

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

Author: Dr. Rafail Murtazin
Rocket Space Corporation Energia, Russian Federation, Rafail.Murtazin@rsce.ru

Dr. Nikolay Petrov
Rocket Space Corporation Energia, Russian Federation, Nikolay.Petrov@rsce.ru

SHORT PROFILE FOR OF THE HUMAN SPACECRAFT SOYUZ-TMA RENDEZVOUS MISSION TO
THE ISS

Abstract

Reduction of flight duration after insertion till docking to the ISS is considered. In the beginning of the human flight era both the USSR and the USA used short mission profiles due to limited life support resources. The duration of the mission was usually 1-5 revolutions. The short-term missions were provided due to the predefined launch profile of two rendezvousing spacecraft, which required specific relative position of the spacecraft or phase angle conditions. After the beginning of regular flights to the orbital stations these requirements became difficult to fulfill. That is why it was decided to transfer to one or two-day rendezvous profile. The long stay of a crew in a limited habitation volume of the *Soyuz-TMA* spacecraft before docking to the ISS is one of the most strained parts of the flight and naturally cosmonauts wish to dock to the ISS as soon as possible. As a result of previous studies the short four-burn rendezvous mission profile with docking in a few orbits was developed. It is shown, that the current capabilities of the *Soyuz-FG* launch vehicle and the *Soyuz-TMA* spacecraft are sufficient to provide for that. The first test of the short rendezvous mission during *Progress* cargo vehicle flight to the ISS is planned for 2012. Possible contingencies pertinent to this profile are described. In particular, in the majority of the emergency cases there is a possibility of an urgent transfer to the present two-day rendezvous profile. Thus, the short mission will be very flexible and will not influence the ISS mission plan. Fuel consumption for the nominal and emergency cases is defined by statistical simulation of the rendezvous mission. The qualitative analysis of the short-term and current two-day rendezvous missions is performed.