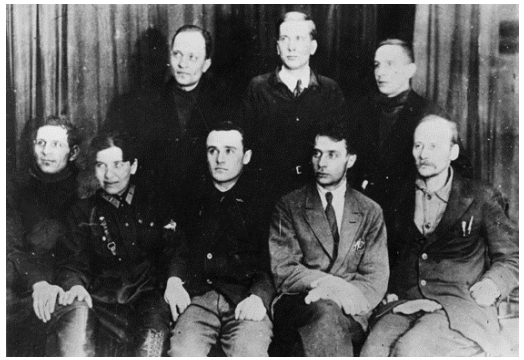
The Soviet Space Program

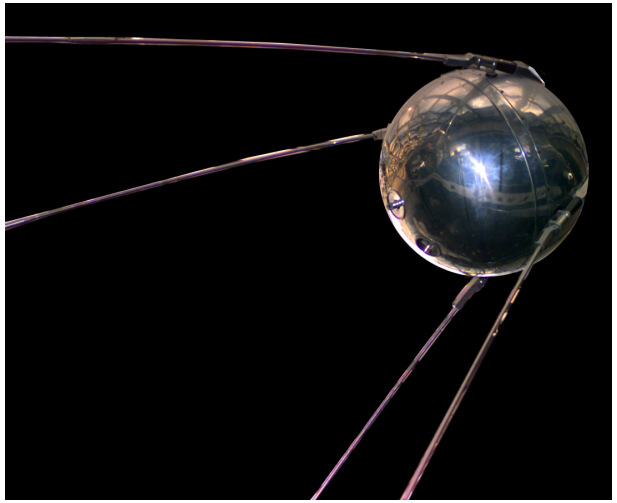


GIRD (1932)

Korolev

Glushko

Mishin

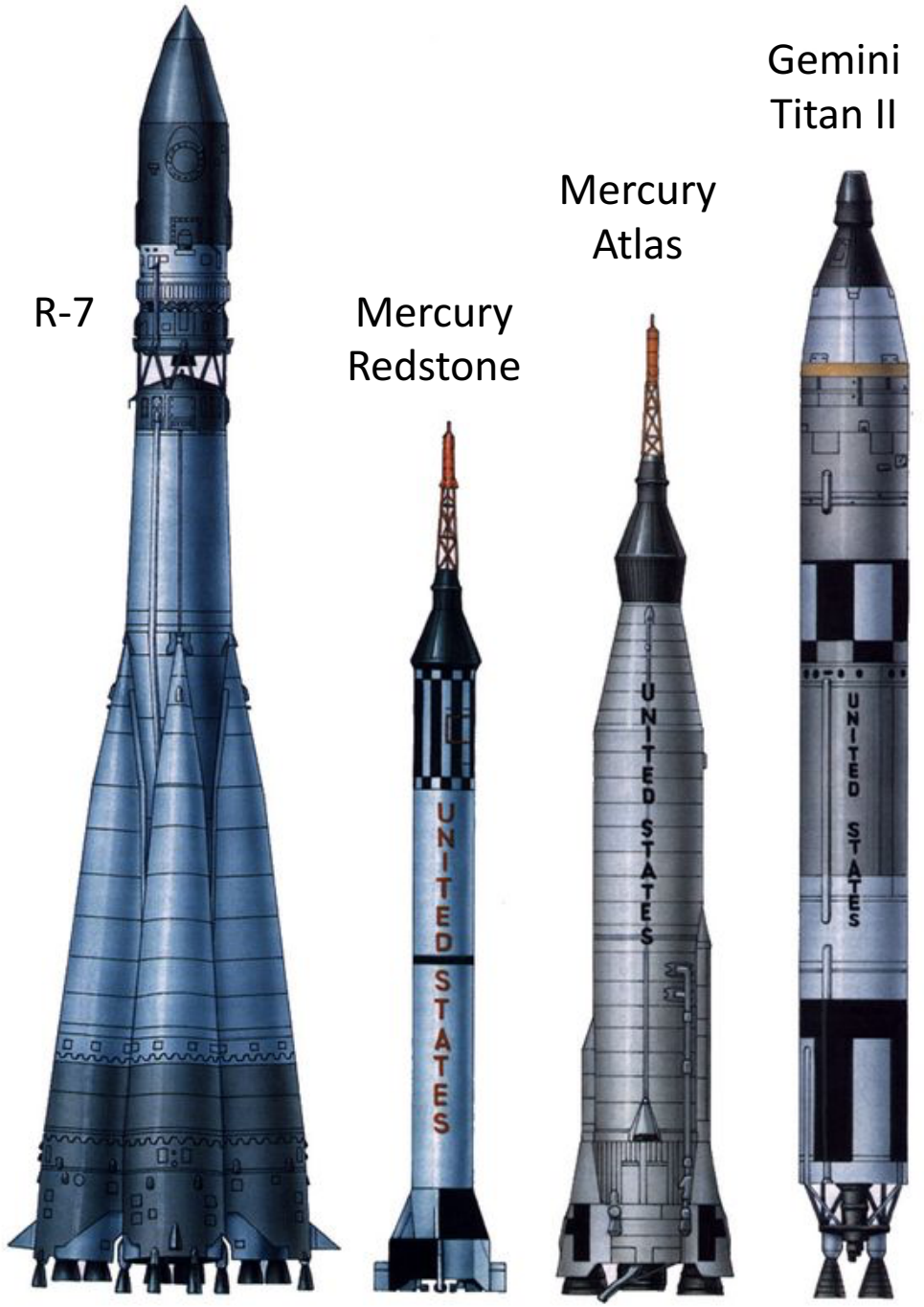


The Soviet R-7 was the work horse of the early space race

It was designed to carry a 5 ton hydrogen bomb 7000 miles, as such it could but ½ a ton into earth orbit

3 manned programs

Vostok	04/1961 – 06/1963	(6 flights)
Voshkod	12/1964 – 03/1965	(2 flights)
Soyuz	05/1966 – current	



Vostok Program (1 “man”)

Mission	Patch	Launch	Duration	Landing	Pilot	Notes
Vostok 1		12 April 1961	1 h 48 m	12 April 1961	Yuri Gagarin	First man in space; first manned orbital flight.[1]
Vostok 2		6 August 1961	1 d 1 h 18 m	7 August 1961	Gherman Titov	First full day in space.[2]
Vostok 3		11 August 1962	3 d 22 h 22 m	15 August 1962	Andriyan Nikolayev	First simultaneous flight of two manned spacecraft.[3]
Vostok 4		12 August 1962	2 d 22 h 56 m	15 August 1962	Pavel Popovich	First simultaneous flight of two manned spacecraft.[4]
Vostok 5		14 June 1963	4 d 23 h 7 m	19 June 1963	Valery Bykovsky	Longest solo orbital flight.[5]
Vostok 6		16 June 1963	2 d 22 h 50 m	19 June 1963	Valentina Tereshkova	First woman in space.[6]

