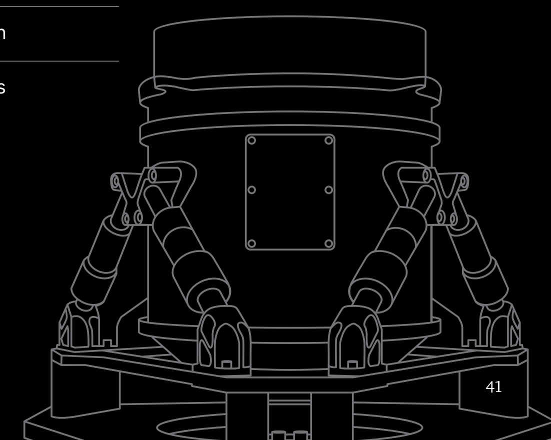
The Blue Canyon Technologies range of Control Moment Gyroscopes (CMGs) are built to provide your spacecraft with the exquisite agility necessary to navigate the most challenging missions.

Blue Canyon's CMGs offer improved torque performance at a lower power consumption than reaction wheels. Leveraging our advanced reaction wheel technology, CMGs provide low jitter and long-life performance for your mission.

DRIVE CONTROL ELECTRONICS

Flexible interface options include discrete CMG torque and momentum control to fully integrate spacecraft attitude control systems using up to four CMGs.

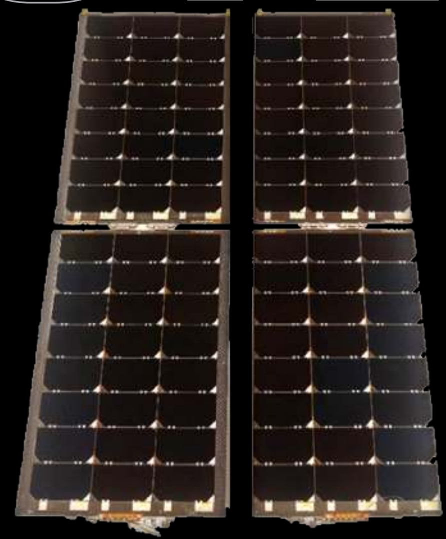
	CMG-8	CMG-12
MOMENTUM	8 Nms	12 Nms
TORQUE	8 Nm	12 Nm
GIMBAL AXIS ANGULAR RANGE	Unlimited	Unlimited
MASS	< 13 kg	< 18 kg
VOLUME	22 × 22 × 30 cm	34 × 43 × 38 cm
VOLTAGE	22-36 VDC	22-36 VDC
POWER, FULL MOMENTUM	25 W	20 W
POWER, MANEUVER	30 W	35 W
COMMUNICATION	RS-422	
GIMBAL MANEUVERS	> 2 million	
DESIGN LIFE	> 10 years	



POWER SYSTEMS

POWER SYSTEM CAPABILITIES

Ensure the reliability and functionality of onboard subsystems with our flight-proven power system capabilities. Blue Canyon solar arrays, solar array drive assemblies and batteries offer outstanding power efficiency, flexibility and fault tolerance.



