

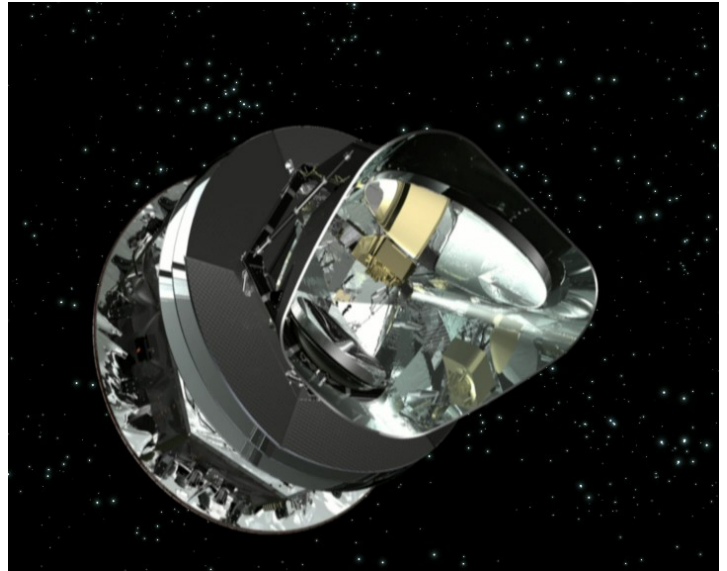


Planck Spacecraft High Frequency Instrument (HFI) Drive Electronics

The SEA designed and built 4K Cooler Drive Electronics (4KCDE) was launched into space from ESA's Kourou space port on Thursday 14th May 2009 on an Ariane 5 rocket. The 4KCDE is a critical part of the High Frequency Instrument (HFI) on the Planck spacecraft. The 4KCDE is one of several UK contributions to the Planck scientific payload funded by

Planck is a European Space Agency mission to map the Cosmic Microwave Background. The Planck spacecraft will eventually orbit the Sun approximately 1.5 million kilometres from the Earth. The HFI will look for fast variations in the background temperature of deep space. The temperature of the detectors used in the instrument needs to be extremely cold (approximately 0.1°C above absolute zero). The 4KCDE is used to control and drive mechanical coolers which cool these detectors.

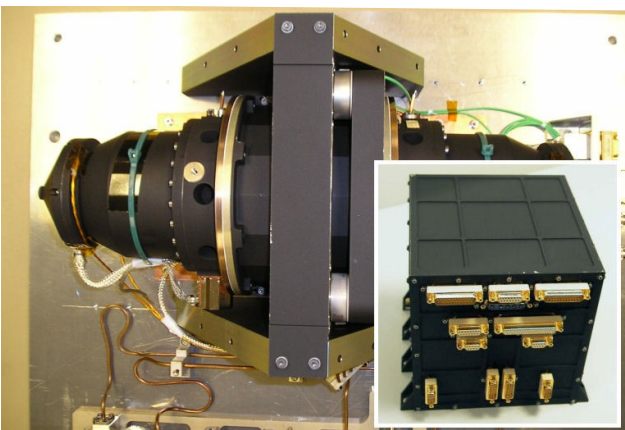
The 4KCDE is the first flight hardware which has been designed and built by the company and which has been launched into space. The 4KCDE project started back in June 2001 and the launch therefore represents the culmination of several years of work. The SEA designed electronics allows the precise control of the motions of the compressors so as to minimise the mechanical disturbance to the sensitive instrumentation on the satellite whilst achieving the required cooling that is needed. The large distances between the spacecraft and the Earth also place great emphasis on the robustness of the designs.



Planck Spececraft

The Low Frequency Instrument (LFI) is designed to convert the lower energy microwaves into electrical voltages. The High Frequency Instrument (HFI) works by converting the higher energy microwaves to heat, which is then measured by a tiny electrical thermometer. The instruments share a common telescope. Image source: ESA

The 4KCDE was one of the few items on the satellite that was active during the launch as it was actively keeping the compressors stationary during the launch vibration. The 4K system was switched on in during the evening of Thursday May 14th 2009 and is now driving the compressors for the main cooling sequence. All telemetry is reported to be nominal.



The Planck 4K cooling system also involved the Rutherford Appleton Laboratory whose Cryogenic Systems Group are responsible for the 4K cooling system as well as the Space Instrumentation Group who were responsible for certain aspects of the design of the 4KCDE.

The High Frequency Instrument (HFI) and SEA designed and built drive electronics