

# 1961

21)

## **Tyazhelyy Sputnik / [Venera]**

**Nation:** USSR (12)

**Objective(s):** Venus impact

**Spacecraft:** 1VA (no. 1)

**Spacecraft Mass:** c. 645 kg

**Mission Design and Management:** OKB-1

**Launch Vehicle:** 8K78 (no. L1-7)

**Launch Date and Time:** 4 February 1961 /  
01:18:04 UT

**Launch Site:** NIIP-5 / launch site 1

**Scientific Instruments:**

- 1) three-component magnetometer
- 2) variometer
- 3) charged-particle traps

**Results:** This mission was the first attempt to send a spacecraft to Venus. Original intentions had been to send the 1V spacecraft to take pictures of the Venusian surface, but this proved to be far too ambitious a goal. Engineers instead downgraded the mission and used the 1VA spacecraft for a simple Venus atmospheric entry. The 1VA was essentially a modified 1M spacecraft used for Martian exploration. The spacecraft contained a small globe containing various souvenirs and medals commemorating the mission. This flight was also the first occasion on which the Soviets used an intermediate Earth orbit to launch a spacecraft into interplanetary space. Although the booster successfully placed the probe

into Earth orbit, the fourth stage (the Blok L) never fired to send the spacecraft to Venus. A subsequent investigation showed that there had been a failure in the PT-200 DC transformer that ensured power supply to the Blok L guidance system. The system had evidently not been designed to work in a vacuum. The “spacecraft + upper-stage stack” reentered Earth’s atmosphere on 26 February 1961. The Soviets announced the total weight of the combination as 6,483 kilograms.

22)

## **Venera**

**Nation:** USSR (13)

**Objective(s):** Venus impact

**Spacecraft:** 1VA (no. 2)

**Spacecraft Mass:** 643.5 kg

**Mission Design and Management:** OKB-1

**Launch Vehicle:** 8K78 (no. L1-6)

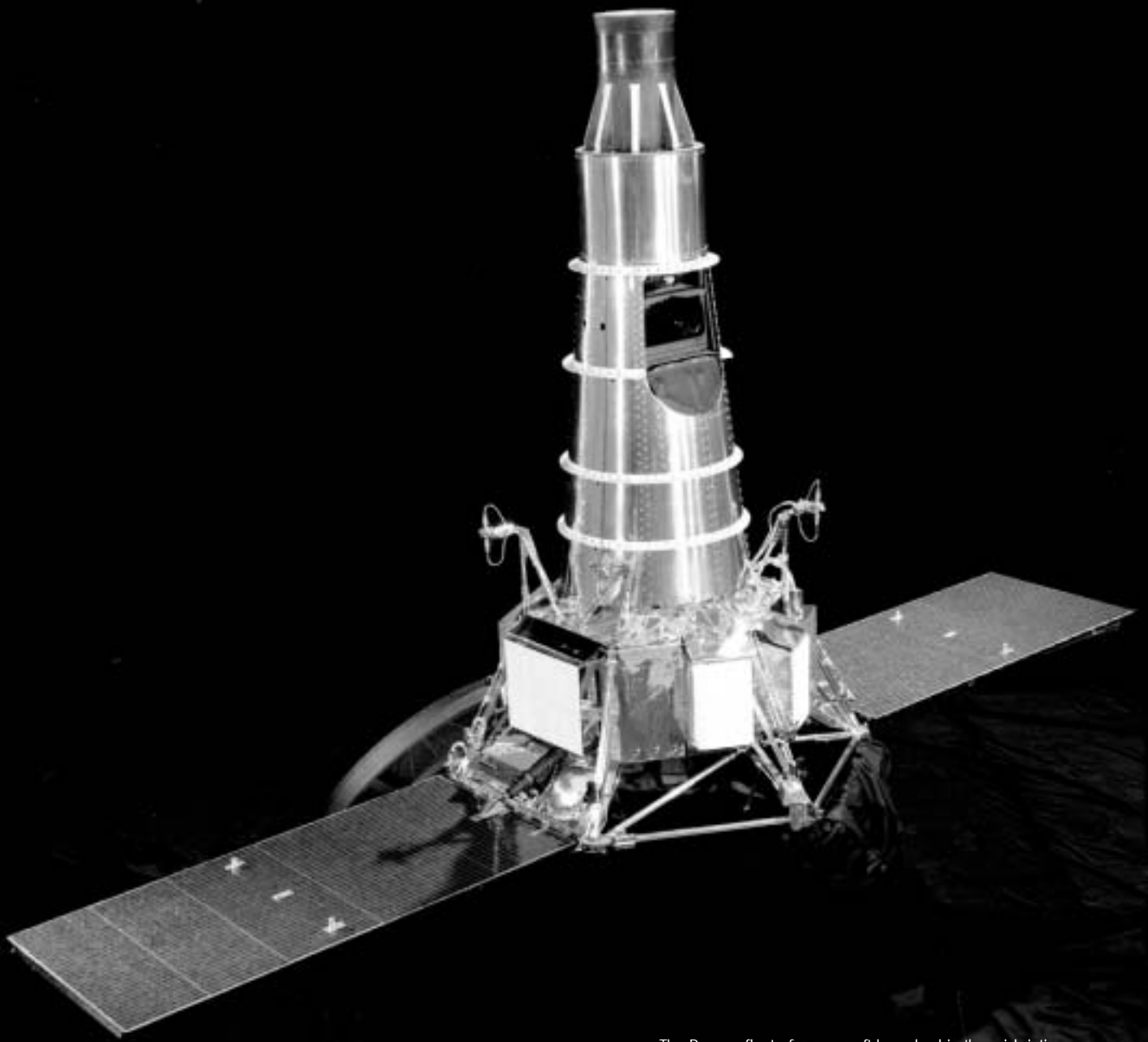
**Launch Date and Time:** 12 February 1961 /  
00:34:37 UT

