

Transcripts give new perspective on Vostok-6 mission

The first woman in Earth orbit

by Asif A. Siddiqi

Much has been written about the selection, training, and flight of Valentina Vladimirovna Tereshkova, who became the first woman in space more than 45 years ago in June 1963 when she spent three days in orbit in her Vostok-6 spacecraft. During the Cold War, the Soviet media published vast amounts of information about her while providing almost no concrete details [1].

Although official Soviet sources claimed that Tereshkova performed with exemplary skill during her mission, rumours of her poor in-flight condition continued to dog her, especially in the West. The occasional brief admission by Soviet officials only helped fuel these rumours. For example, in his 1979 memoirs, the former head of medicine services for the Soviet Air Force, Major-General Aleksandr Babiyuchuk, compared her performance unfavourably to that of cosmonaut Valeriy Bykovskiy, who flew simultaneously with Tereshkova in his Vostok-5 spacecraft. Babiyuchuk wrote that: "Bykovskiy passed through the flight well during all its phases, and did not experience any unpleasant sensations. The same could not be said about Tereshkova. The medical commission noted the heightened sensitivity of her vestibular system" [2].

In the era of glasnost, the trickle of information turned into a flood. In 1987, Soviet authorities allowed the official press to publish the names and details of the other four women selected alongside Tereshkova in 1962 who were not fortunate enough to fly in space [3]. Since then, many articles and books have filled in unknown aspects of the preparations of the Vostok-6 mission, especially about the history of the women cosmonaut team [4]. Many of these new works drew their information from the published diary entries of Lieutenant-General Nikolay Kamanin, a deputy commander-in-chief of the Soviet Air Force responsible for combat training who oversaw the training of the cosmonaut corps from 1960 to 1971. Using Kamanin's diaries as the key source, the most detailed and lengthy account in the English language of the selection, training and mission of Tereshkova appeared in the NASA History Office-sponsored volume, *Challenge to Apollo: The Soviet Union and*



the Space Race, 1945-1974, published in 2000 [5].

Other recent works have added details to the selection and training of the women cosmonauts but there has been one glaring omission: the mission itself. Until now, a key piece of the puzzle - the actual mission transcripts of Tereshkova's flight - were not accessible for study. Recently, the Russian State Archive of Scientific-Technical

Documentation (RGANTD) based in Moscow, declassified these transcripts and made them available to researchers [6].

Also, the recent declassification of a top-secret documentary on the Vostok-5/6 flight, entitled *Multi-day Joint Spaceflight*, adds some key details. This film was produced in 1963 by Mosnauchfilm, the Soviet science film agency, and was meant only for internal use by high-level Party and government officials and senior designers [7].

This two part article is an attempt to use the transcripts, in combination with a number of other primary sources - the Kamanin diaries, the memoirs of leading biomedicine specialists, the writings of the other women cosmonauts, the recently available documentary, and other documents - to construct the most thorough account of the

Vostok-6 mission, with a particular focus on Tereshkova's condition and performance during the flight.

Joint mission

As is well-known, the Vostok-6 mission was executed as a joint mission with Vostok-5. After considering many different options for the joint flight, the Soviet government signed off on the final plan in April 1963: to fly a man in orbit for eight days and a woman for two to three days.

The prime candidates for Vostok-5 were Valeriy Bykovskiy and Boris Volynov; in early June, just a couple of weeks prior to the launch, Bykovskiy got the nod as the primary pilot, in part because he was one of the lightest cosmonauts and the Vostok-5 spacecraft was pushing the limit of the capability of the 8K72K launch vehicle.

The selection of the female Vostok-6 pilot was extremely acrimonious, with different powerful factions split between Valentina Tereshkova and Valentina Ponomareva. Tereshkova's selection as the prime (made on May 21) was a close decision and created tension, particularly because it pit the two giants of the Soviet space programme, OKB-1 chief designer Sergey Korolev (who favoured Tereshkova) and Academy of Sciences President Mstislav Keldysh (who favoured Ponomareva). In the end, Ponomareva did not even serve as backup but as the reserve cosmonaut, something akin to a second backup. Tereshkova's actual backup was Irina Solov'yeva [8].

Prelaunch activities

The cosmonauts flew out from Moscow and arrived at the launch range at Tyura-Tam on June 1. Among the 35 people on board were four of the five women cosmonauts. The documentary *Multi-day Joint Spaceflight* shows Tereshkova, Zhanna Yerkina, Valentina Ponomareva, and Irina Solov'yeva coming down the walkway off the Antonov An-10 aircraft. They were greeted by chairman of the State Commission Georgiy Tyulin and chief designer Sergey Korolev.

