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Author: Dr. Robert Zubrin
Pioneer Astronautics, United States, zubrin@aol.com

MARS DIRECT 2.0 HOW TO SEND HUMANS TO MARS USING STARSHIPS.

Abstract

The ongoing revolution in space launch has radically improved the prospects for the exploration and settlement of Mars. In particular, the rapid development of the Starship system by SpaceX is offering the near term availability of a fully reusable heavy lift booster that also has the capability to transport large exploration missions and considerable numbers of immigrants to the Red Planet.

In this talk we will examine potential utilization of the Starship to support Mars exploration, base building, and colonization. Various options for its operation, including Earth to LEO delivery, LEO to trans-lunar injection (TLI) delivery, and one way and round trip transportation to and from Mars will all be considered. We will also examine infrastructure on Mars enabled by the Starship, and power and other local resource utilization requirements generated by the Starship in its various potential modes of operation. It is shown that the optimal use of the Starship is to refuel it on orbit to send heavy payloads to TLI, which then stage off the Starship to go to trans-Mars injection, while the Starship returns to LEO, allowing it to be reused within 2 weeks, instead of the multi-year delay on reuse entailed by sending it all the way to Mars and back. An optimal plan for using the Starship to enable the exploration and settlement of Mars will then be presented.