

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – missions current and future (3A)

Author: Mr. Carlo Cassi
Thales Alenia Space Italia, Italy

EXOMARS 2016 MISSION: READY FOR LAUNCH

Abstract

Comprising two missions that will be launched to Mars respectively in 2016 and 2018, ExoMars will address the outstanding scientific question of whether life has ever existed on Mars and demonstrate key technologies for entry, descent, landing, drilling and roving on the Martian surface.

For the 2016 mission the integration and testing of the Trace Gas Orbiter (TGO) and the EDL Demonstrator Module (EDM), named Schiaparelli, was completed and the two modules sent to Baikonur for the launch campaign on mid-December 2015, where the Combine Operation with the launcher terminated on schedule for a launch at the beginning of the launch window ranging from March 14th to 25th.

Launch takes place on-board a Proton-Breeze M launcher departing from Baikonur. During the 7 months Cruise phase the TGO Main Engine is activated around end July to perform the Deep Space Manoeuvre; on completion of the DSM a review (MEARR) is held by ESA with Industry participation to verify the system readiness to arrive at Mars. A second small DSM adjustment firing and two Trajectory Correction Manoeuvres are planned after the DSM1 during the Cruise.

The preparations for EDM release and MOI start at the end of September; just two days before separation a final TCM to compensate the delta-V of the EDM separation is performed. The EDM release is exactly planned on October 16th at 14:42 UTC; on 17th at 2:42 the TGO effectuates an Orbiter Retargeting Manoeuvre to avoid colliding with Mars, and two days later, at 13:09, the large delta-V Mars Orbit Insertion.

In parallel the EDM runs along its three days coast phase to encounter the Mars atmosphere on March 19th at 14:42, followed by the Entry Descent Landing phase, lasting about 6 minutes and ending on the Mars surface at Meridiani area (2.05 West longitude, 6.1 South latitude).

While the TGO flies around its first 4-sol orbit around Mars, the EDM accomplishes its mission, sending the EDL back-up data to a NASA relay orbiter flying over its landing site and activating its meteorological station (DREAMS) for a period of 2-4 sols.

The purpose of this paper is to provide an overview of the ExoMars 2016 mission with details of the environmental and functional testing of the EDM and TGO modules, which was performed in the year 2015, together with the outcomes of the early flight phase until DSM.