Aiming to the Moon (3)

Project Lunar Orbiter

This write up is dedicated to my wife, Estrella, and daughters, Raquel and Sara, for their help and encouragement.

Carlos González

Along with Project Surveyor, the Lunar Orbiter Project was an aid to determine a suitable soft landing place by mapping the Moon´s surface. This project was the first to provide photographs from lunar orbit.

Lunar Orbiter aboard an Atlas-Agena

The program was managed through the Langley research Center and consisted of five spacecraft which photographically mapped 99 per cent of the lunar surface (near and far side) with resolutions spanning from 60 to 1 meter.

The launch vehicles were Atlas-Agena D and all five launches were successful. The first three were dedicated to map 20 possible landing sites and were flown at a low inclination orbits. The last two were devoted to broader scientific objectives and were flown at high altitude polar orbits. Orbiter 4 mapped the entire near side and 9% of the far side while Orbiter 5 completed the far side and took medium and high resolution pictures of 36 pre-selected areas.

All the image processing was performed onboard of the Orbiters as they were equipped with a dual-lens camera that took pictures at high resolution (HR) and medium resolution (MR), a film processing unit, a scanner, and a film handling unit. During exposure, the film was moved to compensate for the spacecraft velocity.

The spacecraft were designed and developed by Boeing-Eastman Kodak and it had the shape of a truncated cone, 1.65 m tall and 1.5 m in diameter at the base and was composed of three decks. The deck at the base contained the battery, transponder, flight programmer, inertial reference unit (IRU), Canopus tracker, command decoder, multiplex encoder, amplifier (TWTA), and the photographic system.

The 375 W of energy needed were provided by four solar panels with a total span across of 3.72 m. Also, the base of the spacecraft housed a high gain antenna on a 1.32 m boom and a low-gain antenna on a 2.08 m boom. The middle deck held the velocity control engine, propellant, oxidizer and pressurization tanks, Sun sensors, and micro-meteoroid detectors. The third deck consisted of a heat shield through the center of which protruded the nozzle of the velocity control engine.

Orbiter SC

Photographs were sent using a 10 W transmitter and a directional 1 m diameter high gain antenna while other communications used a 0.5 W transmitter and an omnidirectional low-gain antenna. Both antennas operated in S-band at 2295 MHz.

- **Orbiter 1,** Aug. 1966 – Oct. 1966. Apollo landing site survey
- **Orbiter 2,** Nov. 1966 – Oct. 1967. Apollo landing site survey
- **Orbiter 3,** Feb. 1967 – Oct. 1967. Apollo landing site survey
- **Orbiter 4,** May. 1967 – Oct. 1967. Lunar mapping
- **Orbiter 5,** Aug. 1967 – Jan. 1968. Lunar mapping and hi-resolution survey

The data sent to Earth were written to magnetic tape and to film. The film data were used to create hand-made mosaics which were later distributed to data libraries known as ***Regional Planetary Information Facilities*** and for many years these images have been the basis of much of lunar scientific research.

Several atlases and books using Orbiter photographs have been published.

Earth as seen by Lunar Orbiter 1

Note: All photographs depicted in this essay are from public Internet publications and, in no way, they will be used to collect any income.