

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
Space Stations Assembly and Operations (3)

Author: Prof. Evgeny Mikrin

S.P. Korolev Rocket and Space Corporation Energia, Russian Federation, eugeny.mikrin@rsce.ru

Mr. Sergey Moiseev

S.P. Korolev Rocket and Space Corporation Energia, Russian Federation, Irina.Dunaeva@rsce.ru

Mr. Vladimir Garshin

S.P. Korolev Rocket and Space Corporation Energia, Russian Federation, Vladimir.Garshin@rsce.ru

Dr. Platonov Valery

S.P. Korolev Rocket and Space Corporation Energia, Russian Federation, Valery.Platonov@rsce.ru

DEVELOPMENT OF THE ISS INTEGRATED CONTROL SYSTEMS. CHALLENGES AND
EXPERIENCE

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 Complex based on Russian and American Onboard Control Complexes.

ISS RS Control Complex was designed as a centralized system. The Onboard Control Complex includes Onboard Computer System, GN&C System, Onboard Equipment Control system, Command Radio Link, 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 GN&C System.
3. ISS monitoring and control by the crew.
4. Stable ISS control from the MCC-M and MCC-H, etc.

Assembly of the ISS RS is in progress.

ATV - European cargo vehicle - is being integrated into the Russian segment in accordance with the developed principles. For the first time in the world the rendezvous is to be performed by relative navigation. As part of the station ATV will use its onboard systems to solve the following tasks: station attitude control, re-boost, gyro desaturation, refueling of the propulsion system with the propellant delivered from the Earth, delivery of water and different gasses and waste disposal.

The next modules to be integrated into the ISS RS are: Russian Mini Research Module 1 (MRM 1) (2010), Mini Research Module 2(MRM 2) (2009) and Multipurpose Laboratory Module (MLM) (2011). They will provide for the extension of the ISS RS resources, such as docking ports, additional habitable volume, utilization work stations, pressurized volumes, station re-boost by MLM thrusters. The RS ISS Onboard Computer System will allow to integrate MRM 1, MRM 2 and MLM into the ISS RS and will give the crew and MCC the possibility to control the onboard systems of these modules.

Along side with the development of the new modules we upgrade Progress cargo and Soyuz crew vehicles to switch to the new level of onboard and ground means. RS ISS Onboard Control Complex is

designed and implemented as an open system that may evolve its capabilities depending on the station assembly phase.