On the morning of June 4, the whole State Commission (a temporary body organised specially for each Soviet spaceflight and typically headed by a high government official or military officer) met to give the final go-ahead for the launch. More than 60 people attended the meeting. Later in the day, at 6 pm, there was a repeat meeting of the State Commission, held simply so that it could be filmed for posterity. Footage of the meeting shows cosmonauts



The prime and backup crews of Vostok-5 and -6 shown at the meeting of the State Commission before launch (of Vostok-5) where the crews were formally approved. In the front row (from left) are: Valentina Ponomareva, Irina Solov'yeva, Valentina Tereshkova, Boris Volynov, Valeriy Bykovskiy, and Nikolay Kamanin. Visible in the second row are cosmonaut Andriyan Nikolayev (with thick eyebrows) who flew on Vostok-3, and to his left, Yevgeniy Karpov, deputy director of the Cosmonaut Training Center. Back in the third row (on the extreme right) and yawning is Vladimir Yazdovskiy, the doctor at the Institute of Aviation and Space Medicine, who, from the beginning, was opposed to Tereshkova's selection.
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Bykovskiy, Volynov, Tereshkova, Solov'yeva, and Ponomareva sitting next to Kamanin. The latter introduced them to the assembled, identifying the prime cosmonauts as 'commanders' and the backups as 'deputies'. For Vostok-5, Kamanin named Tereshkova as commander and both Solov'yeva and Ponomareva as deputies. For the cameras, both Bykovskiy and Tereshkova gave short but spirited speeches followed by Tyulin, Korolev and others (including first cosmonaut Yuri Gagarin). Six officially approved journalists from Soviet media sources were allowed to attend this fake meeting [9].

Communications

On the actual mission, communications were carried out using both shortwave and VHF radiolinks. The VHF stations were all known as Zarya (Dawn). Each Zarya station, depending on its number, was identified with a specific location of the Soviet ground communications network (known as the

Women cosmonaut trainees Valentina Ponomareva and Tatyana Kuznetsova. The latter was the only one of the five women trainees not present at Tyura-Tam (Baykonur) during the launch of Vostok-6.



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Command-Measurement Network or KIK). Zarya-1 was at Tyura-Tam, Zarya-2 was at Kolpashevo, and Zarya-3 was at Yelizovo, and so on. Besides voice communications, contact was also maintained with Vostok-6 through shortwave telegraph systems which had the callsign Vesna (Spring). Specific individuals, who were closely involved in communications, also had their own callsigns which they used to identify themselves during comm sessions.

The ones used on the Vostok-6 mission include the following:

Callsign	Meaning	Person
Chayka	Seagull	Valentina Tereshkova
Yastreb	Hawk	Valeriy Bykovskiy
Kedr	Cedar	Yuri Gagarin
Sokol	Falcon	Andriyan Nikolayev
Orel	Eagle	German Titov
Berkut	Golden Eagle	Pavel Popovich
1st	First	Nikita Khrushchev
20th	Twentieth	Sergey Korolev

Launch

The Vostok-5 launch was delayed several times, from June 7 to June 11, and finally to June 14. Although the mission was originally scheduled to last about eight days, because of imprecise orbital insertion (and a lower than expected apogee) it was truncated to a five days.

The launch of Vostok-6 was set for June 16, around the time that Bykovskiy was finishing his first full day in space. On that morning, Tereshkova and Solov'yeva rose at 0700 hours and did about half-an-hour of calisthenics, before beginning the suitup process.



Cosmonaut Valentina Ponomareva shown during training. Although she was the original favourite to fly the Vostok-6 mission, she eventually served as the 'second backup', behind Irina Solov'yeva. She is currently a historian of science and technology at the Russian Academy of Sciences.

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In the hours leading up to the launch, Kamanin spent some time at the launch command post before heading to see how the prime and backup cosmonauts were suiting up. Both Tereshkova and Solov'yeva sailed smoothly through this process without any delays. Besides Kamanin, among those present for the suiting up were cosmonauts Y Gagarin, Titov and Nikolayev, chief designer Korolev, State Commission chairman Georgiy Tyulin, and Soviet Air Force First Deputy commander-in-chief Marshal Sergey Rudenko. All wished Tereshkova good luck.

At precisely 0915 hours Moscow Time, the bus carrying Tereshkova arrived at the

Shown here are the three prime and backup members of the Vostok-6 crew as they arrived at Tyura-Tam. Pictured (from left) are: Valentina Ponomareva, Irina Solov'yeva and Valentina Tereshkova. The man on the left (between Ponomareva and Solov'yeva) is Georgiy Tyulin, the chairman of the State Commission for the Vostok-5/6 mission.

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launch pad. Footage from the film documentary shows both Tereshkova and Solov'yeva suited up and in good spirits. Nikolayev held a microphone to Tereshkova to record her last impressions.

Exiting the bus, Tereshkova walked towards Tyulin and made a brief statement: "Comrade chairman of the State Commission, cosmonaut Tereshkova is ready for flight." She was given some flowers which she handed to Korolev.

The film shows numerous cameramen taking pictures (and others recording audio), while Tereshkova said goodbye to Korolev, the commander-in-chief of the Strategic Rocket Forces Marshal Nikolay Krylov, and other senior officials. She was clearly excited (and perhaps nervous): by the time she was set into the ejection seat of her Vostok spacecraft, her pulse (at rest!) was at 140 beats per minute. After about 10 to 15 minutes, she established communications with the nearby command post and reported on each check of onboard equipment. Here, the transcripts provide a unique glimpse into launch preparations during the early days of the space programme.

In communication with Tereshkova at various times were four men - Gagarin, Nikolayev, Korolev and Kamanin. As the transcript (and other sources verify), there were no glitches during the entire period leading up to launch.

