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JEMRMS GROUND CONTROL AND CREW OPERATIONS

Abstract

JEMRMS was assembled to JEM Pressurized Module (JPM) and launched on ISS Flight 1J (STS-124) in 2008. It has been used by the onboard crew members for a wide variety of operations, such as handling H-II Transfer Vehicle (HTV) Exposed Palette (EP) or Exposed Payloads. These operations have been often conducted in proximity to various complex external features on JEM Exposed Facility (JEF). JAXA Robotics Operations Team, KIBOTT (JAXA Flight Controller, Robotics Operations Team), has brought various JEMRMS operations by crew such as initial deployment from the JEM Pressurized Module (JPM) in the Flight STS-124 1J, payload transfer in the Flight STS-127 2J/A, HTV1 and HTV2 to a successful conclusion working around a variety of challenges.

On the other hand, it has been a recent problem that there is not sufficient onboard crew time for the ISS system and science operations. Thus KIBOTT started the preparations and implementations of JEMRMS ground control (GC) operations with engineering team in 2010 to make an effective use of the onboard crew time for other ISS operations. In the end, KIBOTT has successfully completed all four JEMRMS GC demonstrations including maneuvers in auto mode increasing maneuver distance and rate gradually, emergency stop functionality during the coarse rate maneuver and contact operations in the proximity etc. in December, 2011. Also they completed the real time operations (demonstration 4) applying the element operational technology proven through the previous three demonstrations. JEMRMS was ground controlled in the demonstration 4 to transfer an unoccupied EP to hand it off to the Space Station Remote Manipulator System (SSRMS) for insertion to the HTV3 during the flight HTV3. Since these demonstrations, the JEMRMS ground control has become normal and subsequent operations has been mainly conducted by the ground.

In this paper, we present the commonalities, differences and advantages/disadvantages between the crew operations and ground control operations based on perception and knowledge obtained through our JEMRMS operations.