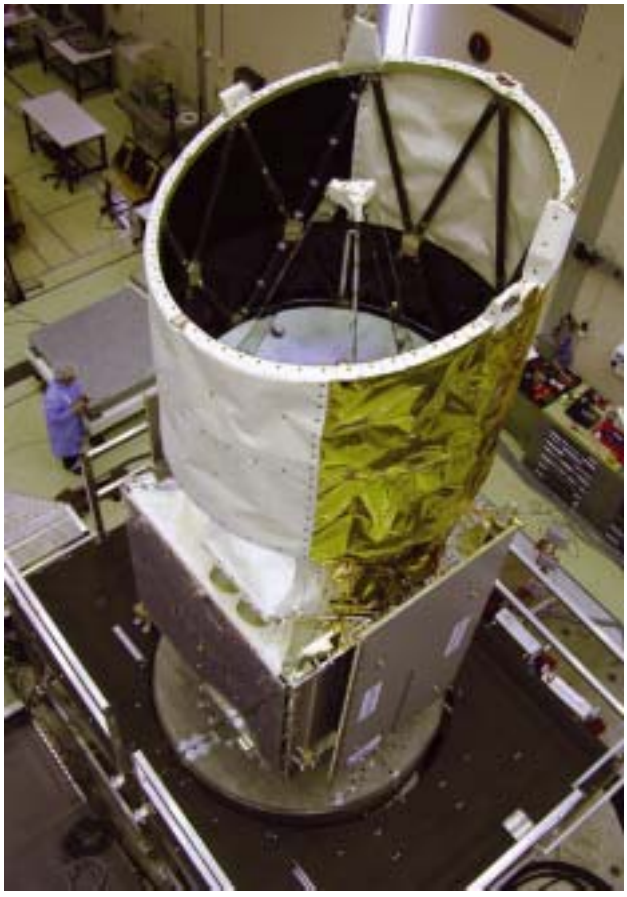
ESTEC

ESTEC Test Centre

The Automated Transfer Vehicle (ATV) was undergoing integration and verification activities in the Test Centre throughout the year. The Aeolus structural model arrived in April for mechanical testing. It was directly followed by the Herschel Service Module structural model for thermal and mass-property testing, and the SMOS Payload Module structural model for mechanical and thermal tests. After SMOS's departure in mid-July, its place was taken by the GIOVE-A flight model for a test campaign lasting until its departure for Baikonur at the end of November. Aeolus left at the end of July, making way for the thermal testing of the Herschel Payload Module structural model. In parallel, a number of smaller test campaigns were conducted on satellite equipment, instruments, antennas and solar arrays, both for ESA projects and external customers.

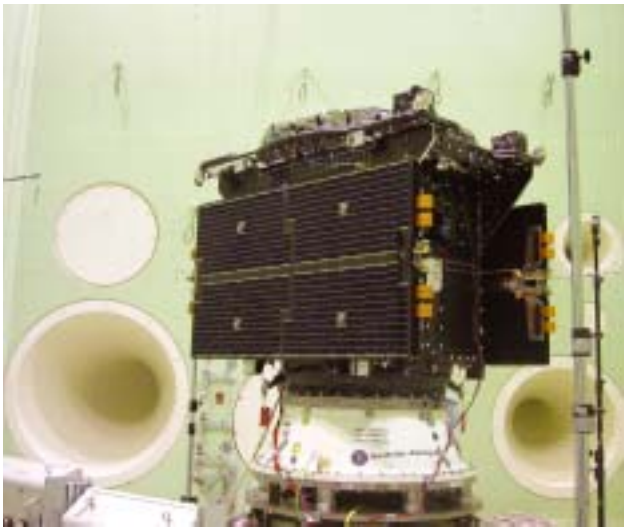


The Aeolus structural model on the Multishaker at ESTEC in Noordwijk (NL)

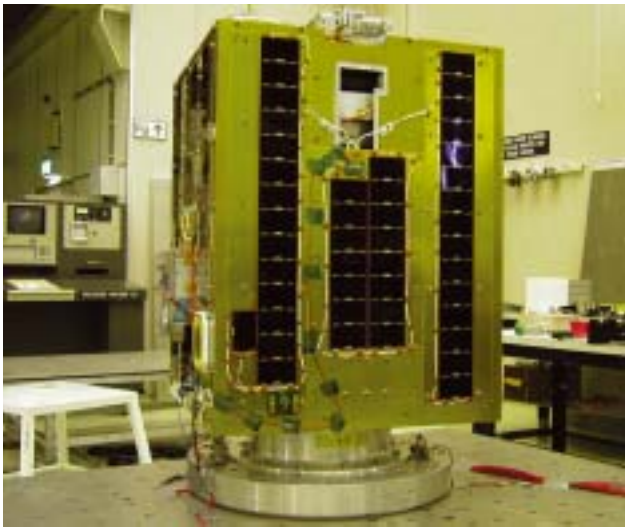
Hands-on support was provided by the Centre's Engineering Services Section for the integration and testing of the student satellite SSETI, in cooperation with the ESA Education Department. Integration and optical alignment of the flight model of the COROT telescope baffle took place in the Metrology Laboratory. A videogrammetry measurement technique with micro-cameras was developed for the Herschel-Planck project.

