

Lunar Exploration (2)
Lunar Exploration (2) (2)

Author: Prof. Mikhail Malenkov
Russian Federation, m.i.malenkov@gmail.com

Mr. David Scott
NASA Marshall Space Flight Center, United States, scotty@nasa.gov

Prof. James Head
Brown University, United States, james.head@brown.edu

Prof. Alexander Basilevsky
Russian Federation, atbas@geokhi.ru

Mr. Ronald A. Creel
United States, roving.ron@gmail.com

Dr. Vyacheslav Dovgan
Russian Federation, vgdovgan-svkv@mail.ru

Mr. Alexander Moisheev
Lavochkin Association, Russian Federation, moisheev@laspace.ru

Mr. Vladimir P. Dolgoplov
Lavochkin Association, Russian Federation, kotl@laspace.ru

50 YEARS OF LUNOKHOD-1 AND LUNAR ROVING VEHICLE (LRV-1): AT THE ORIGINS OF
MOBILE SPACE TECHNOLOGY

Abstract

On November 17, 1970, the mobile robotic apparatus Lunokhod-1, consisting of a self-propelled chassis and a sealed container installed on it, laid the first track on the lunar surface. The container was equipped with attachments and built-in service and scientific equipment, ensuring the implementation of scientific research along the route. Navigation cameras 3 times a minute transmitted an image of the lunar surface to the Control Center. These images allowed the driver to navigate the terrain. By radio, the driver transmitted traffic control commands to the board. In emergency situations, the automation unit independently gave the "Stop" command. Unlike stationary lunar stations, Lunokhod-1 carried out research on a route of about 10 km. In 1973, Lunokhod-2 conducted research on a route about 39 km long. On July 31, 1971, at the other end of Mare Imbrium, a manned lunar rover of the Apollo-15 mission, joined Lunokhod-1 with a crew: commander - driver and pilot of the lunar module. On the frame of the LRV-1 self-propelled chassis, the service and scientific equipments were installed, including chairs for astronauts in spacesuits with life support systems and a control panel with a T-shaped handle. The handle allowed the driver to control the movement with his right hand based on his own understanding of the situation. On the first day, the astronauts made a ten-kilometer trip to conduct research. In total, the crews of the Apollo 15, 16, and 17 expeditions have mastered more than 90 km of routes on the Moon. Three Earth days on the Moon simultaneously worked two mobile space rovers, completely different in design and control methods, personifying the scientific and technical potential of two states, but a single humanity! They were united by common goals and results - they opened up new paths and demonstrated new possibilities for studying and mastering the Moon not in separate points, but in large territories. The team of authors, which includes engineers, scientists and drivers of Lunokhod-1 and LRV, in this report conducts a comparative analysis of the most interesting episodes in the history of creation, design

and scientific results of lunar research. The authors are convinced that the new lunar rovers, which will become the main engineering components of the lunar bases of the 21st century, should be universal in control methods and combine the best qualities of mobile space robotic and manned rovers.