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PERSPECTIVE AUTOMATED CONTROL SYSTEM FOR A COMPLEX OF REGENERATIVE LIFE SUPPORT SYSTEMS OF THE CREW OF THE SPACE STATION

Abstract

For an effective automated control system (ACS) design for the complex of life support systems (CLSS), a complex multi-criteria optimization problem should be solved. The paper proposes to divide the set of criteria into three groups. In each group are not conflicting criteria. For every group a generalized global criterion is selected. There are three criteria: survivability, cost and comfort. PURPOSE. The problem of ACS for CLSS is divided into three stages of optimal decisions determining: by the structure, by the choice of technical support and by the software design. Each of these problems is solved with its global criterion. Other criteria have its limits. APPROACH. From the first two stages of the creation of ACS should the need for a distributed control system with a common interface. The third phase is proposed to use a combined control algorithm based on the error and the disturbance, and additionally to introduce a special control loop that takes into account the number of crew members. For CLSS is considered control of technical state and observability of the system. The paper considers the possibility of using functional duplication and advantages of this method of parameters control. CONCLUSIONS. 1. The system approach to the design of ACS of CLSS on the basis of generalized global criteria is offered. 2. The need for a distributed control system for CLSS is shown. 3. A perspective algorithm of ACS is offered for air revitalization system of the Russian segment of the International space station. The application of this control algorithm for the Russian oxygen generating system "Electron-VM" is discussed in detail.