

1962

25)

Ranger 3

Nation: U.S. (12)

Objective(s): lunar impact

Spacecraft: P-34

Spacecraft Mass: 330 kg

Mission Design and Management: NASA JPL

Launch Vehicle: Atlas-Agena B (no. 3 / Atlas D no. 121 / Agena B no. 6003)

Launch Date and Time: 26 January 1962 / 20:30 UT

Launch Site: ETR / launch complex 12

Scientific Instruments:

- 1) imaging system
- 2) gamma-ray spectrometer
- 3) single-axis seismometer
- 4) surface-scanning pulse radio experiment

Results: This was the first U.S. attempt to achieve impact on the lunar surface. The Block II Ranger spacecraft carried a TV camera that used an optical telescope that would allow imaging down to about 24 kilometers above the lunar surface during the descent. The main bus also carried a 42.6-kilogram instrument capsule that would separate from the bus at 21.4 kilometers altitude and then independently impact on the Moon. Protected by a balsa-wood outer casing, the capsule was designed to bounce several times on the lunar surface before coming to rest. The primary onboard instrument was a seismometer.

Because of a malfunction in the Atlas guidance system (due to faulty transistors), the probe was inserted into a lunar transfer trajectory with an excessive velocity. A subsequent incorrect course change ensured that the spacecraft reached the Moon 14 hours early and missed it by 36,793 kilometers on 28 January. The central computer and sequencer failed and the spacecraft returned no TV images. The probe did, however, provide scientists with the first measurements of interplanetary gamma-ray flux. Ranger 3 eventually entered heliocentric orbit.

26)

Ranger 4

Nation: U.S. (13)

Objective(s): lunar impact

Spacecraft: P-35

Spacecraft Mass: 331.12 kg

Mission Design and Management: NASA JPL

Launch Vehicle: Atlas-Agena B (no. 4 / Atlas D no. 133 / Agena B no. 6004)

Launch Date and Time: 23 April 1962 / 20:50 UT

Launch Site: ETR / launch complex 12

Scientific Instruments:

- 1) imaging system
- 2) gamma-ray spectrometer
- 3) single-axis seismometer
- 4) surface-scanning pulse radio experiment

Results: This spacecraft, similar in design to Ranger 3, was the first U.S. spacecraft to reach another celestial body. A power failure in the central computer and sequencer stopped the spacecraft's master clock and prevented the vehicle from performing any of its preplanned operations, such as opening its solar panels. Drifting aimlessly and without any midcourse corrections, Ranger 4 impacted the Moon on its far side at 12:49:53 UT on 26 April 1962. Impact coordinates were 15°30' south latitude and 130°42' west longitude. Although the spacecraft did not achieve its primary objective, the Atlas-Agena-Ranger combination performed without fault for the first time.

27)

Mariner 1

Nation: U.S. (14)

Objective(s): Venus flyby

Spacecraft: P-37 / Mariner R-1

Spacecraft Mass: 202.8 kg

Mission Design and Management: NASA JPL

Launch Vehicle: Atlas-Agena B (no. 5 / Atlas D no. 145 / Agena B no. 6901)

Launch Date and Time: 22 July 1962 / 09:21:23 UT

Launch Site: ETR / launch complex 12

Scientific Instruments:

- 1) microwave radiometer
- 2) infrared radiometer
- 3) fluxgate magnetometer
- 4) cosmic dust detector
- 5) solar plasma spectrometer
- 6) energetic particle detectors

Results: After approval by NASA Headquarters in September 1961, JPL prepared three spacecraft based on the design of the Ranger Block I series (therefore named Mariner R) to fly by Venus in late 1962. Each spacecraft carried a modest suite (9 kilograms) of scientific instrumentation but had no imaging capability. The spacecraft included 54,000 components and was designed to maintain contact with Earth for 2,500 hours—an ambitious goal given that the (still unsuccessful) Ranger was designed for only 65 hours of contact. Mariner 1 would have flown by Venus at a range of 29,000 kilometers on 8 December 1962, but due to an incorrect trajectory during launch, range safety had to destroy the booster and its payload at T+290 seconds.

