

## **The Mishin Diaries – A western perspective**

**Charles P.Vick**

October 22, 1993 was a cold, overcast day in New York City. We (Charles Vick and David Woods) had made special arrangements with the staff of Sotheby's to view the collection of items that they had assembled for a huge Russian Space History auction. We had come to see such fascinating items as the Cosmos-1443 TKS reentry capsule, an engineering version of the Voskhod-2 EVA airlock, a Krechet lunar program space suit, and many other items. These were all stored in a big warehouse, some still in their original shipping crates from Russia. Following that we went over to the Sotheby's main office to see still more of the smaller items: space suits, desktop models, autographed items, etc. In one conference room there was a rather sad looking cardboard box, filled with a collection of 31 small, well worn books. To the uneducated eye, these would seem to be of no special interest and of little value compared with the other items that had been assembled for the auction. However, these were the set of personal diaries that had been made available by Vasily Mishin, covering the period from 1960 to 1974. To historical researchers, they represented one of the most valuable items there. With only a day to review all of the items, there was not much of an opportunity to examine the diaries in detail. Nevertheless, it was obvious that they contained a wealth of information about the day to day happenings during one of the most fascinating periods in time: the depth of the Cold War when Russia and America were competing for political supremacy in the arena of world opinion.

The auction was held on December 11, 1993, following a three day period when all of the items were out on display for the public to examine in detail. To some this was an opportunity to own a piece of history, with a successful bid. And bid they did. 226 individual items were sold for a grand total of \$6.8 million: far exceeding Sotheby's original estimate. Prices ranged from \$633 for the Lap Plotting Board that Vyacheslav Zudov had used on Soyuz-23 to \$1,652,500 for the Soyuz TM-10 reentry capsule. Many came away delighted with what they had been able to obtain. For others like us, however it was a sad day, because here were items, Russian national treasures in many cases, that were disappearing into private collections that should have remained in the hands of the Russian people. There were others who shared that opinion as well: one of them being the famous American industrialist: H. Ross Perot. After the auction, a small collection of these items went on tour around the United States. It was later revealed that Mr. Perot had recognized the significance of many of the auction items and had out bid all of the others to assemble them into a personal collection of his own. This was not a private collection that would disappear from public view forever. Instead, it was his wish that they remain together in the hopes that one day they could be returned to Russia, to a facility much like the Smithsonian Air and Space Museum in Washington DC where many of them are on display today.

The Smithsonian display includes copies of a number of pages from the Mishin Diaries, one of many items that Mr. Perot made a special point to obtain. Each of the items submitted for the Sotheby's auction had to come with a letter of authenticity and a brief description of the significance of the item. That description was then used to assemble the catalog of all of the various items. In the catalog, Vasily Mishin is quoted as saying that the diaries "took an utmost effort of mine. I was thinking of destroying them. They are my private diary, which I started in 1958-59, and kept up through 1974. Some of the entries were made promptly in the wake of events, others written down as recollections. I put my soul into them."

The catalog went on to say that "A brief survey of Mishin's diaries gives some idea of the riches they hold. (The first volume) begins with a sort of memoir or summary of the Soviet space program in 1960

and '61, and delves shortly into outline form, and then into a chronology. The first portion was written not long after Gagarin's epochal flight in April 1961; and we may well imagine that it was at this time that Mishin began to see how his place at the heart of great events afforded him a special privilege as their chronicler". The description concluded with: "Far beyond anything in all the memoirs and interviews that have been published in Moscow and elsewhere, these documents present this historic era from an entirely new dimension, full of authentic details and precise dating. They are written by the very hand that steered the Soviet space program for years; they are strictly contemporary with the pioneering events they chronicle; and they are extraordinarily frank and unsullied by the kind of secrecy and misinformation that cloaks so much of the Soviet space program. Any attempt at telling the history of the space race without the material in these notebooks will be second-rate."

One would think that with such a conclusion as that, that a small army of researchers would have immediately examined the diaries, each trying to glean every last bit of information out of them. Strangely, that proved not to be the case. Copies of the diaries were made available for a number of people and some information was extracted from them, but no one ever published any of his or her findings from any of those examinations. It appeared that the information content hidden in the pages of those tiny 31 volumes would eventually be lost to time.

