LKS (Black Shuttle)

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http://www.russianspaceweb.com/index.html

At the end of the 1980s, the Russian press revealed that a leading Soviet space designer, Vladimir Chelomei, had worked on a mini-Shuttle, which could be an economical alternative to the heavy US Space Shuttle and Russia's own Buran. However later publications hinted that Chelomei saw his reusable orbiter as the Soviet response to Ronald Reagan's "Star Wars" program. Chelomei's mini-Shuttle, apparently, would be capable of carrying laser weapons and shooting down American ballistic missiles.

LKS tech specs:

Launch mass	20 tons - 25 tons
Landing mass	17.8 tons
Payload to low-Earth orbit	5 tons
In-orbit propellant cache	2 tons
Payload bay volume	30 cubic meters
Crew	2 - 3 people
Flight duration	Manned: 10 days; Unmanned: 1 year
Touchdown speed	300 km/h
Launch vehicle	Proton

After his initial unsuccessful attempts to develop a reusable vehicle in the early 1960s, Chelomei returned to the concept of a winged orbiter at the beginning of the 1970s. Around 1975, Chelomei proposed a "smaller and cheaper" Soviet response to the US Space Shuttle.

Technical description

As in his previous forays into the field, Chelomei was not satisfied with the traditional launch system for a reusable orbiter. This time, in cooperation with the Institute of Mechanics of the Ukrainian Academy of Sciences, Chelomei's TsKBM design bureau studied a space plane capable of collecting and liquefying oxygen in the upper atmosphere.

Various concepts of a booster stage, including exotic water-gliding carriers, rocket-powered sleds, detachable wheels and carrier aircraft with rotatable and variable geometry wings were considered for the LKS project. Folding wings were also studied for the orbital stage.

Final configuration

After extensive evaluation of various configurations of the LKS, Chelomei settled for a 20-ton Light Space Plane, or LKS, launched by the Proton booster. The spacecraft could deliver into orbit a crew of two, four tons of payload and two tons of propellant. Resembling a scaled-down version of the US orbiter, the LKS would be capable of atmospheric maneuvering during the reentry at altitudes between 50 and 15 kilometers and would touchdown on a regular runway with a speed of around 300 kilometers per hour.

Like the US Shuttle, the LKS would use small liquid-propellant thrusters for attitude control beyond the atmosphere. During the atmospheric phase of the flight, two-section elevons on the wings and a tail rudder would be used for flight control. The tail rudder would deploy by splitting into two sections on both sides of the tail, serving as a balance during the initial phase of the atmospheric reentry and as a speed brake during the touchdown.

Unlike the US Shuttle, the LKS featured a ski-like device rather than wheels on its rear undercarriage. The front undercarriage sported a regular steerable wheel. Another major difference from its American counterpart was the thermal protection system. To avoid the use of fragile and labor-intensive tiles, developers hoped to use a continuous protective layer borrowed from the reentry vehicle of the TKS spacecraft. It would still allow as many as 100 missions.

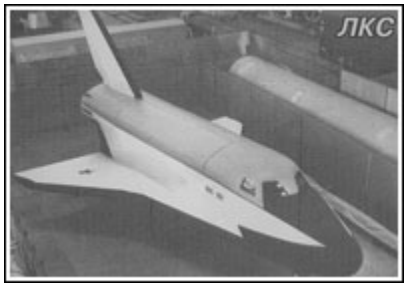
Finally, the LKS was designed to fly with or without a crew. During manned missions, emergency escape scenarios were available for the crew at every stage of the flight.

The LKS project would borrow heavily from hardware and experience accumulated in the course of the Almaz space station program.

Chelomei argued that despite its small size, the LKS could achieve most tasks proposed for the US Space Shuttle, including the delivery and retrieval of satellites, or the resupply and servicing of space stations.

Development

Within OKB-52, B. N. Natarov was appointed as head of the group responsible for the LKS project. A. P. Kirpil was the leading engineer in the project. Herbert Efremov, Deputy Designer General, oversaw the development effort on the project.



LKS-001 Proto-Type

OKB-52 estimated that it could complete the development of the LKS system within a four-year period.

However, ultimately, the Soviet government chose to emulate the size and capabilities of the US Space Shuttle. NPO Energia led by Valentin Glushko was chosen as the prime-developer of the reusable space system, MKS, later known as Energia-Buran. All materials on the LKS spacecraft were ordered transferred to NPO Molniya, the developer of the glider for the Buran orbiter.