Urey Gagarin (Vostok 1)
The first man to be in space and the first to orbit Earth.
April 12, 1961

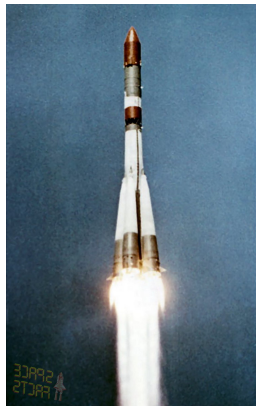
Gherman Titov (Vostok 2)
The second cosmonaut in space; He did 17 orbits.
August 6-7, 1961

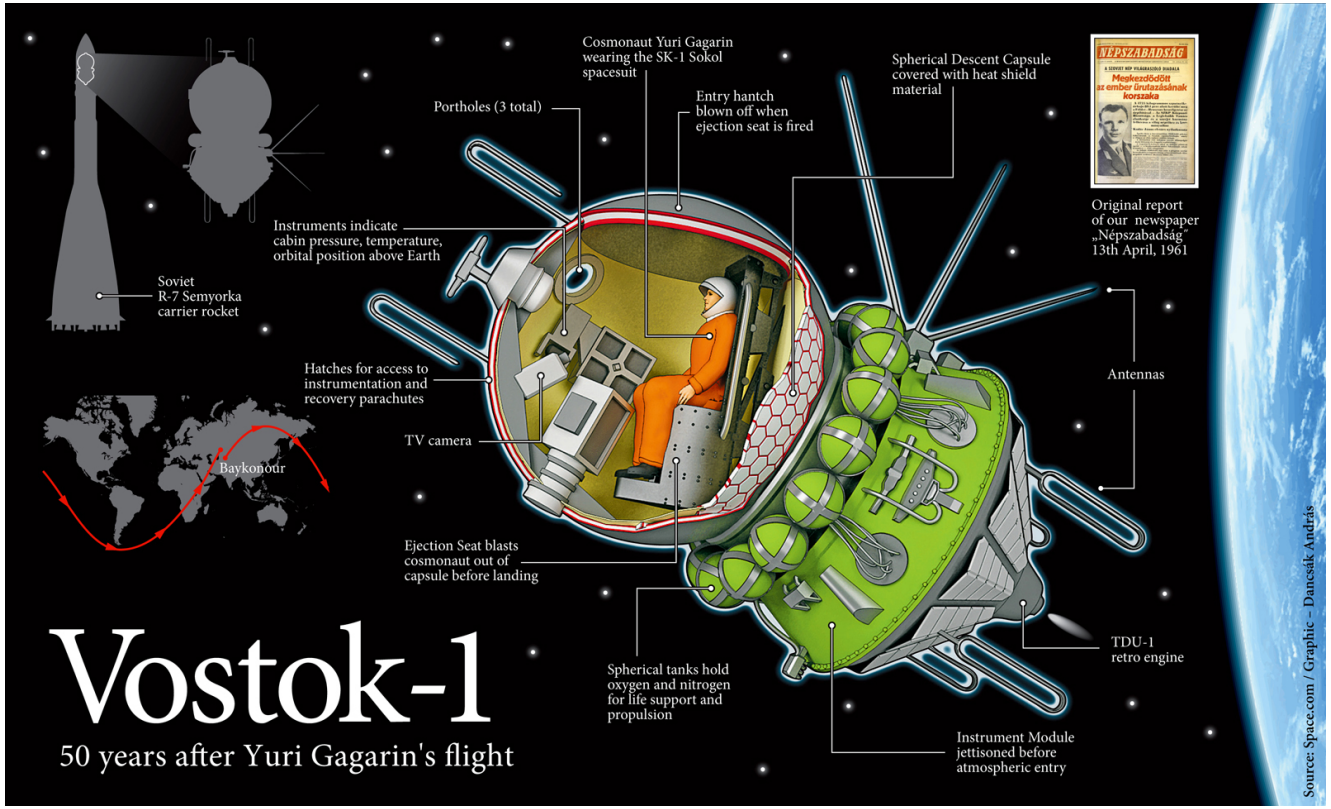
Andriyan Nikolyaev (Vostok 3)
Part of the first two-craft mission. He did 64 orbits.
August 11-15, 1962

Pavel Popvich (Vostok 4)
In orbit with Vostok 3, came within 5 miles. He did 48 orbits
August 12-15, 1962

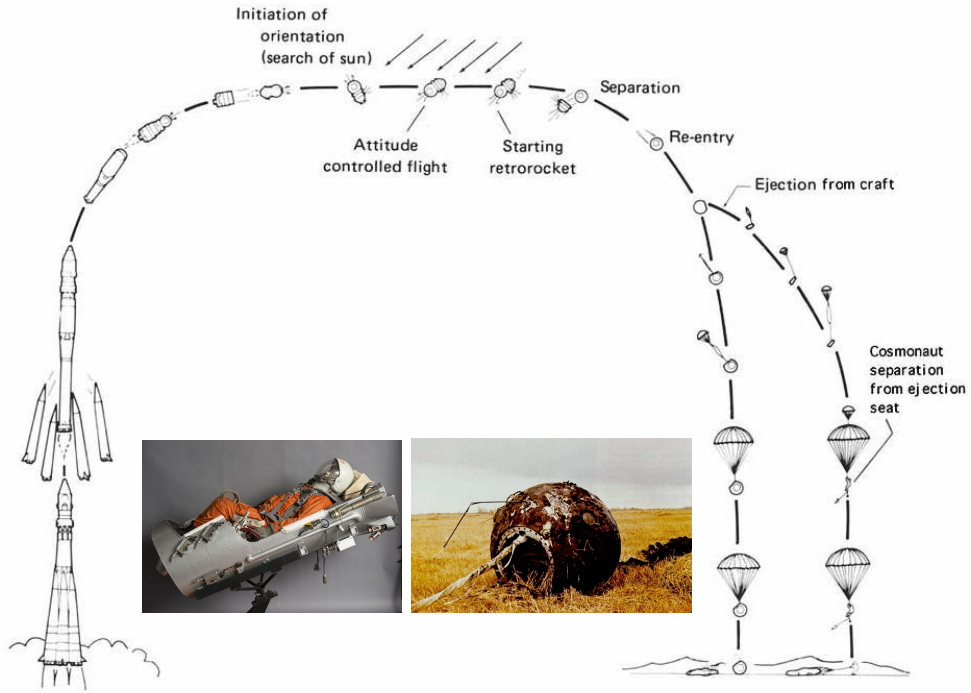
Valery Bykovsky did 82 Earth orbits in the **Vostok 5** spacecraft.
June 14-19, 1963

Valentina Tereshkova (Vostok 6)
was the first woman in space. She did 48 Earth orbits.
June 16-19, 1963





Original report of our newspaper „Népszabadság" 13th April, 1961



Typical mission profile for Vostok flights.

