Book Review

Space pioneer Sergei Korolev, the Soviet Wernher von Braun

by Marsha Freeman

Korolev: How One Man Masterminded the Soviet Drive to Beat America to the Moon
by James Harford
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It is most appropriate, that to celebrate the 40th anniversary of Sputnik this October, there be a renewed appreciation of the life and work of Soviet Chief Designer Sergei Korolev. It is fortunate that James Harford, himself part of the history of the U.S. space program, has been able, after nearly ten years of research and writing, to have his biography of Korolev published this year.

Harford opens his Prologue with the following: "One day in the early 1960s, Sergei Pavlovich Korolev was looking at a newspaper photograph of Wernher von Braun, then being lionized in the United States for his part in the upcoming Apollo program. His comment, recalled Antonona Otrieshka, a staff assistant: 'We should be friends.' " Korolev died at the height of the Cold War, in 1966, so such a meeting was not destined to occur.

Just as the German emigré Wernher von Braun was a driving force in the United States for contributing an Earth-orbiting satellite during the activities of the International Geophysical Year in the mid-1950s, so it was Ukrainian emigré Korolev's vision, tenacity, and commitment to that same effort, that enabled the Soviet Union to be the first to open the Space Age of man on Oct. 4, 1957.

Like von Braun, as a young man, Sergei Korolev was inspired to dedicate his life to the technology for space exploration after becoming acquainted with the work of a great space pioneer: Hermann Oberth in the case of von Braun, and Konstantin Tsiolkovsky in the case of Korolev. While biographers differ as to when, or whether, Korolev ever met Tsiolkovksy, who died in 1935, there is no question that, as Harford states, "Korolev began to build what Tsiolkovksy had conceived."

Korolev's life paralleled von Braun's in many other ways. Both spent the 1930s working for brutal, totalitarian regimes, with which each had to make some peace in order to survive and continue doing research. Both were imprisoned by these regimes, the Nazis in one case, Stalin in the other. Both worked on projects of such strategic import, that, as distasteful as it was to each, the leaders of both dictatorships had to be appealed to, and dealt with directly, in order to make any progress.

There were also significant differences between these two giants of space exploration, seemingly less of temperament and vision, and more of circumstance; but they both began their careers in space development through serious study, participation in amateur rocket societies, and then support from the military. Both died prematurely, many years before their work could be brought closer to completion. Both saw one overarching goal for mankind in space: trips by man to Mars.

Prelude to space exploration

The space programs of both the United States and the Soviet Union grew directly out of the missile defense efforts of the 1950s. The work of the German team under von Braun during World War II had proven beyond a doubt that rocket engines could be built to propel a missile into space. Both the German and Soviet efforts had their roots in the experimets by enthusiastic amateurs, mainly young men, who in the 1920s and early 1930s were trying to turn the ideas of Tsiolkovsky and Oberth, into hardware.

Before his 20th birthday, in 1926, Sergei Korolev moved to Moscow from Ukraine, to study at the prestigious Bauman Institute. As a youngster, he had become enamored of the new technology of flight, and was intent upon studying where other young men were also designing the gliders and planes of the future. Because the Institute was so near to the Central Aero-Hydrodynamics Institute (TsAGI), as Harford relates, many students were involved also in projects there, and could

Chief Designer Sergei Korolev, whose vision and tenacity made it possible for the Soviet Union to be the first country to venture into space, 40 years ago.

gain the experience of taking their conceptual studies to practical reality.

Interest among the technical community in Moscow was broadening to encompass "flights in Universal Ether," in addition to flights in the air, when Korolev arrived in Moscow. In 1927, the First World Exhibition of Interplanetary Apparatus and Devices was held in Moscow. Spaceplane models by F.A. Tsander (1887-1933), whom Korolev would meet four years later, and papers and concepts by Robert Goddard, Oberth, and Max Valier, were on display. Like Friedrikh Tsander, at that time Korolev thought that the major role for the rocket would be as an adjunct to aircraft.

