

Spacecraft Passenger Television from
Laika to Gagarin

[Redacted]

P.L. 86-36

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With the launch of a five-ton earth satellite on 15 May 1960 it became apparent that the Soviet Union had the capability to put a man into ballistic flight around the world. The U.S. government needed a reliable method to sense attempts at orbiting a human passenger. This is the story of the race to provide this capability through the exploitation of a unique SIGINT source that had been revealed only months before Major Yuri Gagarin's flight on 12 April 1961.

At 0600 hours GMT on 12 April 1961 a five-ton payload was boosted from its launch platform in Kazakhstan—signalling man's entry into the world of space travel. VOSTOK 1 was on its way to an injection into a 200-mile-apogee earth orbit with Major Yuri Alexseyevich Gagarin of the Russian Air Force as its passenger. In a few minutes, and while the orbiting spacecraft was still over Siberia, Gagarin's stoic features would flash on a television monitor [Redacted]

[Redacted] In the space of a quarter hour, and as the five-ton spacecraft continued on its historic one-revolution flight to a successful de-orbit maneuver and reentry in Central Asia, the White House would be apprised of this very firm evidence that the Soviet Union had just succeeded in placing a human in ballistic flight around the world. With this sure knowledge of the accomplishment, the President would extend our country's congratulations to the Kremlin and to the Russian people. [Redacted]

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Declassified and Approved for
Release by NSA on 04-04-2008
pursuant to E.O. 12958, as amended
MDR 52536



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This is the story of those fateful few months. But to set the stage for this winter's work it is useful to go further back in time and review related activities leading up to the 1 December 1960 ESV launch.

The world's first artificial earth satellite, SPUTNIK 1, was placed in orbit by the Soviet Union on 4 October 1957. Its loud and beeping 20-MHz transmission was immediate evidence of its existence all over the world. This Russian accomplishment was a surprising and distressing affair for the United States, its people, and its growing corps of ballistic missile technologists. Even more so, it was very embarrassing. On 29 July 1955 the U.S. government had publicly announced its intention to contribute to the forthcoming International Geophysical Year (1 July 1957 to 31 December 1958) by placing a number of 20-pound Project Vanguard payloads in near-earth orbit. A few days after this proud statement, the Soviet Union announced they had similar plans for a contribution to the IGY, but with larger and more ambitious payloads in earth orbit. Over the next two years Project Vanguard came more and more into the news while little was said by the Russians with respect to their plans for placing payloads in earth orbit. No one, not even those following the growing Soviet ballistic missile activity, had an inkling that the first orbiting payload would have been built in the Soviet Union.

Subsequent to the injection into earth orbit the Russian news media announced the weight of SPUTNIK 1 as 185 pounds. In October 1957 there were many people in the Western World who were of the opinion that the decimal point had been misplaced to the right in the weight announcement. Then, in quick order, the Russians followed this spectacular success with the 3 November 1957 launching of the 1,100-pound-payload ESV, SPUTNIK 2. Gloom settled over official Washington. Not only had the Russians beaten us to near-earth orbit, but Project Vanguard was in serious trouble. It could not seem to get a payload out of sight of the launch platform. On good advice the White House turned to the Army and its leading ballistic missile expert, Wernher von Braun. Von Braun was confident that the Army could soon lash up some Corporal missiles as a makeshift second stage to a Redstone missile, and orbit some 20 pounds of useful payload in a 13-pound spent rocket casing. His time schedule was three months, and all his predictions were accurate. The United States would orbit the third ESV of the world that late winter on the Army's first try—Explorer 1. All of 1958 would see the first of three Vanguard payloads and two more Explorer ESVs by the Army. The U.S. was in the space business, but only the experts in the discipline could receive the payloads' feeble 10-milliwatt transmissions on 108 MHz. But back to SPUTNIK 2.

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There was to be another surprise, beyond its half-ton weight. The Soviet news agency announced that SPUTNIK 2 was carrying a Siberian Husky, named Laika, as a passenger. The Soviets concurrently announced that a television system was allowing observation of the passenger and its motions.

