Article: Lockheed Martin – Mars Base Camp

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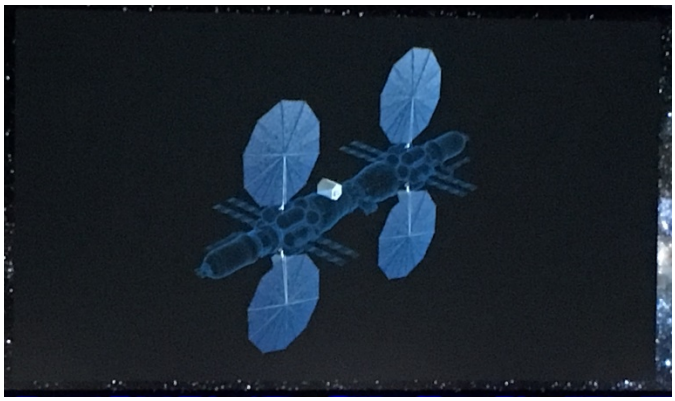
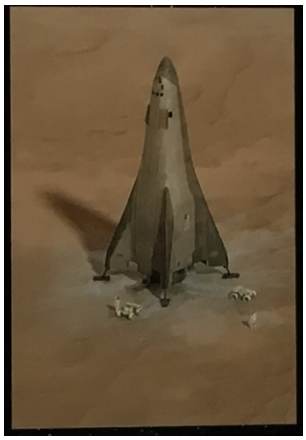
"The time is now." First announced at the 67th International Astronautical Congress (IAC), Lockheed Martin has unveiled additional details of the Mars Base Camp (MBC) during Late-Breaking News 1 on the final day of IAC 2017 in Adelaide, Australia. This presentation covered a thorough examination of the key hardware components of the thousand-day mission, as well as the ideas which contextualise this blueprint as part of the wider vision for space exploration set by the National Aeronautics and Space Administration (NASA).

The spacecraft contains two of nearly every major system to enhance redundancy. There are four main sections which compose the vehicle, described by Advanced Programs Exploration Architect, Danielle Richey:



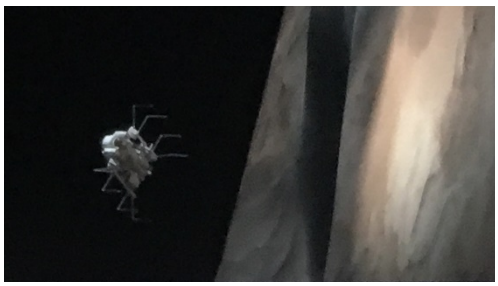
- Four large commercial solar arrays for electricity generation to power the spacecraft.
- Two cryogenic propulsion stages and two tank farms to store the liquid hydrogen and liquid oxygen fuel.
- Two habitats and a single living space for the six-astronaut crew to eat, sleep and exercise.
- Two Orion modules which contains the necessary equipment to perform Mars exploration whilst in orbit. This section improves reliability of the orbiter and allows for safe transportation back to Earth.

Further elaborated during this announcement were the ways to explore Mars, specifically the Mars lander and the Spider Flier-Walker suit.



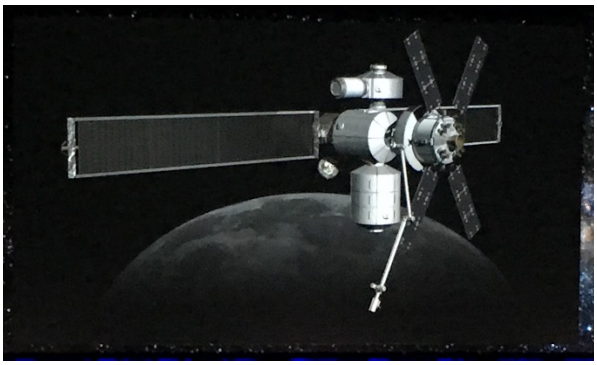
Program Strategy Lead for Orion Production, Robert Chambers, described the lander as "…single-stage [and] completely reusable… which will be able to both descend and ascend." It is planned that Mars will have a "water-based economy" and so hydrogen will be used to fuel the vehicle.

There are also plans for a rocket-powered, eight-legged suit to explore Phobos and Deimos. This is a cost-effective way to probe the low gravity environment of both moons, ensuring safety of the astronaut by enabling a soft landing and then keeping them on the surface while working.



What makes this architecture a relatively credible approach to Mars exploration is the logical sequence of missions to test and evaluate the systems incrementally, summarised by Space Exploration Architect, Tim Cichan.

Exploration Mission (EM) 1 will see an unmanned Orion launched by the Space Launch System (SLS) for a three-week orbit around Earth to ensure all systems operate safely. EM-2 will be the first manned flight of Orion, and the SLS will also carry the first element of NASA's Deep Space Gateway (DSG), the power and propulsion module, to begin construction. EM-3 to EM-5 will involve the delivery of other key components to further develop DSG; the habitat, logistics and airlock modules. DSG is a cislunar space station to enable further research in the space environment, as well as serve as the staging point for MCB prior to manned flight to Mars.



An important note to highlight is the extensive scope for a public-private partnership as these stages are under the Next Space Technologies for Space Partnership (NextSTEP) scheme set by NASA. The NextSTEP model enables commercial entities to provide space-faring capabilities and so will establish a lunar commercial economy. This reinforces the increasing role of the private sector within the space industry, a prevalent theme of IAC 2017. At the conclusion of DSG assembly, MBC will be built and tested throughout EM-6 to EM-8, while Mars assets are deployed so that humans can be ready to travel to Mars.

Looking deeper into MBC is the philosophical justification for such a daring endeavour. It enables the human race to challenge the fundamental questions; "Where did we come from? Where are we going? Are we alone?" Having astronauts in orbit provides access to the entire surface of Mars, allowing them to make real-time decisions when controlling rovers and drones, highlighting the synergy that exists between man and machine to bolster the capacity of exploration. Whether it is the MBC specifically or some other system used to pioneer beyond, this vision of discovery is essentially a physical expression of what makes us human; "we are explorers."