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## Chapter 10

# The Military Space Organization in the Soviet Union: 1946–1991<sup>\*</sup>

Christian Lardier<sup>†</sup>

During the Second World War, the famous Katiouchas were placed under the responsibility of a military council headed by artillery General P. A. Degtiarev, P. N. Koulechov (1908), L. M. Gaïdoukov (1911–1999) and N. N. Kouznetsov (1903–1983). The latest was chief of the armament directorate (GUGMTch), which was responsible for orders to the ammunitions ministry. This directorate included military engineers, such as A. I. Sokolov (deputy), A. I. Semenov, G. A. Tiouline, A. G. Mrykine, N. N. Yourichev, V. P. Morozov, P. E. Troubatchev, K. A. Kerimov, and others.

In May 1945, a group of specialists was sent to Germany to study the war trophies (V-2 missiles, Wasserfall, Schmetterling, Rheintochter, and Taïfun). It consisted of Marshal N. D. Yakovlev (head of GAU), General P. A. Degtiarev, General L. M. Gaïdoukov, General A. I. Sokolov, Colonel G. A. Tiouline, Captain K. A. Kerimov, Lieutenant You. A. Mozjorine (ballistic), Colonel You. A. Pobedonostsev (powder rockets), Lieutenant-Colonel S. P. Korolev (V-2), Colonel V. P. Glouchko (liquid engines), and others. They formed the Berlin Institute headed by D. G. Diatlov and V. P. Barmine, Nordhausen Institute headed by L. M. Gaïdoukov and S. P. Korolev, Rabe of Bleicherode headed by B. E. Tchertok

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and N. A. Piliouguine, engine specialists being in Leesten. L. M. Gaïdoukov, A. I. Sokolov, G. A. Tiouline, You. A. Pobedonostsev, S. P. Korolev, and V. P. Glouchko were present at the Backfire operation in Cuxhaven on 14 October 1945.

At the end of 1945, the deputy minister of aeronautical industry, P. V. Dementiev, asked the NII-1 specialists to stop their work at Nordhausen, Bleicherode, and Leesten. In fact, the minister, A. I. Chakhourine, didn't want the rockets because he wanted to concentrate on jet aircrafts. And the ammunition minister, B. L. Vannikov, was occupied by the atomic bomb. But the development of rockets was supported by artillery Marshal N. N. Voronov and N. D. Yakovlev, the defense industry minister D. F. Oustinov, and his deputy V. M. Riabikov. But this minister was only involved in weapons for aircraft, ships, or tanks. He had never been engaged with rockets, including Katiouchas. That is why the first plants for rockets were former gun factories. At the beginning, it had been foreseen to produce the V-2 at plant no.70 "Vladimir Ilitch" after producing Katiouchas during the war, but on 13 May 1946, it was finally decided that it would be produced at plant no. 88 "Kalinine" of Podlipki. In 1942, Minister D. F. Oustinov, his deputies B. L. Vannikov and V. N. Novikov, and three directors of gun factories—A. S. Elian (plant no. 92 of Gorky), A. I. Bykhovsky (plant no. 172 "Lénine" of Motovilikhinsk near Perm), and L. R. Gonor (plant no. 221 "Barricade" of Volgograd)—had received the medal of Hero of socialist labor. General-Major A. S. Elian (1903–1965) would then be chief of OKB Mach (nuclear reactors) in 1947/50, then chief of KB-1/NPO Almaz (ground-to-air missiles) in 1950–53, before being reduced to a main mechanic in a Moscow factory after Josef Stalin's death. On his side, A. I. Bykhovsky (1895-1972) would be director of NII-229/NII KhimMach at Zagorsk in 1955–57. As for L. R. Gonor (1906–1969), he would be the first director of NII-88 in 1947–50. Finally, A. S. Spiridonov (1903–1976), of plant no. 232 "Bolchevik" of Léningrad, would also be director of NII-88 in 1954–59, whereas K. I. Tritko, E. V. Sinelchikov, S. E. Rachkov, and P. I. Kostin (1904–1970), who rebuilt the German's missiles, were coming from those factories.

On 13 May 1946, a governmental decree gave the responsibility of rockets to the 4th directory of GAU of ministry of Defense headed by General A. I. Sokolov. He also created the special artillery corps (BON) headed by General A. F. Tveretsky in Germany, the Kapustin Yar test site headed by General V. I. Vozniouk, and the scientific institute no. 4 (NII-4) headed by General A. I. Nesterenko. In 1948, the Navy created a main directorate of rocket weapons for warships (A. M. Brezinsky, B. V. Lipatov, I. G. Ivanov, and others) and the scientific institute NII-4 (with N. A. Soulimovsky as first chief).

On 23 May 1953, the 4th directorate was replaced by the directorate of the deputy commander of artillery (UZKA). In 1955, UZKA became UNRV headed by General A. I. Semenov. On 17 December 1959, UNRV became the Strategic Rocket Army (RVSN) headed by Marshal M. I. Nedeline (commander), V. F. Toloubko (first deputy), M. A. Nikolsky (chief of general staff), V. A. Boliatko (chief of 12th main directorate), A. I. Semenov (chief of GURVO), F. P. Tonkhikh (deputy for education and military training), and others. The 12th main directorate managed the Semipalatinsk test site (Kazakhstan) and the nuclear weapons arsenals for the Air Force, the Navy, the Strategic Rocket Army, and others. Created in September 1947, it was a special sector of General staff in 1947–49, the 6th GUMO in 1949–57, part of the Medium Machinery Ministry in 1957–59, part of RVSN in 1959–74, and the 12e GUMO since 1974. It was headed by General V. A. Boliatko in 1947–65, N. P. Egorov in 1965–74, E. V. Boïtchouk in 1974–85, E. P. Masline in 1985–92, and then I. D. Valynkine.

On his side, UNRV became the armament directorate (GURVO) with the 3rd directorate, created in September 1960, in charge of space programs. GURVO was headed by General A. I. Semenov in 1955–64, with General A. G. Mrykine as first deputy in 1959–65. At the same time, a space directorate was created at the Rocket directorate (URV) of the operational directorate (GOU) of General Staff (GCh). This directorate was headed by Colonels I. A. Afonsky, V. I. Bely, N. F. Chlygov, N. N. Joukov, I. P. Fomitchev, and others. URV was headed by Generals M. A. Lovkov, E. V. Boïtchouk, F. L. Tcherniavsky, and others.

On 24 October 1960, the first missile R-16 exploded on the launch pad at Baïkonour. Nedeline and around 100 people were killed by the explosion. He was replaced by Marshal K. S. Moskalenko in 1960–62. On 22 October 1962, Colonel Oleg Penkovsky was arrested for treason. After graduating from Dzerjinsky artillery academy in 1959, he worked in the State Committee for Science and Technic (GKNT) and defected to England. In April 1961, he offered his services to MI-6 and gave them information about Soviet rockets. Also on 22 October 1962, the United States decided on the Cuba blockade, because the military had seen the deployment of Soviet rockets during 71 flights with the U-2 spy-aircraft. As a matter of fact, 42 R-12 and R-14 rockets with 36 warheads were deployed between 9 September and 22 October within the framework of the Anadyr operation. On 27 October 1962, a U-2 was shot down by an S-75 missile similar to the one that shot down Gary Powers over Sverdlovsk in May 1960. The removal of missiles was done between 29 and 31 October and the return to the Soviet Union was achieved on 9 November 1962. The Cuban crisis could release a third world war, which might be nuclear. During this period, the Soviet

Union had only 42 launch pads for ICBMs (6 R-7As and 36 R-16s) and 30 missiles launched from submarines. Penkovsky was executed on 16 May 1963, causing the dismissal of the artillery commander, Marshal S. S. Varentsov (1901–1971), who was near him.

While the military space program was under the leadership of aviators in the U.S Air Force (USAF), it was under artillerymen in the Soviet Union. The 3rd directorate of GURVO of RSVN was headed by General K. A. Kerimov from September 1960 to October 1964, with his deputy Colonel V. I. Cheoulov. It was replaced by the Central directorate for Cosmos (TsUKOS) headed by General A. G. Karas. In May 1970, it became the main directorate for Cosmos (GUKOS) headed by General A. G. Karas until 1979, and then by General A. A. Maximov (his first deputy was cosmonaut G. S. Titov). In 1981, GUKOS went out of RSVN and became an independent organization. Those Space Units (UNKS) became the Space Forces (VKS) in 1992. Then in 1997, they returned to Strategic Rocket Army (RVSN).

The 3rd directorate includes four sectors for launchers (Colonel Alexandre Maximov), satellites (Colonel Alexei Maximov), cosmodromes (Colonel A. F. Korchounov), and ground stations network (Colonel M. F. Kouznetsov). In May 1963, the 3rd directorate formed the Center for military space no. 156 (213 officers), which was headed by Colonel V. I. Cheoulov, with his deputy Colonel Alexei Maximov. In October 1964, the 3rd directory was changed into TsUKOS. Its Chief K. A. Kerimov had three deputies: V. I. Cheoulov, Alexandre Maximov (chief of center), and A. G. Karas (chief of KIK). In March 1965, Kerimov was replaced by Karas and became the chief of 3rd Glavka of MOM. The deputies of Karas were V. I. Cheoulov, Alexandre Maximov (chief of center), and I. I. Spitza (chief of KIK). The first sector for satellites, headed by V. V. Favorsky, was divided into several sectors by types of missions (photographic survey, electronic intelligence, telecommunications, navigation, and others). The second sector for launchers was headed by A. F. Mordovtsev, the third for ground segment (KIK) by M. F. Kouznetsov, and the fourth for cosmodromes (Kapustin Yar, Baïkonour, and Plesetsk) by A. F. Korchounov. The main engineer was Alexei Maximov in 1964–65, then V. I. Samonov in 1966–80.

In March 1970, TsUKOS was changed into the Main Directorate for Cosmos (GUKOS). The chief was A. G. Karas and the three deputies were V. I. Cheoulov (first deputy), A. A. Maximov (deputy for technics), and N. G. Kislit-syne (deputy for politics). The TsUKOS was divided into three directorates and eight sectors. The first directorate (satellites) was headed by V. V. Favorsky, the second (launchers and cosmodromes) by V. A. Bokov, and the third (KIK) by M. F. Kouznetsov.

In November 1981, GUKOS became UNKS with a general staff, a scientific and technic Council (NTK), an armament directorate and an operating directorate, the cosmodromes at Baïkonour and Plesetsk, arsenal-28 at Kapriian-Stroganov, ground segment (KIK), institute TsNII-50, and the academy Mojaïsk.

The first military space program was issued on 30 October 1961. It included satellites for GRU, for the Strategic Rocket Army (RVSN), for anti-aircraft defense (PVO), and for the Navy (VMF). The first military satellite was Zenit-2 for photographic survey built by TsSKB and the Progress plant in Kouybychev-Samara, the payload coming from NPO Zenit and factory Imeni Zverev in Krasnogorsk. Since 1961, the Zenit-2 (4.7 t) has been launched by Vostok rockets and realized eight-day missions. Since 1963, the Zenit-4 (5.5 t) was launched by Voskhod rocket and prolonged the missions to 12 days. Then it was followed by Zenit-6/Argon and Zenit-8/Oblik (6.5 t) launched by Soyuz rockets. The civilian derivatives are the Ressource-F1 and F2 (14–30 days). The fourth generation corresponds to the satellites Yantar-2K/Feniks (6.5 t) launched by Soyuz rockets since 1974 (Cosmos-697), Yantar-4K1/Oktan since 1979 (Cosmos-1097), Yantar-1KFT/Kometa and Yantar-4K2/Kobalt since 1981 (Cosmos-1246 and 1298). The fifth generation corresponds to satellites with digital transmission Yantar-4KS1/Terilen (6.5 t) launched by Soyuz rockets since 1982 (Cosmos-1426), then Yantar-4KS2/Neman since 1989 (Cosmos-1731). The lifetime of that generation was one year in orbit. The sixth generation was the satellite Don/Orletz-1 equipped with eight small capsules (6.5 t) launched by Soyuz rockets since 1989 (Cosmos-2031). The seventh generation was the satellite Kouban/Orletz-2 (10 t) with 22 small capsules launched by Zenit-2 rockets. Five launches were performed in 1986–87, then another one was made in 1994 (Cosmos-2290). In 1984, the serial production of Yantar had been transferred in Arsenal factory at Lenin-grad/St. Petersburg. The last generation is built by NPO Lavotchkine. It is the Arkon satellite launched by Proton rockets since 1997 (Cosmos-2344).