Zarya-1 [Gagarin]: Check the KV [shortwave]-communications and the operation of the telegraph key.

Chayka [Tereshkova]: Have settled into the cabin. Going to check the equipment.... The suit is working well. The inflow stream is working well. The ventilation of the suit-it's on automatic status.



Zarya-1 [Gagarin]: Check the KV-communications and the operation of the telegraph key.

Chayka [Tereshkova]: I've already checked KV-communications and the telegraph key. Confirmation was received. Vesna hears me well. I'm ready for launch.

Zarya-1 [Gagarin, speaking to Nikolayev]: Sokol, greetings from Berkut [Popovich].

Zarya-1 [Gagarin]: Chayka, how are you feeling? Perhaps, we can give you music? We've checked all systems, and everything is normal.

Chayka [Tereshkova]: I feel excellent. You could give me music, you could.

Zarya-1 [Gagarin]: I'm asking to give some good music, the best for Chayka; we shall give the best, by order.

Chayka [Tereshkova]: Zarya-1, thanks.

A significant amount of time then passed with no audible activity.

Chayka [Tereshkova]: Zarya-1, still nothing, no singing.

Zarya-1 [Gagarin]: They're saying that they want to give the best, that we'll work at once, but half-an-hour has already gone by. Give us music faster!

Zarya: One minute, we're about to give, we're about to give.

Zarya-1 [Gagarin]: Your 'one minute' has already stretched to half-an-hour. Sokol says they're 'incompetents.'

Finally, music began playing: a Russian national chorus.

20th [Korolev]: You're working the



A portrait showing 13 members of the original 1960 group and three members of the women cosmonaut group. In the back row (from left) are: Georgiy Shonin, Pavel Belyayev, German Titov, Andriyan Nikolayev, Grigoriy Nelyubov, Yevgeniy Khrunov, Vladimir Komarov, Yuriy Gagarin, Boris Volynov, Viktor Gorbatko and Aleksey Leonov. In the front row, sitting are: Ivan Anikeev, Zhanna Yerkina, Pavel Popovich, Valentina Tereshkova and Irina Solov'yeva. The image is unusual for including several unflown cosmonauts, including Nelyubov and Anikeev who were dismissed from the cosmonaut team very soon after this photo was taken.

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communications excellently, like a solid communicator with twenty years of experience. Do your work well, excellently, that's what we need in space. Please pass on a big big hello from us to Bykovskiy.

After this, light music continued to play in the background.

Chayka [Tereshkova]: [You should] wait, wait on praising me. I'll duly pass on your regards to Bykovskiy.

Sokol [Nikolayev]: How are you feeling, how's your breathing, how's your heart beating?

Chayka [Tereshkova]: Everything is normal. I remember our arrangement - more than anything, I'm not a delicate lady. Everything is normal on board. Instrument indicators are unchanged: temperature is 25 degrees, humidity is 30 per cent. The music's very good. I'm ready for launch.

The commands "T-50 minutes" and "T-30 minutes" are heard.

Chayka [Tereshkova]: Zarya-1 [Gagarin], this is Chayka. Temperature is 25 degrees, humidity is 25 per cent. I'm taking up the initial position.

Zarya-1 [Gagarin]: Announcing minute's readiness. Everything's normal. The launch will begin a minute after [garbled]. The course of the launch will be broadcast. This is Zarya, over.

Chayka [Tereshkova]: Feeling excellent.

Zarya-1 [Gagarin]: Key to launch.

Chayka [Tereshkova]: Understood-key to launch.

Zarya-1 [Gagarin]: The cable-mast has left, normally.

The Vostok-6 spaceship lifted off at 1229 hours 51 seconds Moscow Time on 16 June 1963 from Site 1 at Tyura-Tam [10].

Zarya-1 [Gagarin]: Main stage-liftoff! Good luck, Valyusha, bon voyage! We're all with you.

Tereshkova's first words after lift-off were: "We've left, dearest homeland, we've left, see you later!"

Zarya-1 [Gagarin]: We wish you well. Goodbye!

Chayka [Tereshkova]: The vehicle's moving smoothly, vehicle's moving smoothly. See you soon!

Zarya-1 [Gagarin]: Everything OK.

Chayka [Tereshkova]: I feel excellent. Vehicle's moving well.

Zarya-1 [Gagarin]: Flight proceeding well, the vehicle's working excellently. Have a good trip!

Chayka [Tereshkova]: Loads growing slowly, I feel good.

Zarya-1 [Gagarin]: The vehicle is moving well, flight is proceeding excellent. All normal.

Chayka [Tereshkova]: Loads increasing. I feel good.

Zarya-1 [Gagarin]: The flight is proceeding very well, the vehicle is working excellently. Everything's on trajectory. Be healthy! Have a good trip!

A little later we hear the following:

Chayka [Tereshkova]: I see the Earth on the porthole.

Zarya-1 [Gagarin]: Understood, you see the Earth. Beautiful Earth? The vehicle is working excellently on trajectory.

Chayka [Tereshkova]: Insignificant loads, I feel excellent. The Earth is very beautiful. I see a small river. Tell everyone that I'll use every effort and their knowledge to fully carry out the assignment.

Zarya-1 [Gagarin]: Understood. We all believe that you'll carry out the assignment excellently, that you'll carry out this flight excellently. We're all waiting for you on Earth and we wish you a good flight.