By 1930, an amateur rocket experimental group had been established in Moscow, called the Group for Studying Reaction Propulsion (GIRD), and led by Tsander. Korolev and Tsander, then both working at TsAGI, devoted their after-hours and weekends to the experiment GIRD was embarking on, Harford reports. Tsander's rocket design, which was not successful, was tested by the GIRD staff in March 1933, while Tsander was dying of typhoid fever. It was followed by more advanced designs, and the first Soviet liquid-fueled rocket was launched on Aug. 17, 1933.

Eight days later, Korolev wrote an article for the newspaper *Vechernaya Moskva,* with the title, "Towards the Rocket-plane." Himself misled by some of the fantastic versions of international rocket developments then prevalent in the press, Korolev reportedly warned that the Germans had "allegedly built a rocket of such size that it will be able to fly a man." In 1924, the world's first amateur rocket society, established by Tsander in Moscow, had fallen into disrepute by debating for days the "fact" that Goddard had launched a rocket to the Moon! In his 1933 article, Korolev warned that although rocket technology held great promise, "practical resolution of this huge problem requires many years and persistent work."

As reported by Harford, in August 1932, the amateur rocket organization in Moscow began receiving funding from the military, thanks to the interest of Marshal Mikhail Tukhachevsky. In October 1933, the Soviet Council of Labor and Defense created a Reaction Propulsion Institute—a recommendation by the Revolutionary Military Council of the U.S.S.R.—and the deputy chief engineer of the new Institute was Korolev.

Between 1933 and 1938, families of rocket engines and their guidance, control, and other requirements were under full-scale development in these new institutes in Russia.

Research in the Gulag

In the early morning hours of June 27, 1938, two men from the Soviet secret police and two "witnesses" entered Korolev's apartment, and he was quickly taken away. At the age of 31, Korolev's work on liquid propellant rockets had become recognized, certainly by his colleagues, and also by the Soviet state.

The charges against Korolev and other rocket researchers, who had also been arrested, was "subversion in a new field of technology." They were accused of collaborating with an anti-Soviet organization (of rocket enthusiasts) in Germany. Soon after, Wernher von Braun and his German colleagues would be arrested by the Nazi Gestapo, with some similar charges levelled. And Romanian Hermann Oberth would be threatened with being sent to a concentration camp if he did not become a German citizen, to prove that he was not under the influence of foreign interests. Most likely, it was his work with Tukhachevsky, who was excuted by Stalin, that led to Korolev's arrest and exile.

Korolev was sentenced to ten years in prison, and, by October 1939, was "in one of the most dreaded of all prisons, a camp in the Kolyma area of far eastern Siberia," Harford reports. The privations of his time in the camp, under unspeakable conditions, led to a permanent deterioration of his health, and, in all likelihood, contributed to his premature death at the age of 59.

But Korolev was called back to Moscow and finally moved, in September 1940, to a *sharaga,* or prison factory, likely through the intercession of the great aircraft designer Andrei Tupolev, who himself was arrested on Oct. 21, 1937. Tupolev had earlier been Korolev's teacher at the Bauman Institute. During World War II, Tupolev and Ilyushin attack aircraft, made famous during the war, were produced in Gulag

"design bureaus." In the summer of 1944, the entire experimental design bureau where Korolev was working, was released from custody, and Korolev's "prior convictions expunged."

In 1945, Korolev was commissioned a colonel in the Red Army. As Harford reports, he flew to Germany in September to "join other Soviet colleagues gathering information" on the V-2 rocket which had been developed by the von Braun team during the war. Von Braun himself was already in the United States. When German technical specialists, snatched from the East German Soviet zone, were brought to the Soviet Union to work on missile technology, one group worked under Korolev. But by 1950, the Germans were being sent back to their homeland, and Korolev was leading the effort to design, build, and test the world's first ICBM, the R-7. According to Harford, Korolev believed that the World War II V-2 liquid propellant technology could not be extended significantly, and preferred to work on his own designs.