The installation of a new light plate for the large slip table of the Multishaker extended the latter's performance range, which now covers the excitation levels required for large antenna vibration tests and for the quasi-static testing of small spacecraft. The new large-force measurement device, allowing for an interface diameter of 2.6 m, was completed and used for the Herschel Structural Model system-level tests. The acceptance of the new mass-property measurement facility is close to completion. Refurbishment of major subsystems of the Large Space Simulator was initiated, including the control-command system and new mirror segments. The replacement of other ageing equipment will be pursued in the coming years to ensure the provision of an optimum service to the Centre's many customers.

The European Environmental Test Facility Inventory Database (EETFI) was launched on the ESA web site for the benefit of facility providers and users.



GIOVE-A in the LEAF acoustic facility at ESTEC



The SSETI spacecraft during vibration testing at ESTEC

European Coordinated Test Centres

ESA-related activities at the coordinated test centres included tests at Intespace (F) for MetOp Service Module flight model 3, at IABG (D) for the Cryosat flight model, and at CSL (B) for the Planck cryogenic qualification model.

Electrical Engineering Laboratories

Several new instruments were procured during the year to upgrade the solar-generator testing capabilities to handle the latest generation of high-efficiency, III-V compound multi-junction solar cells and panels, including new mini-flasher equipment, a large-area pulsed solar simulator and spectral-response measurement equipment.

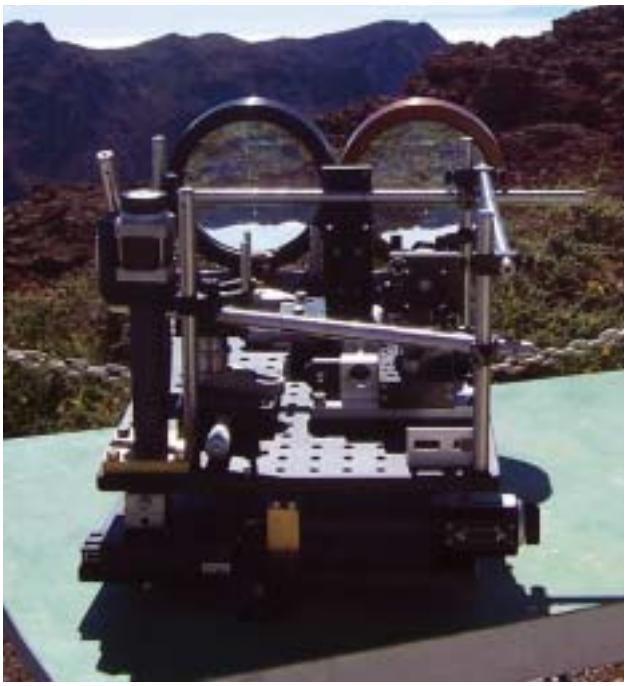
The engineering qualification model of the GSTB-V2 satellite L-band antenna array, designed and manufactured by EADS CASA Spain, was calibrated in the Compact Payload Test Range (CPTR) at the request of the Galileo Project. The purpose of the test was to verify that the antenna's performance is not degraded due to other equipment mounted on the spacecraft.

The European Navigation Laboratory (ENL) has played a key role in a number of radio-navigation-related programmes, including GOCE, MetOp, ATV, EGNOS and Galileo. The focus in 2005 was on supporting the EGNOS verification and Galileo System Test Bed (GSTB-V1 and GSTB-V2) activities, including navigation receiver and signal testing, system simulations, and monitoring of system performances. The RF signal generators that were extensively used for this purpose can simulate the signal that would be received by a mobile platform equipped with a real receiver, taking into account such aspects as host-vehicle characteristics (aircraft, ships, cars and spacecraft), satellite constellation parameters and mission profiles.

Mechanical Engineering Laboratories

The Optical Ground Station (OGS) infrastructure at Izaña in Tenerife was used to prove novel concepts for future secure space-communication systems based on the principles of quantum physics by transmitting encryption keys optically (via entangled photons) between Tenerife and La Palma. The OGS was also used regularly during the year for astronomical observations, space-debris monitoring and scientific campaigns, including the observation of the Deep Impact event on comet Tempel-1.