[redacted] There wasn't any doubt in our shop that such a video system did exist in SPUTNIK 2. Subsequent to the launch of the satellite the Soviets displayed the results of this televising of the passenger, indicating a video system that was low in resolution and slow in rate of framing. This was not unexpected in view of battery-supplied electrical energy and the power restrictions that would exist for a flight of any length of time.

[redacted] Unfortunately doctors of medicine, rather than veterinarians, were used as expert consultants. This was to cause a long delay in the identification of Laika's biological functions

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[redacted] But even with the advent of SPUTNIK 2 this possibility seemed far away in time—perhaps a decade or more in the future. Heavy though this payload was, it was far from sufficient for the needs of a man, his life support systems, and the de-orbit and reentry requirements.

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The late spring of 1958 was to see the launching of the third Russian ESV on 15 May. No biological passenger was announced by the Soviets for this 3,900-pound spacecraft. The Soviet announcements indicated this was in the nature of an orbiting geophysical observatory, and

[redacted] There was, however, no mention of a video system by the Soviet Union. And impressive though the payload weight was (we were still in the 10-to-20-pound class with Vanguard and Explorer shots), 3,900 pounds did not seem sufficient for an ESV program that would have a manned flight goal.

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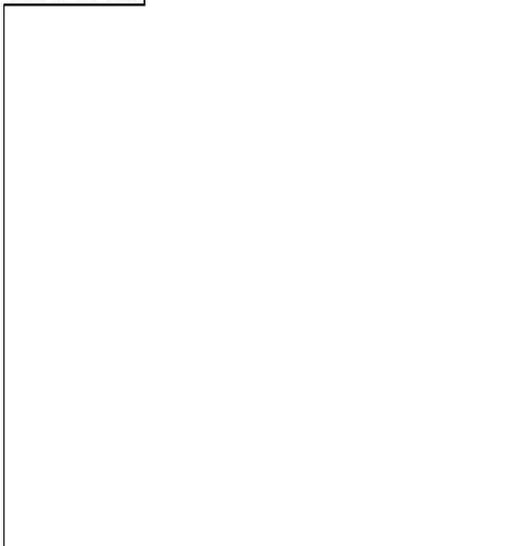
[redacted] Customer interest in the subject was on the wane and it was to wane even more during the following year. In 1959 all Soviet space ventures were limited to their three "moon" shots, the Luna series.

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After a two-year hiatus, the Russians resumed their earth satellite vehicle program with the orbiting of a payload of massive weight. On 15 May 1960 a 10,000-pound spacecraft was injected into an impressive (370-kilometer apogee; 310-kilometer perigee) earth orbit. National interest quickened in all aspects of the Soviet Union ESV program. From this day onward the spectre of a manned Soviet ESV—undoubtedly before the United States could manage it—was a distinct and unhappy fact. There was little doubt as to the eventual goal of this heavy satellite. The Russians attempted to de-orbit and reenter the payload on its 48th orbit. This was a necessary maneuver attendant to manned flight. Such was the situation created by the three-day flight of SPUTNIK 4. We could take some comfort in the fact that the de-orbit maneuver was unsuccessful. As a consequence of a spacecraft attitude error during the firing of the braking rocket, the ESV was boosted into a higher orbit, where it was to languish for over five years before reentering the earth's atmosphere.

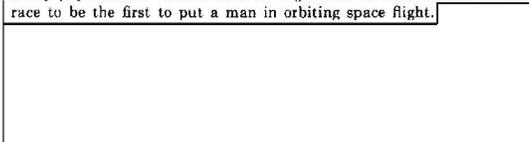
The second ESV in this new 5-ton payload series, launched on 19 August 1960, was successfully de-orbited and recovered during its second pass around the world. This flight had passengers. The Russian media announced that the dogs Strelka and Belka had survived the flight without ill effects and that a television system allowed viewing of the passengers. We were unable either to confirm or deny this state-

ment at the time.



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1 December 1960 saw the launching of the third in the series of these 5-ton-payload satellites, SPUTNIK 6. TASS announced that this spacecraft carried two dogs as passengers in its two revolutions around the world; however, Pchelka and Mushka were not to be as fortunate as the previous flight's passengers: the spacecraft burned up during reentry. This made two failures out of three attempts to reenter these heavy payloads. It did not seem to augur well for the Russians in the race to be the first to put a man in orbiting space flight.