Chayka [Tereshkova]: The vehicle is moving smoothly. I see the Earth in the porthole, slightly obscured by clouds.

Zarya-1 [Gagarin]: Chayka, this is Zarya-1. I read you, understood. I know how beautiful that is. And I'm very happy that you liked it too. Everything's working excellently. The flight is proceeding well.

Chayka [Tereshkova]: Thank you for the kind words.

Zarya-1 [Korolev]: Chayka, this 20th. How do you read me?

Chayka [Tereshkova]: 20th, 20th, I hear you excellently, I hear you excellently. All systems on the ship are working excellently, I feel excellent. See you soon... Yastreb [Bykovskiy] passes warm greetings to all of you. Everything's in order here. I feel excellent. I'll use every effort to fully complete the flight assignment. Hugs to you...

At orbital insertion, Gagarin is brief:

Zarya-1 [Gagarin]: Separation has occurred. Everything's very good. The vehicle is working perfectly, everything is on track. Be healthy. 300km, that's normal.

Vostok-6 (vehicle 3KA no. 8) was inserted



Tereshkova surrounded by doctors. This is a still photos from the documentary film The Soviets in Space. RIA Novosti

into its originally planned orbit (as opposed to Vostok-5 which wasn't) of 180.9 x 231.1 km at 65 degrees inclination. The vehicle had a mass of 4,713kg.

First 24 hours in orbit

Immediately after orbital insertion, ground control called Tereshkova many times without any response from her. It's clear from the transcripts that right after orbital insertion, communications were rather poor and intermittent. For example, both Gagarin and Titov repeatedly asked Tereshkova if she observed the upper stage of the 8K72K launch vehicle. Tereshkova apparently never heard these queries. After several attempts, ground control was clearly getting irritated by her non-response.

Chayka [Tereshkova, speaking to Titov]: Orel, I hear you very well. ... Don't worry. I'll do everything that I need to do. This is Chayka. Over.

Orel [Titov]: Chayka, this is Orel. Well, we all congratulate you. Sitting here right now, watching you, all our boys are very happy that you're feeling excellent. Please inform us how you observed the last stage.

Chayka [Tereshkova]: Zarya-1, this is Chayka. I hear you well. This is Chayka. Over.

Zarya-1 [Gagarin]: This is Zarya-1. Tell us if you saw the last stage.

Zarya-2: Did you see the last stage?

Chayka [Tereshkova]: This is Chayka. How do you read me? Repeat, I don't understand. This is Chayka. Over.

Zarya-2: Did you see the last stage? Chayka, did you see the last stage?

Zarya-2 repeated this question seven times and, during the last time, each word of the question was emphasised distinctly with intermittent pauses with a worried and irritated voice. Right after that there was an abrupt command: "End of communications". There was a long pause after that before Tereshkova finally reported about the upper stage.

Chayka [Tereshkova]: I didn't see anything. This is Chayka. The separation occurred at 1247. There is now a state of weightlessness. I feel excellent. At 1243 I saw the last [stage] in the right porthole. Over. At 1250 the instruments worked perfectly. Globus is operating, the clock is moving. I see the horizon through the observation port. I see the Earth in the observation port.

Chayka [Tereshkova]: [speaking to Bykovskiy]: Yastreb! A big hello to you from all of us, from landysh, from all the people of the country. They're proud of you. I feel

Tereshkova in the cabin of the Vostok-6 spacecraft on 12 June 1963. RIA Novosti



excellent. Let's work together, my friend.

Bykovskiy's response was garbled. Although the transcripts indicate that Tereshkova's performance on the first day was more or less fine, other unconfirmed sources suggest that Tereshkova's problems emerged early on in the flight. In a 1988 article in the Russian media for example, the author noted that, Tereshkova was "not feeling so well on the first few orbits. The [State] commission was even discussing the possibility of ending the flight of Vostok-6 ahead of schedule. [Tyulin] talked it over with Tereshkova by radio. She asked that the flight not be interrupted, said that she already felt better (that was later verified with the telemetry data), and assured the State Commission that she would carry out "everything that the programme called for" and would do "everything as we were taught". [11]

The transcripts, however, indicate that the flight proceeded without much concern throughout the first day in orbit. The next exchange confirms that ground control had TV imagery of Tereshkova fairly soon after orbital insertion.

Zarya-4: Chayka, Chayka, this is Zarya-4, how do you hear me? I congratulate you. Chayka, Chayka, this is 20th [Korolev], how do you hear me? Over.

Chayka [Tereshkova]: 20th! I hear you perfectly. ... All systems on the vehicle are working perfectly. See you soon. Hugs to all.

20th [Korolev]: Chayka, roger, I see you on the TV system, I see how you smile. I wish you a perfect flight. Greetings from all of us. This is 20th. Over.

Chayka [Tereshkova]: 20th! This is Chayka. Everything is excellent, I hear you perfectly.

20th [Korolev]: You're carrying out your tasks perfectly. Greetings from us to all. Over.

Chayka [Tereshkova]: Thanks for the kind word. ... I'll put all my efforts to carry out the flight assignments. A kiss to you. See you soon.

