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SORTIE LANDER HABITABLE MODULE ARCHITECTURE

Abstract

When humans go to Mars, asteroids, or even back to the Moon, they will require a Sortie Lander to support the crew and keep them safe. At a minimum, this Sortie Lander will perform the functions of the Apollo LM. New mission operations, longer surface durations, longer times in-space, and more complex mission architectures will require improvements over the Apollo LM paradigm.

Before the President cancelled the Constellation Program, the author was well along with developing a configuration for the Altair Lunar Lander, and published four papers on it (see references below). Constellation's distinctions between Sortie, Outpost, and Cargo lander created a degree of confusion, but regardless of whether the mission architecture would be Outpost- or Sortie- first, there would always be a need for the Sortie scenario. Furthermore, it would be an easy and obvious extension from this effort to asteroid and Mars landers – the only difference being the differences in the gravity field. All the key functions are essentially the same, and it really should not matter whether it is labeled for one body in space or another.

The associated Crew Productivity Study developed a set of rigorous criteria to evaluate the effects of configuration design decisions upon crew safety and productivity. By applying these criteria, it was possible to perform a trade and analysis on the habitable module configuration that took the universe of 120 possible permutations down to five configurations that complied.

This paper takes the Sortie Lander configuration design process one step further, to down-select the best one of those five and explicate it to show how it can adapt easily to different missions and gravity regimes. This down-select configuration provides an ascent module, habitat module, airlock, and connective elements to create an optimized design for the habitable module design and organization.

References:

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