The Electronic Intelligence (ELINT) was given to NPO Youjnoe and YoujMach factory (Dniepropetrovsk), the payload coming from the TsNII-108 Imeni Plechakov (Moscow). The first generation consisted of satellites DS-K-40 (250 kg) launched by Cosmos-2 rockets since 1965 (two failures). The second generation was composed of satellites Tselina-O (415 kg) for general survey (Obzor) and Tselina-D (1,640 kg) for detailed listening (Detail). The first, which was not oriented and was equipped with solar panels, was launched by Cosmos-3M rockets since 1967 (Cosmos-189). The second, which had a gravitational orientation system with an indication of the angular position of stars, was launched by Vostok rockets since 1970 (Cosmos-389), and the Cyclone-3 since 1977 (Cosmos-921). The civilian derivative is the oceanology satellite Okean-E (Cosmos-

1076). The third generation, which holds the functions Obzor and Detail, was the satellite Tselina-2 (3.5 t), launched by Zenit-2 rockets since 1985. The civilian derivative is the Okean-O launched in July 1999.

For GRU communications, the small satellites Strela were built by NPO PM (Krasnoïarsk) with the payload coming from NII-695/MNIIRS and radio-technic plant of Krasnoïarsk. The Strela-1s are launched in clusters of five satellites by Cosmos-1 rockets, whereas the Strela-2s, equipped with a magneto-gravitational orientation system, are launched at one exemplar by the same launcher. The Strela-1Ms (61 kg) are launched in clusters of eight satellites by Cosmos-3M rockets since 1970. But their lifetime is only six months. As for Strela-2M, it was also launched since 1970 (Cosmos-372). The Strela-1M had been replaced by Strela-3, launched in clusters of six by Cyclone rockets since 1985. The civilian derivative is the satellite Gonetz.

The military telecommunications are realized with the help of Molniya-1 satellites built by OKB-1 in 1961–65, then by NPO PM (Krasnoïarsk), transponders coming from NII-695. The transponder Beta, tested in 1970–75, was used for the Koround system (RVSN, Air Force, and Navy), Routchei (communications army), and Sourgout (governmental communications). The Molniya-2 satellite was equipped with a Segment-2 transponder and the Molniya-3 with a Segment-3 transponder. As for the geostationary satellites Radouga/Gran, they were equipped with Delta-1 and 2 transponders since 1975. The data-relay satellites Geïzer/Potok, on their side, were equipped with Splav-2 and Synthese transponders of NPO Elas, whereas Altair/Loutch have an Arion transponder from NII-885. They formed the unified system ESSS (communications) and GKKRS (data relay), which have been operational since 1976 and 1985.

The meteorological satellites were built by the NII-627/VNIIEM with a payload of NII-380/VNIIT and TsKB-589/Geophysika. They were launched by Vostok rockets since 1964 (Meteor-1 was operated from 1969 to 1979). The Meteor-2 was launched since 1975 (Vostok was replaced by Cyclone-3), and the global system GMKS was operational in 1976. The Meteor-3 was launched since 1984, whereas the unique geostationary satellite Elektro was launched by a Proton rocket in 1994.

As for geodesy, the NPO PM (Krasnoïarsk) built the Sphera satellites that were launched by Cosmos-3M rockets since 1968 and the Mousson/GeoIK by Cyclone-3 rockets since 1978. The topogeodesic system TGKS was operational in 1976.

To measure radiation during nuclear explosions in the atmosphere, seven satellites DS-A1 were launched in 1962–65, but only four reached orbit (Cosmos-11, 17, 53, and 70).



The other space systems were developed for the Air Defense (PVO) and Navy (VMF). As a matter of fact, PVO was responsible for early warning (SPRN/EWS), space surveillance (SKKP), antimissile defense (PRO/ABM), and antisatellite (PKO/ASAT). For the calibration of ground radars, they used spherical satellites (Youg) built by NPO Youjnoe and YoujMach factory (Dniepropetrovsk). The first were DS-P1 (Cosmos-6, 19, and 25) launched by Cosmos rockets since 1962, followed by DS-P1-You (SPRN and SKKP) since 1964, and DS-P1-I (PRO and PKO) since 1966. The second generation included Taifun-1/Vektor and Taifun-2/Romb, which jettisoned subsatellites. The Taifun-1You, on its side, was tested in 1979–81 (operational in 1983). As for Taifun-3, it began its trials in 1984. The Youg, Vektor, and Romb were launched by Cosmos-3M rockets since 1974 (three launches were realized with Cyclone-3 rockets in 1988–90).

The early warning satellites (US-KS) were built by NPO Lavotchkine (Khimki) with a payload coming from NPO Kometa (Moscow). The Oko satellites were launched by Molniya rockets since 1972 (orbit of 12 h) and the Prognoz satellites by Proton rockets since 1984 (orbit of 24 h). The control center of PVO is located at MaloYaroslavetz near Obninsk (Serpoukhov-15). In case of nuclear attack, the center gives the necessary information to the ABM system for the warhead interception (system A-135, which protects Moscow). The system also comprises ground radars Daryal and Volga. The first generation radars Dniestr are now used for the SKKP.

Finally, the PVO had the responsibility of the antisatellites system IS realized by OKB-52 (Reoutov) with NPO Kometa (Moscow). The killer-satellite IS had been tested in 1963–64 (Poliot) and in 1967 (Cosmos-185) before the first interception of a target I-2M of Tchelomei in November 1968. Since 1971, targets are the DS-P1-M/Lira of Youjnoe launched by Cosmos-3M rockets. The system was declared operational in 1973. The last trial happened in June 1982. However, a system consisting of launcher Cyclone-2 and killer-satellite IS-MU (14F10) has been in permanent operation since April 1991.

The systems SPRN, SKKP, PRO, and PKO were headed by General-Colonel You. V. Votintsev (1919) in 1967–86, General-Colonel W. M. Krassovsky (1931) in 1986–91, and finally General-Colonel V. M. Smirnov (1939) since 1991. However, they have been integrated inside RVSN in 1998 and Smirnov is now deputy chief of general staff of RVSN. The General-Lieutenant M. M. Kolomietz (1918) had headed the ASAT system, whereas General-Lieutenant I. E. Barychpoletz (1916–1976) had been in charge of the ABM system. Now the chief of RKO is the General-Lieutenant S. S. Martynov (1940), whereas the commander of SPRN is the General-Lieutenant A. V. Sokolov (1946). In 1960,

the TsNII-45 had been created to help those developments. It was headed by Generals I. M. Pentchoukov, You. G. Erokhine, and G. S. Batyr. It became a research center of TsNII-4 in 1998.

On its side, the Navy was engaged in the development of navigation systems and ocean surveillance by satellites. The navigation and communications satellites Cyclone were built by NPO PM (Krasnoïarsk) and produced by the Poliot plant in Omsk. The payload comes from NII-885/RNIKP and NII-695/MNIIRS. They were launched by Cosmos-3M rockets since 1967 (Cosmos-158). The enhanced version Cyclone-B (Cosmos-700) was tested in 1974 and was introduced in the military system Parus in 1976. The civilian derivatives are Tsicada and Nadejda equipped with the search-and-rescue system Cospas-Sarsat. The second generation was the Ouragan of the Glonass network, launched in clusters of three by Proton rockets since 1982.

The ocean surveillance comprised the satellites US-A, equipped with a lateral vision radar (4.0 t) and US-P equipped with a passive radiotechnic system (3.5 t). They allowed the localization of an enemy warship and provided coordinates for cruise missiles of Tchelomei. The MKRTs "Ousspek" system was used onboard Tu-95RTs aircrafts since 1962. The US system was built by NPO Mach of Reoutov, NPO Kometa of Moscow, and Arsenal factory of Leningrad/St. Petersburg. The payload was coming from NII-17/MNIIP/NPO Vega-M (radar), the subsidiary of TsNII-108/NIRTI at Kalouga (radiogoniometer), and the NII-132/NPO "Kvant" of Kiev (ship equipments). US-A was equipped with a nuclear generator TEU-5/Buk (Topaz) from OKB-670/NPO Krasnaya Zvezda of Moscow. This generator would be used onboard 31 satellites in 1970–1988 (Cosmos-367 to 1932). The version Topol/Topaz-1 had been tested on Cosmos-1818 and 1867 (Plasma-A), whereas TsKB Mach of Leningrad would build the lenisseï/Topaz-2 that would never fly in space. US-A was in permanent operation since October 1975 (the space MKRTs "Legende" was operational in 1976), whereas US-P reached this step only in October 1979. The second generation system Ideogramme-Pirs included Pirs-1 and Pirs-2 satellites. In October 1989, the satellites US-M and US-PM were integrated in the armament. The Pirs-3 system should be in development. All those satellites were launched on Cyclone-2 rockets from Baïkonour. The space control center of the Navy was located at Noginsk near Moscow.

The Soviet Navy had been headed by Admiral S. G. Gorchkov (1910) in 1955–89. He was assisted by Admiral V. A. Kassatonov in 1964–74, then Admiral N. I. Smirnov in 1974–92 (first deputy). Deputies for naval building and weapons were N. V. Issatchenkov (1902–1969), P. G. Kotov (1965–86), and then F. I. Novosselov. At the directorate of rocket and artillery armament, the chiefs

were V. A. Sitchev, F. I. Novosselov, and others. In 1960, three institutes and an experimental factory merged to form the armament's NII of the Navy, which was headed by A. T. Melnikov, N. I. Boravenkov, A. M. Petrov and V. T. Martynenko. N. I. Boravenkov and K. K. Frantz were involved in the realization of ocean surveillance satellites.

Each space program was managed by a state commission. For the most important programs, needing interministerial coordination, the president could be a minister. For more routine programs, the president could have a less high rank (deputy minister, chief of institute, or chief of cosmodrome). In numerous cases, the president of the state commission was a representative of the rocket army or the chief of the cosmodrome. The first space state commissions were headed by the chief of VPK General-Colonel V. M. Riabikov in 1955–57, the minister K. N. Roudnev in 1958–61, the minister L. V. Smirnov in 1961–63, then by the deputy minister General-Lieutenant G. A. Tiouline in 1963–65. Since 1965, some specialized state commissions were created in MOM. The minister S. A. Afanaseiev headed the lunar program N1-L3 in 1965–74, whereas the minister V. Kh. Dogoujiev headed the shuttle program Bourane in 1976–91. On its side, the manned flights commission was headed by General-Lieutenant K. A. Kerimov in 1965–91, then by General-Colonel V. L. Ivanov in 1991. Moreover, the commission for interplanetary spacecraft Luna, Venera, and Mars was headed by General-Lieutenant G. A. Tiouline in 1962–73, then by General-Lieutenant K. A. Kerimov in 1974–91. However, Proton rockets and the Almaz space station were under the responsibility of General-Colonel M. G. Grigoriev (first deputy RVSN).