There's a call from 48th at this point and a transfer to the second channel. Voice communications are barely audible.

Zarya-4: Chayka, Chayka, this is Zarya-4. How do you hear me? Congratulations to you.

20th [Korolev]: Chayka, Chayka, this is 20th. How do you hear me? Over.

After this Tereshkova responded both to Vesna-2 (by telegraph) and to Zarya (by voice). Despite the communications problems, we see below that Tereshkova and Bykovskiy established rudimentary communications fairly soon after she entered orbit.

Chayka [Tereshkova]: I hear you perfectly, I feel excellent. I've adjusted well to weightlessness. This is Chayka.

21st: And what about Yastreb?

Yastreb [Bykovskiy]: I heard your conversation with Chayka. I hear you perfectly. And even started to call for Chayka. Chayka's not responding. Permission to prompt Chayka, that Zarya-2 is calling her.

21st: Prompt. Your time - on the hour.

49th: Yastreb continue to call Chayka.

Yastreb [Bykovskiy to Tereshkova]: Probably it's hot in your cabin?

Chayka [Tereshkova]: And how are things with you?

Yastreb [Bykovskiy]: What's, what's your temperature?

Chayka [Tereshkova]: I feel excellent, excellent. How much is it for you?

Yastreb [Bykovskiy]: I have 11 [degrees C]

Chayka [Tereshkova]: Don't go lower. Understood?

Yastreb [Bykovskiy]: Roger, roger.

Chayka [Tereshkova]: I'm approaching Cape Horn. At the outer ring ... is that perhaps that's you, Valyerka? The little star disappeared, wasn't that you? ... Bon voyage. Don't go far from me, my friend.

There was a pause in the communications after that.

Chayka: [Tereshkova to Bykovskiy]: Along the strip. I can't see the Moon. The stars are passing further up. The horizon - first there's a dark blue strip, then orange and a yellow strip, then it becomes light blue and dark blue again. I am seeing such a bright star. It's not really similar to a star, but somewhat elongated...

Failed manoeuvre

The transcripts below show that according to the original plan, Tereshkova was to have completed an attitude control exercise on her second orbit, a manoeuvre which she

failed to carry out. This was one of the major objectives of her mission. Due to her inability to carry out the experiment, ground control was naturally disappointed.

Reasons for her failure to do so were not clarified at the time. However, very quickly, ground control rescheduled her experiment to her 38th orbit (which had been planned from the beginning as a contingency). As the transcripts below show, Gagarin passed on instructions for the rescheduled experiment via a radiogram.

Chayka [Tereshkova to ground control]: The vehicle is responding perfectly, perfectly. I'm orienting the vehicle.

There was a long pause at this time. It soon became clear that she was unable to carry out this procedure.

Orel [Titov]: Why didn't you finish the orientation on the second orbit? Didn't you have enough time or did you start late?

Chayka [Tereshkova]: I didn't get orientation. While controlling the vehicle, the vehicle pitched over. I didn't get [orientation] and I turned it off.

Orel [Titov]: Meaning, if we read you correctly, that you incorrectly set the vehicle to roll with manual control, correct?

There was another communications pause.

Orel [Titov]: Before your work with the photometer on the 38th orbit, regardless, you'll first try to orient the ship. If you don't manage to do it, then don't do your work with the photometer.

Chayka [Tereshkova]: Roger.

Orel [Titov]: Here we're interested in how you were able to search for the Earth; with residual velocity or with deliberate [ie, manual] action? When were you oriented on the second orbit?

Chayka [Tereshkova]: This is Chayka. The ship was oriented on the second orbit using an energy-saving mode....

Orel [Titov]: Chayka, carry out orientation on the 38th orbit with deliberate action, you don't need to economise, you have enough gas.

Chayka [Tereshkova]: Roger. On the 38th orbit orient the ship with deliberate action.

Orel [Titov]: On the 38th orbit you'll talk to 20th [Korolev]. See that you don't fall asleep again. Turn on the UKV [VHF] mode manually. At this point, Zarya-8 talked to Tereshkova to

prepare her for the reception of a radiogram from Gagarin.

Kedr [Gagarin]: [radiogram for Tereshkova] On the 38th orbit carry out the landing orientation. If you're successful, continue work with the photometer. If it's not successful, carry out a roll turn and turn off the manual orientation. It's preferable that the orientation work be carried out over our territory. After the roll, switch off the orientation. Turn off the orientation after passing over the territory of the Soviet Union. Do this work over our territory. Don't forget to turn on the toggle switch for the UKV [VHF]-mode.

The radiogram ended at this point. Soon, Tereshkova expressed her wish to congratulate Bykovskiy on being accepted as a member of the Communist Party of the Soviet Union. She attempted to contact Bykovskiy. They had evidently planned in advance to sing a duet together. Tereshkova initially had problems contacting Bykovskiy.

Chayka [Tereshkova]: Kedr [Gagarin], over. I've not been able to establish communications with him [Bykovskiy]. From the southern point I called him, he's silent, from the north, the same. For the moment, we've lost each other. But without fail, I congratulate [him]. I'm very happy for him. Tell Yastreb [Bykovskiy] that I'm prepared to carry out the space duet as we planned.

