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STATUS OF THE ADVANCED LIFE SUPPORT SYSTEM ACLS - INSTALLATION,
COMMISSIONING AND OPERATION ON ISS

Abstract

The Life Support Rack ACLS does comprise a regenerative life support system for closed habitats. With regenerative processes the ACLS covers the life support functions of CO₂ removal, oxygen generation and CO₂ reprocessing. ACLS was accommodated for installation and operation in the International Space Station's (ISS) Destiny module, which offers all interfaces needed for its extended operations. The ACLS Flight Model (FM) was launched to the ISS with JAXA's HTV7 in September 2018 and subsequently installed in the Destiny Module. In-Orbit Commissioning is in process and subsequent life support service provision to the ISS crew is envisaged to start in April 2019. Subject to preventive maintenance on Life Limited Items (LLI) the ACLS FM is qualified for an in-orbit operational period of ten years. The fully integrated ACLS Engineering Model (EM) is an integral part of the Ground Segment at AirbusDS to train the operations team but also to support on-orbit activities like troubleshooting. Besides, the EM serves for testing on the ACLS' operational flexibility beyond its design point in view of extended operations beyond the technology demonstration phase. NASA's System Maturation Team (SMT) recommended that a cumulative period of up to one year in-orbit operation of the ACLS FM may serve for demonstration of the maturity of the technologies applied in ACLS for future exploration missions. Besides heading for such technology demonstration onboard the ISS, ACLS ground operations data are being evaluated and, well respecting the requirements for future exploration missions beyond the ISS, technology enhancements and amendments to the ACLS are being developed. The paper reports on the in-orbit installation, commissioning and life support service operation status of ACLS. Furthermore, it provides an outlook on the application of ACLS technologies in future Deep Space Gateway building blocks.