Voskhod Program (2 to “3” man)

Mission	Patch	Launch	Duration	Landing	Crew			Notes
Voskhod 1		12 October 1964	1 d 0 h 17 m 3 s	13 October 1964	Vladimir Komarov	Konstantin Feoktistov	Boris Yegorov	First spacecraft to carry a crew.
Voskhod 2		18 March 1965	1 d 2 h 2 m 17 s	19 March 1965	Pavel Belyayev	Alexey Leonov		First walk in space.

Vladimir Komarov, Konstantin Feoktistiv, Boris Yegorov were the first multi-cosmonaut crew, with three members. They stripped the Voskhod 1 spacecraft down to a flying empty shell and flew with no space suits. The flight was October 12-13, 1964.

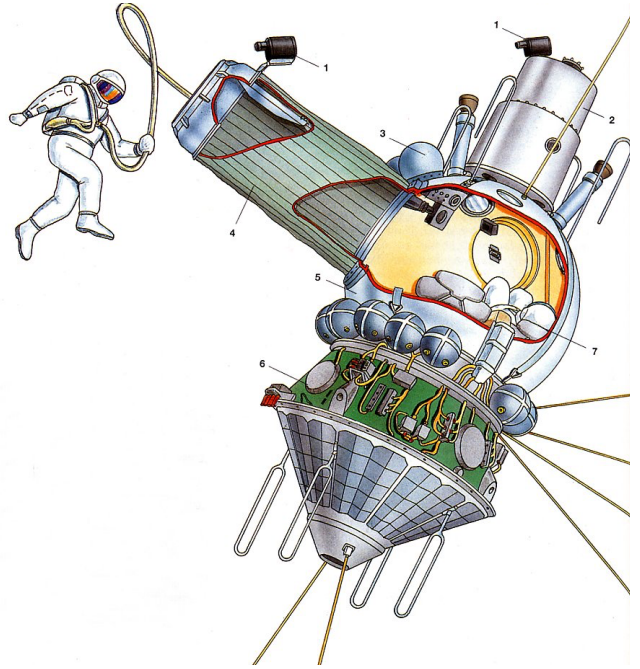
Pavel Belyayev and Alexey Leonov. Leonov became the first human to conduct a space walk from the Voskhod 2 spacecraft. March 18-19, 1965

Voshkod 2. The first Space Walk (EVA)

Alexey Arkhipovich Leonov – first man “in space”.

His spacesuit expanded so his hands and feet were not in the gloves or boots anymore! He couldn’t pull himself back to the airlock!

He had to let pressure out of his suit and he got pins and needles as he came close to getting the benz. He barely made back in alive.



Link: Movie of Spacewalk (1 min)

50-years-ago-the-first-spacewalk-nearly-ended-in-tragedy

Their craft got over pressurized with oxygen due to a leak from jettisoning the airlock.

They had malfunctions on re-entry. They landed in Siberia and suffered two-days in the freezing snowy forest, even fighting off a pack of wolves for two nights.

Voskhod Program: Planned but Cancelled Flights

Soviet Premiere Khrushchev wanted space firsts to parade as political superiority to the US. Korolev had to repeatedly drop well-laid plans (thus the 3-man Voshkod 1 flight.)

This created a tense environment in which testing was compromised and a systematic step by step approach to a moon program was forsaken.

Voskhod 3 Manned space flight deferred just 15 days before launch in May 1966. It would have been a world-record 18-day space endurance mission, tasked primarily with testing ballistic missile detection equipment. Never formally cancelled, it just faded away in Brezhnev-era stagnation...

Voskhod 4 Planned second long-duration 20 day Voskhod flight. Cancelled in spring 1966 after near-disaster with Voskhod 2 and death of Korolev.

Voskhod 5 Planned all-female ten day long-duration flight. Solovyova would have conducted the first female space walk. Cancelled in spring 1966, after death of Korolev, in order to concentrate on Soyuz and Lunar landing programs.

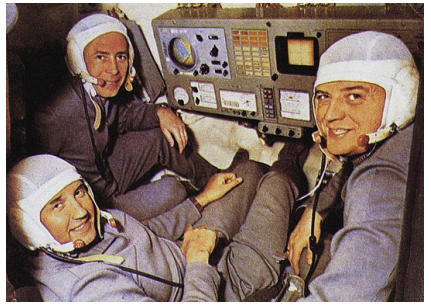
Voskhod 6 Planned Voskhod flight that would include EVA with test of the UPMK 'jet belt'. Cancelled in spring 1966.

Soyuz 1: Death of a Cosmonaut

Vladimir Mikhaylovich Komarov died in a Soyuz 1 spacecraft. April 24, 1967

His craft was defective and the controls barely worked. He was able to fight the ship to a successful re-entry, but then the parachute didn't open.

Soyuz 11: A Sad Disaster



Georgy Dobrovolsky, Vladislav Volkov, Viktor Patsayev died in the Soyuz 11 spacecraft due to a value being "jolted open" during the separation that released oxygen to space during reentry. June 30, 1971

The landing was nominal. The ground crew knocked on the spacecraft and there was no answer. They were found dead (but still warm) sitting in their couches.

Soyuz Program: Preparing for the Moon Landing

The Soviet government issued a response to the American Apollo challenge after three years. According to the first government decree about the Soviet Manned Moon programs (Decree 655-268, '*On Work on the Exploration of the Moon and Mastery of Space* '), adopted in August 1964. They would also use the Lunar Orbit Rendezvous mode.