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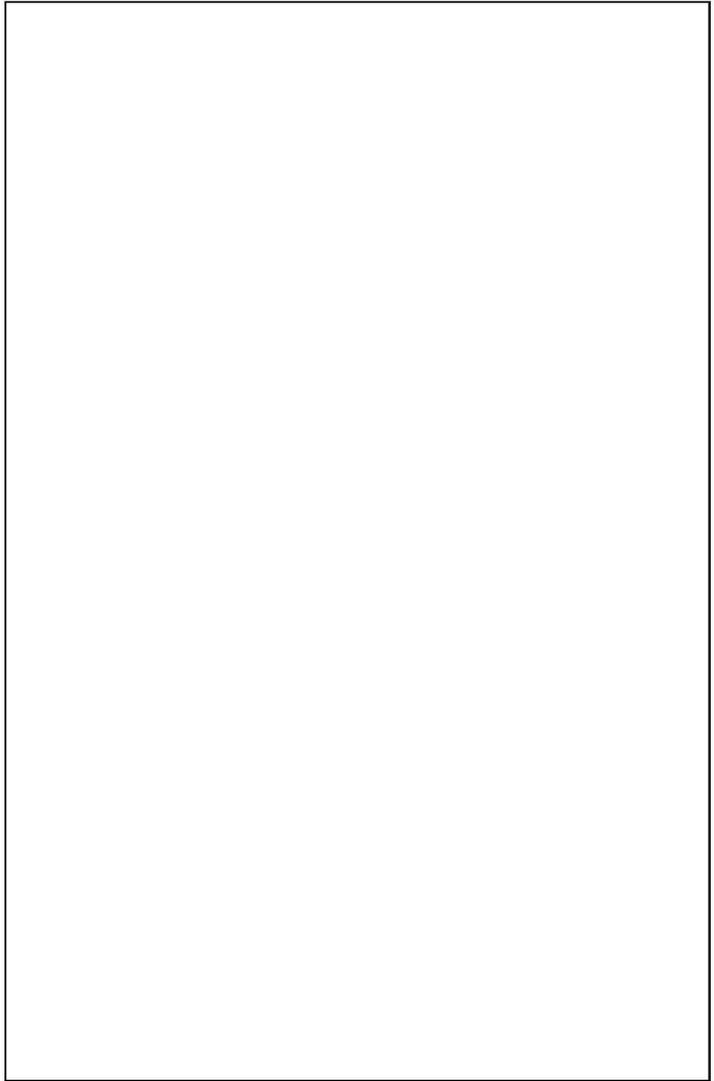
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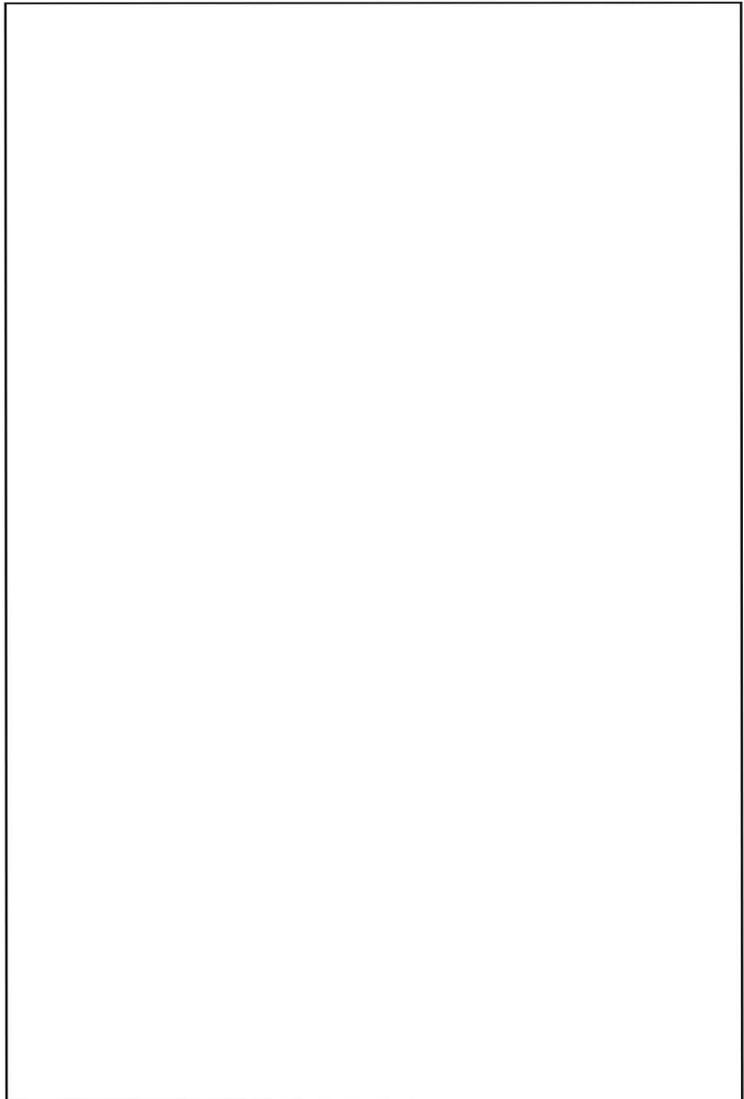
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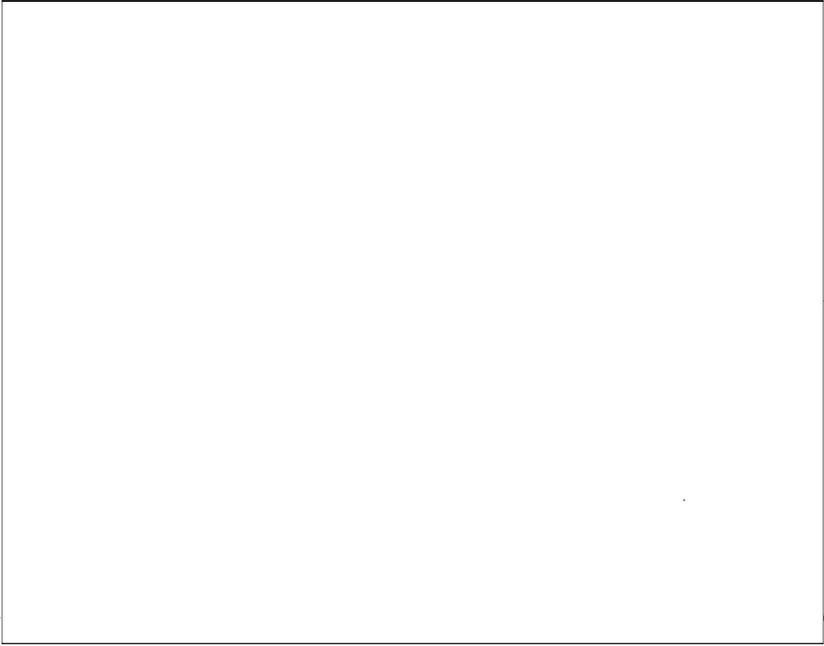
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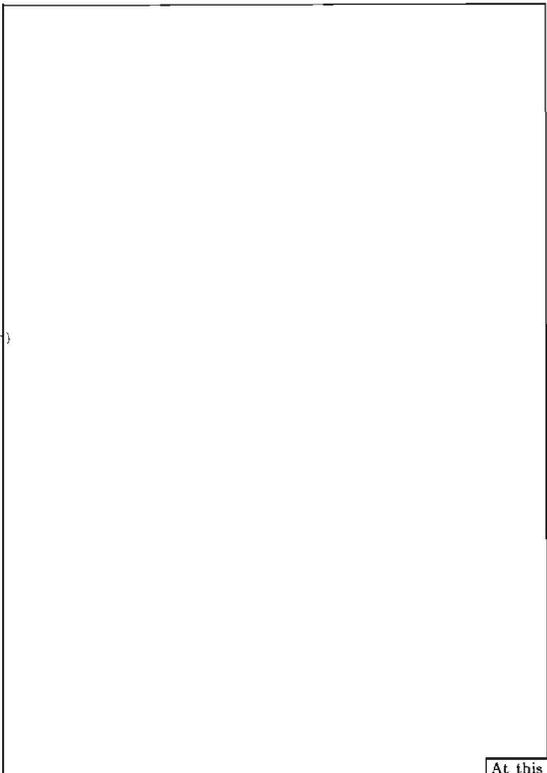