There was a short pause at this point, after which Tereshkova managed to establish contact with Bykovskiy and then launched into a short excerpt from a patriotic Russian song, immediately followed by two recent popular favourites:

Chayka [Tereshkova]: "Our town is alright, the people are just that way Pa-ra-ra-ra-ra-ra-ra, la-la-la-la-la-la-la. Yastreb, this is Chayka! Listen to your favourite. At our harbour the ships are silently smoking... Can you hear?

Yastreb [Bykovskiy]: I hear you, I hear you, I hear you....

Chayka [Tereshkova]: For the real boys, the harbour is the native home, comrade to comrade, they'll always stand together. And far far away, the ships are on their way, and all who are young at heart, stand shoulder to shoulder.

These excerpts were from two songs, one entitled 'Textile Town' and the other 'Friendship Song'. Her voice sounded remarkably on key for someone who was not



Soviet leader Nikita Khrushchev (right) shown here speaking to cosmonaut Valentina Tereshkova during her Vostok-6 mission. On the left is Leonid Brezhnev who would succeed Khrushchev as general secretary of the Central Committee of the Communist Party in 1964. Asif Siddiqi

a trained singer.

Yastreb [Bykovskiy]: Thanks, thanks...

Chayka [Tereshkova]: So we didn't carry out our plan, but you, don't be upset: we'll do it together [later].

On her fourth orbit, Tereshkova reported the following to Zarya at ground control.

Chayka [Tereshkova]: 19 hours 25 minutes. The flight's going well... I sang songs for him [Bykovskiy], communicated well, especially before reaching Cape Horn. In the centre of the port-there's such a blue spot. Here now, the Sun seems so orange, not red, not light [red], but orange. I'm also feeling excellent. Here now, the Sun's visible and lit up the whole cabin. [Pause]. In the porthole, in the outer ring, the horizon is visible. It's a very beautiful sight: at first it's light blue, then lighter, then dark...

At this point Tereshkova sent greetings to all women of the world, a message transmitted on all communications channels. Through her trajectory, she transmitted greetings over all the countries over which she flew, including, for example, China and Australia.

Chayka [Tereshkova]: From the Vostok-6 spaceship: Soviet women! Greetings to all Soviet women. I wish you personal good luck and great success in [your] work for the good of our beloved motherland... Women of the world! Greetings to you from space. I wish you good luck and success... To the people of China! I am over your country onboard the spaceship Vostok-6, warm greetings to the millions-strong Chinese people... Greetings to the people of Australia.

According to Kamanin's diaries, ground

control had no data on the condition of Vostok-6 during its fifth orbit. He noted that it would be advisable in the future to have ground communications stations for that purpose located in Australia or in Cuba.

However, by Tereshkova's sixth orbit, communications were restored and vastly improved as the transcripts below confirm. Among several people who spoke directly to Tereshkova was Marshal Sergey Rudenko, the first deputy commander-in-chief of the Soviet Air Force (and Kamanin's superior). The following communication from Tereshkova was on the sixth orbit.

Chayka [Tereshkova]: Observation of the solar corona is impossible, there aren't enough fingers to block the Sun. From above the blinds it's very sunny, difficult to see, can't see absolutely anything. I'm repeating the cabin parameters: cabin pressure 1.15; humidity 61 per cent, temperature 23 degrees. The temperature switch is in position... [garbled]. Carbon dioxide 0.1; oxygen 250. I'm turning on the dryers.

On the night of June 16 and early morning June 17, things were going well on the Vostok-5 and Vostok-6 spacecraft. Both cosmonauts slept about a full eight hours. During the sleep period, Tereshkova had a pulse ranging from 64 to 72. During his eight hour shift, beginning 1000 hours on June 17, Kamanin noted that communications with both ships were excellent. He was present for two communications shifts with Tereshkova, both of which were without problem.

Officially 'approved' journalists spoke to both cosmonauts on June 16 and 17. On the second day, correspondent V. M. Peskov from the newspaper *Komsomol'skaya pravda* informed Tereshkova that he had just spoken with her mother and that the latter

was very proud of her daughter's achievements and was expectantly awaiting her return. Tereshkova told Peskov to pass on her best to her mother and to all readers of *Komsomol'skaya pravda*.

On the morning of June 17, from 1130 hours, Kamanin attended a 90 minute meeting of the State Commission where there was a discussion of when to bring both Bykovskiy and Tereshkova home. It was decided to limit Bykovskiy's mission to 5-6 days and Tereshkova's to three days.

A few hours after beginning her second 24 hours in orbit in the late afternoon of June 17, Tereshkova spoke directly with Soviet Central Committee first secretary Nikita Khrushchev. In the lead up to the conversation, Tereshkova talked to cosmonaut Popovich as well as a ground controller (with the codename 5th) who was supposed to conduct a rehearsal conversation with her.

Chayka [Tereshkova]: 10th! 1359 [hours] to 1413 [hours]. Pulse-84-90-100. Breathing-22. I feel excellent. Over.

49th [speaking to Bykovskiy]: Yastreb [Bykovskiy], how goes the communication between Chayka and Yastreb?