Zond-5	7K-L1 No. 9	Sept. 15, 1968	Sept. 21, 1968	Proton	-	Flew around the Moon; splashed down in the Indian Ocean
Soyuz-2	7K-OK	Oct. 25, 1968	-	Soyuz	-	Rendezvous with Soyuz-3
Soyuz-3	7K-OK	Oct. 26, 1968	Oct. 30, 1968	Soyuz	Georgy Beregovoy	Attempted to dock with Soyuz-2 but failed due to wrong orientation
Zond-6	7K-L1 No. 12	Nov. 10, 1968	Nov. 17, 1968	Proton	-	Flew around the Moon; reentry craft depressurized during landing and crashed
Soyuz-4	7K-OK	Jan. 14, 1969	Jan. 17, 1969	Soyuz	Vladimir Shatalov	Docked with Soyuz-5
Soyuz-5	7K-OK	Jan. 15, 1969	January 18, 1969	Soyuz	Boris Volynov, Yevgeny Khrunov, Aleksei Yeliseyev	Docked with Soyuz-4; Khrunov and Yeliseyev transferred to and landed onboard the Soyuz-4
Zond-7	7K-L1 No. 11	Aug. 8, 1969	Aug. 14, 1969	Proton	-	Flew around the Moon
Soyuz-6	7K-OK	Oct. 11, 1969	Oct. 16, 1969	Soyuz	Georgy Shonin, Viktor Kubasov	-
Soyuz-7	7K-OK	Oct. 12, 1969	Oct. 17, 1969	Soyuz	Anatoly Filipchenko, Viktor Gorbatko, Vladislav Volkov	Planned to dock with the Soyuz-8
Soyuz-8	7K-OK	Oct. 13, 1969	Oct. 18, 1969	Soyuz	Vladimir Shatalov, Aleksei Yeliseev	Planned to dock with the Soyuz-7, but docking system failed

The first manned flyby was scheduled for mid-1967, and the first manned landing for the end of 1968. Korolev's death, along with various technical and administrative reasons, as well as a lack of financial support, resulted in both programs being delayed.

-	7K-L1A (7K-L1S)	Feb. 21, 1969	-	N1	-	The N1-L3 launch (No. 3L) failed at T+68.7 seconds
-	7K-L1A (7K-L1S)	July 3, 1969	-	N1	-	N1-L3 launch (No. 5L) failed at launch
Kosmos-398	T2K	Feb. 26, 1971	-	Soyuz	-	A lunar lander test in the Earth orbit.
-	N1-L3	June 27, 1971	-	N1	-	The N1-L3 launch (No. 6L) failed at T+50.1 seconds
Kosmos-434	T2K	Aug. 12, 1971	-	Soyuz	-	A lunar lander test in the Earth orbit
-	7K-LOK	Nov. 23, 1972	-	N1	-	The N1-L3 launch (No. 7L) failed at T+107 seconds

What if Korolev had lived?

Proton

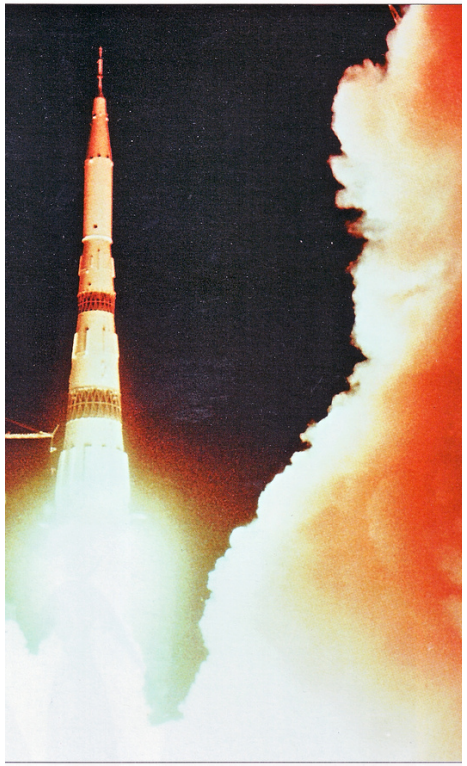
Soyuz

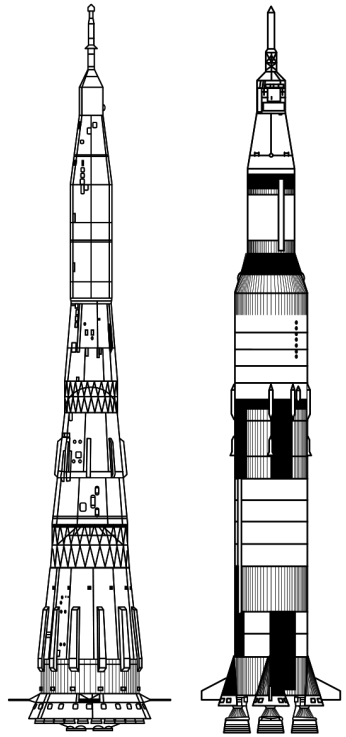
N1

N1: Korolev's Lunar Mission Launch Vehicle

All four N1 test launches in 1969 (twice), 1971, and 1972 were failures, despite incremental improvements after each failure.

The second launch, on 3 July 1969, which was an attempt to upstage Apollo 11 by 13 days, resulted in the destruction of the rocket and the entire launch complex, which delayed the N1-L3 lunar program for two additional years.





September 1968
CIA Spy Satellite Image

3 July 1969

The N1 was assembled horizontally and transported to the pad on its side. It was then lifted upright for launch.

Soviet Manned Lunar Progam


Chelomei


Korolev


Mishen


Barmin

There were three parallel manned lunar projects:

1. **Lunar L1 (LK-1)** program, assigned to Chelomei, to beat the Americans to a circumlunar flight
2. **Lunar L3 (Soyuz 7K-LOK-LK)** program, assigned to Korolev, to land a Soviet man on the moon
3. **Zvezda permanent lunar base** assigned to Barmin.

The key element of the L3 and Zvezda Projects was the **N1** launch vehicle.