The commission for satellites Zenit-2, Meteor, and Molniya-1 was headed by K. A. Kerimov in 1961–65. After that, Zenit and Yantar were taken in charge by A. S. Kirillov, V. I. Samonov, and V. V. Favorsky; Meteor by V. I. Cheoulov; and Molniya-2 by N. F. Chlykov. V. I. Cheoulov would also take over the satellites Strela and Sphera. The first Tselina satellites had been given to General G. E. Alpaïdze (chief of Plesetsk). On the other hand, the rocket Zenit-2 and satellites Tselina-2 were under the responsibility of General-Lieutenant G. S. Titov (first deputy GUKOS). Titov was also president of the state commission for the two satellites Plasma-A in 1987. For program US, the first and second steps were headed by General-Major A. M. Voïtenko (first deputy of Baïkonour in 1964–69), whereas the third step was given to Admiral N. N. Amelko, chief of submarines forces. On its side, the Cyclone system was headed by Vice-admiral G. G. Tolstoloutsky (chief of communications in VMF) and the Cyclone-B went to Admiral A. I. Rassokho (chief of navigation and oceanographic directorate).

In the Air Defense (PVO), the president of the state commission for system US-K of SPRN was General-Lieutenant M. I. Nenachev (chief of PRO/PKO at the armament directorate of PVO in 1964–87). For calibration, state commissions were headed by B. P. Eremine (chief of staff at Plesetsk), B. N. Karpov, N. N. Joukov, and B. G. Zoudine (chief of space units at Plesetsk). The orbital bombs (FOBS), on their side, were given to General-Colonel F. P. Tonkhikh. The vertical rockets, scientific satellites Cosmos, Intercosmos, and Prognoz were under the responsibility of General-Major G. S. Narimanov (General-Major G. M. Tamkovitch succeeded him).

In 1974–78, the state commission for telecommunications satellites Molniya-3, Radouga, and Ekran were headed by General-Colonel A. A. Maximov (N. F. Chlygov succeeded him). On its side, General-Lieutenant You. F. Kravtsov headed the commission for data-relay satellites Potok/Loutch.

The chiefs of the cosmodromes, Generals V. I. Vozniouk (Kapustin Yar), A. G. Zakharov and A. A. Kourouchine (Baïkonour), I. I. Oleïnik (Plesetsk), were presidents of state commission, which was also the case of Generals A.G.Mrykine, I. I. Spitza, V. G. Sokolov, N. E. Dmitriev, A. I. Dounaiev (chief of Glavcosmos at MOM), You. A. Afanaseiev, and others.

The TsNII-4 of MO (unit no. 25840) was created on 13 May 1946 at Bolchevo near Moscow (Jubilé). Like the ballistic and artillery armament institute (NII-3) created on 10 June 1946, it belongs to the Academy of artillery sciences in 1946–53 (President A. A. Blagonravov, then N. N. Voronov), to the main directorate of Artillery (GAU) in 1953–59, to the strategic rocket army (RVSN) in 1960–82, and finally to the Space Units (VKS) in 1982. The institute was in charge of trajectographic and telemetry means for the first rockets regiments and created the ground stations network (KIK) in 1957. It also participated in the creation of cosmodromes Kapustin Yar, Baïkonour, and Plesetsk. It was headed by General A. I. Nesterenko in 1946–50, General P. P. Tchetchouline in 1950–55, General A. I. Sokolov in 1955–76, General E. B. Volkov in 1976–82, General L. I. Volkov in 1982–92, and General V. Z. Dvorkine in 1992. Deputies for science of the institute were Generals Ya.B.Chor in 1946/49, G. A. Tiouline in 1949–59, You. A. Mozjorine in 1959–61, G. S. Narimanov in 1961–65. Also in the institute were working Generals P. A. Agadjanov, A. A. Vitrouk, Colonels M. K. Tikhonravov, P. E. Eliasberg, A. A. Bolchoï, A. V. Brykov, and others.

The command and measure complex (KIK) had been created by Generals You. A. Mozjorine and G. A. Tiouline at NII-4 in 1955. The first chief of the control center was the General-Major A. A. Vitrouk and his deputy P. A. Agadjanov. The coordination and calculation center KVTs, which comprised four sectors, the communications center and the decoding bureau, was first located at

Bolchevo in 1956–57, then it moved to Moscow in December 1957 (Gogolevsky Boulevard no. 6). It was connected to computers at the calculation center of Defense ministry (1e Khorochevskoe Proezd, Begovaya) and the IPM AN SSSR (Miuskaya Plohad). The NII-4 would get its own computer center in 1959 (computers M-20 and M-50). The network comprised stations on the U.S.S.R. territory, but also the tracking ships TOGE-4 and TOGE-5. In 1957, Mozjorine, Tiouline, Tikhonravov, Narimanov, Eliasberg, Agadjanov, A. V. Brykov, I. K. Bajinov, and I. M. Yatsounsky received the Lenin Prize for the launch of Sputnik-1.

In 1959, for lunar missions, two stations were installed at Simenz in Crimea (41E) and Moscow (42E). Afterward, the antennas ADU-1000 (eight parabolas of 16 m of diameter formant) were installed at Vitino near Evpatoria in Crimea (NIP-16) for the control center of deep spaceflights (TsDKS). This center had a backup in Moscow (NIP-14) and Oussourisk (NIP-15). At the same time, antennas of 25 m of diameter (TNA-400) were built at Simferopol in Crimea (NIP-10). There, they would be the first control center for manned flights in 1961. For the Gagarin flight, Mozjorine received the medal of Hero of socialist labor, whereas Sokolov and G. I. Levine received the Lenin Prize. In April 1962, the center was again transferred at the general staff (3e Frouze Street). In January 1963, it became an independent organization (unit no. 32103), and it began to use the computer center in NII-88 of MOM. The center of KIK controlled the satellites of reconnaissance Zenit (1961), of meteorology Meteor (1964), of electronic intelligence Tselina (1965), of navigation Cyclone (1967), and IS (ASAT) and US (RORSAT) in 1967. In 1970, for the last time, the center of KIK was transferred on the territory of a communications center of the Air Force at Golitsyno near Moscow. The coordination and calculation center (KVTs) of Golitsyno-2 (Objet-413, alias GITsIU no. 153) was located at Krasnoznamensk near Moscow. The first chief of the command post was Colonel V. V. Kovalenko. Not far from Golitsyno, there was the command center of RVSN at Vlassikh near Odintsovo (this center was equipped with a computer center and a communications center). With the creation of Golytsino-2, the military satellites (Zenit, Tselina, Cyclone, and others) were separated into civilian satellites (telecommunications, meteorology, deep space probes, manned flights, and others). The telecommunications stations were at Medveji Ozera (near Moscow), Doubna and Vladimir (Gouz-Khroustalny), whereas meteorology stations were at Obninsk (near Moscow), Novossibirsk, Khorol near Khabarovsk and Tachkent.

Today, Krasnoznamensk is a town of 30,000 people (5,000 in 1976, 10,000 in 1981). Five doctors and 65 science candidates worked in this center. The permanent staff consisted of 2,000 people. It coordinated the activity of 13 different

complexes (OKIK) and formed the single ground automated complex of control (NAKU). It was equipped with computers Elbrus (tenth of millions ope/s). It provided all the information for the TsOUP of Kaliningrad, for the TsDKS of Evpatoria, and for ground and naval control stations.

In 1972, a control center for satellites with dual use (civil and military applications) had been installed in the IKI building in Moscow. The first flight followed by this center was Intercosmos-6. The directorate no. 61 was in charge of automatic satellites and the directorate no. 62 of manned flights (with the TsOUP). The first one comprised the sectors for Meteor, Okean, Ressource-01, Bion, Photon, Intercosmos (AUOS), IRS (Inde), and Elektro-1 (GOMS). The 6e center Rockot, headed by Colonel V. I. Glebov, was transferred to the 4e directorate of GITSIU no. 153 at Golitsyno in December 1995.

The control center (Tsoup) of TsNII Mach at Kaliningrad began the construction of a computer center in December 1959. The first spacecraft followed by the center were Cosmos-8 and Mars-1 in 1962. Since January 1963, it was in charge of scientific satellites and interplanetary probes, then of manned flights since October 1964 (Voskhod). It was used as a coordination and calculation center since October 1965 (backup for manned flights and interplanetary probes). A new building was built in 1970 (it would be used for the Apollo-Soyuz program in 1974–75). The Tsoup had been headed by M. A. Kazansky, A. V. Militysne, and V. I. Lobatchev, whereas the ballistic center was headed by I. K. Bajinov, V. N. Potchoukaiev, and N. M. Ivanov.

In 1978, a radiotelescope RT-70 of 70 m diameter (antenna TNA-1500) entered in service at Evpatoria and Oussourisk. Another radio-telescope RT-70 built at Souffa (Ouzbekistan) had to be connected to the TsDKS of Evpatoria.

The tracking ships were Yuri Gagarin (45,000 t); Sergei Korolev (22,000 t); Vladimir Komarov (17,500 t); Pavel Belayev, Georgui Dobrovolsky, Vladislav Volkov, and Victor Patsaiev (class 9,000 t); Marshal Nedeline and Marshal Krylov (class 24,000 t); Tchoumikan and Tchajma (class 13,500 t); and Kegostrov, Morjovetz, Borovitchi, and Nevel (class 6,100 t). They were abandoned because they were too expensive and they had been replaced by data-relay satellites Altaïr/Loutch (with exception of Nedeline and Krylov, which had been affected to the Pacific Fleet). The satellites Cosmos-1700 (1985), Cosmos-1897 (1987), and Cosmos-2054 (1989) had been replaced by satellites Loutch/Hélios in 1994–1995.

The TsNII-4 opened two new specialties in 1960. It concerned means for cosmodrome (V. T. Dolgov) and space means (G. I. Levine). On 17 March 1962, the institute became the organization for ballistic rockets of all categories and for military satellites. The specialties were changed into directorates. The space re-

search directorate (L. M. Gaïdoukov) was created in March 1964, the directorate for KIK (I. V. Mecheriakov) in 1966, and the directorate for satellites and subsystems (A. M. Belaiev) in 1967. In 1968, the interdepartmental ballistic group (MGBT) was formed under the responsibility of a new subsidiary, which would become TsNII-50 (unit no. 73790) in 1972. The first chief of TsNII-50 Imeni Tikhonravov was the General-Lieutenant G. P. Melnikov, his deputy being the General I. V. Mecheriakov (second chief in 1983–88). Then, the institute would be headed by the General E. V. Alexeiev in 1988–92 and General V. A. Menchikov since 1992. The institute comprises four directorates, headed by L. M. Gaïdoukov, A. M. Beliakov, Ya. Ya. Sirobaba, and You. N. Krylov.

