



Ball Aerospace
& Technologies Corp.

CT-601 High Accuracy Star Tracker

Designed to meet the most exacting accuracy requirements, the CT-601 defines the state of the art in stellar attitude sensing. Based on a modular design approach that facilitates substitution of light shades, optics, charge-coupled device (CCD) detectors, and data interfaces, the CT-601 is the optimum solution for mission-critical, high-performance science, DOD and commercial spacecraft attitude control systems. The CT-601 radiation-hardened, environment-tolerant, micro-processor-controlled electronic architecture can be easily reprogrammed to fine-tune

performance, or even change basic aspects of sensor operation.

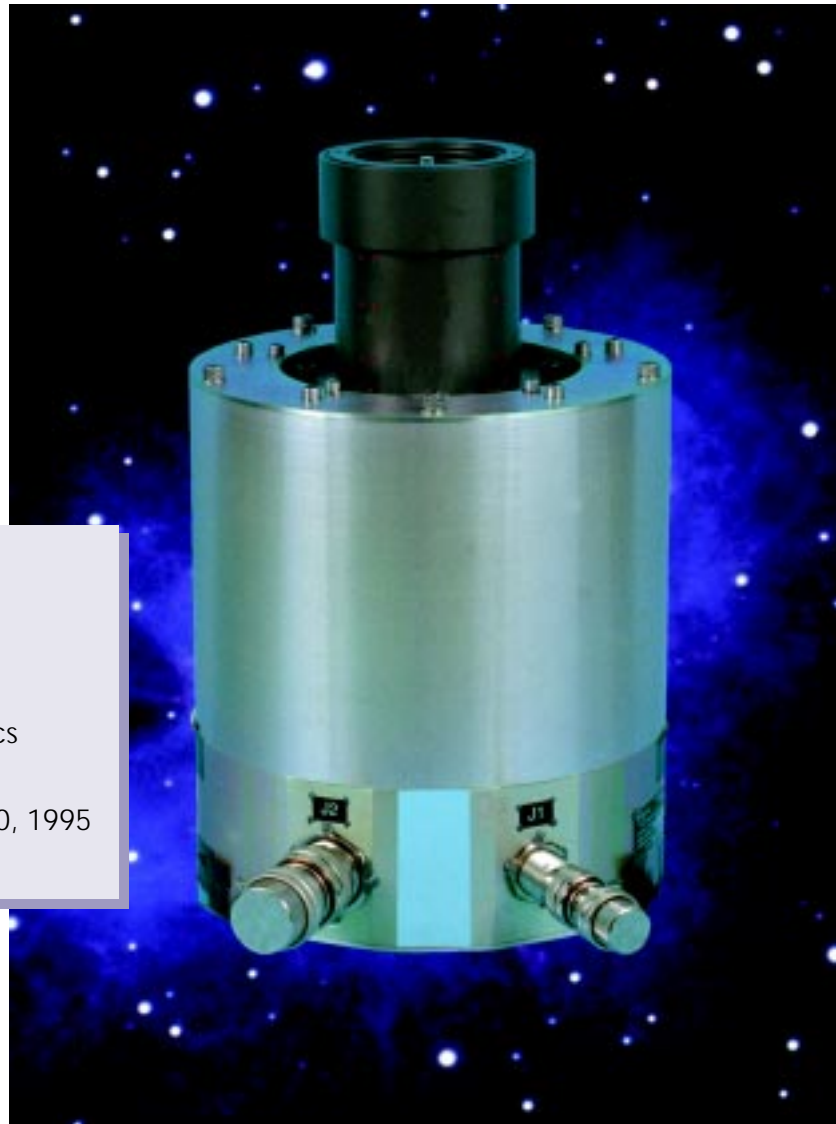
The CT-601 has logged many years in space, there have been no reported failures and all performance parameters have been met or exceeded on every mission.

The CT-601 individual parts will not sustain latch-up

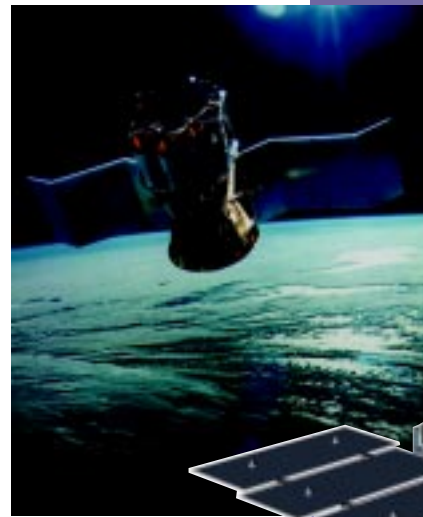
and the overall design is immune to single-event upsets.

Considerable design margin is incorporated for long-term degradation of the CCD detector from exposure to radiation, particularly protons. Ultimate sensor performance depends on orbits, radiation particle spectra and other mission dependent parameters.

- Flight proven
- LEO, MEO, HEO, GEO orbits
- Deep-space missions
- 12- to 15-year life
- Radiation-hardened electronics
- Programmable operation
- First launch date: December 30, 1995
- Readily available

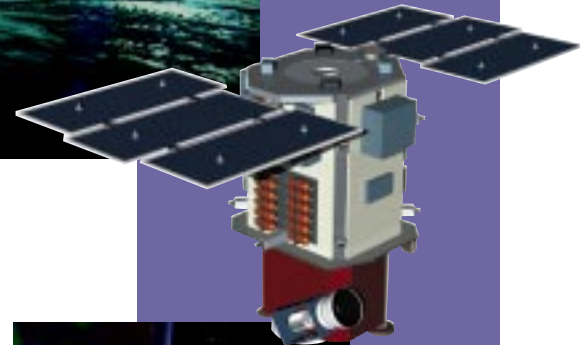


CT-601 Specifications	
Weight without shade (lb)	17.2
Base dimension (in.)	7 diameter
Length (in.)	10.9
Operating temperature range (°C)	-30 to +50
Power (at 28 V dc)	
(Average at +20 °C)	8 W
(Average at +50 °C)	12 W
Operating voltage (V dc)	28 ±6
Data interfaces	MIL-STD-1553 (standard) MIL-STD-1773 RS422 Custom
Field of view (deg)	8x8
Star catalog size	6000 (external)



SWAS

Ball Global Imaging System



XTE

CT-601 Performance^a	
Sensitivity range (M_I)	+1 to +6
Star intensity accuracy (M_I , 1 σ)	0.25
Number of stars tracked	1 to 5
Angular accuracy ^b (Full temperature range), per star coordinate, per update (arc sec, 1 σ)	3
Noise equivalent angle ^b (arc sec, 1 σ)	5
Update rate (Hz)	10
Tracking rate (deg/sec)	
Full performance	0.3
Reduced performance	1.5
Maximum acquisition time (sec)	
Full field	5
Reduced field	0.4

- a Sensor performance can be tailored to requirements via software modifications.
- b Based on a typical 5-year missions in a 96 deg, 900-km orbit. End of life (EOL) accuracy for other missions can be accurately predicted using our flight data-validated models.

The CT-601 star tracker was delivered for use on these programs: the Commercial Remote-sensing Satellite System (CRSS), the Earth Observing System (EOS), QuickBird Satellite, Submillimeter Wave Astronomy Satellite (SWAS) and the Wide-field Infrared Explorer (WIRE). It was delivered and launched on the Midcourse Sensor Experiment (MSX) program, April 24, 1996, and X-ray Timing Explorer (XTE) program, December 30, 1995.

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