Engineering qualification model of the GSTB-V2 antenna under test in the ESTEC Compact Payload Test Range



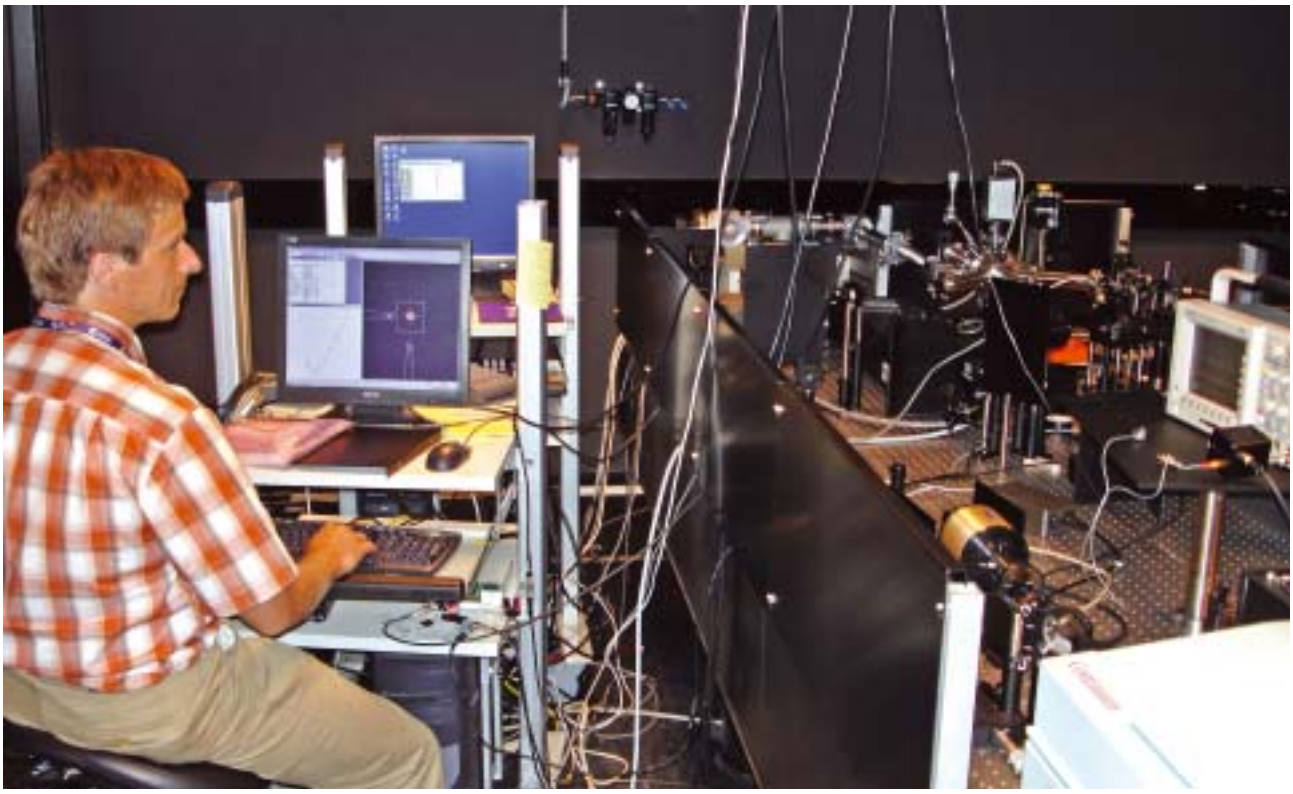
Photonic receiver aligned for encryption-key exchange between the Canary Islands of Tenerife and La Palma

Responding to the needs of the ADM-Aeolus project, a new test capability to support the development of high-power lasers for use in space was purchased. The laboratories can now perform laser-induced-damage tests on high-power optics in vacuum to investigate the performance of laser components and qualify them for space operations.

Considerable effort was devoted to the design and implementation of a new Microgravity Laboratory building at ESTEC, including a large centrifuge for hyper-gravity experiments, which is expected to be completed in mid-2006.

Several tests were performed in the ESA Propulsion Laboratory (EPL) in support of the LISA Pathfinder, Gaia, GSP and CryoSat projects.

A new Avionics System Laboratory has been set up by integrating elements from the Control, Data and Software Laboratories. This provides for an end-to-end avionics



Laser-induced damage testing under way at ESTEC

The new microgravity laboratory facility under construction at ESTEC

testbed that will allow avionics technology (software and hardware) to be validated in a representative context, thereby achieving the higher technology-readiness level required by projects. The first element of this infrastructure is the Virtual Spacecraft Reference Facility, which will be used to create a formation-flying test bench for Proba-3.

The Establishment

There were many significant changes on the ESTEC site in 2005. A major project to enhance main-entrance security was completed and the road layout was adjusted to ensure smooth and safe traffic flow. A large new office and laboratory complex to replace many ageing facilities built some 30 years ago, which also contain varying quantities of asbestos, commenced construction. A major project was also initiated in May to ensure removal of all remaining asbestos on the ESTEC site, with a commitment from Member States to fund the work needed to provide all staff with asbestos-free working conditions by 2007.

ESTEC continued to pursue a wide range of initiatives to ensure the highest possible health, safety and environmental standards. With full compliance with Dutch national regulations as its baseline, many actions were completed to upgrade infrastructure and put processes in place to mitigate any risks associated with the Establishment's core business.