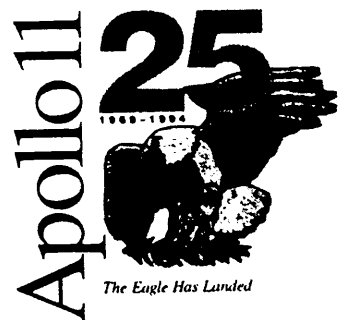


# A Race to the Moon

## The Flight of Luna 15



by Michael Tilgner

**A**s we recognize the 25th anniversary of Apollo 11, most people have forgotten that, in addition to the United States, there was another country that launched a landing mission to the Moon in July 1969. The Soviet Union launched Luna 15 on a mission to land an unmanned lunar sample return vehicle. The timing of the launch caused some concern within the U.S. as it seemed to interfere or even endanger the Apollo 11 mission which launched several days after the Russian probe.

According to contemporary TASS announcements [1], Luna 15 was launched on July 13, 1969, only three days before the Apollo 11 mission was to begin. After reaching an intermediate Earth orbit, the lunar probe was propelled toward the Moon. The task of the mission was described in rather vague terms: "to perfect the systems on board the automated probe and to continue the scientific exploration of the Moon and near-Moon space."

After performing a midcourse maneuver on July 14, Luna 15 entered lunar orbit on July 17, 1969. It was stated that the orbital parameters were near to the calculated ones and that all equipment was functioning normally. The lunar orbit was adjusted on July 19 to 221 km by 96 km; inclination was 126 degrees. A second orbit correction took place on July 20; the orbital parameters were given as 110 km by 16 km; inclination was 127 degrees. All systems were said to perform well.

On July 21, the probe failed to land softly on the lunar surface, or in the words of TASS, "The probe left the orbit and reached the lunar surface at a predetermined place. The work of the probe was over at 1851 hours [Moscow Time]."

At the time in the general press and for many years among Western observers of the Soviet space program, there was considerable speculation about the objectives of Luna 15. Was it to obtain a lunar sample and to return to Earth like Luna 16, or it was it to deliver the first Lunokhod onto the lunar surface as was done later by Luna 17? Arguments for both options were given and discussed [2, 3].

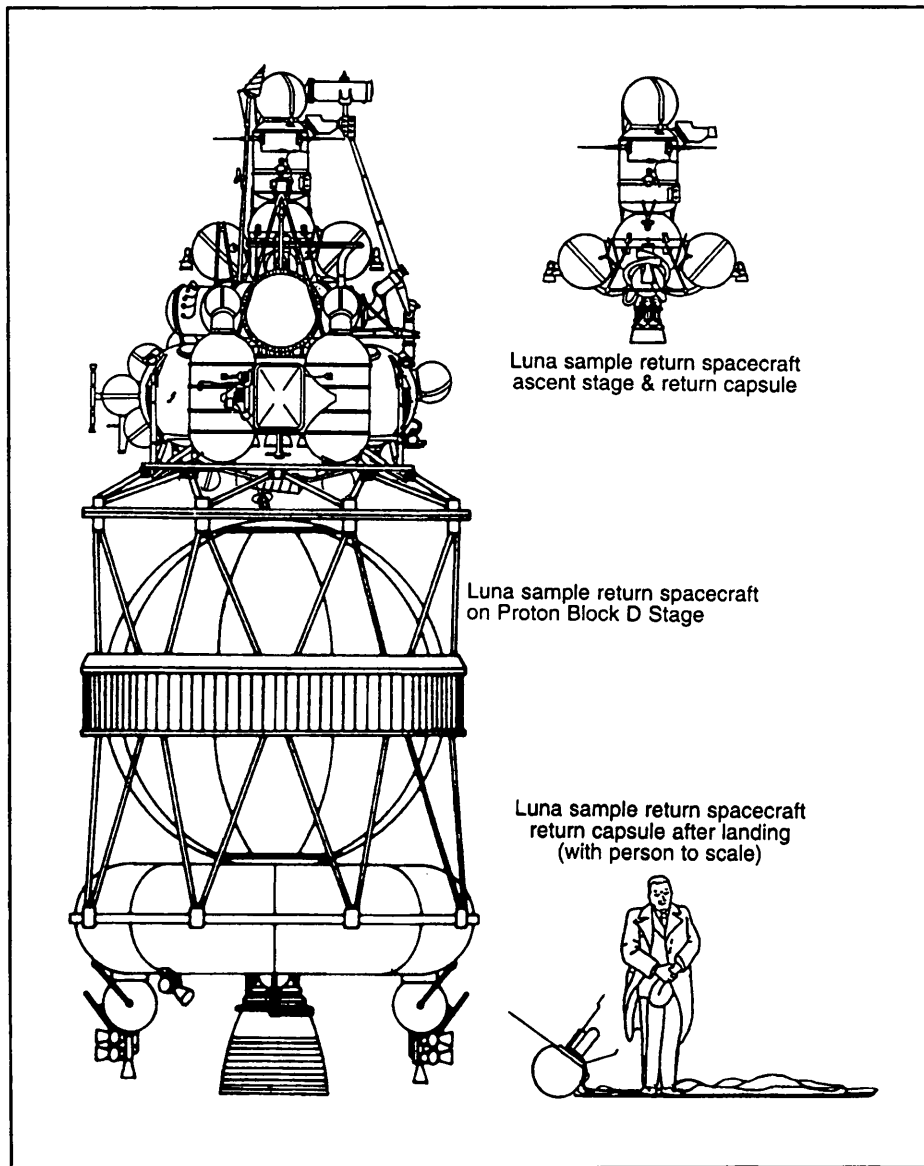
The Luna 15 mission remained a mystery for many years. In 1990, Soviet spaceflight analyst Nicholas Johnson disclosed [4] that Soviet officials acknowledged in 1990 "that the mission of Luna 15 was to return lunar soil samples to Earth three days before the return of the American Apollo 11 crew," citing a *Krasnaya Zvezda* article of January 13,