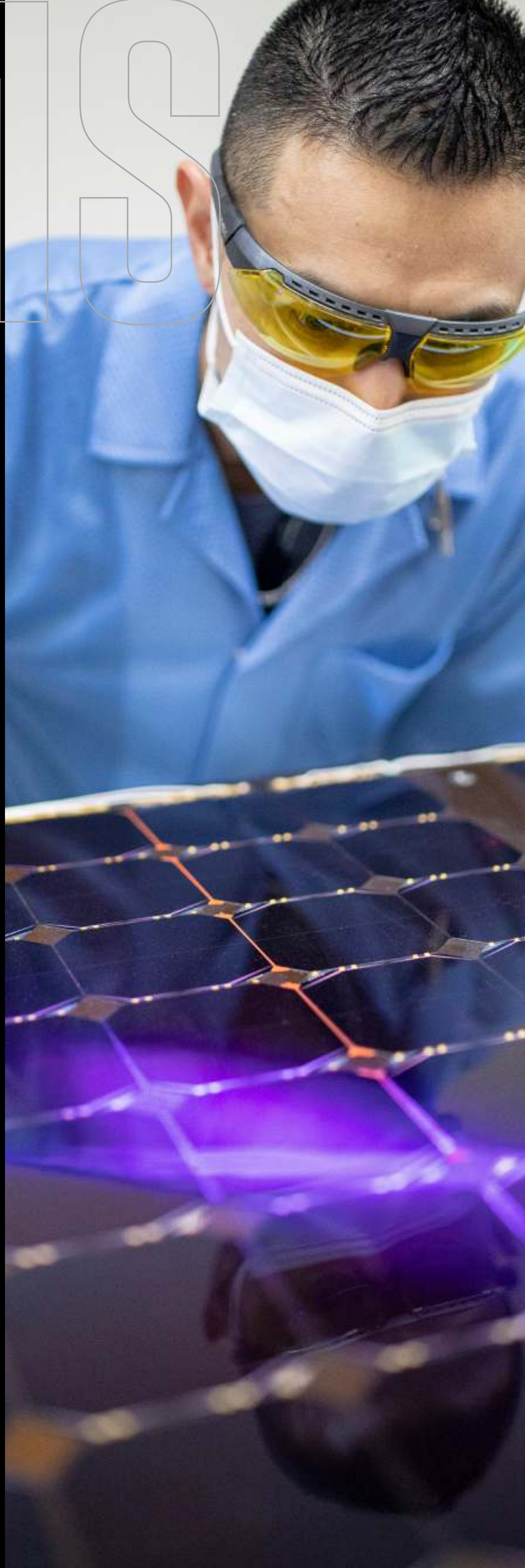
6U-V Double Panel Solar Array
48 W - 96 W

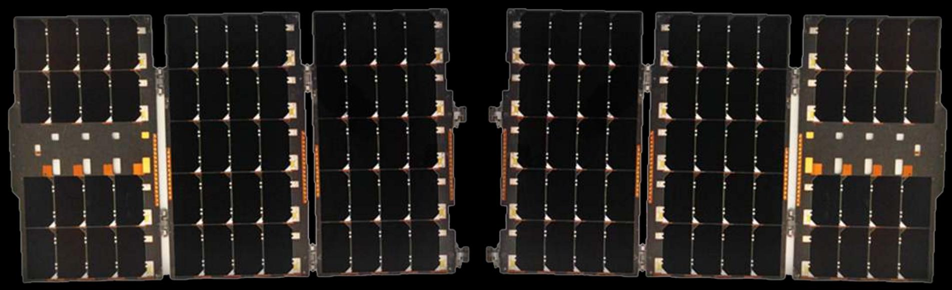
SOLAR ARRAYS

Solar panels generate power with high-efficiency solar cells. Blue Canyon offers configurations ranging from simple body-mounted wings to multi-panel and multi-wing deployed arrays with the option to gimbal up to two arrays. Our standard arrays include 30 percent efficient cells, carbon fiber substrates and magentic-dipole mitigation.

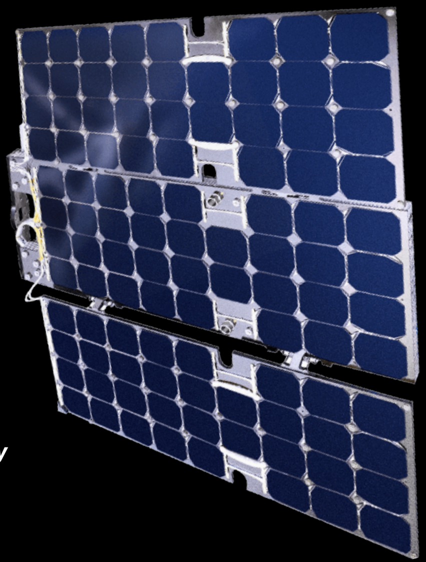
Release mechanisms and solar array drive assemblies (SADAs) are available for optimum sun-pointing operations.