Remaining was the position of the Air Force (VVS) in the soviet space program. It was responsible for manned space flights since 1958, making the selection and the training of cosmonauts, and the recovery and rescue of cosmonauts. The commander in chief was Marshal K. A. Verchinine (1900–1973) in 1957–69, then Marshal P. S. Koutakhov (1914–1984) in 1969–84. The first deputy was the Marshal S. I. Roudenko (1904–1990) in 1953–68, whereas General-Colonel F. A. Agaltsov was deputy for military training in 1958–62. Roudenko and Agaltsov were members of state commissions for manned flights. Finally, the deputy for armament was General-Colonel A. N. Ponomarev in 1956–66, then General-Colonel M. N. Michouk in 1966–83. But the real boss for space in VVS was General-Colonel N. P. Kamanine (1908–1982), his deputy being the General-Major L. I. Goregliad (1915–1986). The Air Force had chosen the first cosmonauts group in October 1959–March 1960 with the help of Central Aeronautical Hospital (TsVNIAG) and the Aerospace Medicine Institute (GNIIAKM). Those two institutions were under the responsibility of the aerospace medicine service (General-Major A. N. Babiitchouk in 1959–74) of the central directorate for military medicine (General-Colonel E. I. Smirnov and General-Colonel D. D. Kouvchinsky (1912–1994) in 1960–77, then General-Colonel Ivan Tchij). However, for the selection of civilian cosmonauts, it was decided to create the medicobiologic problems institute of the Health ministry in 1963. The first group of cosmonauts stayed at first at Central Airport Imeni Frounze of Khodinka, and then at Star City (TsPK) of Chelkovo near Moscow (where also is located the NII VVS of Tchkalov, the Air Academy Imeni Gagarine, and the Monino museum). The TsPK had been headed by Colonel E. A. Karpov in 1960–63, General-Major M. P. Odintsov from January–November 1963, General-Major N. F. Kouznetsov in 1963–72, General-Lieutenant G. T. Beregovoi in 1972–87, General-Lieutenant V. A. Chatalov in 1987–91, and then General-Lieutenant P. I. Klimouk in 1991. The deputy chief for training of cosmonauts was General-Colonel N. P. Kamanine in 1966–71, General-Lieutenant

V. A. Chatalov in 1972–87, General-Lieutenant A. A. Leonov in 1987–91, General-Major You. N. Glazkov in 1991–2000, then Colonel V. V. Tsybliev since May 2000.

The recovery and rescue service (group in 1961, service in 1966, complex in 1971, EGAPSS in 1976, federal directorate AKPS in 1994) was headed by Generals A. I. Koutassine in 1961–66, N. M. Chirobokov in 1966, V. A. Kartakov in 1968, I. A. Koulitchev in 1971, V. D. Ougliansky in 1976, S. I. Mossienko, D. I. Demianenko, G. V. Amelkine in 1994–97, and others.

The NII VVS (GNIKI at Tchkalov near Chelkovo in 1932, evacuated at Koltsovo near Sverdlovsk in 1941, then 8e state NII Imeni Tchkalov in 1990, had been headed by Generals N. T. Pouchko in 1959–61 and M. S. Finogenov in 1961–70. It had test sites (GLITs) at Tchkalov and Vladimirovka/Akhtioubinsk (Kazakhstan), and a directorate in charge of rockets, life support systems, and rescue systems for spaceships (barometric chamber, catapults, simulators). The first chief of this directorate was Colonel S. G. Frolov. The Center for elaboration of space technology headed by General V. N. Kholodkov was engaged in testing the recovery techniques (based at Feodossi in Crimea). As for TsNII-30 of Noginsk, it realized the simulators for Star City. It was headed by Generals Z. A. Ioffe, A. P. Molotkov (during 20 years), G. S. Chonine in 1988–91, V. V. Kovalenok, and others.

The Air Force wanted to take over the military space program like the Air Force in the United States. The Special Committee that was in charge of producing rockets for the Defense Ministry had been headed by deputy presidents of the Ministry Council G. M. Malenkov (13 May 1946–March 1947), then N. A. Boulganine (March 1947–July 1953). It was then under the ministry of middle machines headed by V. A. Malychev (July 1953–April 1955), under the Special Committee for armament of Army and Navy headed by V. M. Riabikov (April 1955–December 1957), then under the VPK headed by D. F. Oustinov (1957–63). But it was in reality Oustinov and Riabikov, two leaders of armament industry, who managed those questions. The aeronautic industry had been requested only in 1960 when Khrouchtchev decided to transfer a part of aeronautic industry into rocket production (Tchelomei, Miassichtchev, Lavotchkine, Kouznetsov, Lioulka, Toumansky, Izotov, and others). On the side of Defense, the ministers were Marshals R. Ya. Malinovsky (1957–67), A. A. Gretchko (1967–76), and then D. F. Oustinov (1976–84). Badly informed, Gretchko, who commanded the Warsaw Pact forces in 1965, believed that TsUKOS was a part of VVS. In fact, there was no single opinion inside the ministry, but instead several antagonists' positions. Nevertheless, state commissions had a military majority (the industry people were the minority). There were three candidates to manage the military



space program: RVSN (Krylov), VVS (Verchinine), and PVO (Soudetz). In 1964, a project for the unification under leadership of VVS was submitted to Marshal Biriousov who was chief of general staff. A special commission was created. The Marshals Biriousov, Epichev, and Gretchko supported the VVS against RVSN. But after the accidental death of Biriousov, this proposition was rejected and the decision to let the TsUKOS stay inside RVSN had been taken in July 1966, to the great satisfaction of Oustinov who became Defense minister in 1976. Oustinov supported mainly Yangel whereas Gretchko was supporting Tchelomei (integrated to MOM in 1965). In fact, Tchelomei had been in great difficulties during the dismissal of Khrouchtchev and at the time when Oustinov was Defense minister (1976–84). Today, the space military activities are re-grouped in RVSN, and the three institutes NII-4, NII-50 and NII-45 have merged.

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## Annexes

### ***Strategic Rocket Army***

#### **Commander in Chief**

Marshal M. I. Nedeline: 1960  
Marshal K. S. Moskalenko: 1960–62  
Marshal S. S. Biriousov: 1962–63  
Marshal N. I. Krylov: 1963–72  
Marshal V. F. Toloubko: 1972–85  
Army General You. P. Maximov: 1985–92  
Army General I. D. Sergueiev: 1992–97  
Army General V. N. Yakovlev: 1997–2002  
General-Lieutenant N. E. Solovtsov: 2002–

#### ***First Deputy***

General-Colonel V. F. Toloubko: 1960–68  
General-Colonel M. G. Grigoriev: 1968–81  
General-Colonel You. A. Yachin: 1981–89  
General-Colonel A. P. Volkov: 1989–94  
General-Colonel N. E. Solovtsov: 1994–97  
General-Colonel V. A. Mouraviev: 1997–

#### **Chief of General Staff**

General-Lieutenant M. A. Nikolsky: 1960–62  
General-Lieutenant M. A. Lovkov: 1962–66  
General-Colonel A. G. Chvetsov: 1966–76  
General-Colonel V. M. Vichenkov: 1976–87  
General-Colonel S. G. Kotchemassov: 1987–94  
General-Colonel V. I. Esine: 1994–96  
General-Lieutenant V. N. Yakovlev: 1996–97  
General-Colonel A. N. Perminov: 1997–2001

#### ***First Deputy***

General A. S. Boutsy: 1960–75  
General V. V. Korobouchine: 1975–85  
General I. D. Sergueiev: 1985–89  
General V. M. Sizov: 1989–94  
General Serguei Khoutortsev: 1999–

#### **Deputy for Armament (GURVO)**

General-Major A. I. Semenov: 1960–64  
General-Lieutenant A. A. Vassiliev: 1964–67  
General-Lieutenant N. N. Smiritsky: 1967–75  
General-Colonel You. A. Pitchougine: 1975–84  
General-Colonel A. A. Riajskhikh: 1984–93  
General-Lieutenant V. A. Nikitine: 1993–

#### ***First Deputy***

General-Lieutenant A. G. Mrykine (1905–1972): 1959–65  
General-Lieutenant V. I. Bolyssov (1937): chief of glavka for purchase and orders in 1993–  
General-Major I. L. Malakhov (1922–1978)

**Scientific-Technic Committee (NTK)**

General-Major V. P. Morozov: 1962–67  
General-Lieutenant A. A. Vassiliev: 1967–69  
General-Lieutenant A. S. Kalachnikov: 1969–74  
General-Major S. A. Sergueiev: 1974–79  
General-Lieutenant V. M. Rioumkine: 1979–89  
General-Major V. G. Popov: 1989–

**Deputy for Exploration (GUEVO)/Main Engineer**

General-Lieutenant L. M. Gaïdoukov: 1962  
General-Colonel N. F. Tcherviakov: 1962–73  
General-Colonel G. N. Malinovsky: 1973–88  
General-Colonel G. A. Kolesnikov: 1988–92  
General-Lieutenant V. A. Nikitine: 1992–93  
General-Lieutenant A. N. Perminov: 1993–95  
General-Lieutenant A. V. Oussenkov: 1995–

**Chief of Operational Directorate (GOU)**

General-Lieutenant A. Ya. Popov: 1959–76  
General-Lieutenant V. V. Liachik: 1976–83  
General-Lieutenant I. D. Sergueiev: 1983–85  
General-Lieutenant S. N. Ermak: 1985–89  
General-Lieutenant V. I. Esine: 1989–94  
General-Major V. F. Lata: 1994–

**Command Center at Vlassikh near Odintsovo**

**TsKP RSVN Created in June 1960**

General-Major K. V. Gertchik: 1961–63  
General-Lieutenant K. A. Fedorenko: 1963–74  
General-Major N. G. Reznikov: 1974–83  
General-Lieutenant V. D. Mikhaïlenko: 1983–84  
General-Lieutenant V. D. Bilyk: 1984–89  
General-Major V. S. Denissiouk: 1989–

**Other Command Post**

1967 General-Major M. S. Bourmak  
1972 Colonel E. F. Jitkov (transferred to Communications Army)  
1972 Colonel V. G. Chlygine  
1981 Colonel V. S. Zorkov  
1989 Colonel A. S. Loukianenko

**Calculation Center of RSVN (1960)**

Colonel P. P. Polozov: 1960–63  
General-Major-Ingénieur V. P. Alexeiev: 1963–79  
General-Major A. K. Sytniak: 1979–89  
Colonel B. P. Yarussov: 1989–

**Chief of Communications Army of RSVN**

Marshal A. I. Belov: 1960–68  
General-Lieutenant I. A. Dioukarev: 1968–76  
General-Lieutenant D. M. Galtsov: 1976–80  
General-Lieutenant V. I. Petrankov: 1980–87  
General-Lieutenant You. A. Pikine: 1987–92

General-Lieutenant V. V. Roudakov: 1992–  
**Communications Center TsOUS RSVN (March 1960)**  
Colonel-Engineer F. I. Maximov: 1960–65  
General-Major N. A. Tsarev: 1965–68  
General-Major V. A. Koulenko: 1968–73  
General-Lieutenant V. I. Petrankov: 1973–76  
Colonel V. Ya. Potapov: 1976–78  
General-Major I. N. Bakanov: 1978–81  
General-Major N. I. Tchernoukha: 1981–  
General-Major M. V. Solnstev: 2004

### ***GAU/UZKA/UNRV/GURVO/NII-4/NII-50***

Note: DTS = doctor in technical sciences CTS = candidate in technical sciences

HTS = Hero of socialist labour PL = Lenine Prize PE = State Prize

#### **Marshal P. N. Koulechov (1908–2001)**

HTS78 PL82

Ended artillery school of Tomsk, Dzerjinsky Academy in 1938, general staff academy in 1941, deputy chief of artillery general staff in 1944, chief of rocket faculty at Dzerjinsky Academy in 1946–50, deputy chief of the academy in 1950–52, chief of PVO test site at Kapustin Yar in 1952–54, chief of 4e main directorate of Defense ministry in 1954–62, deputy commander of PVO for armament in 1962–65, chief of GRAU in 1965–83.

#### **General-Major N. N. Kouznetsov (1903–1983)**

PE43

Chief of armament for Katiouchas in 1941–46, chief of sector at 4e directorate in 1946–63.