L1 Planning (as outlined in 1964)

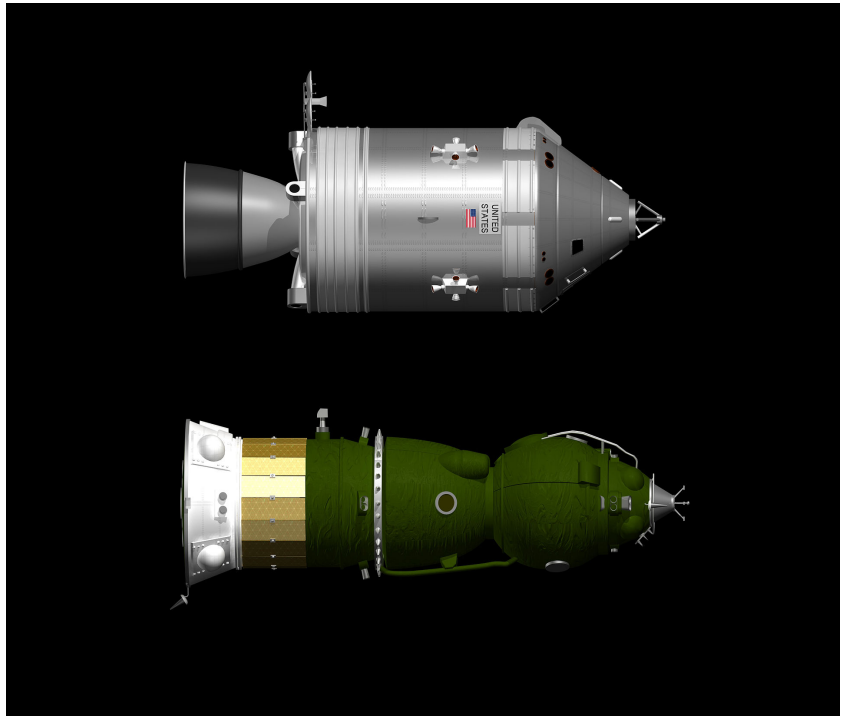
2P: Develop Block D stage (February or March 1967)
3P: Develop Block D stage (March 1967)
4L: Unmanned lunar flyby (May 1967)
5L: Unmanned lunar flyby (June 1967)
6L: Manned lunar flyby (June or July 1967)
7L: Manned lunar flybys (August 1967)
8L: Manned lunar flybys (August 1967)
9L: Manned lunar flybys (September 1967)
10L: Manned lunar flybys (September 1967)
11L: Manned lunar flybys (October 1967)
12L: Manned lunar flybys (October 1967)
13L: Reserve spacecraft

L3 Planning (as outlined in 1964)

3L: Develop LV & Blocks G&D (September 1967)
4L: Reserve
5L: LOK/LK unmanned (December 1967)
6L: LOK/LK unmanned (February 1968)
7L: Manned LOK/unmanned LK (April 1968)
8L: Manned LOK/unmanned LK (June 1968)
9L: Piloted LOK/unmanned LK with LK landing on Moon (August 1968)
10L: First men land on the Moon (September 1968)
11L: Reserve
12L: Reserve

It was decided in the second half of 1965 that Chelomei would no longer be responsible for high-priority projects, and the L1 project was assigned to Korolev. A month later Korolev died suddenly, a crippling blow to the entire program. Mishin was named as Korolev's successor after a long delay (Mishin was no Korolev).

The N1 rocket would carry the **L3 Moon expedition complex**, comprising two spacecraft (the LOK and LK).



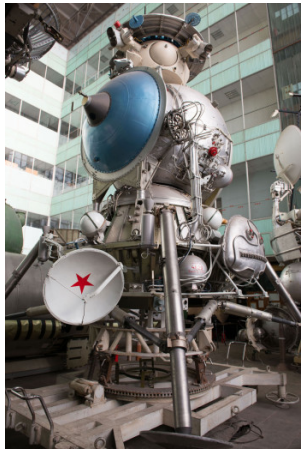
Similar to the Soyuz craft, the **"Lunniy Orbitalny Korabl" (LOK)** command ship, would carry two men, with three modules like the regular Soyuz 7K-OK, but was heavier by a few tons.

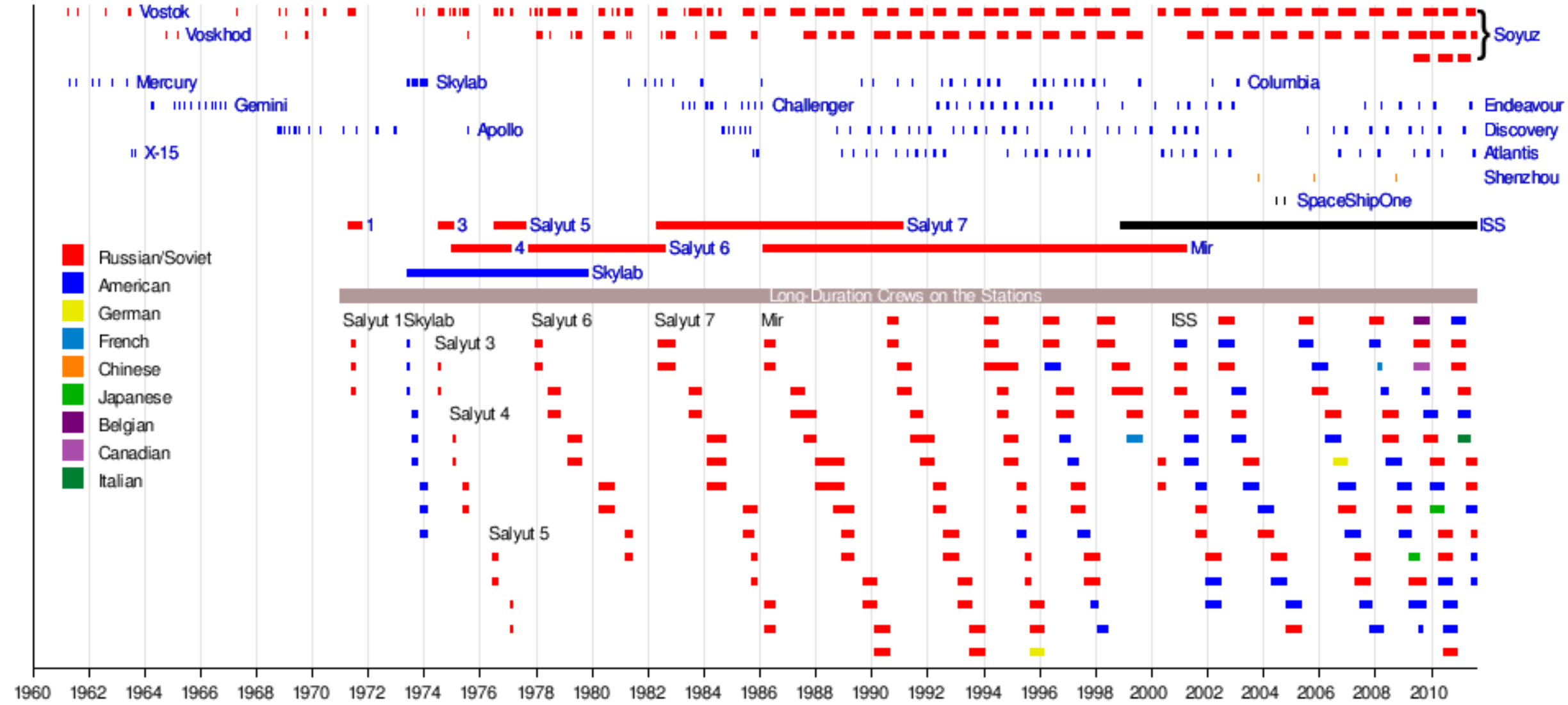
The 7K-OK (bottom spacecraft) was half the mass of the three-man Apollo orbital command ship (top spacecraft).