3U Double Panel Solar Array
27 W - 34 W





6U-12U-H Triple Panel Solar Array
54 W - 118 W



ESPA-Class Venus Solar Array
222 W - 444 W

NOMINAL PARAMETERS* *Parameters at 60 C/BOL	3U	6U/12U	VENUS-CLASS MINISATELLITE	SATURN-CLASS MINISATELLITE
SOLAR ARRAY POWER	27 - 34 W	48 - 118 W	222 - 444 W	588 - 1175 W
ARRAY VOLTAGE, VMP	14.9 VDC	17 or 34.1 VDC	36.2 VDC	38.4 VDC

FEATURES:

- Industry-leading 30 percent efficient solar cells
- Carbon fiber and honeycomb structures
- Arrays pair with GN&C for maximum performance

OPTIONS:

- Linear, rotary and micro release mechanism options for
- Frangibolt® release mechanisms for minisatellites

SOLAR ARRAY DRIVE

SOLAR ARRAY DRIVE ASSEMBLIES

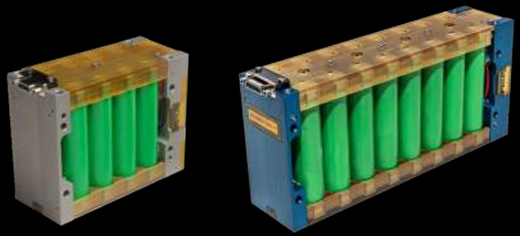
Maximize your payload operation time by freeing up the solar array pointing constraints using our effective and cost-efficient Solar Array Drive Assemblies (SADAs). Blue Canyon Technologies SADAs have increased capabilities across our suite of spacecraft. From standard to custom solutions, Blue Canyon has the pointing mechanisms to enable even the most complex of smallsat missions.

	SADA-3	SADA-3HP
MASS	1.5 kg	1.66 kg
VOLUME	Ø11.1 × 12.5 cm	Ø11.1 × 15.0 cm
RATED TORQUE	10 Nm	10 Nm
RANGE OF MOTION	+/- 175°	+/- 175°
MAXIMUM RATE	10°/s	10°/s
POWER CONSUMPTION (MANUEVER)	12 W	12 W
DESIGN LIFE	5 Years	5 Years
SOLAR ARRAY STRING COUNT	15 Strings	25 Strings
MAXIMUM CURRENT PER SOLAR ARRAY STRING	1.4 A	1.5 A
SOLAR ARRAY COMPATIBILITY	Venus Class Minisatellite Array, Saturn Class Minisatellite Array, Custom Array	

BATTERIES

BATTERIES

Our high-capacity battery packs come with fault protection and heaters for spacecraft use and feature under voltage protection, over current protection and cell balancing.



CONFIGURATION	1P8S	2P8S
NAMEPLATE CAPACITY	3.4 Ah	6.8 Ah
ENERGY	99 Wh	198 Wh
MASS	< 650 g	< 1200 g
FOOTPRINT	1.8" x 4.2"	1.8" x 7.2"
HEIGHT	3.5"	3.5"
NOMINAL VOLTAGE	28 V	28 V
VOLTAGE RANGE	24V - 33.6 V	24V - 33.6 V

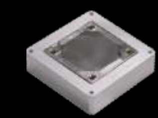
FEATURES INCLUDE:

- Under Voltage Protection
- Over Current Protection
- Cell Balancing

ANTENNA CAPABILITI

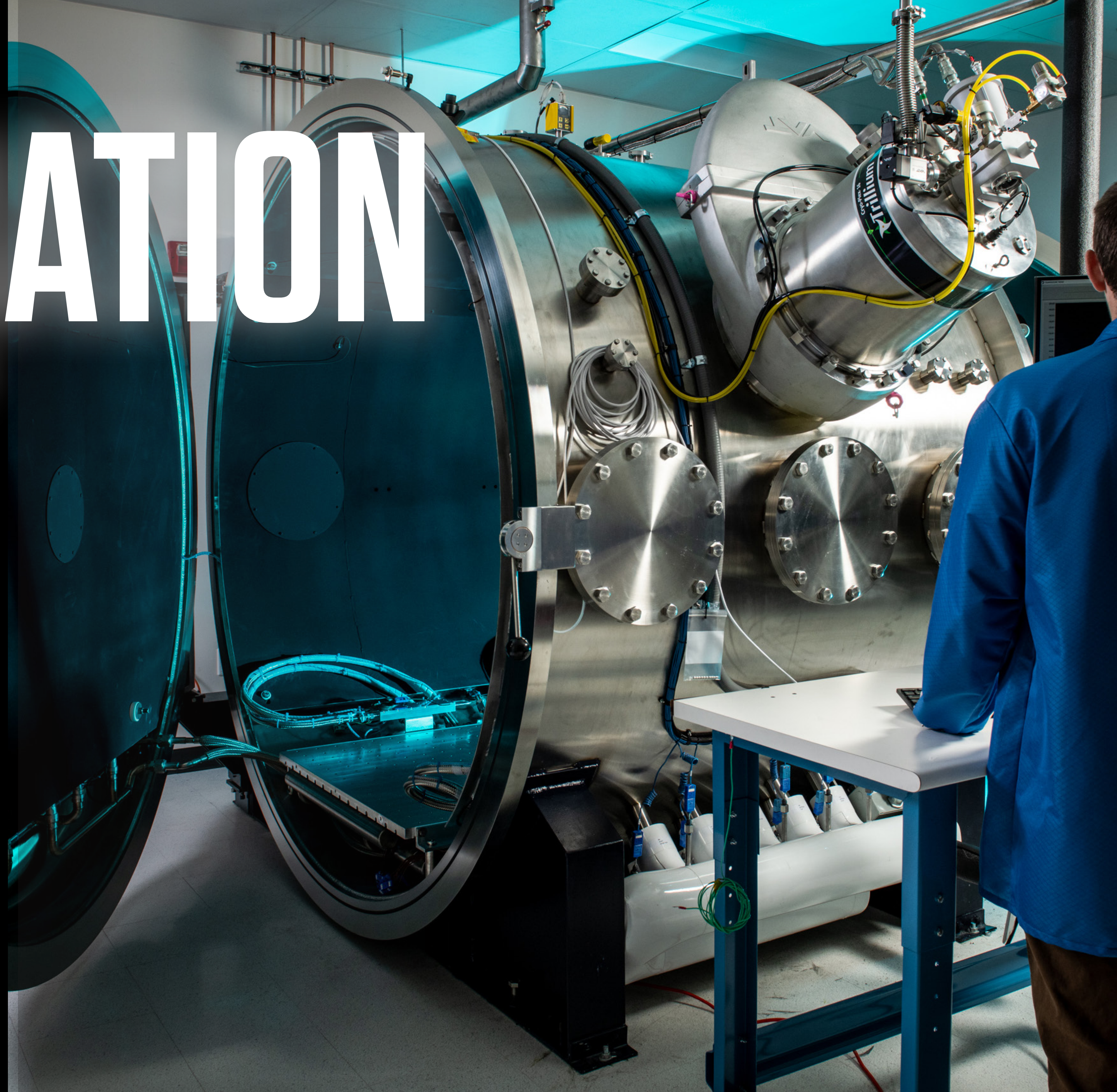
ANTENNA CAPABILITIES

Blue Canyon Technologies' flight antennas are currently operating on-orbit, supporting numerous successful customer missions over a wide range of bandwidths. Typical applications for these antennas include commands, telemetry, crosslink and mission downlink. Available versions feature those that operate with LHCP or RHCP polarizations. Blue Canyon also offers custom-designed antenna couplers (test hats) to support safe, repeatable testing at the integrated spacecraft level.

