



German TET-1 small satellite launched

22 July 2012

On 22 July 2012 at 08:41:39 CEST, the first small German satellite in the 'On-Orbit-Verification' (OOV) programme was carried into orbit from the Cosmodrome in Baikonur, Kazakhstan by a Russian Soyuz launch vehicle. TET-1 is a technology testbed with 11 experiments on board that will be operated in space for a year.

Eleven space technologies tested in space for one year

Conditions in space are very different to those on Earth – large temperature variations, microgravity and cosmic radiation. Components of satellites, the International Space Station and other systems must have the capacity to withstand these conditions while continuing to function reliably. As part of its OOV programme, the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) is testing space technologies under actual space conditions.

"Technologies for use in space must be reliable; otherwise, the risk inherent in employing them is too great. Verification of their performance in space is of critical importance, given the extreme environmental conditions prevalent there," stated DLR Executive Board Chairman Johann-Dietrich Wörner as he described the OOV programme, the core element of which is the TET series of satellites. "With the successful flight of the TET-1 satellite, we are in a position to enable the various organisations involved to 'qualify' their payloads directly for use in space," explained Wörner at the TET-1 launch. In the past, new technologies could only be tested on Earth. Space-related influences are many and varied; for example, high-energy particles can damage the on-board electronics of a satellite, thereby interrupting the transmission of television or mobile phone signals from space.

Bridge between ground-based testing and utilisation in space

TET-1 (Technologieerprobungsträger-1, Technology Testbed-1) weighs 120 kilograms and has a payload capacity of 50 kilograms. The DLR Space Administration appointed the space systems engineering company Kayser-Threde GmbH as Prime Contractor for the development of the satellite. The 11 experiments selected by DLR for this first mission include solar cells, navigation equipment, a camera that can be used to detect forest fires, telecommunications technologies, spacecraft propulsion systems and computer hardware. For a one-year period, TET-1 will operate in low-Earth orbit, at an altitude of 520 kilometres. After that, it will slowly re-enter Earth's atmosphere, where it will burn up.

"With the OOV programme, we are building a bridge between ground-based testing and practical applications in space," explains Christoph Hohage, Director of Space Projects at DLR's Space Administration. "We want to offer the space industry and research institutions regular, reliable and safe flight opportunities, deployable on short timescales, to make it easier to employ technologies not previously 'space-qualified' on future projects."

The 'chassis' of this small satellite, about the size of a suitcase and known as the 'satellite bus', is based on DLR's BIRD (Bi-Spectral Infrared Detection) research satellite, launched in 2001. "However, TET-1 has much greater performance capabilities than BIRD," explains Michael Turk, TET Project Manager at DLR Space Administration. "TET-1 has a greater volume and provides more space for payloads." The satellite bus was built by Astro- und Feinwerktechnik Adlershof GmbH. The DLR Institute of Robotics and Mechatronics and the DLR Institute of Space Systems were involved in the development stages. DLR's German Space Operations Center (GSOC) in Oberpfaffenhofen will be responsible for the mission operations of TET-1, while the Russian space company NPO Lavochkin was responsible for launching the satellite.

First radio contact over Spitsbergen

After launch, TET-1 first made radio contact at 10:24 CEST with the ground station in Spitsbergen. "Now our work can begin," enthused Felix Huber, Director of Space Operations and Astronaut Training at DLR Oberpfaffenhofen. Over the course of the next 12 months, the 11 different experiments will be switched on by telecommands. Data from the payloads will be received by the DLR ground station in Neustrelitz, from where it will be passed to the experimenters for analysis.

Germany's TET-1 satellite mission was made possible by funding from the Federal Ministry of Economics and Technology (Bundesministerium für Wirtschaft und Technologie; BMWi). Development and construction of the satellite cost about 27 million Euros, and about two million Euros have been invested for its mission operations.

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The Soyuz launch vehicle carrying TET-1 after launch on 22 July 2012



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Credit: DLR.

Artist's impression of TET-1 in space



Artist's impression of the TET-1 small satellite, which will verify the performance of eleven payloads under space conditions over a period of one year. Kayser-Threde GmbH developed and built the refrigerator-sized satellite on behalf of the DLR Space Administration, with the support of its subcontractors. DLR's German Space Operations Center (GSOC) in Oberpfaffenhofen will be responsible for the mission operations. TET-1 orbits at an altitude of 520 kilometres.

Credit: DLR / Astro- und Feinwerktechnik Adlershof GmbH.

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