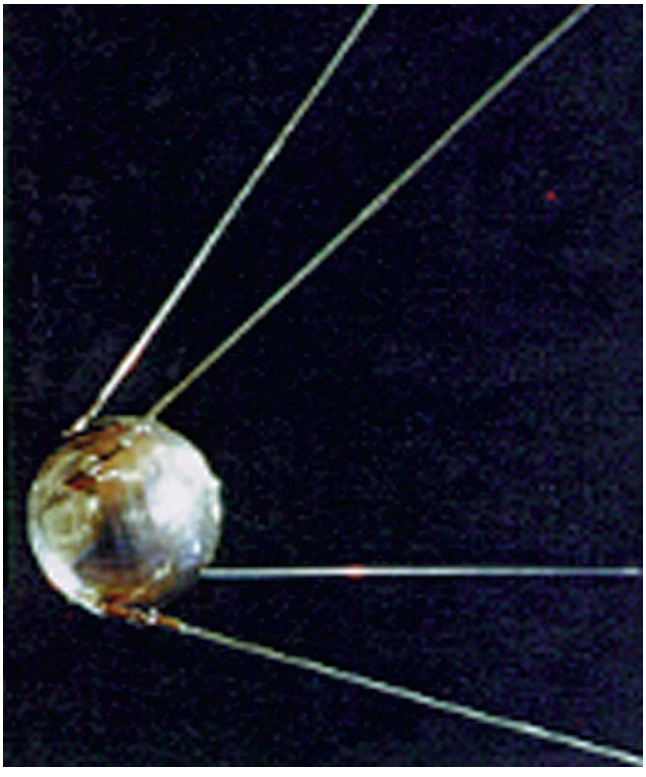
On Oct. 4, 1957, the world was awed by the orbiting of the first artificial satellite, Sputnik. Less than two months before that, the R-7, which launched Sputnik, made its first successful test for its intended purpose, carrying a dummy warhead. For Soviet Communist Party chief Nikita Khrushchov, the urgency was for the military capability. The leap into the Space Age for the Soviet leadership was useful merely as a publicity stunt to prove the superiority of the Soviet system to capitalism.

As Harford richly documents, the Soviet regime was constantly an obstacle to Korolev's plan for the orderly progression of new space capabilities. The Soviet government funded design bureaus that were developing competing designs to Korolev's, in everything from second-generation ICBMs to Moon rockets, which created confusion and inadequate funds for everyone. The regime, and Khrushchov personally, made outrageous demands on the Chief Designer to meet deadlines for space "firsts," based on political considerations, such as speeches before the United Nations, or concerns about when the United States would do it.

Yes, there was also pressure on American engineers to out-do the Soviet Union, and there was political pressure that had little to do with science and technology. But no one in the United States feared that if they spoke up, or failed, they would end up in the Gulag. Here, it was the top-level leadership of the space agency that decided when to push the launch button, not a nomenklatura.

The anonymous Chief Designer

Unlike Wernher von Braun, who became a widely recognized proponent of space exploration through magazines, newspapers, and television in the early 1950s, Sergei Korolev's name was not known outside the circles of the Soviet government, the military, and his colleagues who were involved with the space program, until after his death. Although intelligence services in the West knew there was a "Chief Designer," his name was never made public. He was not seen



Sputnik, the world's first artificial satellite.

in photographs with the cosmonauts, nor at state ceremonies where awards and medals were bestowed upon those recognized for their contributions. Yet, he was the man most responsible for their successes.

Anonymity was undoubtedly vexing to Korolev, although it was not his most serious problem. But the successful effort by the paranoid Soviet government to keep the identity of the Chief Designer a virtual state secret, produces a most frustrating aspect of Harford's book.

Although the author spent many years making an herculean effort to interview hundreds of people who knew and worked with Korolev, the Chief Designer's thoughts, his vision of the future, his long-range plans for space exploration, are missing. There is no way to explain how this man, who had been unjustly imprisoned, and stymied at every turn by a vicious and opportunistic regime, could have driven himself and his colleagues to accomplish what they did during his life, if he had not had a goal that allowed him to see everything else around him as merely ephemeral.

It seems inconceivable that Korolev left no notes, diaries, letters, or other personal material which would give us an insight into what ideas sustained him. It *is* conceivable that such material has not yet been made accessible to researchers by the Russian government, which would be a great disservice to the memory of the Chief Designer.

It can be hoped that such material will soon see its way into the light of day, and that Jim Harford will be able to write a sequel to this informative and moving biography.