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MISSION OPERATIONS AND SOH KEEPING OF FORMOSAT-2 IN TEN YEARS

Abstract

The purpose of this paper is to summarize the mission operations and status-of-health (SOH) keeping for FORMOSAT-2 (Formosa Satellite 2) in 10 years, including 6 times of orbital maneuver. As a small satellite operated in orbit from 20 May 2004 to now, FORMOSAT-2 keeps its two unique characteristics: (1) orbiting the Earth 14 revolutions per day with daily revisit capability using sun synchronous orbit, and (2) performing Earth observation in satellite's day time and transient luminous events (TLEs) observation in satellite's night time. It carries two payloads: the remote sensing instrument (RSI) for Earth imaging in sunlight time and the imager of sprites and upper atmospheric lightning instrument (ISUAL) for scientific observations in eclipsed time. Under such fully engaged operations scenario and with a design life of 5 years, it is inevitable that the satellite encountered many anomalies, either permanent or temporary. In average, about 30 anomalies and 4.5 automatic reconfiguration orders (AROs, the ARO is a computer reset for FORMOSAT-2) occurred every year. In particular, one attitude gyro (totally four in cold redundancy) and one reaction wheel (totally four in hot redundancy) have been failed. A dark line appears in the images taken by ISUAL. Also, 6 orbital maneuvers have been performed to bring FORMOSAT-2 from its drifted trajectories back to the original deployed trajectory. This paper categorizes these anomalies and AROs. It addresses the processes of debugging and the final resolutions of most of the anomalies and AROs. Also presented are the orbital maneuvers as well as the degradations in power supply subsystem, solid state recorder (SSR), etc. In summary, FORMOSAT-2 still keeps about 70 percent of the designed functions and capabilities after 10 years.