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STATUS OF THE LIFE SUPPORT RACK ACLS FOR ACCOMMODATION ON THE ISS AND BEYOND

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 is being installed and operated in the International Space Station's (ISS) Destiny module, which offers all interfaces needed for its extended operations. 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. The fully integrated and tested ACLS Flight Model (FM), having passed the Consent to Ship (CtS) review with ESA in February 2018, is heading for its launch to the ISS with HTV7 scheduled for August 2018. In parallel, the ACLS ops products and associated ground segment infrastructure are being completed and validated in support of ACLS Flight Readiness. ACLS installation in the Destiny Module and commissioning are envisaged to be completed in November 2018. Subsequently, ACLS in-orbit operation serves for life support service provision to the ISS crew. Subject to preventive maintenance on Life Limited Items (LLI) the ACLS FM is qualified for an in-orbit operational period of ten years. NASA's System Maturation Team (SMT) recommended that a cumulative period of up to one year in-orbit operation of ACLS 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 summarizes the flight hardware and in-orbit installation and ops preparation status of ACLS and provides an outlook on the application of ACLS technologies in future Deep Space Gateway building blocks.