One of the early incarnations of the LKS orbiter.
Credit: NPO Mash

Yet, Chelomei, refused to give up, continuing the project without formal authorization. By 1980, TsKBM had already generated 25 volumes of technical proposals on the design of the LKS and 15 volumes of technical proposals on the deployment of the LKS fleet. OKB-52 also built a full-scale mockup of the vehicle.

Star Wars candidate

After years of low-profile studies, Chelomei apparently saw a chance for his LKS project in 1983. As often in the course of the Cold War, the Americans provided an opportunity for the Soviet designers to pitch new projects to their bosses in the Kremlin. On March 23, 1983, President Reagan announced the Strategic Defense Initiative, SDI, program, commonly known as Star Wars. This large-scale undertaking envisioned a multi-layered defense network of ground-, sea- air- and space-based battle stations, which would be

capable of destroying each and every Soviet missile heading toward the American continent in a hypothetical nuclear war.

At least initially, Reagan's Star Wars speech triggered alarms in Moscow. According to former Deputy Foreign Minister Oleg Grinevskiy, on March 24, 1983, or within 24 hours after Reagan's speech, the Soviet leader Yuri Andropov discussed the implications of the SDI with his top advisors.

In this kind of atmosphere, Chelomei pitched the LKS project to the Defense Minister and the head of the General Machine Building, MOM, a government body overseeing the space industry. Post-Soviet sources hinted that Chelomei was "selling" the LKS in the role of an antimissile cruiser, carrying laser weapons and capable of intercepting American ICBMs in flight. It is less clear whether Chelomei intended to assemble laser battle stations in orbit with the help of the LKS, or if, (more likely), he actually hoped to use the LKS as platforms firing lasers.

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What is known is that Chelomei assigned Department 34 at TsKBM to develop a technological schedule for production and launch of 90 LKS-Proton systems per year! Such plans were drawn and were approved by N. M. Korneev, then First Deputy Chief of GSKB Spetsmash -- the major development center responsible for the Soviet launch complexes -- and Yu. F. Volodin, the department chief at Spetsmash, responsible for the Proton launch complex. (From 1978, total four launch pads for the Proton rocket were available at the Baikonur Cosmodrome.

Shabanov commission

In September 1983, the Soviet government set up a special State Commission, consisting of several working groups, to review and critique the UR-500-LKS project. Deputy Defense Minister V. M. Shabanov led the commission, which also included President of the Academy of Sciences A. P. Aleksandrov, E. A. Fedoseev, Deputy Minister of Electronics Industry, Designer General of Anti-Aircraft Systems Grigory V. Kisunko and a representative of MOM, B. V. Balmont.

At the first meeting of the commission, Chelomei brought four of his associates from TsKBM: Herbert Efremov, A. V. Tumanov, I. S. Epifanovskiy and G. I. Dmitriev. However, in the typical secrecy paranoia of the Soviet period, Shabanov personally

screened those arriving at the meeting. When he noticed several unfamiliar faces, Shabanov sternly asked Chelomei about the affiliation of the people. Chelomei assured Shabanov of the reliability of his subordinates, however never again risked inviting them to the commission meetings.

Herbert Efremov, Chelomei's deputy at TsKBM, defended "technical proposals" before Shabanov commission. Although most working groups of the commission gave positive review to the design of the LKS itself, Chelomei's hopes of using lasers to shoot down missiles were apparently met with widespread skepticism. Ultimately, Kisunko and, later Shabanov, concluded that the project was impractical for the purposes of missile defense.

The Shabanov commission buried the LKS project and apparently, Chelomei was formally reprimanded for unauthorized work. The LKS turned out to be the last ambitious undertaking in the field of space flight for Chelomei. With his death in 1984, the issue of the Soviet response to the "Star Wars" was left to the next generation of designers to resolve.

LKS Chronology
Source: astronautix.com

1983 September 1 - State commission reviews LKS spaceplane -
A State Commission reviewed Chelomei's LKS spaceplane design on behalf of Minister of Defense V M Shabanov. Shabanov was completely opposed to the LKS, and had staged the commission for the express purpose of burying Chelomei's proposal once and for all. Further development of the LKS was stopped.

1991 March 1 - Saboteurs destroy LKS spaceplane mock-up -
A group of unidentified saboteurs (possibly KGB) broke into the premises of NPO Mashinostroyeniye and destroyed the mock-up.