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OXYGEN GENERATION SYSTEM: RESULTS OF THE OPERATION ON-BOARD ISS AND THE DEVELOPMENT TENDENCIES FOR INTERPLANETARY SPACEFLIGHT

Abstract

The Electron-VM Oxygen Generation System (OGS) based on a water electrolysis of water with an alkaline electro-lyte circulated through the cathode and anodic cavities of an electrolyzer) is the main source of oxygen onboard the ISS from the moment of its creation and provides requirement for oxygen of crew up to 6 person. By present time in conditions of operation on-board ISS: total operating time makes 1795 day, with maximum operating time of the Liquid Unit (LU) 456 day before failure and the Signal and Command Interface Unit (SCIU) 959 day without failure; the system reworks 4706 liter of water and produced 2863 m3 oxygen (for 4772 man-day) and 5726 m3 hydrogen; it is used units (in view of nowadays working): 7 LU and 2 SCIU; the total mass of units makes 1130 kg (0,237 kg of total mass of units on production oxygen for one person in day); average power consumption is 8 W on production of 1 l of oxygen/h. PURPOSE to generalize results of operation of system onboard ??? and to develop recommendations for creation of new generation of the oxygen generation systems for the autonomous manned interplanetary spaceflight. The Electron-VM Oxygen Generation System (OGS) is the main source of oxygen onboard the International Space Station (ISS). In the paper results of comprehensive analysis of the off-nominal situations arisen at operation of system onboard station, its operating considering feature and results of subsequent ground fault detection of the OGS 005, 006, 008 and 009 are resulted and four groups of the reasons promoting occurrence and development of the off-nominal situations are allocated. The analysis of tendencies of development of systems of generation of oxygen for interplanetary flights is lead in view of restrictions and the requirements of their installation to structure of the integrated life-support system of crew defined by conditions of flight. Key technologies for OGS development on the basis of results of the conducted out analysis are certain.

CONCLUSIONS: 1. Results of long-term operation of the OGS on-board ISS are examined. 2. The basic restrictions and requirements for new generation OGS development are formulated. 3. Key technologies for its creation are certain.