Soon after World War II had ended, Europe became divided and the Cold War set in, with each side desperately trying to determine the strengths and weaknesses of the other side. The United States resorted to surveillance aircraft and later to reconnaissance satellites to try to locate Soviet assets and then make an assessment of their significance. One of the destinations of the last U-2 surveillance flight over the Soviet Union was the Baikonur Cosmodrome in the Soviet Republic of Kazakhstan. Previous overflights had shown it to be an ever expanding facility where missile tests and space launches were being conducted. Listening posts in Turkey and Iran could pick up telemetry from these launches once they came over the horizon. If it was not encrypted, it was possible to determine what some of the downlink information contained. With this information plus whatever imagery could be obtained from above, a better assessment began to immerge of the true measure of the perceived threat.

Imagery from the first series of American reconnaissance satellites was eventually declassified and made available to the public. Many of these Corona missions included passes over Baikonur, giving researchers an opportunity to develop detailed facility layouts; a timeline of when they were built; and when they were out in the open, a look at the launch vehicles that would use those facilities. Vasily Mishin had taken over the OKB-1 programs being run by Sergey Korolov following his death in 1966. The American Apollo lunar program was well underway at that point and Mishin was faced with a monumental task of trying to compete with a fraction of comparable resources and funding. Nevertheless a giant vehicle assembly building was completed under his direction as well as two huge launch pads to accommodate the N-1 rocket that would hopefully carry two cosmonauts to the Moon before the Americans could. Because the first stage was so big, the decision was made to forego building a separate test facility for it, and instead to try to discover any problems with a series of full-up launches. In hindsight, this would prove to be a mistake, because each of the four launch attempts of the N-1 resulted in failure due to various problems with the first stage. A fifth launch was being made ready in the mid-1970's, but by then Mishin had been replaced by Valentine Glushko. Glushko, who had despised the manned lunar program, set about obliterating anything associated with that program. Four N-1 boosters in various stages of completion were deliberately cut up with torches rather than completed and launched, and all historical documentation of the program was directed to be destroyed: all in an effort to erase any record of the program from the pages of history. At that point Mishin was tired of all of the political battles and infighting that he had to endure during those years, so he left the space program and accepted a position as the Chair of the Rocket and Space Systems Department of the Aerospace School at Moscow Aviation Institute (MAI). In 1989 he accepted a position as the Rector's Advisor where he remained for a few short years until his death in 2001.

That might have been the end of the story, except for the end of the Soviet Union and Perestroika that now allowed people to start discussing these programs in public. Mishin was now free to begin writing about the N1-L3 program, describing in detail what the mission profile was to be with specific performance data about the giant N1 launch vehicle. For researchers in the west, this began a flood of totally new information. Corona imagery and later higher resolution spacecraft had seen the N1 launch vehicle at Baikonur, giving an opportunity to make measurements of its exterior. It was obvious that it included three stages below a giant payload shroud, but what was under that shroud was only a guess. Recently declassified intelligence reports now show that guesses about the payload configuration were largely incorrect. No one correctly predicted for a fact that there were two more stages plus the lunar payload under the shroud, because it could not be seen from the satellite imagery and because there had been no successful penetrations into the manufacturing or assembly facilities to see any actual hardware.

Mishin had brought a number of lunar program artifacts with him when he went to MAI, including an N-1 final stage Block-D as well as a number of L1 and L3 spacecraft modules. In 1989, during collaborative discussions between faculty members of MAI and the Massachusetts Institute of Technology from the United States, visitors were given a tour of MAI Laboratory-601 where all of this hardware was located. They took a few tantalizing pictures of some of the items, providing the first unclassified proof that there had been a Soviet manned lunar program and what some of these spacecraft actually looked like. None of that would have happened if Mishin had not been involved in preserving some of these items from the past.