1990 which included the statement that the spacecraft "slammed into a mountain in the Mare Crisium."

When I visited Moscow in May 1993, I discussed this story with people formerly involved in the Soviet lunar exploration program. They confirmed that the Luna 15 mission was indeed to return lunar soil to Earth. However, all officials denied categorically that it was conceived as a propaganda feat to beat the Americans in getting lunar soil or to minimize the propaganda effect of the first successful American manned lunar landing.

Instead, it was emphasized that this mission was part of an overall Soviet strategy to explore the Moon and that the July date was the next suitable launch window.

It is difficult to accept this reasoning, as Soviet space officials had a highly developed sense of timing with their many earlier space spectacles which were designed for maximum propaganda affect. In addition, the sequence of events which followed Luna 15's crash seems to demonstrate that all were aware of the special political significance of this mission.

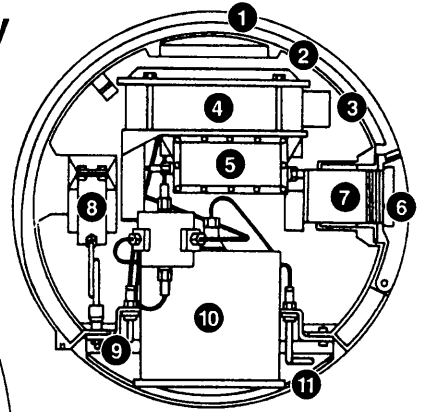
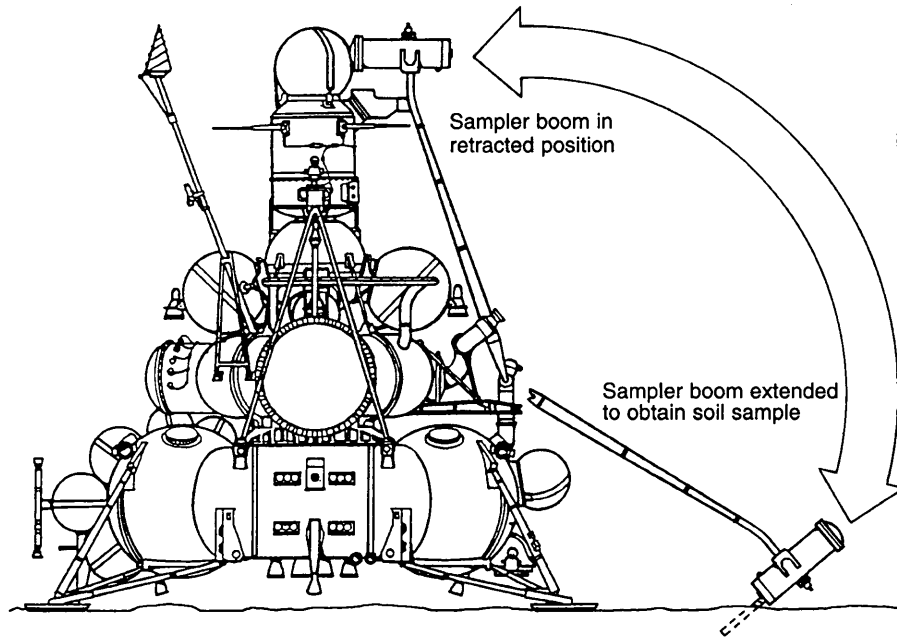