The **"Lunniy Korabl" (LK)** accommodated only one cosmonaut, so in the Soviet plan, only one cosmonaut would land on the Moon.

The mass of the LK (left) was 40% of the mass of the Apollo lunar module (LM, right).

(right) An LK is on display in the Space Museum in Moscow.




Vostok
Voskhod
Soyuz
Mercury
Skylab
Columbia
Gemini
Challenger
Endeavour
Apollo
Discovery
X-15
Atlantis
Shenzhou
SpaceShipOne
1
3
Salyut 5
Salyut 7
ISS
4
Salyut 6
Mir
Skylab
Russian/Soviet
American
German
French
Chinese
Japanese
Belgian
Canadian
Italian
Long-Duration Crews on the Stations
Salyut 1
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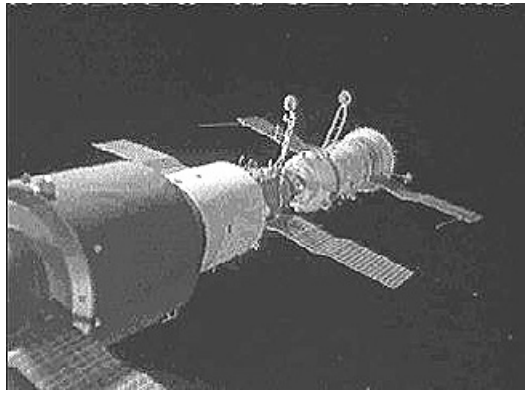
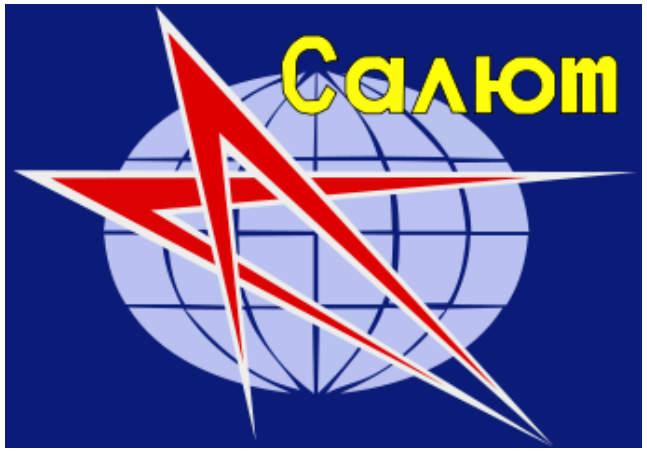
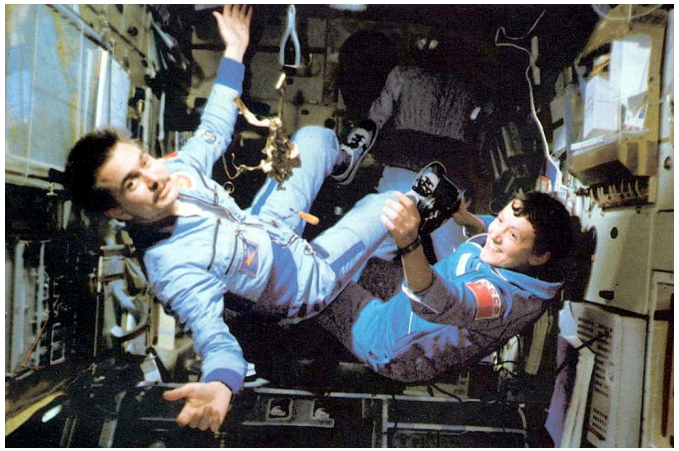
Space Stations: Salyut 1-7

Salyut 1: April-Oct 1971



Salyut 1 was the first space station program undertaken by the Soviet Union. It had only one crew.

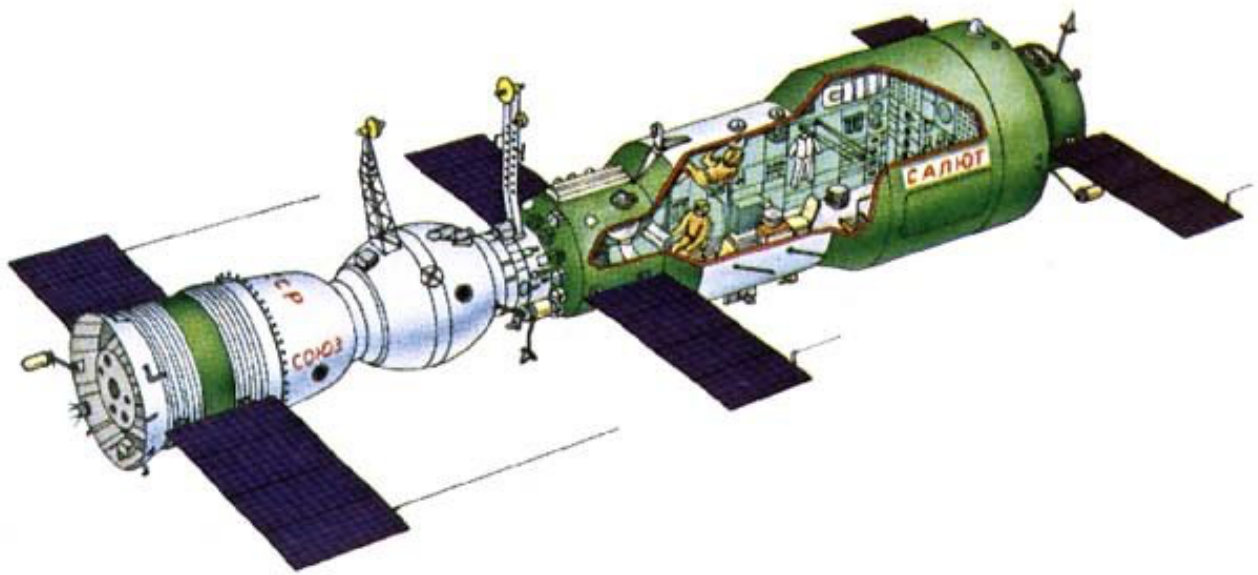




Salyut was the world's first space station, developed in one year by the Soviet Union on the basis of Chelomei's Almaz station, in an attempt to upstage the American Skylab after the loss of the moon landing race to the Americans.

