

HUMAN SPACEFLIGHT SYMPOSIUM (B3)

Flight & Ground Operations of HSF Systems (A Joint Session of the Human Spaceflight and Space Operations Symposia) (4-B6.5)

Author: Mrs. Natalia V. Mishurova

S.P. Korolev Rocket and Space Corporation Energia, Russian Federation, trigonella@mail.ru

Dr. Sergey V. Solovyev

S.P. Korolev Rocket and Space Corporation Energia, Russian Federation, sergey.soloviev@scsc.ru

AUTOMATED CONTROL SYSTEM OF SPACESHIP STATUS IN FLIGHT

Abstract

The article describes proposition to enhance current flight control process of the Russian Soyuz and Progress spaceships. To date this process highly depends on Lead operation control team and doesn't use advantages, that is given by automated control system (ACS). Considerable experience in flight control process, Russian specialists in lead control team got over the last decade, allows to get clear view on disadvantages of control process, which is used at that moment. These disadvantages are: - presence of control operations that are performed manually; - limited analyzing ability of flight control process; - lack of automated forecasting for spaceships technical conditions; - technical limitations of displaying information for operator station; - limited information support for operator. Safety of spaceship crew and accomplishment of flight objectives heavily depend on efficiency and reliability of flight control process. Control process can be performed by three branches of management: - ground management, performed by the Lead operations control team; - spaceship management, performed by the crew; - onboard automated management performed by onboard control system. The article describes in details the algorithms for status control process carried out by the lead operations control team and changes in it in case of using ACS, considers problems arisen and ways of their solution. The main advantages of ACS are following: - reducing duration of decision making; - increasing quality of flight control process; - increasing flight safety. Automated control of flight operations fulfillment could be achieved by creating and installing control system software on ground hardware. Unlike onboard hardware, it has far more resources for analyzing and controlling, so there is practically no limitations for complexity of algorithms. The article also considers prospects of the using ACS in future missions of Soyuz and Progress spaceships.