Paper ID: 28619

SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

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ANALYSIS OF MANNED LUNAR ROVERS' MISSION REQUIREMENTS AND FUNCTIONAL CHARACTERISTICS IN CHINA

Abstract

According to the fractional mission planning of manned lunar landing, including first landing moon, arriving at lunar south pole, and establishing lunar science station, manned lunar rovers' corresponding mission requirements are presented. The first mission planning is to establish fixed base station watched short term by astronauts, which is regarded as an oasis in the desert. The home range is a circle, with the lander as its center and astronaut's safe distance as its radius. The lander supply manned lunar rovers with energy sources, communication relay and living protection. As reliable vehicles with proper payloads, manned lunar rovers can get across typical landforms, and cover definite distance. Astronauts play the role of rover drivers, or payload operators. The second mission planning is to establish travelling science station, which is regarded as a nomad in the grassland. The home range is unrestricted due to astronaut's safe distance, which is connected with discrete scientific objectives. The lander is divided into several modules. Each module is realized by single manned lunar rover. Scientific expedition vehicle, energy guarantee vehicle, communication guarantee vehicle and living guarantee vehicle adopt unitized mobile platform, and they can assemble temporary lunar base with unified docking interfaces. As intellectualized robots with various payloads, manned lunar rovers are able to search independently, and they can get across various landforms and cover long distance. Astronauts play the role of community robot managers, or research workers. The third mission planning is to establish long playing lunar base, which is regarded as long live city. Lunar base possesses relatively perfect public facilities, including energy and communication. Lunar base need various specialized vehicles. In the early stage engineering trucks are required for base construction. In the middle stage vehicles loading men or cargos are required to offer convenience

for daily life and routine work. In the late stage mobile units are required which integrate multiple functional modules of study, life, work and fun. As various specialized vehicles, respective functional characteristics are given prominence to stress integration of men, rovers and base. Astronauts play the role of drivers, scientists, engineers or doctors. Generally speaking, human scientific explorations of the moon are implemented in steps. Functional requirements of integration, intelligence, and specialization are presented, according to the lunar scientific goals and detecting scale. Research findings will be directly applied to manned lunar rovers' mission planning and engineering development in the future.