Yastreb [Bykovskiy]: I have excellent two-way communication with her. We've been supporting each other. How do you read? Over. How are things at home, how are things at home? Where's Berkut [Popovich], where's Berkut, where's Berkut? This is Yastreb. Yesterday he communicated with me, while today he's silent, why's he silent today? [response garbled]. And I thought that you shut, shut his mouth.

Vesna-1 [Popovich]: Terrible hiss, I have a terrible hiss. This is 30th, [calling] 65th. This is 30th, [calling] 65th. This is 30th, calling for communication. Chayka, this is Berkut. How do you read me? Over.

Chayka [Tereshkova]: ... Moscow, Kremlin. I am reporting. To the Leninist Central Committee of the Communist Party of the Soviet Union, the Soviet government, to dear Nikita Sergeyeovich Khrushchev. The flight is proceeding normally. All systems on the ship are working perfectly. I feel excellent. Thanks to the Communist Party, the government and all the Soviet people for putting their trust [in me]. See you soon in the homeland!

Berkut [Popovich]: Chayka, Chayka, this is Berkut. We hear you perfectly, we see you

on the TV. How do you read me? Over.
Over. Over.

Chayka [Tereshkova]: This is Chayka. I hear you perfectly, perfectly. The flight is proceeding normally. All systems of the ship are working perfectly. I feel excellent. This is Chayka. Over.

Berkut [Popovich]: Chayka, this is Berkut. We hear you perfectly. On the next orbit you'll speak with 1st [Khrushchev]. How do you read me, Valyusha? Over.

Chayka [Tereshkova]: Berkut, this is Chayka, I hear you perfectly. Understood: on the next orbit I'll speak to Nikita Sergeyeovich.

Berkut [Popovich]: Chayka, this is Berkut. We all warmly congratulate you and embrace you. We see you now on the television. We're transferring you to the intervision, everywhere. Everything's excellent, Valyusha. It's pleasant to see you smile like this. Over.

During the last audio, Tereshkova interrupted Popovich several times by saying "excellent", "all in order", and "see you soon".

Berkut [Popovich]: Chayka, this is Berkut. I read you - everything is in order on board. You feel excellent. Carry out the planned programme that you trained for. This is Berkut. Over.

Chayka [Tereshkova]: You correctly understood my message. Chayka. Over.

Berkut [Popovich]: Chayka, this is Berkut. Much thanks to you for the excellent smile of yours from space and congratulations. A hearty embrace to you. Best to you on your flight.

Berkut [Popovich]: Chayka, this is Berkut. Report to the TsK [Central Committee]... Nikita Sergeyeovich will receive you perfectly, hear you perfectly. This is Berkut. Over.

48th: Chayka, this is 48th. How do you read? Over. Over. Over.

5th, are you ready?

5th: I'm ready, ready. [Speaking to Tereshkova] Be more attentive.

Chayka [Tereshkova]: 48th, I hear you.

48th: I'm transferring the connection to 5th for training. How do you read?

Chayka [Tereshkova]: 48th, I'm waiting.

5th: Chayka, this is 5th. How do you read? Over. Over. Over. Over. I hear you faintly.



On a skating rink in December 1970 (from left): Tatiana Pitshkelaury, Irina Solovyeva, Valentina Tereshkova and Valentina Ponomaryova.

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Over.

At this point, 48th noted that 5th had been unable to call, and that they couldn't hear 5th. 48th tried again and Tereshkova responded.

Chayka [Tereshkova]: I hear you poorly. I hear you poorly. The flight's going normal. Everything is excellent. The spaceship is working perfectly. I'm in good spirits. I feel excellent. I spoke with Berkut [Popovich]. Will speak with Nikita Sergeyeovich. Over.

48th: Roger.

Tereshkova was told by 48th that she would be called on by 5th for verification.

Tereshkova explained that she understood. During this time 5th was apparently hearing Tereshkova poorly; a subsequent command is heard from ground control to skip the rehearsal-presumably meaning that Tereshkova should skip the rehearsal with 5th and instead talk to Khrushchev.

Chayka [Tereshkova]: 48th, this is Chayka. How do you read me? This is Chayka. Over [said over music in the background].

5th: This is 5th. I hear you better now. Over.

Apparently, this was a one-way conversation since Tereshkova did not hear 5th. Soon after, at 1655 hours on June 17, the conversation with Khrushchev began. It's clear from the transcripts that Khrushchev rambled on a bit - the conversation was omitted from all accounts of the Vostok-6 mission published after the 1964 fall of Khrushchev.

Zarya-7: How do you read me? Over.

Chayka [Tereshkova]: I hear everything well. The flight is normal. All systems on the ship are working perfectly. Pressure in the suit-1 atmosphere. Humidity 40 pre cent. Temperature-28 degrees. Carbon dioxide 0.2



Tereshkova (left) talks to the Indian prime minister Jawaharlal Nehru (right) on her visit to India.

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per cent. Oxygen 200 mm mercury column. ... [rest garbled]

5th: Chayka, I hear you perfectly. I'm transferring the line to Nikita Sergeyeovich. I'm asking you to report. Over.

Chayka [Tereshkova]: This is Chayka. To the Central Committee of the Communist Party of the Soviet Union, to Comrade Nikita Sergeyeovich Khrushchev. I'm ready to fulfil the joint spaceflight. We've established reliable communications between our ships. We remain in close range. All systems on the ships are working excellently. I feel excellent. Soviet cosmonauts Tereshkova, Bykovsky. How do you read me? This is Chayka. Over.

