KONSTANTIN EDUARDOVICH TSIOLKOVSKY

He anticipated rockets, artificial satellites, orbital stations and spacewalk long before it became reality. Konstantin Tsiolkovsky is the founder of theoretical cosmonautics.

Tsiolkovsky created the first wind tunnel in the USSR. It was a huge contribution to the development of aviation.

He owned the idea of launching a rocket with an inclined rail. Nowadays it is used in multiple launch rocket systems.

Konstantin Tsiolkovsky was the first who thought about using of gyroscopes in aviation. Initially he designed the mercury automatic axis governor. Then he proposed to use the spinning top principle for aircraft balancing.

Kaluga was named “The cradle of cosmonautics” in 60’s while people celebrated the first manned flight into space. The founder of theoretical cosmonautics Konstantin Tsiolkovsky wrote his the most important scientific researches in Kaluga.

ANIMALS IN SPACE

Experimental flights with dogs were conducted by the USSR to prepare for the future manned space flights. Before them the influence of weightlessness conditions and the tolerance of overloads during launches were studied on animals.

The 22nd of July 1951 — the first experimental flight of dogs named Dezik and Tsygan.  
The 3rd of November 1957 — the first living creature that made the orbital flight and space travel is dog Laika. After 5-7 hours dog that made four turns around the Earth was dead. But this experiment confirmed that a living creature can transfer the launch into orbit and weightlessness.  
The 19th of August 1960 — the first orbiting dogs Belka and Strelka safely returned to Earth.  
In 1961 Chernushka (in the 9th of March) and Zvezdochka (in the 25th of March) was launched into orbit twice for the final decision to send a man into space.  
Twenty nine flights were carried out on geophysical rockets. Thirty six dogs participated in them (some have flown multiple times). Fiftheen dogs died.

ALEXEI ARKHIPOVICH LEONOV AND PAVEL IVANOVICH BELYAYEV

Soviet cosmonaut Alexei Leonov made the first spacewalk in the history on the 18th of March in 1965.  
The experiment was planned as part of a spaceship "Voskhod-2" expedition. Commander Pavel Belyayev and pilot Alexei Leonov were in the crew of the spacecraft. Problems began when the spaceship was entered into orbit. It was planned to move away from the Earth by 350 kilometers. Due to a technical error “Voskhod-2” moved away by 495 km. The radiation layer destructive for humans was located at a distance of 500 km from the Earth.

Cosmonauts received radiation in the amount of 70 billion rad. If at the moment solar wind streams of increased intensity passed near the Earth, the cosmonauts could die.

The “Berkut” spacesuit was designed for 30-minute stay in open space. Alexei Leonov moved away from the spacecraft 5 times at a distance of up to 5,35 meters.

When the cosmonaut wanted to return to the airlock, he realized that the spacesuit was inflated because of the pressure difference. Risking his life Leonov reduced the pressure inside the “Berkut”. He climbed into the airlock head first violating safety rules. This is how the cosmonaut managed to return to the spacecraft.

Leonov spent 23 minutes and 41 seconds in an airless space.

On the 19th of March during the return of the spacecraft to the Earth the automatic landing system failed. The cosmonauts landed the spacecraft by hand. It was the world’s first landing in this mode. In the book “The Age of Pioneers” Alexei Leonov tells a story of his life: about the repressed father, about the hungry war years, about his passion for painting.

In this zine was used the painting by Alexei Arkhipovich Leonov “Cosmic Dawn”.

FALLEN ASTRONAUT

In memory of the deceased cosmonauts the Belgian Paul van Hoeydonck made a small sculpture of an astronaut with a tablet which reflected the names of those who died in 1964-1971. The sculpture was delivered with the crew of the “Apollo-15” spacecraft to the Moon. David Scott installed it in the Hadley – Apennines area.

The names of 14 astronauts and cosmonauts were engraved on the plague:

Theodore Freeman (died in the plane crash on the 31st of October 1964);

Charles Bassett (died in the plane crash on the 28th of February 1966);

Elliot See (died in the same plane crash at the age of 38);

Gus Grissom (died in the fire on “Apollo-1” on the 27th of January 1967 at the age of 40);

Roger Chaffee (died in the same fire at the age of 31);

Edward White (was the first American walked into space; died in the same fire at the age of 36);

Vladimir Komarov (died while landing on the Earth on “Soyuz-1” on the 24th of April 1967 at the age of 40);

Edward Givens (died in the plane crash on the 6th of June 1967 at the age of 37);

Clifton Williams (died in the plane crash on the 5th of October 1967 at the age of 35);

Yuri Gagarin (the first human walked into space; died in the plane crash on the 27th of March 1968 at the age of 34);

Pavel Belyayev (died of peritonitis on the 10th of January 1970 at the age of 44);

Georgy Dobrovolsky (died while landing on the Earth on “Soyuz-11” on the 30th of June 1971 at the age of 43);

Viktor Patsayev (died in the same disaster at the age of 38);

Vladislav Volkov (died in the same disaster at the age of 35).

The names of two dead Soviet cosmonauts weren’t included in the plague due to the secrecy of the Soviet space program. But we deem it necessary to mention them:

Valentin Bondarenko (died in a fire accidentally provoked by him on the 23rd of March 1961 at the age of 24);

Grigori Nelyubov (died under the wheels of a train on the 18th of February 1966 at the age of 31).

The sculpture “Fallen Astronaut” was the first piece of art which was delivered into the space.

