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UNKNOWN to the world, a Soviet rocket stood ready to race for the Moon in December 1968. While Apollo 8 basked in sunshine at Cape Kennedy in full view of the world, a Russian Proton rocket, shrouded in Soviet secrecy, awaited orders to fly. Whipped by freezing winds at the Baikonur Cosmodrome in the Soviet central Asian republic of Kazakhstan, the rocket represented the culmination of a Soviet project to reach the Moon, ahead of the Americans.

For 25 years the US intelligence services have known about the rocket and its mission but the details have remained secret. Space historians are now collecting evidence from recently declassified CIA documents and from Russian archives, available since the collapse of Communism, that tell the story of a high-risk race for Superpower supremacy in space.

The battle began in 1961 with President Kennedy's dream of putting a man on the Moon by the end of the 1960s—a goal much prized by politicians on both sides of the Iron Curtain. While the American dream was public, the Soviets secretly commissioned designs for lunar orbiting spacecraft and a rocket powerful enough to reach the Moon.

The go-ahead

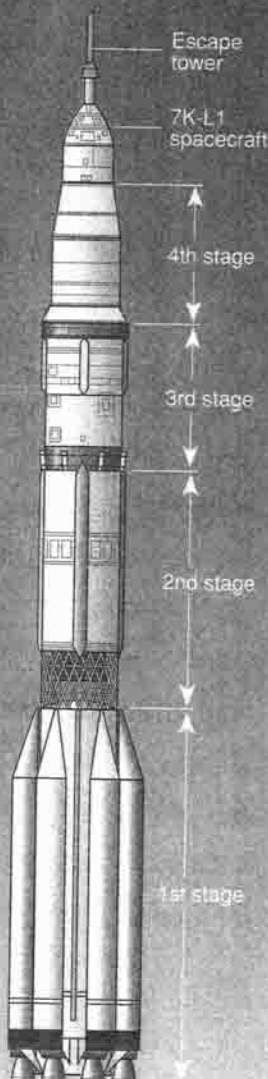
In December 1965, the USSR's powerful ruling body, the Politburo, approved a design to put the first crewed spacecraft into lunar orbit by July 1967. Agreement came after 16 months of squabbling between Soviet design teams over who would design and build the hardware. The Soviet lunar projects were bogged down in bureaucracy and involved over five hundred organisations representing 26 different government industries and departments.

The final design for the circumlunar mission produced a four-stage Proton rocket that would carry the spacecraft into Earth orbit. The spacecraft, called 7K-L1, was made up of a propulsion module to boost the craft out of Earth orbit towards the Moon, a service module to orbit the Moon and a re-entry module that would carry the cosmonauts back to Earth. The 7K-L1 was a two-man forerunner of the Soyuz-TM used by cosmonauts today to visit the Mir space station currently in orbit.

The original plan was to launch the 7K-L1 on a series of 10 uncrewed missions with the 11th and 14th missions crewed. In 1965 training began. Cosmonauts

Two weeks that killed the Soviet dream

The Soviet Union abandoned the race to the Moon after the success of Apollo 8, but just a few weeks earlier Russian cosmonauts were waiting for their green light from a cautious Politburo



spent thousands of hours on 7K-L1 simulators, practised water splashdown in the Black Sea—in case the re-entry module missed its terrestrial landing point. They even practised navigation using stars in the southern hemisphere as the standard return to Earth would be over the Antarctic. Cosmonauts also had to undergo centrifuge tests that simulated the extreme G-forces associated with emergency re-entry into the Earth's atmosphere. A spacecraft coming back from the Moon hits the atmosphere at a much higher speed than a craft re-entering after a simple Earth orbit. In a planned re-entry, the craft would skip across the top of the atmosphere to slow the craft down, but in an emergency it would plummet straight into the atmosphere. Cosmonaut Alexei Leonov, who was one of six eventually short-listed for the mission, remembers enduring 12-4Gs in training.

Tell-tale signs

It was not until January 1967, that Soviets tested a full-scale version of the rocket at Baikonur Cosmodrome. A launch escape rocket was fitted to the main rocket nose cone and was designed to blast the crewed capsule away from the main rocket in an emergency. Uncrewed spacecraft do not have these towers and the Americans were quick to spot its significance.

In March 1967, a CIA report on the Soviet space programme crossed President Johnson's desk at the White House. Photographs from US reconnaissance satellites flying over the cosmodrome showed the unusual size of the rocket, an indication of its fuel capacity, and the escape tower. The CIA accurately concluded that the rocket was designed to launch a crewed spacecraft to the Moon. Speculating on the timing of such a flight, the CIA said an early mission "would pay important dividends in terms of prestige, and could . . . offset some of the propaganda value of the US Apollo programme". The Americans thought it unlikely the Soviets would risk a rushed Moon flight in 1967 to coincide with the 50th anniversary of the October Russian Revolution. More likely, they thought, was a crewed flight in the first half of 1968.