1st [Khrushchev]: I hear you very well. I'm calling you Chayka [but] please allow me to call you simply Valya, Valentina. I'm very happy and proud like a father that our young woman, a young woman of the Soviet Union is the first, and for the very first time in the world is in space, handling the most modern technology. This is a triumph of Leninist ideas, a triumph of our people's struggle, and we are proud of the successes, they are proud of you, we are proud of you, that you so glorify our people so well, our native land, our Party, our ideas. I read you well. Roger.

Chayka [Tereshkova]: Dear Nikita Sergeyeovich, ... [garbled] and deeply touched by your attention. Many many thanks for your warm words and your paternal concern. With all my heart, I thank the Soviet people for their warm wishes. ... [some words garbled]. This is Chayka. Over.

1st [Khrushchev]: I read you. Greetings from

me. I want to pass on [some] greetings. Here beside me are Comrade [Leonid] Brezhnev, Comrade [Anastas] Mikoyan, Comrade [Leonid] Smirnov, Comrade [Dmitriy] Ustinov, here with other comrades. Everyone, of course, is very happy and they're all proud of the fact that you, Valya, right here and now, are in space, that already women are there... Today, we had dinner at home. And after dinner... I had a few women, so to speak, [who] were at dinner. You couldn't even approach them. They all sat down as they entered, in an excited mood. Voroshilov even called me. Keep in mind, he said, I always raise a toast to women at all receptions, for what women do here. Well, we told him that you don't have a monopoly, as if only you're for women while we're against women. [But] I'll say this to you, that Moscow and the whole world lives so that you [communications dropout]. Of course, we are proud of our comrade Bykovskiy, we greet him, but now that you are a pair, as they say, operating in space, and this is a [moment of] great pride and great happiness; for our country and for all our people and especially for women, and we have more women than men. So that your side

is sufficiently strong. Greetings to you-I wish you good health... complete your flight programme well and land without any problems, and when you've already landed and flown to Moscow, then, rest assured, we'll prepare and meet you with a sufficiently worthy meeting. Goodbye... I wish you success [and] health. Over.

Chayka [Tereshkova]: Dear Nikita Sergeyeovich! Many many thanks for all your wishes. I will use all my strength and knowledge to fully complete the flight, the assignment of the motherland and government. 'Till we meet again soon on our Soviet land. This is Chayka. Over.

48th: Chayka, Chayka, this is 48th. Your conversation has ended. How did they read me? Over.

Chayka [Tereshkova]: I want to repeat. I hear you poorly. A lot of noise. This is Chayka. Over.

48th: Chayka, this is 48th. [He added that Khrushchev ended their conversation]

Chayka [Tereshkova]: I hear you satisfactorily.

48th: The conversation went very well.

Chayka [Tereshkova]: I hear you excellently.

48th: Tell us, what do you see? You're visible on the television.

Chayka [Tereshkova]: In the right viewport I see... at the present a very bright sun, illuminating the very high clouds... the horizon above the bright clouds transitions into shadows. The dark sky is visible in the survey viewport. The flight is proceeding normally. I feel excellent.

48th: Roger. I wish you success.

The first signs of problems on Tereshkova's mission appeared on June 17. The leading space biomedicine specialist from the Air

Valentina Tereshkova (left) and Tatyana Kuznetsova shown during a moment of relaxation.



Christian Lardier

Force's Institute of Aviation and Space Medicine, Vladimir Yazdovskiy, later claimed that Tereshkova's problems at the end of her first day and through her second day were so severe that Korolev wanted to bring Tereshkova home at the earliest opportunity, a wish that was not carried through apparently because Yazdovskiy believed that she could make it to the full three days [15].

Furthermore, in his memoirs, Boris Chertok notes that "during day two of her flight, [ground control] began to complain about her responses, which were not always clear. Whether she was fatigued, or suffering from nausea in weightlessness, she sometimes gave evasive responses to direct questions" [12].

This is clearly borne out by the transcripts, particularly Tereshkova's communication to Korolev (personally) on her 23rd orbit at 1807 hours, ie, about six hours into her second day in orbit and soon after her talk with Khrushchev. Tereshkova's brief response to Korolev in which she repeatedly denied being tired was defensive in tone, suggesting that there was an undercurrent of tension between the cosmonaut and ground control.

Chayka [Tereshkova]: I hope to fully complete the flight as per the plan. I'm prepared to fully complete the flight. I don't feel tired because I've taken frequent breaks. There's a lot of time so I don't feel tired, am feeling well.

Kamanin in his diaries describes the general mood near the end of June 17, noting that he spoke to Tereshkova during three different communications sessions during the day and that she seemed tired although



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Tereshkova with husband Andriyan Nikolayev and their daughter Alyona in August 1973.

reluctant to admit as such. During the third communications session, she apparently did not respond to a call from the Leningrad tracking station. Ground control turned on the TV monitor in the spaceship and were able to see that she was asleep. The

Multiday Joint Spaceflight film clearly shows long clips of Tereshkova asleep and inert inside the cabin.

Part 2 of this article will appear in the February 2009 edition of Spaceflight.

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