28)

no name / [Venera]

Nation: USSR (14)

Objective(s): Venus impact

Spacecraft: 2MV-1 (no. 1)

Spacecraft Mass: 1,097 kg

Mission Design and Management: OKB-1

Launch Vehicle: 8K78 (no. T103-12)

Launch Date and Time: 25 August 1962 / 02:18:45 UT

Launch Site: NIIP-5 / launch site 1

Scientific Instruments: unknown

Results: This mission was the first of a second generation of Soviet deep space probes based on a unified platform called 2MV (“2” for the second generation, “MV” for Mars and Venus) designed to study Mars and Venus. The series included four variants with the same bus but with different payload complements: 2MV-1 (for Venus impact), 2MV-2 (for Venus flyby), 2MV-3 (for Mars impact), and 2MV-4 (for Mars flyby). The landers carried pressurized capsules; the Venus landers were cooled with an ammonia-based system, while the Mars landers used a system of air conditioners. Both landers were sterilized with a special substance on recommendation from the Academy of Sciences's Institute of Microbiology. The buses were powered by solar panels with an area of 2.5 square meters capable of providing 2.6 A. For Venus, the Soviets prepared three spacecraft for the August-September 1962 launch window, one flyby spacecraft and two landers. This first spacecraft was successfully launched into Earth orbit, but the Blok L upper stage cut off its interplanetary burn after only 45 seconds (instead of the planned 240 seconds). Later investigation showed that the stage had been set on a tumbling motion prior to main engine ignition due to asymmetrical firing of stabilizing motors. The spacecraft remained in Earth orbit for three days before reentering Earth's atmosphere.

29)

Mariner 2

Nation: U.S. (15)

Objective(s): Venus flyby

Spacecraft: P-38 / Mariner R-2

Spacecraft Mass: 203.6 kg

Mission Design and Management: NASA JPL

Launch Vehicle: Atlas-Agena B (no. 6 / Atlas D no. 179 / Agena B no. 6902)

Launch Date and Time: 27 August 1962 /
06:53:14 UT

Launch Site: ETR / launch complex 12

Scientific Instruments:

- 1) microwave radiometer
- 2) infrared radiometer
- 3) fluxgate magnetometer
- 4) cosmic dust detector
- 5) solar plasma spectrometer
- 6) energetic particle detectors

Results: NASA brought the Mariner R-2 spacecraft out of storage and launched it just thirty-six days after the failure of Mariner 1. Mariner 2, as it was known after launch, was equipped with an identical complement of instrumentation to that of its predecessor (see Mariner 1). The mission proved to be the first fully successful interplanetary mission performed by any nation. After a midcourse correction on 4 September, the spacecraft flew by Venus at a range of 34,762 kilometers on 14 December 1962. During a 42-minute scan of the planet, Mariner 2 gathered significant data on the Venusian atmosphere and surface before continuing on to heliocentric orbit. NASA maintained contact until 07:00 UT on 3 January 1963, when the spacecraft was 87.4 million kilometers from Earth, a new record for a deep space probe. The data returned showed that the surface temperature on Venus was at least 425°C with minimal differentiation between the day and night sides of the planet. Mariner 2 also found that there was a dense cloud layer that extended from 56 to 80 kilometers above the surface. The spacecraft detected no discernable planetary magnetic field; this lack is partly explained by the great distance of the flyby. After this successful mission, NASA elected to stand down the third spacecraft in the series (Mariner R-3), scheduled for the 1964 launch window.

30)

no name / [Venera]

Nation: USSR (15)

Objective(s): Venus impact

Spacecraft: 2MV-1 (no. 2)

Spacecraft Mass: c. 1,100 kg

Mission Design and Management: OKB-1

Launch Vehicle: 8K78 (no. T103-13)

Launch Date and Time: 1 September 1962 /
02:12:30 UT

Launch Site: NIIP-5 / launch site 1

Scientific Instruments: unknown

Results: This was the second of three Venus spacecraft launched by the Soviets in 1962. Like its predecessor launched in August 1962 (also a Venus impact probe), the spacecraft never left parking orbit around Earth because of a malfunction in the Blok L upper stage designed to send the probe out of Earth orbit toward Venus. Evidently, the valve that controlled the delivery of fuel into the combustion chamber of the Blok L engine (the S1.5400) never opened. As a result, the engine never fired. The payload decayed within five days of launch.

31)

no name / [Venera]

Nation: USSR (16)

Objective(s): Venus flyby

Spacecraft: 2MV-2 (no. 1)

Spacecraft Mass: unknown

Mission Design and Management: OKB-1

Launch Vehicle: 8K78 (no. T103-114)

Launch Date and Time: 12 September 1962 /
00:59:13 UT

Launch Site: NIIP-5 / launch site 1

Scientific Instruments:

- 1) imaging system
(remainder unknown)

Results: Like its two predecessors (launched on 25 August and 1 September 1962), this Soviet Venus probe never left parking orbit around the Earth. The Blok L upper stage, designed to send the spacecraft toward Venus, fired for only 0.8 seconds before shutting down because of unstable attitude. Later investigation indicated that the upper stage had been put into a tumble by the violent shutdown of the third stage. The tumble had mixed air bubbles within the propellant tanks, preventing a clean firing of the engine. Unlike its predecessors, this probe was designed for a Venus flyby rather than atmospheric entry and impact. The spacecraft reentered Earth's atmosphere two days after launch.