In addition to a series of papers on the subject that Mishin published, he was also permitted to travel abroad to various international conferences. It was at several of these that we finally had an opportunity to meet him and listen to him speak about these fascinating programs. On each occasion we would bring along material that we had developed of the layout of the Baikonur facilities and the N1-L3 lunar spacecraft. In Montreal at the IAF in 1991 he was the center of attention following the presentation of his paper. He could see that we had put a great deal of research into our layouts and that we were interested in more than just the sensational aspects of the program. We saw him again at the Paris Air Show and another IAF conference, this time in Washington in 1992. The last time we saw him was an afternoon visit to his apartment in Moscow in April 2000. At each of our meetings, he seemed to open up more and more with unique information about program technical details and, in many cases, some of the management and space policy issues that seemed to have imposed so many constraints on him. When he left the program in 1974 many could see that he was deeply depressed at what had become of his legacy, largely due to factors beyond his control. By the time of our last meeting, I believe that enough information had come out about him and his programs to see that he had actually made some very remarkable accomplishments during that period of time. We hope that gave him some sense of comfort and peace of mind in his final years.

We were all so sad to hear of Mishin's declining health and death on October 10, 2001. We felt so fortunate to have had those opportunities to meet directly with him and to discuss the details of his programs. Obviously there will be no more such opportunities for these discussions, which means that we will now have to rely entirely upon his writings for any further insight into those programs. The best opportunity for that had to be the diaries, which takes us back to the Sotheby's auction. Mr. Perot had purchased the diaries and given them to his Perot Foundation which now legally owns them outright, and technically has the right to prevent any access to them. Instead, they have graciously made copies of them available to a number of researchers with the proper credentials, including us. When our copy arrived, we were immediately confronted with a number of problems. First and foremost, it was written in Russian and our Russian translation skills were not up to the task. Secondly, these were all written when there were the most severe restrictions on the release of any information, especially about the space program. In order to keep them unclassified, in many cases, Mishin would use only the initials or titles of

co-workers and government officials that he was making comments about, and just a number for the various projects he was referring to. He would also use abbreviations instead of full words which could be confusing at times. And finally, the xerox copy pages of the diaries that were provided filled a copier paper box: approximately 3000 pages. It was obvious that we needed someone who was fluent in both Russian and English, and who came from a technical background where he would know the personalities involved, the organizations they worked for, and the technical terminology that filled those pages. Dr. Maxim Tarasenko was asked to take a look at one section, to do a translation of it, and then gauge the scope of a grant application that would be necessary to fund the rest of the project. The following is his translation of a few days surrounding the second N1 launch attempt in July 1969. Maxim filled in abbreviations and clarified personalities and organizations with italics or footnotes.

## **20.VI.69**

**18?0 – Rollout of [N1 rocket No] 5L to SP (launch pad)**

## **2.VII.69**

**1800 – GK on N1-L3S (The session of the State Commission on the launch of the N1-L3S complex)**

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*There are Remarks after “rehearsal”*

- **on system of targeting**
- **non-hermeticity of helium system**

- 
- 1. Moiseyev Yevgeniy Georgievich**
  - 2. Patrushev Vladimir (Vladislav?) Semenovich**
  - 3. Shabarov Yevgeniy Vasilievich**
  - 4. Dorofeyev Boris Arkadievich**
  - 5. Finogeyev Vladimir Petrovich**

- 
- 6. Utkin Ivan Ivanovich**
  - 7. Demonov. (LOMO) LOMO: Leningrad Optical and Mechanical Association – optical instruments**

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**To Stanishevskiy - form the document [i.e., prepare formal protocol of the session]**

## **3.VII.69**

**800 – Beginning of prelaunch preparation**

*On the facing page:*

**Console of fueling – 12-05**

**(Moiseyev, Kitayev, Dorofeyev et.al.)**

**Guest room (GK et.al.) – 15-93 [probably a miswritten time when members of the State Commission (GK) collected at the Guest Room at the pad]**

**1705 – Finished fueling of Blocks V, B, A [with oxidizer]**

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**Leak in the valve of IGN VK-5 (Voltsifer) Voltsifer: TsKBEM representative responsible for valves**

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**1740 – Beginning of loading of fuel into Blocks A, B, V**

**1930 – End of loading Blocks A, B, V with fuel**

**2100 – Beginning of loading of O2 into GB**

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**2308 – Readiness 2:10 (before launch)**

### **Launch sequence**

*On the facing page: Smirnitskiy (Head, Main Administration of Missile Armament at the Strategic Rocket Forces) Morozov*

**Preparation for launch – Normal**

**Launch is a failure**

(see 4.VII.69)