	L-, S- AND X-BAND PCB PATCH ANTENNA	S- AND X-BAND ALL-METAL PATCH ANTENNAS	WIDEBAND X-BAND PCB MEDIUM GAIN ARRAY ANTENNA	WIDEBAND X-BAND HYBRID HIGH GAIN ARRAY ANTENNA
X-Y DIMENSION	L-band: 8.38 × 8.38 cm S-band: 7.62 × 7.62 cm X-band: 4.71 × 4.71 cm	S-band: 8.38 × 8.38 cm X-band: 4.71 × 4.71 cm	10.16 × 10.16 cm	25.4 × 25.4 cm
FREQUENCY	L-, S-, or X-bands. (Customized) Single or Dual Frequency Units	S-, or X-bands. [Customized]	8-8.5 GHz	8-8.5 GHz
GAIN/AR	Directive Gain 3.5-5 .7 dBic/AR <6dB at CF (Level Depends on Ground Plane, Frequency, and Size)	Directive Gain >6 dBic/AR<6dB at CF (Level Depends on Ground Plane, Frequency, and Size)	Directive Gain 13-15.5 dBic/ AR<4dB over BW	Directive Gain> 19-21 dBic/ AR<4dB over BW
BANDWIDTH	10 MHz Nominal S-band units (frequency dependent)	10 MHz Nominal S-band units (frequency dependent)	> 500 MHz	> 500 MHz
POLARIZATION	RHCP or LHCP	RHCP or LHCP	RHCP	RHCP or LHCP (Dual Ports)
VSWR	< 1.5:1 at CF (Single-Freq Patch) < 1.75:1 at CF (Dual-Freq Stacked Patch)	< 1.5:1 at CF	< 2:1 over Operating BW	< 2:1 over Operating BW
CONNECTOR	50 Ohm SMA Female (Others Available)	50 Ohm SMA Female (Others Available)	50 Ohm SMA Female (Others Available)	50 Ohm SMA Female (Others Available)
MASS	< 75 Grams Standard L/S -Band Antenna < 45 Grams Standard X-Band Antenna	< 75 Grams Standard L/S -Band Antenna < 45 Grams Standard X-Band Antenna	< 220 Grams	< 1.2 Kgrams
TEMPERATURE	-50° to +125°C (Operational)	-50° to +125°C (Operational)	-50° to +100°C (Operational)	-50° to +125°C (Operational)
MIN QTY (FOR CUSTOM DESIGNS)	1 EDU and 3 Flights	1 EDU and 3 Flights	1	1

INTEGRATION & TEST



Build confidence in your mission with our advanced testing facilities. As part of our standard suite of environmental testing, Blue Canyon performs vibration and thermal vacuum testing. In addition, we have developed a one-of-a-kind shock testing machine that tests high-G shock events across all three axes. Contact us to learn more about how we can support your environmental testing needs.

Further testing capabilities include star simulators, wheel balance equipment, solar array deployment support hardware, thermal cycle chambers and use of a Helmholtz cage. To deliver the most reliable method of testing and operating for your mission, we use the same software to test our spacecraft as we do to operate on-orbit. This cohesion ensures the interfaces and ground databases are the same throughout the lifecycle of the mission.

INTEGRATION & TEST

SIMULATION PRODUCTS

To prepare for your mission, Blue Canyon Technologies offers two spacecraft simulation products to serve a variety of mission to hardware-in-the-loop needs – the GN&C Software Simulator and the Real-time Dynamics Processor (RDP).

The GN&C Software Simulator is a desktop executable that meshes the GN&C flight code and high-fidelity simulations into a tool that runs up to 150x faster than real-time, to support rapid mission planning and software behavior testing.

