Challenges of Life Support/Medical Support for Human Missions (8)
Challenges of Life Support/Medical Support for Human Missions (2) (2)

Author: Mrs. Maja Tommerup
Danish Aerospace Company A/S, Denmark

EXPLORER'S ENDURANCE FOR MOON, MARS AND BEYOND

Abstract

Humans wish to expand the exploration of space. Our journeys now go beyond low Earth orbit and out to the Moon and in the future to Mars. To insure muscular, bone and cardiovascular stimulants during the extensive time spent in microgravity during travel and stay, a small and flexible exercise devicse is needed.

E4D (European Enhanced Exploration Exercise Device) is built under European Space Agency (ESA) funding and based upon more than 30+ years of DAC experience with exercise and medical hardware in space. It is a compact and versatile exercise device which is developed to ensure, that human space explorers will be fit to land and work on other planets and stay fit so they eventually can return safely to Earth.

E4D is a compact device that supports cycling, rowing, resistive exercises and rope pulling all-in-one. Exploration of other celestial bodies introduce various magnitude of gravity and to support these E4D can simulate this during exercise which can be used to prepare for work conditions on e.g. the Moon and Mars, and eventually for the return to Earth.

An E4D ground version has been build and extensively tested at Johnson Space Center with great success for a six weeks period. It was tested by a total of twenty five subjects of which fourteen were flown astronauts and included one third of NASA's active astronauts. The evaluation of the test shows that E4D is suitable for deep space exploration and its flexible design is capable of offering both great aerobic and anaerobic exercise.

The next step is to develop a flight system that can be tested on the ISS to better understand the exercise needs of future crews, training protocols, as well as gaining experience operating such a flexible exercise system in microgravity in an operational environment.

E4D can be modulated and adapted for future exploration where transport or landing vehicles have limited space and may not need all of E4D's exercise configurations. E4D is a strong companion for future space exploration and can ensure explorers endurance for work on the Moon, Mars and beyond.