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The 13-16th of the October 1969

The first group flight of three manned spaceships. It was planned to dock the two and shoot the process from the third. But the mission was failed. The docking didn’t take a place.

The 24th of September 1970

The first automatic sampling of the lunar soil and delivery to the Earth.

The 23rd of November 1970

The first remote controlled self-propelled vehicle on the Moon.

The 25th of December 1970

The first landing on the Venus.

The 23rd of April 1971

The first orbital station.

The 6th of June 1971

The first long-term expedition to an orbital station.

The 27th of November 1971

The first spacecraft on the surface of the Mars.

The 2nd of December 1971

The AMC’s first landing on the Mars.

The 15th of July 1975

The first joint international manned flight and docking of spacecrafts of the two states. “Apollo”’s crew consisted of Thomas Stafford, Vance Brand and Donald Slayton. Alexei Leonov and Valery Kubasov piloted “Soyuz-19”.

THE FIRST WOMAN IN THE SPACE

The first female cosmonaut in the world Svetlana Yevgenyevna Savitskaya went into open space. She spent 3 hours and 35 minutes in the space. It went down in the history of world astronautics. Svetlana Savitskaya and the astronaut Vladimir Dzhanibekov tested an unique versatile hand tool that could weld, cut and solder metal.

Svetlana Savitskaya also was the first woman who has completed two space flights. The first space flight was on the 19-27th of August 1982. She was a cosmonaut-researcher of the “Soyuz T-7”/”Soyuz T-5” spacecraft and the “Salyut-7” long term orbital station with Leonid Popov and Aleksandr Serebrov. The second was on the 17-29th of July 1984. She was a flight engineer of the “Soyuz T-12” spacecraft and the “Salyut-7” station with Vladimir Dzhanibekov and Igor Volk. Moreover, Savitskaya was a member of the USSR national aerobatic team in 1969-1977. She won the UK World Championship in 1970. Also she set 3 world records in parachuting and 18 jet aircraft records. Savitskaya became the Honored Master of Sports of the USSR in 1970.

BURAN

“Buran” is a reusable spacecraft capable of delivering various cargoes into orbit and returning them to the Earth. He made his first and only flight on the 15th of November 1988. The chief designer Gleb Evgeniyevich Lozino-Lozinskiy was ordered to create a Soviet shuttle in 1976. Everyone was worried about the landing, which was supposed to go completely automatically for the first time in history. There were no pilots in the “Buran”’s cockpit. The success of the operation depended on the actions of the on-board computer and ground navigation systems.

When the spacecraft approached the runway, it deviated sharply from the set course. The actions of the on-board computer were unexpected. MCC employees suggested blowing up the spacecraft thinking that the automation was out of order. The reason for the deviation from the course was information about strong winds received by the on-board computer from ground stations. The spacecraft’s automation took it into account and changed the trajectory to a safe one. The legend has it that at the moment when “Buran” changed the direction, someone shouted: “Dear, come back!” Apparently it listened.

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The 25th of July 1984

Svetlana Savitskaya was the first woman who walked into space and flew into space twice.

The 20th of February 1986

The launch of the first multi-module orbital station “Mir”.

The 15th of November 1988

The first orbital spacecraft (“Buran”) in the history which successfully landed in automatic mode.

The 4th of October 1994

Elena Kondakova was the first woman which completed a long flight into space. It lasted 169 days 5 minutes and 21 seconds.

The 20th of November 1998

The launch of the functional cargo block “Zarya” into orbit. The beginning of the ISS deployment.

The 31st of the March 1999

Tests of the developed rocket engine RD-180 were completed. The engine considered one of the best engines in the world and the most reliable in terms of its parameters.

The 28th of April 2001

The first space tourist Dennis Tito (from the USA) was sent in the spacecraft “Soyuz”. Russia became the first country which launched space tourism.

The 10th of December 2003

The first satellite from the GLONASS series was launched into orbit “Kosmos-2404”.

The 17th of September 2009  
Launch of "Meteor-M". The beginning of the creation of a complex of hydrometeorological and oceanographic support "Meteor-3M".  
  
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The 20th of January 2011  
Launch of "Electro-L". The beginning of the creation of the geostationary hydrometeorological system "Electro-L".  
The 23rd of May 2011  
Development of the newest rocket engine - RD-191 was completed. It held the world record for deep throttling thrust.  
The 11th of December 2011  
Launch of "Luch-5A". This is the first telecommunications satellite, part of the multifunctional space relay system "Luch".  
The 22nd of July 2012  
Launch of "Kanopus-V". The beginning of the creation of a complex for operational monitoring of man-made and natural emergencies "Kanopus-V".  
The 25th of June 2013  
Launch of "Resurs-P". The beginning of the creation of a complex for highly detailed, detailed wide-capture and hyperspectral optical-electronic observation of the Earth's surface - "Resurs-P".  
The 26th of September  
Elena Serova was the first Russian woman on the ISS.  
The 23rd of December 2014  
The first launch of the Angara-A5. This is the first heavy launch vehicle which provided Russia with guaranteed independent access to space.  
The 14th of March 2016  
Launch of the ExoMars-2016 AMS by the Proton-M carrier rocket under the joint program of Roscosmos and ESA. The goal is the searching for life on Mars.  
The 4th of December 2018  
Living tissues in space were printed using the bioprinter "Organ.Avt".  
The 31st of July 2019  
"Progress MS-12" docked to the module "Pirs" of the ISS 3 hours 19 minutes after launch. It became the fastest spaceship.