

SPACE OPERATIONS SYMPOSIUM (B6)
Human Spaceflight Operations Concepts (1)

Author: Ms. Tatiana V. Matveeva
Korolev RSC Energia, Russian Federation

SPECIFIC FEATURES OF TRANSPORT OPERATIONS PLANNING IN CASE OF INCREASING
NUMBER OF TRANSPORT VEHICLES**Abstract**

Coming up to its complete configuration the International Space Station (ISS) requires increasing support of transport vehicles. At present time there are from 3 to 6 transport vehicles continuously attached to the ISS. For example, on March 1, 2011, 2 Russian Soyuz manned vehicles and Russian Progress cargo vehicle, American Space Shuttle orbiter, European ATV automated transfer vehicle and Japanese HTV cargo vehicle flew together with the station. Number of Russian transport operations also increased much. For example, in October 2010 there were 5 Russian transport vehicles in space simultaneously.

Under these circumstances it is very important to understand problems and specific features of mission planning provided for several transport vehicles simultaneously. It is clear that increase of their number will cause corresponding numerical growth: -whole number of transport vehicle operations in orbit will increase, -the scope of the command and program data transferred to the orbit and telemetry received from the vehicles will grow, -the scope of activities of different control teams and supporting services will increase.

However, to investigate the whole problem it is not enough to mention only numerical changes. There are some qualitative things to be considered and solved. Among them there are the following: -need to consider not only work of the separate transport vehicles but also specific features of their joint operation, -need to allocate different control facilities for several vehicles, -appearance of many restrictions requiring development of new methods, modeling facilities, software, etc., -initiation of new tasks and operations of transport vehicles (for example, management of the handover of equipment, data, documentation when the transport vehicle is replaced by next one; ensuring of emergency departure of several vehicles from the station within short time, etc.).

In case of upgrading or new modifications of the transport vehicles, the mission control process is especially complicated as the control of several similar but not identical transport vehicles is very difficult. In 2008-2009 Russians made a transfer to new modification of transport cargo vehicles (Progress M-M). Currently new Soyuz TMA-M manned vehicles change the previous Soyuz modification.

The paper presents analysis of the specific features of mission control when several transport vehicles are attached to the ISS or fly separately; organization of planning and execution of operations of several transport vehicles including basic planning phases, work of control teams, approach to off-nominal situations overcoming.