**Launch Site:** NIIP-5 / launch site 1

**Scientific Instruments:**

- 1) three-component magnetometer
- 2) variometer
- 3) charged-particle traps

**Results:** This was the second of two Venus impact probes that the Soviets launched in 1961. This time, the probe successfully exited Earth orbit and headed toward



The Ranger fleet of spacecraft launched in the mid-sixties provided live television transmissions of the Moon. These transmissions resolved surface features as small as 10 inches across and provided over 17,000 images of the lunar surface. These detailed photographs allowed scientists and engineers to study the Moon in greater detail than ever before, thus allowing for the design of a spacecraft that would one day land men of Earth on its surface.

Venus. Despite some initial problems with the solar orientation system, the spacecraft responded properly during a communications session on 17 February 1961 at a distance of 1.9 million kilometers. Unfortunately, controllers were unable to regain contact during a subsequent communications attempt on 22 February. A later investigation indicated that the spacecraft had lost its “permanent” solar orientation due to a faulty optical sensor that malfunctioned because of excess heat after the spacecraft’s thermal control system failed. The inert spacecraft eventually passed by Venus on 19 and 20 May 1961 at a distance of about 100,000 kilometers and entered heliocentric orbit.

23)

#### **Ranger 1**

Nation: U.S. (10)

Objective(s): highly elliptical Earth orbit

Spacecraft: P-32

Spacecraft Mass: 306.18 kg

Mission Design and Management: NASA JPL

Launch Vehicle: Atlas-Agena B (no. 1 / Atlas D no. 111 / Agena B no. 6001)

Launch Date and Time: 23 August 1961 / 10:04 UT

Launch Site: ETR / launch complex 12

Scientific Instruments:

- 1) electrostatic analyzer
- 2) photoconductive particle detectors
- 3) Rubidium vapor magnetometer
- 4) triple-coincidence cosmic-ray telescope
- 5) cosmic-ray integrating ionization chamber
- 6) x-ray scintillation detectors
- 7) micrometeoroid dust particle detectors
- 8) Lyman alpha scanning telescope

