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Life Support, habitats and EVA Systems (7)

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A NEW MODULAR SPACE HABITAT - FORMED BY FUNCTION - FUNCTION BY DESIGN

Abstract

Three years ago, our vision was a private capsule for every astronaut that modulates the various physiological systems of the human body while also catering to the mind of the passenger with an emphasis on reducing physical and psychological stress during the missions. By the input of physiological measurements and deductions of the needs for long term space travel some models were developed together with Airbus Defence and Space to fuse that vision with the technical requirements of a functioning space ship. Confined space on a spaceship has to provide privacy and quietness as well as room for team work and crew meetings. The first part goes hand in hand with improving sleep quality and extending sleep duration and thereby the circadian rhythm, creating a short “hibernation” effect. Based on the knowledge that physical reparations and antioxidant levels are dependent on sleep and the circadian rhythm it has been planned to influence sleep and recovery phases and onset using known physiological effects including medication, CO₂ blood levels, light stimulation and thermic stimulation. Those concepts are based on our technologies and experiments in system biology, molecular modelling, classical physiology and clinical research on hypothermia. And they were integrated in the structural concept of the space traveller’s habitat construction. This construction has to be training instrument, providing artificial gravity and a pleasant place to live. The personal area has to be equipped with an automated system to train the astronaut’s body and mind and reduce the daily stress based on our applied research on the ISS, the Antarctic Stations and in clinical trials. But it will also be the astronaut’s tiny private area with his own communication system, and his private virtual entertainment area designed following the latest design of modern aircraft interior. We will present preliminary tests on physiological experiments, sensor miniaturization, as well as earlier and latest construction plans for this habitat and our aims for the future in cooperation with Airbus Defence and Space.