

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)  
Human Mars Exploration (2)

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INVESTIGATION ON CYCLER STRATEGIES TO ESTABLISH A CONTINUOUS HUMAN  
PRESENCE ON MARS**Abstract**

The human continuous presence on Mars is a complex undertaking, an enterprise that will underline the potential of humans to leave our home planet and make the whole humanity conscious of its own power. Though just a small step on a cosmic scale, it will be a significant one for humans because it requires to leave Earth for a long time and needs global conscience and efforts. Since this is a real complex and expensive task, this paper will present the possibility to use a Cycler approach to reach such an incredible achievement.

Moreover, the advantages of adopting this profile, such as short transit times, comfortable and safe environment, are deeply analysed. Indeed, the system no long needs to repeatedly accelerate and decelerate taking advantage of the inexhaustible “fuel supply” of gravitational forces to adjust the orbit discarding the most large and expensive injection propellant requirements of traditionally conceived human Mars vehicles.

This mission design is based on two spacecraft in elliptical orbits around the Sun, called “free return” trajectories, a special type of orbit that ensures a reencounter again Earth after Mars. By having twin Cyclers orbiting between Mars and Earth, one with the fast leg to go to Mars while the other with the fast leg to return to Earth, it would be possible to have a sort of “spaceway” between the two planets. Furthermore, this architecture allows to have large orbiting facilities, similar to a space stations, that can provide all power, life support, living and work space, gravity environment, and solar storm shelter to be “launched once”, instead of every times. The transportation phases will be provided by another smaller and lighter spacecraft.

Reliable, reusable and dependable Cycler transportation can be the key to carry humanity into the next great age of exploration, expansion and settlement.