

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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Author: Dr. Jose Sergio Almeida
The Brazilian Institute for Space Research - INPE, Brazil, jsergio@lit.inpe.br

THERMAL-VACUUM TESTING CAMPAIGN OF THE CBERS-4A SATELLITE PERFORMED AT
INPE, BRAZIL

Abstract

CBERS-4A is part of the China-Brazil Earth Resources Satellite cooperation program, as a spacecraft dedicated to remote sensing purposes. Measuring approx. 2.5m x 2.0m x 3.9m, weighing approx. 1750 kg, and carrying multispectral, panchromatic wide-scan and wide-field cameras, this satellite is expected to be put in a 778km, sun-synchronous orbit before the end of 2019 by the Chinese Long March 4 launching vehicle. As one of the critical phases of the assembly, integration and environmental testing campaign of the spacecraft, the thermal-vacuum tests are performed in order to confirm that it is able to meet performance requirements under extreme hot and cold vacuum conditions, to verify the thermal design performance and the workmanship of thermal hardware, and others. For this purpose, the CBERS-4A spacecraft was loaded into the LIT-INPE mailbox-shaped 6m x 8m Space Simulation Chamber, when a special metallic but fully vented enclosure was positioned around the spacecraft, this enclosure containing an engineered array of heating strips, designed and built in house aiming to produce thermal radiation for the heat input simulation during these flight tests of the spacecraft. This array of heating strips was powered by a set of 100 DC power supplies, programmed to deliver current to this infrared array following a specific plan of heat flux simulation profile on top of the spacecraft external surfaces, while the thermal-vacuum chamber thermal shrouds were maintained at liquid nitrogen temperature during the many days of these tests. A number of radiometers were installed at selected sections of the spacecraft surfaces aiming to measure the heat fluxes of the impinging thermal radiation. A comprehensive Data Acquisition System was used to acquire and to record a significant amount of test data in terms of temperature, heat flux, voltage, current etc. During these tests, an Electrical Ground Support Equipment was built at the side of the chamber in order to operate several subsystems and components of the spacecraft. This article presents the details and results from the Thermal-Vacuum Tests campaign of the CBERS-4A satellite.

Keywords: Thermal-Vacuum Tests, Spacecraft Environmental Tests, Space Simulation, Infrared Array