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Architecture for humans in space: design, engineering, concepts and mission planning (1)

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WE ARE ON MARS! HOW DO WE FIX OUR HABITAT?

Abstract

After having dealt with the launch system that will take us to Mars, all the systems safety, funding, political and ethical aspects, we are finally on Mars. We have a habitat that we have sent in a precursor mission, and it is waiting to be occupied by humans. As in any recently purchased house, there is always something to fix or improve. This paper presents the results of the first ever refit mission in simulation conducted at the Mars Desert Research Station by Crew 155 “First Engineers”. The discussion is made in a parallel method, where the engineering tasks given to the crew are explained, the challenges that resulted from performing them in simulation being inside the habitat and outside during EVA, and the lessons learned from those activities put in a perspective of a future settlement on Mars. Some of those tasks included engineering airlock deck construction, tunnels from the habitat to the green habitat and observatory, electrical system tracing of lights and outlets to the AC Breaker Panel, among others. All these tasks were hard to accomplish given the circumstances of the simulation, yet it provided good feedback on what should and should not be done in an actual mission to Mars or any other deep space mission. This includes habitability design and human factors integration within this Mars analogue habitat. Furthermore, as the first refit mission in simulation, having the right tools and materials, we proved that doing this is challenging yet possible.