Salyut 7: May 1982 – June 1986

Salyut 7 was aloft for four years and two months, during which time it was visited by 10 crews .

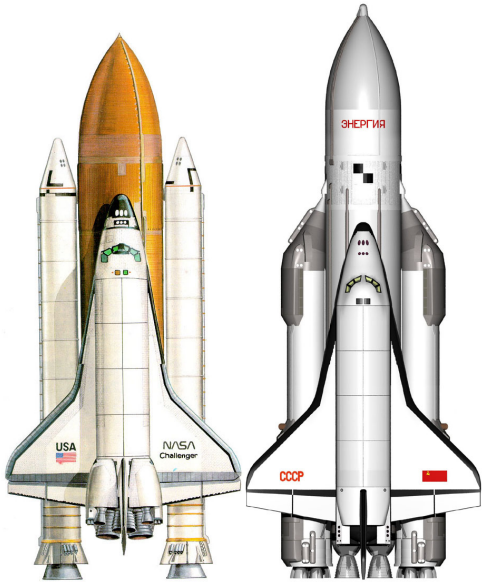


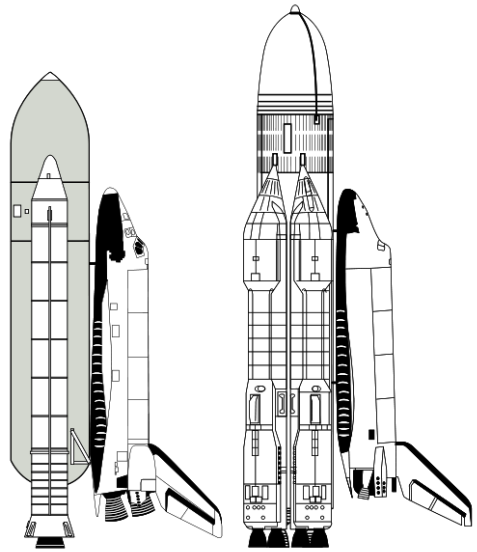
Buran ("Snowstorm"): Soviet/Russian Space Shuttle

1 flight: Nov 15, 1988, unmanned, successful
3 hrs 25 min in space; 2 orbits

Cancelled by dissolution of Soviet State.
Destroyed in a hanger collapse in 2002.

USA USSR

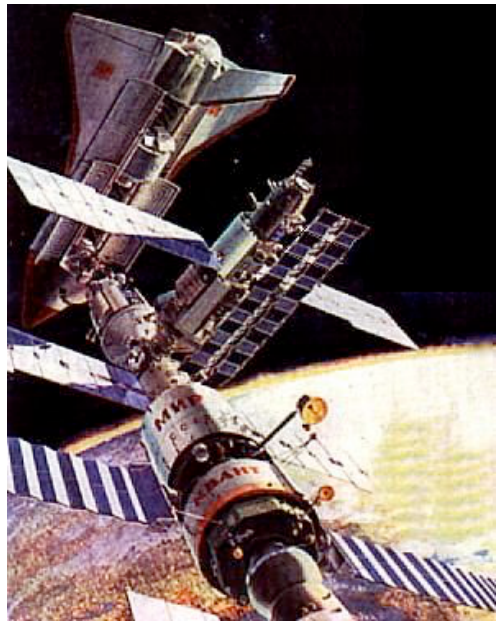




Buran had no main engines! The launch vehicle was called **Energia**, which was multi-purpose human-rated heavy-lift to space. Most of it was expendable. Energia was launched twice successfully, in May 1987 and Nov 1988, and then retired.

Buran could lift 66,000 lbs to LEO.

It was destined for strictly military uses. In 2015, a Russian review panel considered re-instating Buran, but nothing has transpired.

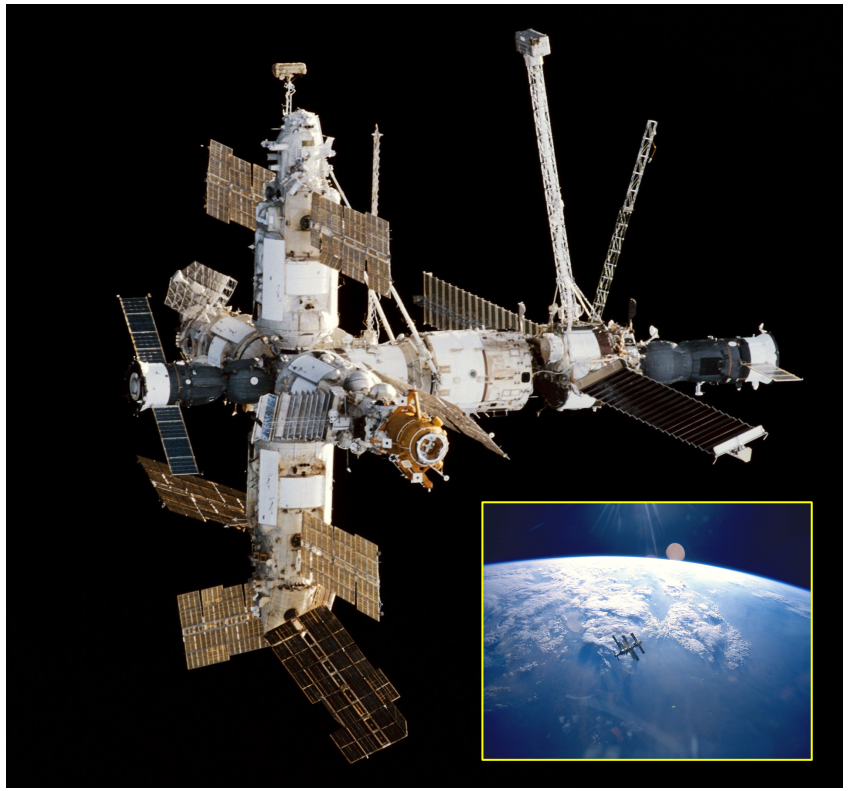


Artists conception of Buran docking with Mir Space station.

"We had no civilian tasks for Buran and the military ones were no longer needed. It was originally designed as a military system for weapon delivery, maybe even nuclear weapons."