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**900**

*Drawing showing the layout of the 30 rocket engines on the first stage of the N-1, with remarks, showing at what time after lift-off which engine shutdown.*

**Short circuit according to telemetry (at 0.6 sec after lift-off)**

**Necessary to look through TM (telemetry) of KORD (engine monitoring system) system for engines NN 7,8,19,20,23,11**

**(Who gave signal “failure”!?)**

- **ODN – engines N 7,18 – abnormal in comparison with N 28**
- **ODN and GDN on N 7 – contradictory**
- **(Engines) NN 7,8,19,20,23 – switched off at – 0.6 sec**
- **All engines, excluding N 18, switched off at T approximately equal to 10 sec**
- **0.3 sec before KP (liftoff indicator switch) [there was a] short circuit of LK in (unclear) of engines NN 8 and 9**

**S.A. – Called to L.I. and A.N.**

*(S.A. – Sergey A. Afanasiev – the Minister of General Machine-Building of USSR)*

*(L.I. – Leonid I. Brezhnev, the General Secxretary of the Central Committee of CPSU)*

*(A.N. – Alexey N. Kosygin – the Chairman of the Council of Ministers of the USSR)*

**(A.N. is dissatisfied with results of the 2 launches)**

- **Engine N 7 switched off at t=0.6 sec after KP inder PRM of KORD**

**Engine N19 switched off under engine N7**

**Engine N20 switched off simultaneously with the engine N19 under [command from] KORD**

**(Next engine N18 was by that time not in the norm)**

**Short circuit of LK at 0.3 sec before KP (before liftoff)**

*Diagram showing layout of 30 engines on the first stage of the N-1, colored in accordance with timing of their shutdown*

**1600 – Consideration of results of processing of tele[metric] measurements in RB (rocket block or stage)**

**Commands for start – N[ormal]**

**Oscillations of GDI are similar to oscillations of EU-28**

**Reaching of the intermediate level [of thrust] by the engine N9 has been delayed by 0.29 sec**

**All engines reached GS (full thrust)**

**At t = KP + 0.6 sec switched off**

**Engine N7 (KORD by PRM)**

**Engine N19 → KORD**

**Engines NN 8,20 → KORD**

**At t = 10.2 sec all remaining engines switched off [by] SU (Guidance System)**

- **In the area of engines NN 12,13 temperatures rise starting from 7<sup>th</sup> second up to 140 deg C**
- **Sharp rise of t[emperatu]re at KP [lift off] in the area of engine NN 10,11**

**Finogeyev Vl. Petr**

**At t = 9.3 sec disruption of the system of power supply due to destruction of BKS (onboard cable system – short circuit)**

*Chain scheme plus Chart with layout of engines*

**High temperature from t = 7**

**Necessary to say to subcommission:**

- 1. Engine(s?) Kuznetsov** – *Chief Designer of rocket engines for the N-1 rocket*
  - 2. Temperatures and loads (Degtyarenko** – *Deputy Chief Designer of TsKBEM*)
  - 3. Power supply (Iosifyan** – *Chief Designer of VNIEM – N-1 power supply system*)
  - 4. SU (+KORD) (Finogeyev** – *Deputy Director of Science and Research Institute of Automatics and Instrument Engineering (NIIAP – N-1 guidance system)*
  - 5. SAS (Shabarov** – *Representative of TsKBEM – responsible for ground testing at the cosmodrome*)
  - 6. S[ystem of] meas[urements] (Dorofeyev** – *Lead Designer of the N-1 at TsKBEM*)
- “KORD” (Kupavin, Dorofeyev)**