Luna sample return spacecraft ascent stage & return capsule

Luna sample return spacecraft on Proton Block D Stage

Luna sample return spacecraft return capsule after landing (with person to scale)

## Landed Configuration / Return Capsule Cutaway



- 1 Outer ablative thermal shielding
- 2 Inner honeycomb thermal shielding
- 3 Recovery capsule shell
- 4 Recovery beacon battery power supply
- 5 Recovery beacon transmitter
- 6 Lunar soil sample chamber cover (closed position)
- 7 Lunar soil sample chamber
- 8 Recovery beacon antenna actuator
- 9 Recovery beacon antennas & markers
- 10 Parachute compartment
- 11 Jettisonable parachute compartment hatch

For example, immediately after the failed touchdown, a series of emergency meetings were held in which emotions surfaced. At that time, the situation was the same as today. The spacecraft designers were responsible for the spacecraft, and the scientists couldn't influence the design of the spacecraft in any way. They had to accept the spacecraft as it was delivered. Accordingly, the spacecraft technicians accused the scientists of having incorrectly calculated the orbit and touchdown or to have used inaccurate cartographic materials of the Mare Crisium region. Conversely, the scientists argued that there were design problems in this new generation of lunar spacecraft.

At one of the meetings, M. Keldysh, then president of the Soviet Academy of Sciences, participated. The lunar scientists could convincingly prove that their calculations of the orbit and the touchdown point had been correct. The Soviet scientists were using the *Lunar Astronautical Charts (LAC)* which had been published in the U.S. in 1967, with a scale of 1:1,000,000. But as only one copy was available in the Soviet Union, most were forced to rely only on poor photographic copies. When a photo-copied page of Luna 15's projected landing site was shown to Keldysh, he thought this was a photographic map and immediately accepted that there was no mountain in the planned area of touchdown. Keldysh summarized this meeting in a short sentence: "It [the crash] is not our problem," implying that there may be a fault in the spacecraft. However, the evidence remained inconclusive.

Later, the explanation that was most generally accepted was as follows: The Mare Crisium belongs to a mascon (mass concentration) which produces unforeseeable variations in the lunar gravitational field. It is not as homogeneous as it was assumed when the orbital calculations had been made. There-

fore, nobody can be made responsible for this failure. Even the Americans had problems with the mascons. Donald E. Wilhelms wrote in his account of the lunar exploration about the Apollo 10 mission (May 1969): "Tracking the spacecraft during this low approach led to improved knowledge of the Moon's gravity; Apollo 8 had been perturbed in unpredictable ways by the mascons, and that had to stop." [5]

According to one source, this story may be only half the truth. Another reason for the failure may have involved hardware. The last measurement of the Luna 15 lunar orbit was made approximately twelve hours before the planned touchdown. With the help of this data, the exact timing of events was derived and sent to the lunar spacecraft. If one assumes that, for example, a valve in a small thruster malfunctioned, the orbit would have been changed and the final touchdown location would have been severely altered causing the crash. The touchdown procedure was changed and the orbit was measured for the last time at T minus 2 hours before landing. Everyone thought that the spacecraft was still on track.

More than a year later, in September 1970, the Soviet Union finally succeeded in returning lunar soil to Earth with the help of Luna 16. However, at that time, public interest in lunar exploration had declined rapidly, even for the Apollo missions. The space race was over and the U.S. had won.

The Luna 16 mission was an important achievement for Soviet scientists and technicians for it clearly demonstrated that lunar science could also be done with the help of automated spacecraft for less cost and without risking human lives. ●

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