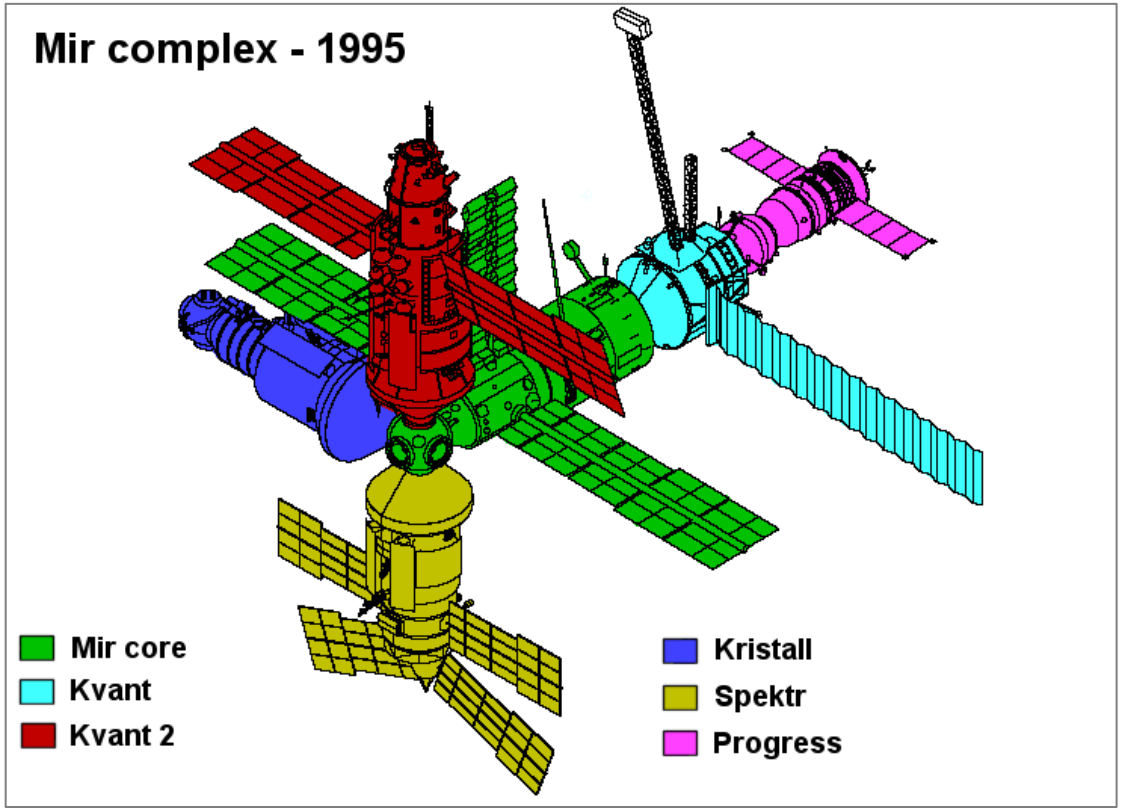
Space Stations: Mir (1986-2001)

In the modern **Russian** language the word 'мир' has two different meanings. It can be translated as 'peace' or 'world'.



Approach view of the Mir Space Station viewed from Space Shuttle Endeavour during the STS-89 rendezvous. A Progress cargo ship is attached on the left, a Soyuz manned spacecraft attached on the right.

Mir
15.7 orbits per day
15 yrs 31 days in orbit
4592/5510 days occupied
86,331 orbits
66 crews/missions



Mir breaks up in the Earth's atmosphere in March 2001.

Russian Space Agency 1991-2004

Boris Yeltsin
1st President of Russia
1991-1999

The Soviet space program did not have central executive agencies. It was organized in non-centralized design bureaus and had no central political leadership. The creation of a central agency after the separation of Russia from the Soviet Union was therefore a new development.

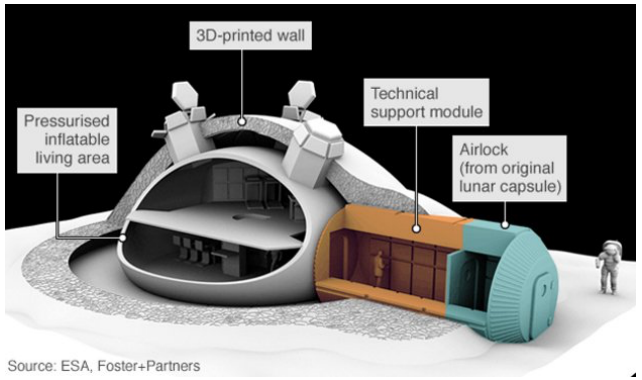
The **Russian Space Agency** was formed on February 25, 1992, by a decree of **President Boris Yeltsin**.

On December 28, 2015, the Agency was renamed **Roscosmos**.

Roscosmos State Corporation for Space Activities

In 2015, the Russian government merged **Roscosmos** with **United Rocket and Space Corporation**.

They re-nationalized the Russian space industry and created the **Roscosmos State Corporation**.



Source: ESA, Foster+Partners

"Roscosmos officials also revealed that RSC Energia is designing a new spacesuit designed to make lunar exploration much easier."

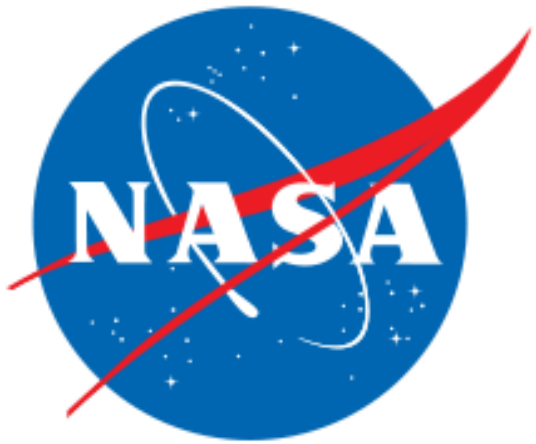
"Russia's space agency is gearing up for a moon mission by 2030. In preparation for a manned lunar mission, the Russian federal space agency **Roscosmos** has started moon landing trials using a '70s-era gravity machine that simulates human activities on the moon."

"**Roscosmos** plans to send a probe to the moon to look for colony locations before launching a manned mission. A crewed spacecraft is slated to launch between 2025 and 2045, about 60 years after the Apollo mission made its historic landing on the moon."

"**Roscosmos'** lunar base will be used for research and mining of precious metals and will be powered by a subsurface energy station. Initially, the base will be manned by four people, which will eventually increase to 10 to 12 people," **Russian Daily Izvestia** reports.

Kind of hard not to see a pattern here….

National Aeronautics and Space Administration



NASA insignia

Russian Federal Space Agency
Федеральное космическое агентство России

Logo of Roscosmos

China National Space Administration
国家航天局

CNSA logo

Starfleet Command

Starfleet Command emblem