**A.G.Iosifyan**

**System of power supply at t – 0.6 s had a sharp flash (increase) of electrical power.**

**Temperature of air incoming into DGG (additional? gas generator)**

**Flashes of the current consumed by KORD system [occurred] at t = 0.6 sec and 8.8 sec.**

**V.P.Barmin**

**“About the status of the launch [pad]”**

**As a result of the explosion the right launch construction is destroyed, service tower is heavily damaged.**

**All special technical equipment within the launch construction is damaged**

**Internal part and the left launch construction are not damaged.**

**Launch construction can be restored. That would be faster and cheaper.**

**Possibility of restoration of the tower is unclear.**

**5.VII.69**

- 1) G.N.Degtyarenko**
  - 2) Rumynskiy (NII-88)**
  - 3) Semyonov**
  - 4) Akimov N.I. – TsUKOS** – *(Main Administration of Space Means: Space Operations for the Ministry of Defense)*
  - 5) –v/ch (Military Unit) Gorki**
- 
- 1) Temperature in the region of engines 6,7,8,9,10,11,12,13 and 26,27**
  - 2) Vibration overloads in the area of engines 7,8,9 and in the area of engines 15,16,17.**
  - 3) Conventional overloads**
  - 4) DkhO, DMO (Compare to 3L)**
  - 5) Temperatures in the area of EGG**

We were delighted with these results and convinced that if Maxim could find the time and funding for all of the diaries, the end product would be an incredible resource for researchers. We began looking into securing a grant to fund Maxim at half time over approximately a year to complete the project. Before we had made any progress on the grant we were devastated to learn from friends in Moscow that Maxim had died in an automobile accident on 14 May, 1999. With all of the difficulties that we were encountering

with our efforts to secure a grant and now the loss of Maxim, it seemed that we were never going to see the Mishin diaries fully translated and documented.

After Mishin died, MAI recognized that a memorial project should be organized to pull together all of his works. A great deal existed from his years at MAI, but very little of his years with OKB-1. It was at that point that we were approached on the subject of the Mishin diaries. To make a long story short, we were able to contact the Perot Foundation and request that copies of the diaries be made available for this project. Permission was granted and we made special arrangements to get the copies delivered to Moscow to begin the translation project. The diaries have now been fully transcribed and documented, guaranteeing that their content will now become part of the historical record and available for researchers delving into them for many years to come. We are sure Vasily Mishin would have been pleased with that.



Vasily Mishin and Charles Vick at the International Astronautical Federation in 1992

## Western intelligence gathering on the Soviet manned lunar program

The United States relied upon classified reconnaissance satellite imagery as one of its primary sources for information about developments within the Soviet Union. This was all done under the Top Secret Talent Keyhole program, with satellites launched as part of that program given a “KH” designation. Access to this information was controlled by “compartmentalization”: by giving it an additional restrictive caveat of “Ruff” beyond a classification of “Top Secret”. The following images show examples of now unclassified images obtained from the Corona KH-4A and KH-4B satellite series which had a ground resolution of approximately 2 meters under ideal viewing conditions.

~~TOP SECRET RUFF~~

Corona reconnaissance satellite imagery, declassified by President Clinton,  
by Executive Order - 12951 on 24 February 1995



Corona Mission-1048 KH-4A  
Sep-24-1968



Corona Mission-1105 KH-4A  
Nov-6-1968



Corona Mission-1115 KH-4B  
Sep-26-1971

(c) C.P.Vick 2003

These images are of the area at the Baikonur Cosmodrome devoted to the OKB-1 facilities of Sergey Korolev and later Vasily Mishin. To the right, within the big image, is the area where the first Earth satellite, Sputnik-1 was launched; as well as the first man in space, Yuri Gagarin onboard Vostok-1. To



the left are the facilities associated with the manned lunar program. Personnel housing is at the lower left. The large Building-112, clearly visible in the middle of the image, is where the lunar program N-1 boosters, and later Energia boosters, were prepared. They were then rolled out to the launch facilities at the top left of the image. The two enlargement images provide greater details of some of the N-1 facilities. The lower image shows Building-112 in greater detail, with two N-1 transporter/erectors parked just outside of the building. The upper image shows the two launch facilities. Clearly visible are railroad tracks leading to each of the pads, the three flame trenches at each pad, and an N-1 booster on the pad to the right.