32)

Ranger 5

Nation: U.S. (16)

Objective(s): lunar impact

Spacecraft: P-36

Spacecraft Mass: 342.46 kg

Mission Design and Management: NASA JPL
Launch Vehicle: Atlas-Agena B (no. 7 / Atlas D
no. 215 / Agena no. 6005)

Launch Date and Time: 18 October 1962 /
16:59:00 UT

Launch Site: ETR / launch complex 12

Scientific Instruments:

- 1) imaging system
- 2) gamma-ray spectrometer
- 3) single-axis seismometer
- 4) surface-scanning pulse radio experiment

Results: This was the third attempt to impact the lunar surface with a Block II Ranger spacecraft. On this mission, just 15 minutes after normal operation, a malfunction led to the transfer of power from solar to battery power. Normal operation never resumed; battery power was depleted after 8 hours, and all spacecraft systems died. The first midcourse correction was never implemented, and Ranger 5 passed the Moon at a range of 724 kilometers on 21 October and entered heliocentric orbit. It was tracked to a distance of 1,271,381 kilometers. Before loss of signal, the spacecraft sent back about 4 hours of data from the gamma-ray experiment.

33)

no name / [Mars]

Nation: USSR (17)

Objective(s): Mars flyby

Spacecraft: 2MV-4 (no. 1)

Spacecraft Mass: c. 900 kg

Mission Design and Management: OKB-1

Launch Vehicle: 8K78 (no. T103-15)

Launch Date and Time: 24 October 1962 /
17:55:04 UT

Launch Site: NIIP-5 / launch site 1

Scientific Instruments:

- 1) imaging system
- 2) magnetometer

Results: This was the first of three “second-generation” interplanetary probes (two flyby probes and one impact probe), designed to reach Mars, prepared by the Soviets for the late-1962 launch window. Because of the repeated failures of the Blok L upper stage during deep space missions, engineers elected to outfit the stage for the Mars missions with supplementary control and measurement equipment. As a result, most of the scientific instruments were removed from the Mars

spacecraft. The three missions were primarily technological test flights rather than scientific missions. In this case, the Blok L interplanetary stage failed again. Just 17 seconds after trans-Mars injection ignition, the main engine (the S1.5400A1) turbopump exploded, destroying the payload. The problem was traced to leaking lubricant. As many as twenty-four fragments were later tracked, the largest of which reentered on 29 October. The original probe was designed to fly by Mars on 17 June 1963.

34)

Mars 1

Nation: USSR (18)

Objective(s): Mars flyby

Spacecraft: 2MV-4 (no. 4)

Spacecraft Mass: 893.5 kilograms

Mission Design and Management: OKB-1

Launch Vehicle: 8K78 (no. T103-16)

Launch Date and Time: 1 November 1962 /
16:14:16 UT

Launch Site: NIIP-5 / launch site 1

Scientific Instruments:

- 1) imaging system
- 2) magnetometer

Results: The second of three Soviet spacecraft intended for the 1962 Mars launch window, Mars 1 was the first spacecraft sent by any nation to fly past Mars. Its primary mission was to photograph the surface. This time the upper stage successfully fired the probe toward Mars, but immediately after engine cutoff, controllers discovered that pressure in one of the nitrogen gas bottles for the spacecraft’s attitude-control system had dropped to zero (due to incomplete closure of a valve). On 6 and 7 November, controllers used a backup gyroscope system to keep the solar panels constantly exposed to the Sun during the coast phase, although further midcourse corrections became impossible. Controllers maintained contact with the vehicle until 21 March 1963, when the probe was 106 million kilometers from Earth. Mars 1 eventually silently flew by Mars at a distance of 197,000 kilometers on 19 June 1963. Prior to loss of contact, scientists were able to collect data on interplanetary space (on cosmic-ray intensity, Earth’s magnetic fields, ionized gases from the Sun, and meteoroid impact densities) up to a distance of 1.24 AU.

35)

no name / [Mars]

Nation: USSR (19)

Objective(s): Mars impact

Spacecraft: 2MV-3 (no. 1)

Spacecraft Mass: unknown

Mission Design and Management: OKB-1

Launch Vehicle: 8K78 (no. T103-17)

Launch Date and Time: 4 November 1962 /
15:35:15 UT

Launch Site: NIIP-5 / launch site 1

Scientific Instruments: unknown

Results: This was the third and last of the Soviet "second-generation" Mars attempts in

1962 and also the only lander in the series. During the trans-Mars injection firing of the Blok L stage, the main engine (the S1.5400A1) prematurely shut down after 33 seconds due to a malfunction in the programmed timer for the stage. The problem was later traced to excessive vibrations of the second stage during liftoff. These vibrations evidently also jarred loose a pyrotechnic igniter from its support, preventing the Blok L upper stage from firing. The spacecraft remained stranded in orbit and reentered Earth's atmosphere on 5 November. The spacecraft had been intended to fly by Mars on 21 June 1963.