

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
How Can We Best Apply Our Experience to Future Human Missions? (2)

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DEVELOPMENT OF THE SPACECRAFTS ONBOARD CONTROL SYSTEMS: ON THE EXAMPLE
OF THE ISS RUSSIAN SEGMENT

Abstract

Presently the International Space Station (ISS) designed by the broad international cooperation is operating in the Low Earth orbit. The ISS consists of two segments - Russian (RS) and American (USOS). Modules of the other international Partners are integrated into these two segments. The integration of the station modules and ISS control are implemented by the Onboard Control System based on Russian and American Onboard Control Systems. ISS RS Control System was designed as a centralized system. The Onboard Control System includes Onboard Computer System, Guidance, Navigation Control (GNC) System, Onboard Equipment Control System, Command Radio Link and Radio Telemetry System. It was for the first time that the orbital station was equipped with the Integrated Onboard Computer System, which made it possible to solve the following important tasks: (1) coordinated station control in the ISS modes; (2) integration at the level of the station onboard systems. The most complete integration is achieved in GNC System; (3) ISS monitoring and control by the crew; (4) stable ISS control from the MCC-M and MCC-H, etc. European cargo vehicles ATV (2008, 2011), new generation cargo spacecraft "Progress M-01M" and crew transport spacecraft "Soyuz-TMA", Mini Research Module 1 (MRM 1) (2010), Mini Research Module 2 (MRM 2) (2009) and Multipurpose Laboratory Module (MLM) (2013) are being integrated into the Russian Segment in accordance with the developed principles. The RS ISS Onboard Computer System will allow integrating these modules into the ISS RS and will give the crew and MCC the possibility to control the onboard systems of these modules. RS ISS Onboard Control System is designed and implemented as an open system that may evolve its capabilities depending on the station assembly phase. The paper systematizes relevant tasks of main principles of the ISS RS Onboard Control System with the main purpose to increase the segment's utilization efficiency.