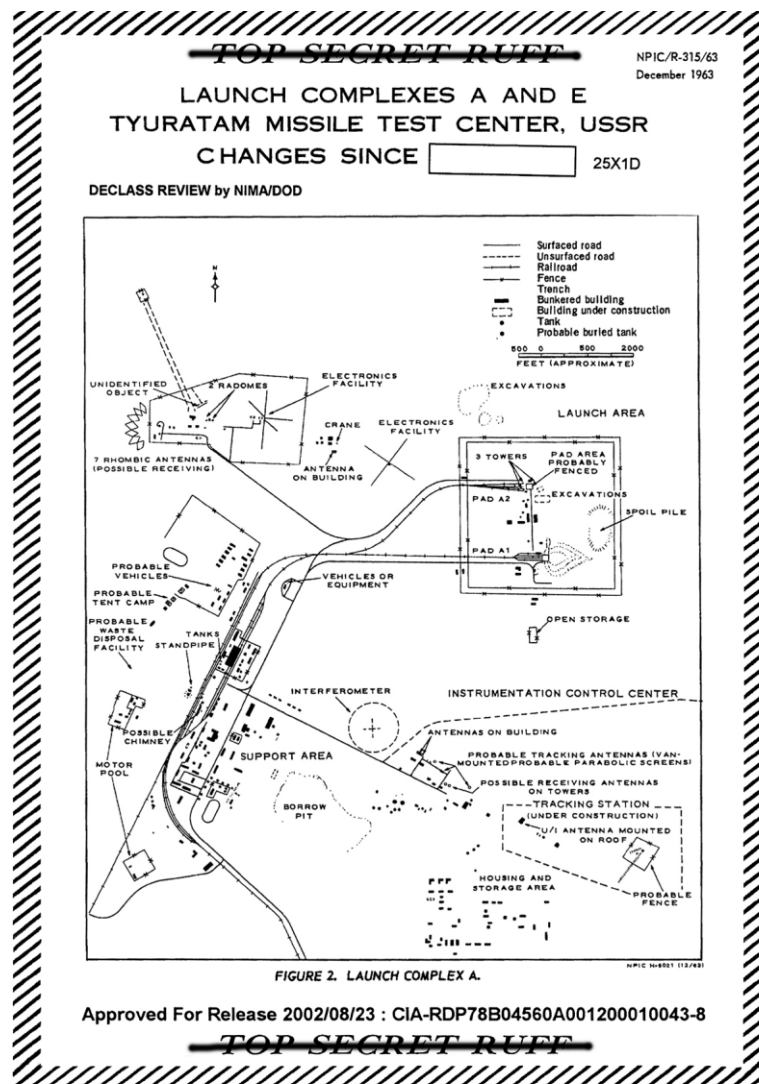
The following image was released by the National Reconnaissance Office in 2012. It shows a KH-8 view of the N-1 booster on the launch pad on 19 September 1968. Clearly visible are the three flame trenches and the gantry structure that enclosed the booster. The image may have been degraded (blurred) slightly to disguise the actual clarity that was achieved.



Analyses of satellite imagery like this would begin with a detailed review of the contents of the areas that had been photographed. In the case of the image above, the separation of railroad tracks provided dimensions for measurements. The known time of day told how high the Sun was in the sky and how

long the shadow of the booster was. From it, the dimensions of the booster and the launch pad structure could be determined.

The figure below is a now-declassified map of Site-1 at the Baikonur Cosmodrome that was prepared in December 1963 based upon analyses of satellite imagery. Site-1 was called Complex-A by the CIA because it was the first satellite launch facility discovered at the Baikonur Cosmodrome.