#### **General-Major A. I. Sokolov (1910–1976)**

DTS, professor, PL61 PE67

He participated in the Katioucha production at Tseliabiinsk before being chief of 4e directorate in 1946–55, chief of NII-4 in 1955–70 (president of state commission for R-16 and UR-100).

#### **General-Major A. I. Semenov (1908–1973)**

HTS61 PE43

Chief of section at 4e directorate in 1946–53, main engineer in 1953–55, chief in 1955–64, member of NTK at general staff in 1964–70.

#### **General-Lieutenant A. G. Mrykine (1905–1972)**

HTS61 PE43

Ended Chemical Protection Academy in 1934 (propellant laboratory). He worked with Katiouchas during the war, was in Germany, chief of section at GAU in 1946–53, chief of I'OKR and NIR of UZKA in 1953–55, deputy chief of UNRV in 1955–59, first deputy of GURVO in 1959–65 (president of state commission for R-14), then worked at MOM in 1965–72.

#### **General-Lieutenant A. A. Vassiliev (1921–1973)**

CTS59, PL57

Ended Dzerjinsky Academy in 1952, worked at Kapustin Yar, Baïkonour, chief of Riga school (VVPKU) in 1959–63, deputy chief of RSVN for schools in 1963–64, chief of GURVO in 1964–67, chief of NTK in 1967–69, chief of Mojaïsk Academy in 1969–73.

**General-Lieutenant N. N. Smirnitsky (1918–1993)**

PL67

Ended electrotechnic school of communications in 1941, worked with Katiouchas during the war, was in Germany, worked at Kapustin Yar, GAU, UZKA, UNRV, chief of GURVO in 1967–75, then works at MOM in 1975.

**General-Lieutenant A. S. Kalachnikov (1921)**

Representative of GAU at OKB-1 in 1950–51, then worked at Kapustin Yar in 1951–61, chief of directorate at GURVO in 1961–69 (CTS 68), president of NTK RVSN in 1969–74, chief of directorate at GURVO in 1974–81, chief of SKB in NPO Geophysika in 1981.

**General-Major P. E. Troubatchev (1911–1981)**

Ended Dzerjinsky Academy, worked in GAU (Katiouchas), in Germany in 1945–47, worked at NII-88 in 1947–61, chief of directorate for rockets and satellites orders at GURVO in 1961–70.

**General-Lieutenant-Engineer A. A. Blagonravov (1894–1975)**

DTS38 HTS64/74 PL60 PE41

Ended Dzerjinsky Academy in 1929 and became its chief in 1941, academician in 1943, president of artillery sciences academy in 1946–50, president of commission to study upper layers of atmosphere AN SSSR (president of state commission for geophysical rockets), director of machines studies institute AN SSSR in 1954, academician-secretary of technical sciences in 1957–63, vice-president of Cospar in 1959, president of commission to study cosmic space AN SSSR in 1963.

**General-Lieutenant of Artillery A. I. Nesterenko (1908–1995)**

PE50

He commanded a group of Katioucha during the war, headed NII-4 in 1946–50, chief of rocket faculty at Dzerjinsky Academy in 1950–55, chief of Baïkonour in 1955–58, member of NTK at general staff in 1958–66.

**General-Colonel of Artillery P. P. Tchetchouline (1896–1971)**

He had been deputy chief of GAU during the war before being chief of NII-4 in 1950–55.

**General-Lieutenant E. B. Volkov (1923)**

DTS65, professor 66, HTS76

Ended Dzerjinsky Academy in 1946 where he worked until 1968, deputy chief, then chief of NII-4 in 1970–82, president of state commission for UR-100N in 1973–79.

**General-Lieutenant L. I. Volkov (1930-2007)**

DTS professor MC RAN PE90

Ended Dzerjinsky Academy in 1958 where he worked until 1982, then chief of NII-4 in 1982–92.

**General-Lieutenant V. Z. Dvorkine (1936)**

DTS75 professor

Ended the high school of Navy in Tchernomorskoe, chief of NII-4 in 1992/2001.

**A. V. Chevyrev**

Chief of NII-4 in 2001/2004.

**General-Lieutenant-Engineer G. A. Tiouline (1914–1990)**

DTS58, professor61, HTS61 PL57

Ended Moscow University in 1941, he commanded a group of Katiouchas during the war, in Germany in 1945–47, then chief of ballistic section at 4e directorate of GAU, chief of flight theory section in NII-4 in March 1948, deputy chief of NII-4 for scientific

part in March 1949, headed the creation of tracking ships fleet in 1955–59, chief of NII-88 in August 1959, deputy minister of MOP from August 1961 to March 1965 (president of state commission for automatic and manned flights), first deputy of MOM in 1965–76.

**General-Lieutenant-engineer You. A. Mozjorine (1920–1998)**

DTS58, professor64, HTS61 PL57 PE83

Ended Moscow Aviation Institute (MAI) in 1941, he participated in the war in 1941–42, then studied at Joukovsky Academy in 1942–46, engineer (then chief in 1951) of flight theory section at 4e directorate of GAU, deputy chief of NII-4 in 1955–61 where he headed the creation of KIK, chief of NII-88 in July 1961 to 1991.

**General-Major G. S. Narimanov (1922–1983)**

DSPM, professor, PL57

Ended Moscow University in 1941, he participated in the war in 1941–46, then studied at Joukovsky Academy in 1946–48, worked in NII-4 where he became chief of ballistic sector (the KVTs was created in this sector in 1957), deputy director of IKI in Moscow in 1965–83, deputy president of NTK MOM in 1965, and president of state commission for about 60 scientific satellites.

**Colonel M. K. Tikhonravov (1900–1974)**

DTS, professor, HTS61 PL57

Ended Joukovsky Academy in 1925, worked in Polikarpov's OKB, in RNII in 1934–46 where he made liquid rocket engines, powder rockets, rocket airplane 302, powder rocket 210, then project VR-190 to launch men at 200 km altitude. In 1946, he worked at NII-4 (deputy chief and chief of sector). He studied staged rockets in 1947–50 and creation of satellites in 1950–55. He was then chief of satellites conception group in Korolev OKB in 1956–74.

**General-Lieutenant G. P. Melnikov (1921–1997)**

DTS, professor, PL69, PE80

Specialist of communications, chief of chair at the aeronautic school of Kharkov, deputy chief of NII-4 in 1965–68, chief of TsNII-50 in 1968–83.

**General-Lieutenant I. V. Mecheriakov (1922)**

DTS, professor, HTS75, PE70

Ended the mechanical technicum of Penza in 1941, he participated in the war in 1941–46, officer in 1946–52, studied at military Academy Imeni Kouybichev in 1952–58 (engineer in radiotelemechanic), worked at NII-4 in January 1958 where he became deputy for space in June 1967 (Sputnik, creation of RSVN, KIK, tracking ships, unique control system for rocket complexes, Golytsino-2), deputy chief in May 1968, then chief of TsNII-50 in 1983–88.

**General-Major E. V. Alexeiev (1930)**

DTS, professor

Ended Dzerjinsky Academy in 1954, worked at NII-4 in 1956, then at TsNII-50 in 1968: chief in 1988–92.

**General-Major V. A. Menchikov (1945)**

DTS professor

Ended command school of Perm in 1968, Dzerjinsky Academy in 1979, worked at Baik-onour from 1968 to 1991 (deputy chief-main engineer), deputy chief of GUV NKS in 1991–92, chief of TsNII-50 in 1992 (NII KS), subsidiary of Khrounitchev company since 1997.

### ***Space Forces (TsUKOS/GUKOS/NKS/VKS)***

#### **General-Lieutenant K. A. Kerimov (1917–2003)**

HTS87 PL66 PE79

Ended industrial institute of Azerbaijandjan in 1942, then Dzerjinsky Academy in 1946, he worked in the study group of German rockets in Berlin. He worked in GAU and GURVO (deputy chief of directorate for ballistic rockets orders), participated in launches from Kapustin Yar (president of state commission in 1957). He headed the 3rd directorate for satellites at RSVN in 1959/64, then headed the 3rd Glavka at MOM in 1965 (president of state commission for manned flights in 1966/91).

#### **General-Colonel A. G. Karas (1918–1979)**

PE70

Ended artillery school of Odessa in 1938, he commanded a group of Katiouchas during the war, ended Dzerjinsky Academy in 1951, he was chief of staff at Kapustin Yar in 1953–55, then in Baikonour in 1955–57, worked in NII-4 in 1957, chief of KIK in 1960–65, then chief of space forces in 1965–79. He had been president of many state commissions.

#### **General-Colonel A. A. Maximov (1923–1990)**

CTS87 HTS84 PL78 PE68

Ended Dzerjinsky Academy in 1952, he was representative of GAU at OKB-1 of Korolev, then worked at 4e directorate of GAU, secretary of state commission in 1957, chief of section for launchers at 3rd directorate of GURVO in 1960–64, chief of center for elaboration and production of military space means in 1964, deputy chief in 1970, first deputy in 1973, chief of space forces in 1979–89.

#### **General-Colonel V. L. Ivanov (1936)**

Doctor in military sciences

Ended the Caspian navy high school in 1958, he was commander of a torpedo-boat in North fleet, then worked at Baikonour in 1959 where he participated in Luna launches. Ended Dzerjinsky Academy in 1971, he became chief of Plesetsk in 1979–84, chief of staff in 1984–89, then chief of space forces in 1989–96.

#### **General-Major V. A. Grin (1946)**

Ended MATI in 1969, worked at Plesetsk, ended general staff academy in 1993, worked at Golitsyno, first deputy of staff at VKS in 1994–96, chief of staff first deputy of VKS in 1996–97, chief of VKS in 1997–2001.

#### **General-Colonel A. N. Perminov (1945)**

Ended command school of Perm in 1967, Dzerjinsky Academy in 1976, general staff academy in 1991, headed the rocket division at Iochkar-Ola, chief of Plesetsk in 1991–93, deputy for exploitation (GUEVO)-main engineer of RSVN in 1993–95, first deputy of staff in 1997–2002, chief of Space Army in 2002–2004, general director of Roscosmos in 2004.

#### **General-Major V. A. Popovkine**

Chief of staff in 2001–2004, chief of Space Army in 2004.

#### **First Deputy**

#### **General-Major V. I. Cheoulov (1922)**

CTS 82, PL70

Ended Dzerjinsky Academy in 1951, worked at 4e directorate of GAU, deputy chief of 3rd directorate of GURVO in October 1960, chief of center for military space in May

1963, deputy in October 1964, then first deputy TsUKOS in March 1970 (president of state commission), deputy chief of KIK for flight control in 1973, chief TsAK of KIK in 1975, deputy chief GNIITs KS in 1982, works at IKI in July 1983.

**General-Colonel A. A. Maximov**

1973–79

**General-Colonel G. S. Titov (1935–2000)**

Candidate in military sciences

Air Force pilot in 1957, he became cosmonaut in 1960. He flew aboard Vostok-2 in 1961, then became a test pilot in 1967. He ended Joukovsky Academy in 1968, then Vorochilov Military Academy in 1972. He was deputy chief of KIK in 1972–73, deputy chief in 1973–79, first deputy of Space Forces in 1979–91. He is Hero of Soviet Union, Lenin Prize in 1990.

**General-Lieutenant G. F. Lyssenkov (1937)**

Ended Dzerjinsky Academy in 1973 and general staff academy in 1981, worked at Baïkonour, first deputy of staff at VKS in 1987–89, deputy chief for military training in 1989–91, first deputy of VKS in 1991–93.