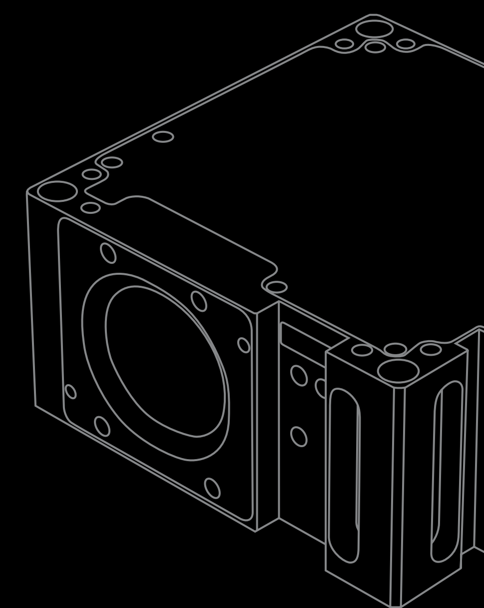
The Real-time Dynamics Processor is both a real-time spacecraft simulator and telemetry ground test interface to our avionics systems. This combination of features enables test-like-you-fly capability at both the unit and spacecraft level. The RDP features an Ethernet port for communication with a test PC and a connection to the unit under test for command and telemetry interfacing.

The common simulation present in both products allows the user to initialize the simulated spacecraft to mission-specific conditions to create orbit-like scenarios. This customization offers users insight into the performance and behavior of the spacecraft under various expected and test cases that may be experienced on-orbit.

	RDP
TEST/GSE INTERFACE	Ethernet
FLIGHT INTERFACE	RS-422 or RS-485, LVDS for Simulations

MODELING CAPABILITIES:

- High-fidelity spacecraft dynamics
- Orbital dynamics and celestial bodies
- Actuator and sensor outputs
- Various fault injection cases



MISSION OPERATIONS

At Blue Canyon Technologies, our vertical integration spans from individual components to mission operations services that manage spacecraft on-orbit. Our customer-driven mission planning and on-orbit tasking allows the customer to focus on the mission while we manage the bus, leveraging our straightforward, agile interfaces.

With more than 24 years of cumulative on-orbit heritage and 50,000+ supported contacts, our Mission Operations team has the expertise you can rely on to support your mission.

SECURE PLATFORM

Our powerful, cloud-based mission operations platform employs a secure and highly scalable architecture, enabling rapid integration for a wide range of missions and Ground Station Network providers. It offers a versatile, centralized mission management solution that supports fully automated contact scheduling, command and control, telemetry trending, data delivery and more.

SEAMLESS AUTOMATION

- Event-based automation efficiently manages all contact objectives from pre-pass setup through post-pass processing without requiring an operator in the loop.
- Autonomous commanding leverages flexible state-based flow control for both routine operations and anomaly detection and response.
- Generate an optimized ground contact schedule to meet your mission through automated contact planning using configurable business rules and resource deconfliction.

ADVANCED MONITORING

- Blue Canyon provides extensive, customizable telemetry dashboards for real-time insights and long-term trending.
- Customers receive direct access to the Blue Canyon Command and Telemetry Database API.
- Our services include enhanced mission awareness through configurable real-time event and status notifications.

COMPREHENSIVE PRE-LAUNCH AND LEOP SUPPORT

- Dedicated pre-launch operations support ensures all operational requirements are met through customer collaborative CONOPS development, mission integration, system interface testing and LEOP simulations.
- Our team of highly experienced operations and systems engineers execute against a streamlined, flight proven LEOP commissioning strategy specifically designed to achieve operational readiness quickly and safely, often within hours of launch.

GROWING OPERATIONAL HERITAGE

Our team is currently operating 20 spacecraft spanning 11 different missions, supporting more than 120+ contacts per day. We are well positioned to take on additional buses, implementing our lessons learned over the last decade.


FINE REF
NOT ACTIVE
14
TRUE
TRUE
TRUE

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BLUE CANYON
TECHNOLOGIES