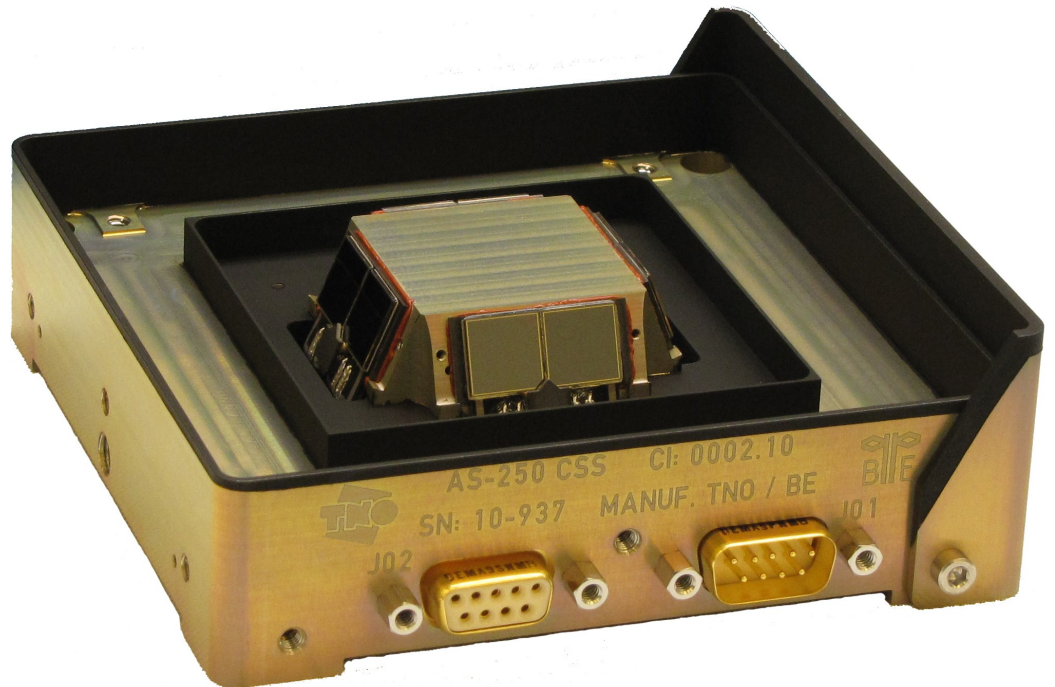




bradford

COARSE SUN SENSOR



The Coarse Sun Sensor (CSS) delivers coarse information about the position of the sun relative to the spacecraft.

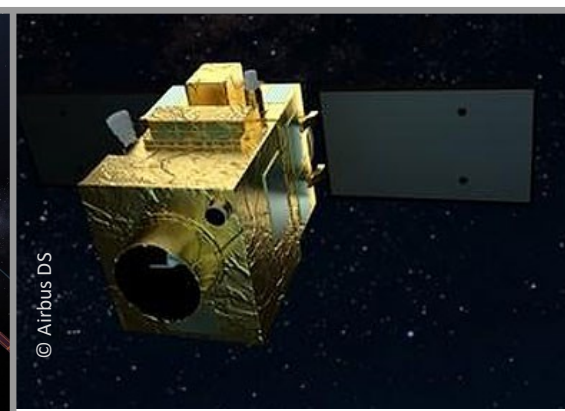
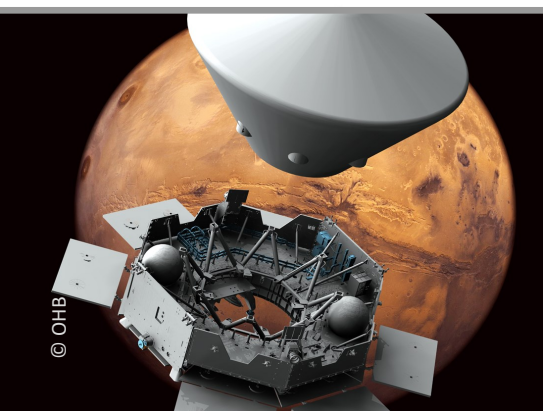
This information is used for coarse maneuvering of the spacecraft and to inform the spacecraft about the position of the sun when it is in a safe mode of operation.

The CSS is a rugged, highly reliable, self-redundant device designed to detect sunlight in potentially a hemispherical field of view (FOV). The sensor is designed to deliver individual detector outputs to the Attitude & Orbit Control Subsystem (AOCS).

This approach enables the AOCS to derive solar aspect angles for offset sun positions in a portion of the near-hemispherical FOV of the sun sensor.

Key Advantages

- Continuously in production since 1975 and applied in a variety of different applications with spacecraft in LEO, MEO, HEO, GEO, planetary and interplanetary orbits.
- Self-redundant sensor



Coarse Sun Sensor

Characteristic	Performance / Interfaces Budget
Mass per unit	Baseline (no strap-on baffle) with rear cover: 215 grams
Dimension per unit	110 x 110 x 30 mm ³ (exclusive dimensions of extensions such as strap-on baffles, bondpin and connectors)
FOV	Hemispherical: can be up to $\pm 90^\circ \times \pm 90^\circ$ Range for linear output: approx. $\pm 12^\circ \times \pm 12^\circ$ (values given for detector pyramid tilt angle of 22°).
Outputs	Analog, in voltage mode (with built-in resistors) up to about 90 mV, in current mode up to about 35 mA
Power consumption	Nil: CSS is passive
Accuracy on sensor boresight (after correction with ground-based data)	Better than $\pm 1.5^\circ$ (3 σ) on boresight (throughout mission lifetime). BOL at ambient temp. Accuracy will be better than $\pm 1.0^\circ$ (3 σ). Figures apply without albedo.
Accuracy beyond central portion of the FOV	By on-board processing of individual detector outputs offset sun position measurement is possible in larger part of the FOV (depends on choice for pyramid tilt angle) with an accuracy of better than ± 3 degrees of arc. Figures apply without albedo.
Noise equivalent angle	Negligible
Redundancy and reliability	Self redundant. Failure rate of detector "channel": 12FIT @ 60°C Four channels are needed to provide two-axis outputs
Alignment	Established with fixation holes; adjustment range $\pm 0.16^\circ$. No dedicated alignment cube incorporated in design.
Qualification temperature	-80°C to +120°C
Radiation Environment	Detectors are radiation hard (EPI technology) with 300 microns thick coverglass.

Variants of CSS Available

- 1 Pentagon Sun Sensor with 5th detector on the pyramid top
- 2 Mission specific strap-on baffles possible
- 3 Current- or voltage sensor outputs



ABOUT

Bradford is a high-tech European developer and manufacturer of satellite control sub-systems and components.

© Bradford Engineering BV • All rights reserved.

BRADFORD ENGINEERING BV

De Wijper 26
4726 TG Heerle
The Netherlands

T: +31 (0)165 305100
F: +31 (0)165 304422
E: info@bradford-space.com
W: www.bradford-space.com