**Results:** Ranger 1 was the first in a series of standardized spacecraft designed to rough-land simple instrumented capsules on the surface of the Moon and take photos of the lunar surface during its descent to the Moon. The spacecraft consisted of a tubular central body connected to a hexagonal base containing basic equipment required for control and communications. Power was provided by solar cells and a silver-zinc battery. Ranger 1’s specific mission was to test performance of the new technologies

intended for operational Ranger flights and to study the nature of particles and fields in interplanetary space. Its intended orbit was 60,000 x 1.1 million kilometers. Ranger 1 was the first American spacecraft to use a parking orbit around Earth prior to its deep space mission. In this case, the Agena B upper stage cut off almost immediately after its ignition for translunar injection (instead of firing for 90 seconds). The probe remained stranded in low-Earth orbit (501 x 168 kilometers), and telemetry ceased by 27 August, when the main battery went dead. The spacecraft reentered Earth’s atmosphere three days later. The cause of the Agena failure was traced to a malfunctioning switch that had prematurely choked the flow the red fuming nitric acid to the rocket engine.

24)

#### **Ranger 2**

Nation: U.S. (11)

Objective(s): highly elliptical Earth orbit

Spacecraft: P-33

Spacecraft Mass: 306.18 kg

Mission Design and Management: NASA JPL

Launch Vehicle: Atlas-Agena B (no. 2 / Atlas D no. 117 / Agena B no. 6002)

Launch Date and Time: 18 November 1961 / 08:12 UT

Launch Site: ETR / launch complex 12

Scientific Instruments:

- 1) electrostatic analyzer for solar plasma
- 2) photoconductive particle detectors
- 3) Rubidium vapor magnetometer
- 4) triple-coincidence cosmic-ray telescope
- 5) cosmic-ray integrating ionization chamber
- 6) x-ray scintillation detectors
- 7) micrometeoroid dust particle detectors
- 8) Lyman alpha scanning telescope

**Results:** Like its predecessor, Ranger 2 was designed to operate in a highly elliptical Earth orbit that would take it into deep space beyond the Moon. Mission planners expected that during five months of operation, they could verify both the technical design of the vehicle and conduct key scientific experiments to study the space environment over a prolonged period. Since the Block I Rangers

Ranger 7 took this image of the Moon on 31 July 1964 at 13:09 UT (9:09 A.M. EDT), about 17 minutes before impacting the lunar surface. The area photographed is centered at 13° south latitude and 10° west longitude and covers about 360 kilometers from top to bottom. The large crater at center right is the 108-kilometer-diameter Alphonsus. Above it is Ptolemaeus and below it Arzachel. The terminator is at the bottom right corner. Mare Nubium is at center and left. North is at about 11:00 at the center of the frame. The Ranger 7 impact site is off the frame, to the left of the upper left corner. (Ranger 7, B001) The Ranger series of spacecraft were designed solely to take high-quality pictures of the Moon and transmit them back to Earth in real time. The images were to be used for scientific study, as well as for selecting landing sites for the Apollo Moon missions. Ranger 7 was the first of the Ranger series to be entirely successful. It transmitted 4,308 high-quality images over the last 17 minutes of flight, the final image having a resolution of 0.5 meters per pixel. Ranger 7 was launched on 28 July 1964 and arrived at the Moon on 31 July 1964.



(Ranger 1 and 2) carried no rocket engine, they could not alter their trajectories. On this attempt, Ranger 2, like its predecessor, failed to leave low-Earth orbit. This time, the Agena B stage failed to fire. In its low orbit, Ranger 2 lost its solar orientation and then eventually lost power; it reentered Earth's atmosphere on 19 November 1961. The most

probable cause of the failure was inoperation of the roll-control gyroscope on the Agena B guidance system. As a result, the stage had used up all attitude-control propellant for its first orbit insertion burn. At the time of the second burn, without proper attitude, the engine failed to fire.