**General-Lieutenant N. A. Borissiouk (1941)**

PE94

Ended Dzerjinsky Academy in 1971, deputy of Baïkonour for armament in 1985–87, deputy chief of KIK in 1987–91, deputy chief for exploitation of space means in 1991–1992, deputy chief in 1992, first deputy of VKS in 1993–96.

**General-Lieutenant B. G. Kalinitchev (1948)**

Ended Mojaïsk Academy in 1971, worked at Plesetsk, deputy chief of 1st directorate of cosmodrome in 1985–90, chief of construction directorate at VKS in 1990–93, deputy chief of VKS in 1993, first deputy in 1996–2001.

**General-Lieutenant A. S. Chichkine**

Deputy of Space Army in 2001

***Politic Directorate***

**General-Major F. I. Kovalev**

**General-Major N. G. Kislistyne (1916):** 1970–76

**General-Lieutenant A. G. Lobatchev (1922–1999):** 1976–80

**General-Major D. P. Chevtchenko (1923–2003):** 1980–86

**General-Lieutenant I. I. Kourinny (1938):** 1986–91

***Chief of Staff***

**General-Lieutenant N. N. Joukov (1922)**

Ended Joukovsky Academy in 1949, worked in Air Force, in operational directorate (GOU) of general staff in May 1962, chief of space directorate at Rocket Directorate of GOU in 1970–76, deputy of GUKOS in 1976–82, chief of staff in 1982–84.

**General-Colonel V. L. Ivanov (1936)**

Chief in 1984–89

**General-Lieutenant S. N. Ermak (1939)**

Chief of operational directorate of RVSN in 1985–89, then first deputy, chief of staff at GUKOS in 1989–96



**General-Major V. A. Grin (1946)**

Chief in 1996–97

**General A. A. Kourinny**

Chief in 1997–2001

**General-Major V. A. Popovkine**

Chief in 2001–2004

**Deputy of staff**

**V. G. Loboda:** 1992–94

**V. A. Grin:** 1994–96

**A. A. Kourinny:** 1996–97

***Scientifico-technic Council (NTK)***

**General-Major A. D. Kourlanov (1924)**

DTS, professor, PE74

Ended Dzerjinsky Academy in 1955, worked at Kapustin Yar in 1955–64, at SNII-45 PVO where he participated at the creation of SKKP in 1964–80, at TsNII-50 in 1980–82, president of NTK in 1982–89.

**Colonel V. S. Doubenetz (1950)**

Ended studies in May 1973, worked at GUKOS, deputy in 1986, then president of NTK NKS in 1989.

***Operational Directorate (GOU)***

**General-Major V. D. Zabolotine (1937)**

Deputy of staff, chief of operational directorate at GUKOS in 1986–92.

**General-Major V. G. Bezborodov (1948)**

Ended MAI in 1972, Dzerjinsky Academy in 1979, worked in first directorate of GUKOS, deputy chief of directorate in 1987, then deputy of staff, chief of operational directorate of GUKOS in 1992–98, chief of directorate at the Security Council in 2002.

***Deputy for Armament (GUV)***

**General-Lieutenant V. V. Favorsky (1924)**

HTS82 PE78

Ended Dzerjinsky Academy in 1951, representative of GAU at NII-88 in 1952–53, then worked at UZKA, NRV, GURVO (R-5, R-5M, R-9), secretary and member of state commissions, chief of engine sector at GURVO in 1959–66, deputy chief of center at GUKOS in 1967, then chief of 1st directorate, deputy chief for armament until 1989.

**General-Lieutenant V. M. Rioumkine (1931)**

CTS86 PE85

Ended MEI in 1953, engineer to chief of directorate at GURVO, president of NTK at Strategic Rocket Forces in 1979–89, president of state commissions, deputy chief for armament at Space Forces in 1989–92.

**General-Lieutenant You. G. Goussev (1941)**

PE86

Ended the electrotechnic institute for communications of Moscow in 1963, worked at NII-4, GURVO, GUKOS, ended Dzerjinsky Academy in 1979, deputy chief of 1st directorate GUV (armament), deputy chief for armament of Space Forces in 1992–96.

**General-Major V. M. Vlasiouk (1946)**

Deputy chief of VKS for armament in 1996, president of state commission for failures of Soyuz-U rockets in 1996.

**General-Major Oleg Gromov**

Deputy chief of VKS for armament in 2002, president of state commission for launches of Cosmos-3M rocket.

***Glavka for Purchase and Orders:***

**General-Lieutenant V. I. Dournev (1940)**

Ended Mojaïsk Academy in 1969, worked in KIK, then at 3rd directorate of GUKOS in 1973, deputy chief of 6e sector of Staff in 1982–86, chief of 3rd sector in 1986–87, deputy chief of GOU in 1987–90, deputy chief of GUV-chief of 4e glavka for Bouran and ASU in 1990–91, first deputy of GUV in 1991–93, chief of glavka for purchase and orders in 1993–95, then deputy of VKS for military training in 1995.

**General A. V. Kalmykov**

Chief of glavka for purchase and orders 1995–

***First Deputy***

**General-Major You. N. Filatov (1931)**

PL90

Ended Dzerjinsky Academy in 1961, worked in 3rd directorate of GURVO, deputy chief of 1st directorate at TsUKOS, deputy for Bouran and ASU in 1986, then first deputy for armament in 1988–90.

**V. I. Dournev**

1991–93

**General-Major B. A. Liachouk (1941)**

Chief of 2nd directorate in 1990–92, deputy chief for armament in 1992–93, first deputy in 1993–95.

***Deputy:***

**V. I. Dournev:** 1990–91

**V. A. Menchikov:** 1991–92

**B. A. Liachouk:** 1992–93

***1st Directorate (Satellites)***

**General-Lieutenant V. V. Favorsky (1924)**

Chief in 1970–79

**General-Lieutenant You. F. Kravtsov (1924–1994)**

PL89

Ended Joukovsky Academy, worked at 6e directorate of Air Force, at 3rd directorate of GURVO in January 1961, then at GUKOS: deputy, chief of sector, chief of first directorate in 1979–86. He has been president of state commissions.

**General-Major V. M. Brejnev (1934)**

Chief of directorate in 1986–91

**General-Major L. P. Bachkirov (1929–1987)**

PE 80

Ended Dzerjinsky Academy in 1960, worked at 3rd directorate of GURVO, chief of sector at TsUKOS in 1970, deputy chief at 1st directorate of GUKOS in 1979–87 (secretary and member of state commissions).

**Colonel E. S. Chapov (1921)**

Chief of sector at 1st directorate in 1970–75

**Colonel M. I. Poglazov (1921–1979)**

PE74

Chief of sector (navigation and communications)

**Colonel N. A. Semikolennykh (1916–2004)**

Chief of sector (Zenit)

**Colonel S. A. Kolesnik**

Chief of sector (Tselina)

***2nd Directorate (Launchers and Cosmodromes)***

**General-Major V. A. Bokov (1921)**

HTS61

Ended Dzerzhinsky Academy in 1943, worked at GAU, Kapustin Yar in December 1946, Baïkonour in June 1955 (deputy chief NOIR in October 1960), deputy president of NTK GURVO in 1961–65, chief of military problems section AN SSSR in 1965–70, chief of directorate for launchers and cosmodromes at GUKOS in 1970–79.

**General-Major V. S. Patrouchev (1930)**

Ended Dzerzhinsky Academy in 1954, worked at Kapustin Yar, Baïkonour, deputy chief of 1st directorate at GUKOS in 1975, chief of 2nd directorate in 1979–88.

**Colonel I. V. Stromsky (1934)**

Chief of 2nd directorate in 1988–90

**General-Major B. A. Liachouk (1941)**

Chief of 2nd directorate in 1990–92

**Colonel A. F. Mordovtsev (1922)**

Worked in navy, then entered military space center in 1963 (chief of sector, deputy chief), then deputy chief of 2nd directorate of GUKOS in 1970–79.

**Colonel A. F. Korchounov (1921)**

Worked at Kapustin Yar in 1948–55, Baïkonour in 1955–61, 3rd directorate of GURVO in 1961–71 (chief of cosmodrome sector in 1961–64, then chief of topic in 1964–71).

**Colonel V. P. Erokhov (1923)**

Deputy chief in 1970–77

***3rd Directorate (Ground Station Network)***

**Colonel M. F. Kouznetsov (1920–1979)**

PE75

Ended Joukovsky Academy in 1956, chief of sector at 3rd directorate of GURVO in 1960, main engineer of TsUKOS, chief of 3rd directorate of GUKOS in July 1970–77 (KIK).

**General-Lieutenant E. I. Pantchenko (1927)**

PE70

Finished Communications institute of Moscow in 1951, worked at GAU, GURVO, chief of sector at GUKOS in 1965, deputy chief of directorate, chief of directorate in 1977–85, deputy GUV and first deputy GUV in 1986–87.

**General-Major V. I. Spirine (1931)**

PE 80

Finished Dzerjinsky Academy in 1961, 3e direction GURVO, chief sector in 1972 (navires et avions du KIK), chief adjoint in 1977, puis chief de la 3e direction TsUKOs en 1986–87.

**General-Major D. G. Andronov (1932)**

PE81

Finished Dzerjinsky Academy in 1955, entered 3e direction GURVO, chief of sector, chief adjoint, plus chief de la 3e direction en 1987–89.

***4th Directorate for Bouran and ASU in 1986***

**General-Major N. E. Dmitriev (1932)**

Pilot in 1952, studied in Mojaïsk Academy in 1958–63, worked at Plesetsk, deputy main engineer at GUKOS in 1975–86, chief of 4th directorate GUV NKS in 1986–90.

**General-Major V. I. Dournev (1940)**

Chief in 1990–91

**General-Major You. N. Filatov (1931)**

Deputy chief in 1986–88

***Deputy for Exploitation (Main Engineer)***

**Colonel Alexei Maximov (1922)**

Ended Dzerjinsky Academy in 1951, worked at 4th directorate at GAU, chief of sector at 3rd directorate of GURVO in 1960, main engineer at TsUKOS in October 1964, studied at general staff academy in 1966–74, then worked at NII Agat of MOM.

**General-Major V. I. Samonov (1924)**

PE68

Ended Joukovsky Academy in 1955, worked at Baïkonour (deputy chief of 1st UIR), main engineer at military space center in December 1965, then main engineer at GUKOS in 1970–80.

**General-Lieutenant V. G. Sokolov (1931)**

Ended Dzerjinsky Academy in 1955, worked at Baïkonour (until deputy of IU), then deputy main engineer at GUKOS in 1970, chief of directorate in 1980, main engineer, deputy chief of Space Forces for exploitation in 1986–90.

**General-Major D. D. Maslioukov (1935)**

Ended RVKIU of Rostov in 1957, worked in PVO and at Baïkonour, entered VKS in 1985, chief of directorate for exploitation in 1989–91 (deputy chief of VKS in 1990).

**General-Lieutenant N. A. Borissiouk (1941)**

Chief in 1991–92

***Deputy for Military Utilization, Communications and Military Training***

**General N. F. Chlygov:** 1970–76

**General N. N. Joukov:** 1976–82

**General V. N. Ivanov:** 1982–88

**General L. F. Lyssenkov:** 1989–91

**General L. D. Kizim:** 1991–93

**General-Major S. V. Limont (1939)**

Ended radiotechnic school of Dvina in 1957, worked at Baïkonour, then ended Dzerjin-

sky academy in 1971, returned to Baïkonour where he became chief of NIU, then chief of staff in 1989–93. Deputy of VKS for military training in 1993–95.