Less than two weeks after President Johnson had seen the report, the Soviets launched Cosmos 146—a Proton rocket carrying an uncrewed 7K-L1 spacecraft into Earth orbit. But the propulsion module malfunctioned and, instead of accelerating towards the Moon, the ship



slowed down, re-entered the Earth's atmosphere and crashed onto Soviet soil. This was the first of a series of disasters that ultimately led to the collapse of the circumlunar project.

A month later, on 8 April, the Russians tried again with an uncrewed mission called Cosmos 154. The craft was launched successfully but the propulsion module was jettisoned too early, stranding the vehicle in Earth orbit.

Multiple failure

The third uncrewed attempt to orbit the Moon ended in failure on 23 September 1967, when only five of the six first-stage engines ignited during liftoff, causing the Proton rocket to tumble from the sky. Two months later, on 22 November, a fourth uncrewed mission failed when only three of the four second-stage engines ignited. On both occasions the launch escape towers pulled the 7K-L1 spacecraft from the rockets. The November flight was the first connected with the circumlunar project by the CIA.

The disasters proved that the emerging technology could not be hurried. Despite Politburo pressure, and as the Americans

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had predicted, the Soviets were unable to launch a crewed mission to the Moon in 1967. But the project to orbit the Moon was still under great pressure because according to the Russian magazine *Aviation & Cosmonautics*, "the goal was to ensure the primacy of the Soviet Union in the first manned orbit of the Moon, since the United States was already actively working on the Apollo Moon landing". The lunar goal was still within reach.

In March 1968, a year after the debut launch of the 7K-L1 spacecraft, the Soviets again tried to send an uncrewed spacecraft beyond Earth. This time they were more successful. In a flight described by the CIA as a "simulated circumlunar mission", the craft was sent into deep space in the opposite direction from the Moon. The Russians named the mission Zond 4 (Probe 4) even though the previous three Zond launches had nothing to do with crewed space vehicles. It now seems that missions failing to leave Earth orbit were designated Cosmos missions, while missions leaving Earth orbit were given the Zond label.

According to space historians Sergei Shamsutdinov and I. Marinin from



Illustration: Volker Sträter

Videokosmos, a spaceflight information centre in Moscow, the trip away from the Moon was unintentional. Engineers at Baikonur Cosmodrome could not aim the ship at the Moon because of a malfunction in attitude control equipment on board the spacecraft. Instead, the ship entered a highly elliptical orbit around the Earth.

On the ground, two of the six cosmonauts short-listed to fly on missions round the Moon, Pavel Popovich and Vitaliy Sevastyanov, were engaged in a flight simulation experiment. During the course of the mission, both cosmonauts stayed in a specially isolated bunker and communicated with the Yevpatoriya Flight Control Centre in Ukraine via a relay on board the spacecraft.

When Zond 4 returned to Earth, the re-entry module failed to separate from the service module before entering the Earth's atmosphere, resulting in an unplanned descent. Learning that the landing site would be nowhere near central Asia, ground personnel activated the self-destruct system and fragments of the spacecraft eventually fell into the Gulf of Guinea off the shore of West Africa.

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The bad luck continued. A month later on 23 April another uncrewed launch was aborted in mid-flight because vibrations during liftoff caused a short circuit in the 7K-L1's automatic control system, firing the launch escape tower prematurely. The rocket tumbled out of control at an altitude above 60 kilometres and was destroyed by safety personnel. A CIA document records this as the second "booster malfunction" linked with the circumlunar project. In fact, it was the sixth mission and the third time the Proton booster had failed during launch.

In July 1968, another Proton rocket carrying a 7K-L1 was transported to the launch pad from its final assembly building at Baikonur. During testing engineers discovered they had overpressurised the propulsion module causing a fuel tank to split. The launch was cancelled.

Careless mistakes

Russian archives reveal that the frequent in-flight failures were not caused by design faults but mainly by engineers' carelessness. Commenting on human errors in a filmed interview, Leonov said: "The spaceship was very good, but at first we had bad luck with the carrier [rocket]—not exactly the carrier but with the servicing of the carrier. Those were annoying mistakes. Then some of the engineers put a plus for a minus... There were other annoying accidents, unpleasant accidents." Leonov, however, felt that engineers would take greater care in the testing and checking of equipment for a crewed flight and he and other cosmonauts were keen to fly, despite the tremendous risks.

In the summer of 1968, the US intelligence community learned that a schedule for a Soviet crewed lunar flight had been finalised for the end of the year. In December there would be an ideal alignment of the Earth and Moon for a lunar launch and the Americans knew the launch window would open 12 to 14 days earlier in the USSR than in the US. Apollo 8 commander Frank Borman says in his autobiography, *Countdown*, that because of the information from the CIA about the Russian threat, in August 1968 the Apollo 8 mission was changed by NASA from an Earth orbital flight to a lunar orbital flight.