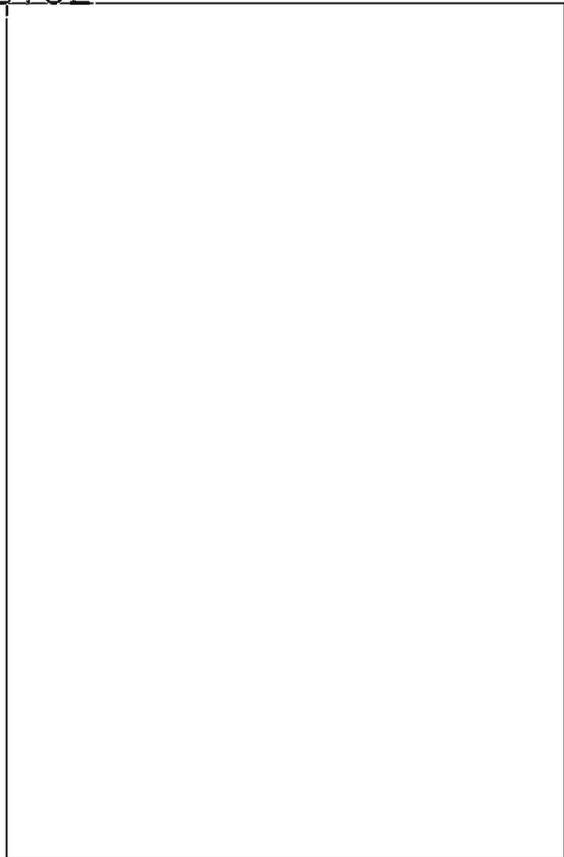
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At this time, and unknown to us, the flight of VOSTOK 1 was less than a month away. The Soviets had launched the fourth in the 5-ton SPUTNIK series on 9 March 1961. On 25 March 1961 SPUTNIK 10 would be launched, just 18 days before Gagarin's flight. Both flights carried a