**General-Major V. I. Dournev (1940)**

Chief for military training in 1995–

### *Construction Directorate*

**General-Major You. A. Egorov (1928–1998):** Chief in 1982–85

**General-Major V. I. Kroutchinine (1931):** Chief in 1985–90

**General-Lieutenant B. G. Kalinitchev (1948):** Chief in 1990–93.

**V. Ya. Ivanov:** Chief in 1993–

### *Command and Measure Complex (KIK)*

**General-Major A. A. Vitrouk:** 1957–59

**General-Major A. G. Karas:** 1960–64

**General-Major I. I. Spitza:** 1965–71

**General-Major I. D. Statsenko:** 1971–75

**General-Major N. F. Chlygov:** 1976–88

**General-Lieutenant V. N. Ivanov:** 1988–92

**General-Lieutenant A. B. Zapadinsky:** 1992–2002

**General-Major N. P. Kolesnikov:** 2002

**General-Major A. A. Vitrouk (1906–1987)**

Ended Machinostroenie institute of Kharkov in 1937, worked in factory Imeni Kalinine of Podlipki in 1937–41, participated in the war in 1941–46, worked at NII-4 in 1955, chief of KIK in 1957–59.

**General-Colonel of artillery A. G. Karas (1918–1979)**

PE70

Ended Dzerjinsky Academy, he was chief of staff at Kapustin Yar, then Baïkonour, chief of KIK in 1960–65, then chief of GUKOS in 1966–79.

**General-Major I. I. Spitza (1919–1992)**

After the war, he ended Communications Academy imeni Boudienny of Leningrad, worked as secretary at general staff (Colonel), participated at Trotsk nuclear test near Orenbourg in 1954, became chief of sector (communications and timing) at NII-4 in 1957, deputy chief, then chief of KIK in 1965–71. He was president of state commissions for scientific and biologic satellites.

**General-Major I. D. Statsenko (1918–1987)**

Commander of the Cuban rocket regiment in 1962, chief of command school of Perm in 1967–71, chief of KIK in 1971–75.

**General-Lieutenant N. F. Chlygov (1922–1999)**

PL80

Ended Dzerjinsky Academy in 1953 and general staff academy in 1966, chief of staff at Kapustin Yar in 1959–64, deputy chief of main operational directorate at general staff in 1966–70, deputy chief of UNKS for communications and military use in 1970–75 (president of state commission for Molniya satellites), chief of KIK in 1976–88.

**General-Lieutenant V. N. Ivanov (1932)**

Ended Communications School of Arzamas in 1955 and Dzerjinsky Academy in 1965, worked in Strategic Rocket Forces, chief of staff at KIK in 1978–82, deputy chief of staff for military training at UNKS in 1982–88, chief of KIK in 1988–92.

**General-Lieutenant A. B. Zapadinsky (1943)**

Ended High School of Kharkov (VVKIU) in 1969, worked at Sary-Shagan (NIP-3), Simferopol (NIP-10), Kolpachevo (NIP-12), ended Dzerzhinsky Academy in 1984, Oulan-Oude (NIP-15), chief of stations Chelkovo (NIP-14) and Eniseisk (NIP-4), ended general staff academy in 1992, chief of KIK in 1992–2002.

**General-Lieutenant N. P. Kolesnikov (1951)**

Ended high school for military engineers of communications at Stravropol, Mojaïsk academy, Dzejinsky academy and general staff academy. Chief of staff, then chief of KIK in 2002.

***Deputy for KIK***

**General-Major I. F. Nikolaiev : 1978/80**

**General-Major A. M. Tchoumakov : 1980–87**

**General-Lieutenant N. A. Borissiouk : 1987–91**

**General-Major K. P. Petrov : 1991/94**

***Chief of Staff***

**Colonel P. G. Kovel: 1957–62**

**General-Major A. G. Afanaseiev (1912–2003) : 1962–73**

**General-Major D. Kh. Tchapylygine (1918–1999) : 1973–76**

**General-Major V. N. Ivanov (1932) : 1976–82**

**General-Major M. A. Kalinkine (1939) : 1982–83**

**General-Major A. D. Krasnov (1939–1990) : 1983/89**

**General-Major B. I. Jouravlev : 1989/93**

**General-Major V. A. Grin : 1993/94**

**General-Major A. A. Kourinny : 1994/96**

**General-Major N. P. Kolesnikov (1951) : 1996/2001**

***Politic Directorate***

**Colonel A. N. Strachnov: 1957–61**

**General-Lieutenant G. L. Toumanian: 1961–68**

**General-Major I. M. Martynov : 1969/80**

**General-Major I. G. Kouznetsov : 1980/86**

**General-Major E. N. Parol : 1986/91**

**Colonel V. N. Filipenko : 1991/96**

***Chief of Cadres and Schools***

**Colonel N. I. Antipov (1927–2004): 1969–76**

***Deputy Chief for R&D***

**General-Lieutenant P. A. Agadjanov: 1957–71**

**Colonel Ya. Ya. Sirobaba: 1971–75**

**General-Major G. M. Tamkovitch: 1975–82**

**General-Major M. A. Kalinkine: 1989–92**

**Colonel O. N. Efremov: 1992–95**

**Colonel N. P. Kolesnikov : 1995/96**

**Colonel V. P. Remichevsky : 1996/2001**

**Colonel Grigori Stoupak: 2002**

**General-Lieutenant P. A. Agadjanov (1923–2001)**

MC RAN in 1984, PL57

Ended Joukovsky Academy in 1945, worked at NII-17 in 1945–47, then at NII-4 in 1948–58 (chief of lab, chief of radiotechnic sector, headed the creation of ground stations), deputy chief of KIK in 1958–71 (headed the operational group for flight control), chief of subsidiary at NII of automatic apparatus in 1971–74, director of TsNII for radio-electronic systems in 1974–75, deputy director at NII of automatic apparatus in 1975–90, then deputy director of Automatization of conception Institute in 1990.

**Colonel Ya. Ya. Sirobaba (1919)**

PE

Ended Mojaïsk Academy in 1944, worked in Air Force in 1944–68, chief of directorate in subsidiary of NII-4 (TsNII-50) in 1968–75, deputy chief of KIK for NIR in 1971–75, then works at VNIIPA and MNIIRS in 1975–86.

**General-Major G. M. Tamkovitch (1936–2006)**

CTS67, DTS88, PE80

Ended military engineers school of Rostov in 1957, worked at Kapustin Yar, at the center of KIK in 1967–82 (he headed the TsDKS), deputy chief for NIR in 1975–82, deputy chief of IKI in 1982 (succeeded to Narimanov), president of state commissions for scientific and intercosmos satellites (Vega, Phobos and Granat).

**General-Major M. A. Kalinkine (1939)**

CTS, professor, PE89

Ended Mojaïsk Academy in 1965, chief of NIP-11, chief of 3rd directorate of KIK (main engineer) in 1977–82, chief of staff at KIK in 1982–89, deputy chief for NIR in 1989–92.

***Deputy Chief for Armament***

**General-Major A. F. Yassinsky (1930)**

PE81

Chief NIP at Simferopol in 1972, then deputy chief of KIK in 1982–89.

**General-Major L. D. Kizim**

deputy chief in 1989–91

**Colonel V. G. Yakovlev**

deputy chief in 1991–98

***Deputy Chief for Flight Control of Satellites***

**General-Major G. S. Titov: 1972–73**

**General-Major V. I. Cheoulov: 1973–75**

***Deputy Chief for Communications (NKSS)***

**Colonel G. I. Tchigogidze: 1957–60**

**Colonel I. I. Spitzza (1919–1992): 1960–65**

**Colonel B. A. Voronov (1921–1994)**

PE 1976

Ended Communications military Academy, worked at NII-4, entered KIK in 1957, deputy chief in 1965–77.

**General-Major V. A. Saus (1933)**

Ended Communications military Academy in 1967, worked at NIP-14, NIP-6, NIP-4, chief NIP-3 in 1973–76, deputy chief of KIK for communications in 1977–91.

**V. P. Polovnikov**  
Chief in 1991-98

### ***Automated Complex Center (TsAK)***

**V. I. Cheoulov:** 1975–82  
**M. T. Dokhov:** 1982–90  
**B. N. Morozov:** 1990–92

### ***KIK Ground Stations***

- OKIK-1: Tioura-Tam/Djoussaly (station Saturn of Plochad no. 23)
- OKIK-2: Makat (Gouriev region) that will be moved to Oussourisk
- OKIK-3: Sary-Shagan/Balkhach (Kazakhstan)
- OKIK-4: Eniseïsk (Krasnoïarsk region)
- OKIK-5: Iskoup that would be flooded during Sputnik-3 flight
- OKIK-6: Vulcanny near Elizovo (Petropavlovsk-Kamtchatka)
- OKIK-7: Klioutchi (Kamtchatka), replaced by Barnaoul (Siberie)
- OKIK-8: Gijiga (Magadan region) that would never be built
- OKIK-9: Krasno Selo (Leningrad/St. Petersburg)
- OKIK-10: Simféropol (Crimea) in 1960
- OKIK-11: Sarty-Tchaly (Tbilissi in Georgie)
- OKIK-12: Novossibirsk, replaced by Kolpachevo (Siberie)
- OKIK-13: Nijny Taltsy near Oulan-Oude (Siberie)
- OKIK-14: Chelkovo-7 at Ivanteievka (Moscow)
- OKIK-15: Galënki near Oussourisk (backup of Evpatoria)
- OKIK-16: TsDKS at Vitino near Evpatoria (Crimea)
- OKIK-17: Yakoutsk (Sibérie)
- OKIK-18: Vorkouta (Sibérie)
- OKIK-19: Dounaïev (region of Khmel'nitsky in Ukraine)
- OKIK-20: Solnetchny (Komsomolsk-sur-Amour)
- OKIK-21: Maïdanak (Ouzbekistan)
- Eisk station (1993)
- MaloYaroslavetz station (1994)

### ***Cosmodromes***

#### ***Kapustin Yar near Volgograd***

Created in 1946 (test polygon no. 4). In use since 1962 for launches of satellites Cosmos and Intercosmos with rockets R-12 (SS-4 Sandal) and R-14 (SS-5 Slean) in Cosmos variants. It was an elimination center for missiles SS-20 and is now included into the Strategic Rocket Forces.

#### **General-Colonel V. I. Vozniouk (1907–1976)**

HTS61

Chief of Katiouchas group during the war, chief of Kapustin Yar in 1946/73.

#### **General-Colonel You. A. Pitchougine (1923–2000)**

PL76

Ended Dzerjinsky academy in 1953, worked in Kapustin Yar where he became chief in 1973–75, then deputy of RVSN for armament in 1975–84.



**General-Lieutenant P. G. Degtiarenko (1926)**

PE80

Commandant of Loutsk rocket division, then chief of Kapustin Yar in 1975–80.

**General-Major N. Ya. Lopatine (1931–1992)**

HTS83

Commandant of Tatischevo rocket division, then chief of Kapustin Yar in 1981–83, deputy of Glavka of RVSN in 1983–92.

**General-Lieutenant N. V. Maziarkine (1933)**

Chief in 1983–90

**General-Lieutenant V. K. Tonkhikh (1941)**

Chief in 1990–97

**General V. P. Youchenko**

Chief in 1997–

***Baïkonour near Tyuratam***

Created in 1955 (test polygon no. 5). In use since 1957 for launches of satellites with rockets R-7 (SS-6 Sapwood) in Vostok, Soyuz and Molniya variants, Proton, Cyclone-2 and Zenit-2. It is also a test site for ICBM in silos.