A month later, on 14 September, the Soviets launched another uncrewed Proton rocket into Earth orbit. This time the propulsion module successfully launched the 7K-L1 spacecraft into its lunar trajectory. The USSR later called the vehicle Zond 5.

Skimming across the face of the Moon, Zond 5 played a tape recording of a human voice reciting simulated instrument readings, an experiment designed to test voice communication with Earth from a vehicle 1950 kilometres above the lunar surface. After nearly seven days in space, disaster struck as the spaceship approached re-entry. An error by a ground controller caused the gyroscope platform aboard ship to fail and an attitude sensor overheated trying to keep the spacecraft in the right position. The spacecraft descended over the North Pole splashing down in the Indian Ocean instead of inside the USSR.

The mission was watched closely by the US. A memorandum to President Johnson on the evening of Zond 5's launch concluded that the spacecraft was probably on a mission round the Moon. The US intelligence network also noticed Soviet mission recovery and support ships in the Indian Ocean and extra search aircraft in India, indicating that the Soviets were prepared for an unplanned descent.

In the event, the recovery of Zond 5 seemed almost comical, according to another CIA bulletin. "The spacecraft splashed down late on 21 September after completing a seven-day flight around the Moon. Soviet recovery ships were unable to locate the vehicle for some ten hours, and it was another three hours—mid-morning—before they recovered it. A US destroyer observed this first Soviet water recovery at close range."

Zond 6 was successfully launched towards the Moon two months later on 10 November, but again the mission was ill-starred. The craft swung past the Moon at a distance of 2250 kilometres and headed back for re-entry. According to Soviet records: "During the return of the spacecraft, the re-entry vehicle's hull was depressurised because of a faulty rubber gasket [probably around the entry hatch]." All the biological experiments on board were killed.

The module's landing was equally disastrous. Zond 6 took a different path home over the Antarctic skipping over the Earth's atmosphere to slow it down. The manoeuvre was successful but an



Novosti

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altimeter malfunctioned and the parachute opened at too high an altitude. The mission ended with the spacecraft buried in the ground, flattened like a pancake. The only experiments salvaged from the wreckage were metal-clad film cassettes containing photographs of the Moon's surface.

Six days later, the USSR officially announced that Zonds 4, 5 and 6 were the precursors of a crewed lunar spaceship. Such official confidence belied the hidden reality. The date for a crewed launch was continually pushed back because of constant troubleshooting and accident investigations, say Shamutdinov and Marinin. Before a crewed mission was given the go ahead, Soviet space engineers wanted to attempt three completely successful flights of the uncrewed 7K-L1 after Zond 6.

Awaiting the order

But in mid-November the US publicly announced that Apollo 8 would be a mission to orbit the Moon. The six Soviet cosmonauts short-listed for the flight round the Moon wrote a personal letter to the Politburo asking for a Soviet crewed mission to be approved immediately. As the cosmonauts had helped design, build and test the crewed spacecraft, they argued, their vested interest would improve safety.

In early December 1968, the six flew together to the cosmodrome with the approval of the Soviet authorities and continued to train vigorously, ready to head for the launch pad at a moment's notice. Rex Hall, a space analyst based in London, says Soviet standard procedures prevented crews travelling on the

same aircraft in case it crashed. Instead two planes were always used. The single flight to Baikonur Cosmodrome was therefore highly unusual. The cosmonauts also planned to flout a second rule that prevented a launch until they had acclimatised to the mission schedule, resetting their body-clocks so they were at their most alert during liftoff. At best, this could have been only partly achieved before the flight. To meet the launch window the Proton rocket must have been transported to the

launch pad, say Western space analysts, and the eight-day fuelling process and preliminary countdown begun.

The movement of the six cosmonauts was reported by the US intelligence network and two destroyers were dispatched from the Italian port of Naples on 6 December to head for the Black Sea. Peter James, a former CIA informant on the Soviet space effort in the 1960s and 1970s, says the ships were sent to eavesdrop on communication from the expected Soviet launch.

But Politburo approval for the launch never came. It is rumoured that the cosmonauts boarded the rocket for take-off with the back-up crew on hand. Russian space historians, however, say this is untrue. The launch window closed on 10 December and two days later the US Navy ships in the Black Sea cut short their tour, ostensibly due to storms and high winds in the area.

The launch on 21 December of Apollo 8, commanded by Frank Borman, and its success as the first crewed spacecraft to orbit the Moon, signalled the end of the Soviet circumlunar project. Its mission, to be first to the Moon, had failed. In December 1968, the project was cancelled.

Today, examples of the 7K-L1 spaceship are used as teaching aids by aerospace students at the Moscow Aviation Institute. One of the spacecraft has been cut in half revealing its construction. Students are left to speculate what might have happened if the swashbuckling cosmonauts had been given their head and ventured around the Moon. □

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