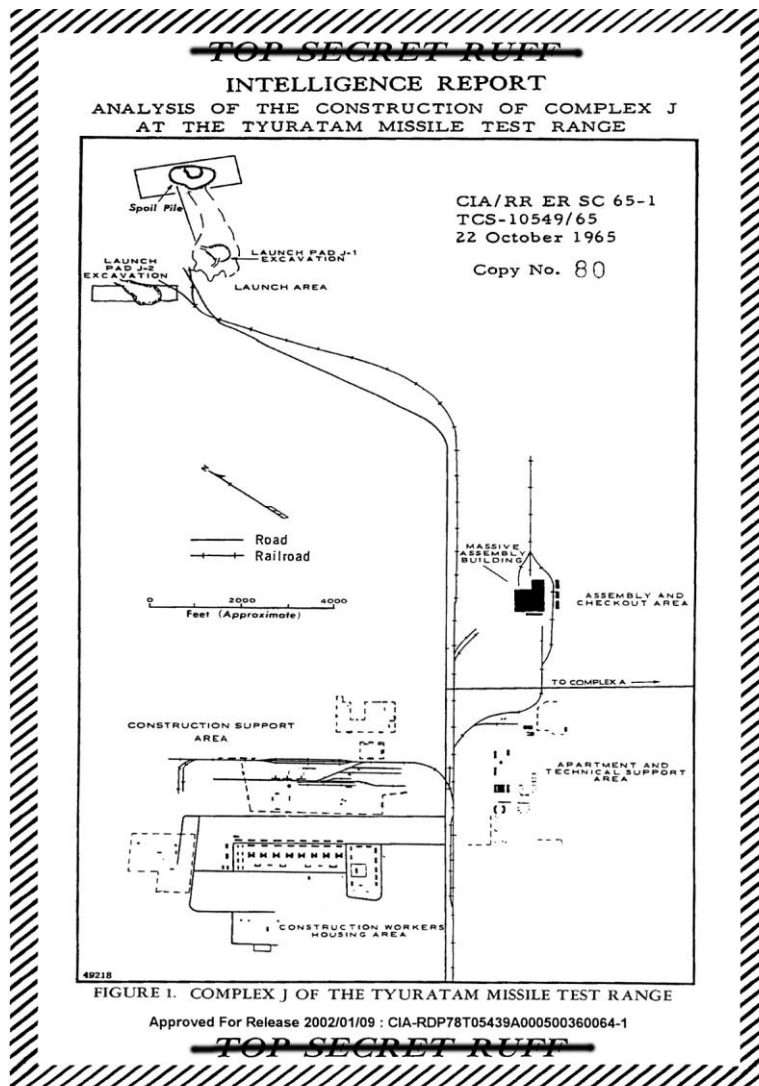


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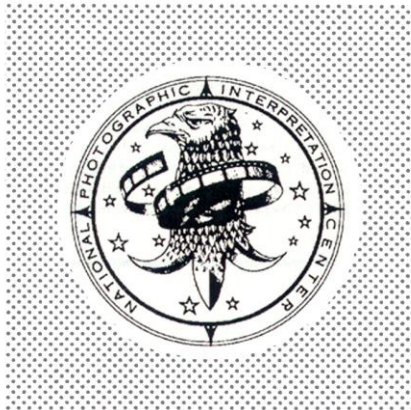
The R-7 based launch vehicle components, in sealed railroad cars, were brought to the vehicle assemble building at the left. The fully assembled launch vehicle was then rail transported to the launch facility on the right. This is where the first Earth satellite, Sputnik-1 was launched; as well as the first man in space, Yuri Gagarin onboard Vostok-1.

The figure below is an early map of the N-1 area at the Baikonur Cosmodrome, called Complex-J by the CIA, as it appeared in October 1965. Housing for the workers was already in place, as was Building-112

where the booster would be assembled. Work had just begun on the two launch facilities at the upper left of the layout.



Once these reviews of the imagery were complete, an analysis of their meaning was then performed. The following three pages are excerpts from example, now declassified, OAK Photographic Interpretation Reports that summarized details that were found in the Corona imagery of Complex-J. (OAK: Orbital Analysis Keyhole) The blacked out, redacted areas are information that is still considered classified. Typically these redactions are specific dates of when the information was discovered. This was important because it would be an indication of when the information was collected and what was seen, and from later imagery, what was not seen or detected at that time. This would give a measure of the capability of intelligence collection assets: National Technical Means, which obviously is still classified.



NATIONAL PHOTOGRAPHIC  
INTERPRETATION CENTER

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# OAK SUPPLEMENT

## PHOTOGRAPHIC INTERPRETATION REPORT

***KH-4 Mission 1109***

***IPIR Number 5***

***OAK Supplement Part II***

***12-23 March 1970***

***TOP SECRET – Handle via Talent Keyhole Channels Only***

***TCS-20064/70***

***OAK-049/70***

***Approved For Release 2000/04/17: CIA RDP78T04562A000200010001-5***

TYURATAM MISSILE TEST CENTER

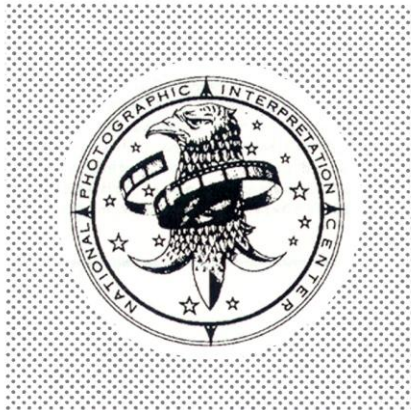
45-57- [REDACTED] N 063-18- [REDACTED] E