**General-Lieutenant A. I. Nesterenko (1908–1995)**

Chief in 1955–58

**General-Colonel K. V. Gertchik (1918–2001)**

After war, ended Dzerjinsky academy where he became professor, commandant of rocket corps, chief of staff in 1957–58, then chief of Baïkonour in 1958–61, chief of TsKP RVSN in 1961–63, chief of staff in 1963–72, then commandant of the Smolensk rocket army in 1972–79.

**General-Lieutenant A. G. Zakharov (1921)**

After the war, worked in general staff in 1950–54, chief of faculty in a high school for artillery engineers in 1954–58, chief of staff in Baïkonour in 1958–61, chief of cosmodrome in 1960–65, then chief for schools in RVSN in 1965–71.

**General-Lieutenant A. A. Kourouchine (1922)**

CTS 1965, PL 1964

Ended Dzerjinsky Academy, worked at Kapustin Yar in 1955, Baïkonour, chief of 2nd NIU, deputy chief for NOIR, chief of cosmodrome in 1965–73, deputy chief of NII-4 in 1973–82.

**General-Lieutenant V. I. Fadeiev (1923–1990)**

PE76

Commandant of a rocket division in Loutsk, deputy of rocket corps, chief of an arsenal in Khrizolitovyi, commandant of 7th rocket corps in Omsk in 1969, first deputy of rocket army in Omsk in 1970, chief of Baïkonour in 1973–78, professor at the rocket and artillery chair at general staff academy in 1978.

**General-Lieutenant You. N. Sergounine (1927–1993)**

PE81

Commandant of rocket division in Dombrovka, first deputy of rocket army, chief of Baïkonour in 1978–83.

**General-Lieutenant You. A. Joukov (1933)**

Ended the high school of air force engineers in 1957, and Dzerjinsky academy in 1979, commandant of rocket division in Lida, first deputy of rocket army, chief of Baïkonour in 1983–89.

**General-Lieutenant A. L. Kryjko (1938)**

Commandant of rocket division on Nijny-Tagil, first deputy of rocket army, chief of Baïkonour in 1989–92.

**General-Lieutenant A. A. Choumiline (1936)**

HTS78 PE78

Ended Mojaïsk academy in 1959, worked in Baïkonour, chief of NIU-1 in 1980, deputy of cosmodrome for NIOR in 1989, chief of Baïkonour in 1992–97.

**General-Major L. T. Baranov**

Chief of Baïkonour 1997–2007

**General-Major A. S. Kirillov (1924–1987)**

HTS 1961

Ended Dzerjinsky Academy, worked at Baïkonour from June 1955, chief of 1st directorate in 1960–67, deputy chief for space from April 1967, worked at MOM from June 1969 to November 1977.

***Plesetsk near Arkhangelsk***

Created in 1960 (test polygon no. 53). In use since 1966 for launches of satellites with rockets R-7 (Vostok, Soyuz and Molniya variants), R-12 and R-14 (Cosmos variants) and Cyclone-3. It is also a test site for ICBM in silos.

**General-Colonel M. G. Grigoriev (1918–1981)**

PL68

Chief of Kaiouchas group during war, commandant of rocket brigade (23e BON in Kamychin) in 1950, academy of general staff in 1954–56, deputy chief of high school for artillery engineer in 1956, commandant of ICBM unit (Angara) in Plesetsk on 15 May 1957, first deputy on 8 June 1962, commandant of rocket army in Vinnitza in 1966, first deputy of RVSN in 1968–81 (president of state commission for R-36 in 1963, UR-100N, orbital station Almaz).

**General-Lieutenant S. F. Chtanko (1922–1981)**

HUS44

Ended Rostov artillery school in 1941, Dzerjinsky academy in 1951, academy of general staff in 1958, chief of Plesetsk in 1962–63, chief of RVSN school imeni Krylov in Kharkov in 1964–81.

**General-Lieutenant G. E. Alpaïdze (1916–2006)**

HUS45 PE77

Ended Tbilissi artillery school in 1940, Dzerjinsky academy, academy of general staff, deputy chief of Kapustin Yar in 1959–63, chief of Plesetsk from 11 April 1963 to 24 August 1975, president of many state commissions.

**Army General You. A. Yachine (1931)**

DTS professor PE76

Commandant of rocket division of Ioachkar-Ola in 1971, deputy chief of GURVO for NIOR in 1973, chief of Plesetsk from 24 August 1975 to 5 June 1979, commandant of the rocket army in Smolensk in 1979–81, first deputy of RVSN in 1981–89, deputy minister of Defense in 1989, president of GosTechCommission in 1992.

**General-Colonel V. L. Ivanov (1936)**

Chief of Plesetsk from 5 June 1979 to 21 August 1984

**General-Colonel G. A. Kolesnikov (1936)**

Worked in PVO in 1958–63, commandant of rocket division of Ioachkar-Ola, deputy of rocket army, chief of Plesetsk from 21 August 1984 to 15 November 1985, commandant of rocket army in Vladimir, deputy of GUERVO in 1988–92.

**General-Colonel I. I. Oleïnik (1937)**

Ended Dzerjinsky in 1975, commandant of rocket division in Teïkovo, chief of school of RVSN Imeni Tchouïkov in Perm in 1983–85, chief of Plesetsk from 15 November 1985 to 24 June 1991, first deputy of GUERVO in 1991–92, worked in ministry of Defense in Ukraine in 1992–95, then retired.

**General-Colonel A. N. Perminov (1945)**

Chief of Plesetsk from 24 June 1991 to 2 August 1993.

**General-Major You. M. Jouravlev (1941)**

Ended aeronautical technical school in Volsk, Dzerjinsky academy, academy of general staff, commandant of rocket division in Proujan in 1984–88, chief of staff in 1988–93, chief of Plesetsk from 2 August 1993 to 12 June 1999.

**General-Major G. N. Kovalenko**

Commandant of rocket divisions in Mozyr and Youria, chief of Plesetsk from 12 June 1999 to 8 April 2003.

**General-Major Anatoli Bachlakov (1957)**

Ended military politic school in Riga, military politic academy, general staff academy in 2000, commandant of rocket regiment, deputy of division, chief of Plesetsk on 8 April 2003.

**General-Major A. F. Ovtchinnikov (1950–1996)**

Ended school of RVSN Imeni Biriouzov in 1973, worked in Plesetsk where he became chief for VKS from 11 November 1994 to 11 August 1996.

***Schools for Education of Strategic Rocket Forces***

**Dzerjinsky Academy of Moscow/imeni Piotr Velikhii**

Artillery Academy Mikhaïlovsky of Leningrad in 1820, Dzerjinsky Academy in 1918, moved to Moscow in 1938, opened the first rocket faculty in 1946 (P. N. Koulechov). It has trained engineers and officers for Rocket Artillery and Strategic Rocket Forces.

**Chiefs:** General V. I. Khokhlov in 1946–51, General G. V. Polouektov in 1951–53, Marshal G. F. Odintsov (1900-1972) in 1953–69, General F. P. Tonkhikh (1912-1987) in 1969–85, General N. N. Kotlovtssev (1926) in 1985–89, General You. I. Plotnikov (1937) in 1989–97, General N. E. Solovtsov (1949) in 1997–2002.

## Air Academy Mojaïsk of Leningrad

Created in 1941; institute for civil aviation engineers, Air Academy Mojaïsk, then Space Institute Mojaïsk in 1960. It has trained engineers for Space Forces.

**Chiefs:** General A. R. Charapov in 1941–47, General P. V. Rodimov (1902-1996) in 1947–69, General A. A. Vassiliev (1921–991) in 1969–73, General N. I. Berezniak (1922-1991) in 1973–77, General A. I. Kholopov (1921–2000) in 1977–88, General N. M. Tchitchevatov (1938) in 1988–93, General L. D. Kizim (1941) in 1993–2002, General A. P. Kovalev in 2002.

## High schools for artillery engineers (VVKIU RV)

School Imeni Nedeline of Rostov (September 1951)

School Imeni Biriouзов of Riga (July 1958) changed into military high school for politics.

School Imeni Krylov of Kharkov (December 1959)

School Imeni Leninsky Komsomol of Serpoukhov (December 1959)

School Imeni V. M. Tchouïkov of Perm (December 1959)

## Figures



Le groupe de Nordhausen en 1946.  
Parmi eux : Pobedonostsev, Korolev, Michine, Piliougine.

**Figure 1:** *The Nordhausen group in 1946.* Left to right, seated, Piliougine, Brovko, Mrykine, Bakounine, Pobedonostsev, Korolev, Boudnik, standing, ?, Khartchev, Voskressensky, Tchijikov, Michine.



**Figure 2:** *The council of main designers in 1946. Left to right: Tchertok, Barmine, Riazansky, Korolev, Kouznetsov, Piliouguine, Glouchko.*



**Figure 3:** *The State Commission for the V-2 flights in Kapustin Yar in 1947. Left to right: ?, ?, ?, D. F. Oustinov, N. D. Yazdovsky, S. I. Vetotchkine, S. P. Korolev.*



**Figure 4:** *The State Commission for dogs flights in 1951.* Left to right: V. I. Yazdovsky, S. A. Khristianovitch, I. F. Tevossian, S. P. Korolev, N. A. Lobanov, A. A. Blagonravov, V. I. Vozniouk, seated, V. I. Popov, A. D. Seriapine.



**Figure 5:** *The State Commission for R-7 flight in May 1957.* Left to right: seated, G. R. Oudarov, I. T. Boulitchev, A. G. Mrykine, M. V. Keldysh, S. P. Korolev, V. M. Riabikov, M. I. Nedeline, G. N. Pachkov, V. P. Glouchko, V. P. Barmine, standing, M. S. Riazanky, K. N. Roudnev, N. A. Piliougine, S. M. Vladimirsky, V. I. Kouznetsov.



**Figure 6:** *The State Commission for Sputnik-1 launch in October 1957. Left to right: seated, I. T. Boulitchev, G. R. Oudarov, A. G. Mrykine, N. A. Piliouguine, M. V. Keldysh, V. P. Michine, L. A. Voskressensky, V. M. Riabikov, M. I. Nedeline, S. P. Korolev, K. N. Roudnev, V. P. Glouchko, V. P. Barmine, standing, A. F. Bogomolov, P. E. Troubatchev, V. I. Kouznetsov, A. A. Vassiliev, A. I. Nossov, A. I. Nesterenko, G. N. Pachkov, M. S. Riazansky, V. I. Kourbatov, 3<sup>rd</sup> K. D. Bouchouyev, I. V. Borissenko.*



**Figure 7:** *The State Commission for Vostok-1 in April 1961.*

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**4 ЦНИИ МО РФ**

Figure 8: The map of the Jubilei town where TsNII-4 is located (Kaliningrad district).



Figure 9: GUKOS Command with KIK Command. Left to right: A. G. Lobatchev, G. M. Tamkovitch, A. G. Karas, V. N. Medvedev, N. F. Chlygov, G. P. Melnikov, N. N. Joukov, V. N. Ivanov.





**Figure 10:** *GUKOS Command with General-Lieutenant N. N. Kotlovitsev in 1976.*  
Left to right, 1<sup>st</sup> row, A. A. Maximov, G. S. Titov, N. N. Kotlovitsev, A. G. Karas, N. N. Joukov, 2<sup>nd</sup> row, V. I. Samsonov, V. V. Favorsky, M. F. Kouznetsov, V. A. Bokov, B. A. Souvorov.



**Figure 11:** *The UNKS Command with participants of a meeting.*



**Figure 12:** *Space Forces in 1989.* Left to right: V. L. Ivanov, I. I. Kourinny, G. S. Titov, A. A. Maximov, V. V. Favorsky, V. N. Ivanov, etc.