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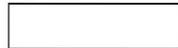
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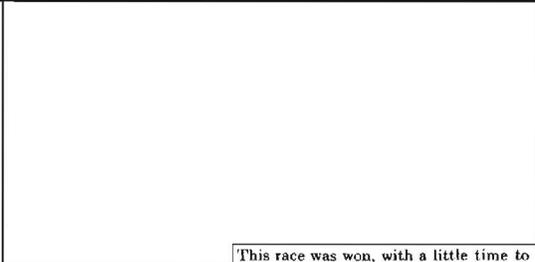
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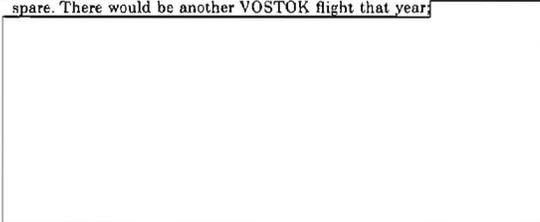
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single dog passenger—Chernushka in one and Zvezdochka in the other—and the passenger television system, transmitting on 83 MHz. But one of the dogs would be denied camera coverage. In his place there was to be seen a human dummy, resplendent in space suit and helmet. The dress rehearsal was over. It was soon to be center stage for a young Soviet Air Force major.



This race was won, with a little time to spare. There would be another VOSTOK flight that year.



Some four months later the spacecraft VOSTOK 2 was to follow the first Soviet manned flight with Major German Stephanovich Titov as the passenger on a 17-orbit flight. As before, the passenger would be televised back to earth.



With VOSTOK 2 the Russians had changed the format of the television system. Titov's features were being scanned by a 400-line, 10-frames-per-second television system. Even more drastic changes had been made in the modulation of the carrier of the radio link to earth. This was a continuous carrier system, vis-a-vis the pulsed carrier format used in all earlier flights.

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The Agency's missile and space signals organization had other fish to fry.