IAF SPACE OPERATIONS SYMPOSIUM (B6)
Mission Operations, Validation, Simulation and Training (3)

Author: Mrs. Emelyne RENARD
CNES, France

Mr. David-Alexis Handschuh
Centre National d'Etudes Spatiales (CNES), France
Mr. Norbert Lidon
CNES, France
Mr. Frederic Masson
Centre National d'Etudes Spatiales (CNES), France
Mr. Jérome DEHOUVE
CNES, France
Mrs. Nathalie DETHIENNE
CNES, France
Dr. Elisabet Canalias
CNES, France
Mrs. Noémie Maury
ArianeGroup, France
Mr. Maxime FOURNIER
ArianeGroup, France
Mr. Pierre LEROUX
ArianeGroup, France
Mr. Damien GILLE
ArianeGroup, France
Mr. Alexis MACAIRE
Arianespace, France
Mr. Jean Campedelli
ALTEN, France
Dr. Florian Renk
European Space Agency (ESA), Germany
Mr. Dario SCOCCIMARO
ESA - European Space Agency, France
Mr. Daniel De Chambure
ESA, France

JWST'S ARIANE 5 UPPER STAGE ESCAPE MANEUVER: FROM CONCEPT TO SUCCESSFUL OPERATIONAL IMPLEMENTATION

Abstract

December 25, 2021 was an important day for international space cooperation: it saw the launch by Ariane 5 of the largest and most ambitious space telescope ever designed: the James Webb Space Telescope. The fruit of many years of work resulted in the perfect launch of the telescope to its working

orbit close to the L2 Lagrangian point of the Earth-Sun system.

The targeted L2 orbit could have undesirable consequences on the launcher's orbit evolution after JWST separation. In order to minimize the risk of a random reentry on Earth of the upper stage and thus to protect the populations on ground, a specific orbital maneuver of the upper stage has been designed. Its aim was the escape of the upper stage taking into account vehicle constraints (such as the impossibility of full re-ignition) and JWST protection (such as non-collision and non-pollution).

The development of this maneuver was started more than 6 years ago by all the teams in the Ariane world: CNES, ESA, ArianeGroup, Arianespace, etc, in a joint and shared repartition of responsibilities. This development began with theoretical studies of space mechanics to study the principle of an escape disposal mission of the upper stage with Ariane 5 but it also posed operational application questions on a launcher, required flights demonstrations and the use of flights feedback. The article proposed here will show all the aspects of this cooperation turned toward the success of this unprecedented operational strategy and will detail the maneuver carried out after exposing studies and experiments that led to its definition. Finally it will present a restitution of the maneuver impact on the future of the upper stage of this extraordinary Ariane 5 flight VA256-JWST.