STATUS: UNKNOWN

REMARKS:

THE ENTIRE TEST CENTER IS COMPLETELY COVERED ON [REDACTED] AND PARTIALLY COVERED ON [REDACTED]. AT LAUNCH COMPLEX J, LITTLE IF ANY REPAIR HAS BEEN EFFECTED ON LAUNCH PAD J1. ON [REDACTED] BOTH TRANSPORTER/ERECTORS ARE PARKED AT THE NORTH END OF THE VEHICLE ASSEMBLY BUILDING (VAB) ON [REDACTED]. ONE TRANSPORTER/ERECTOR IS PARKED AT THE NORTH END OF THE VAB AND THE OTHER IS AT LAUNCH PAD J2 IN AN ERECTED POSITION. SHADOW ANALYSIS SUGGESTS THAT A PORTION OF A LAUNCH VEHICLE IS BEING ERECTED. THE ROTATING SERVICE TOWER IS PARKED IN THE AWAY-FROM-THE-PAD POSITION. ON [REDACTED] ONE TRANSPORTER/ERECTOR IS PARKED AT THE NORTH END OF THE VAB. LAUNCH PAD J2 IS CLOUD COVERED, BUT ENOUGH OF THE ROTATING SERVICE TOWER CAN BE SEEN TO DETERMINE THAT THE TOWER IS AT THE PAD. CONSTRUCTION CONTINUES ON THE LARGE BUILDING AT THE SOUTH END OF THE VAB AND ROOFING IS IN PROGRESS.

*Approved For Release 2000/04/17 : CIA RDP78T04562A000200010005-7*



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# OAK SUPPLEMENT

## PHOTOGRAPHIC INTERPRETATION REPORT

***KH-4 Mission 1112***

***IPIR Number 5***

***OAK Supplement Part III***

***19 November – 7 December 1970***

***TOP SECRET – Handle via Talent Keyhole Channels Only***

***TCS-22612/70***

***OAK-261/70***

***Approved For Release 2000/04/17 : CIA RDP78T04562A001700010009-1***

TYURATAM LAUNCH COMPLEX J 45-57- N 063-18- E

STATUS: UNKNOWN

REMARKS:

LITTLE CHANGE OR ACTIVITY WAS OBSERVED AT PAD J1. TWO SMALL CRANES WERE BETWEEN THE PAD AND THE INTRAPAD BUILDINGS, AND CONSTRUCTION HAD CONTINUED ON THE BUILDING JUST NE OF THE SERVICE TOWER. AT LAUNCH PAD J2, ONE TRANSPORTER ERECTOR WAS ROTATED FORWARD, ALTHOUGH THERE WAS NO LAUNCH VEHICLE ON THE PAD. THE BUILDING WHICH HAD BEEN UNDER CONSTRUCTION JUST NE OF THE SERVICE TOWER APPEARED TO BE COMPLETE AND HAD BEEN EARTH MOUNDED. AN OPEN DITCH EXTENDED FROM THE BUILDING AROUND THE WESTERN SIDE OF THE PAD AND TERMINATED NEAR THE FORWARD PORTION OF THE PAD, NEAR THE SOUTHWESTERN EXHAUST FLUME. TWELVE TANK CARS WERE ON THE RAIL SPUR SERVING J2. IN THE SPACECRAFT INTEGRATION FACILITY, FOUNDATIONS FOR AT LEAST FOUR BUILDINGS WERE OBSERVED IN THE NORTHWESTERN CORNER OF THE FACILITY. A TRANSPORTER ERECTOR AND THE STRONGBACK WERE PARKED AT THE NORTHERN END OF THE VEHICLE ASSEMBLY BUILDING. APPROXIMATELY 12 RAIL CARS WERE ON THE SPUR NEAR THE VEHICLE ASSEMBLY BUILDING.

MISSILE ORDER OF BATTLE:

- LAUNCH PAD J2

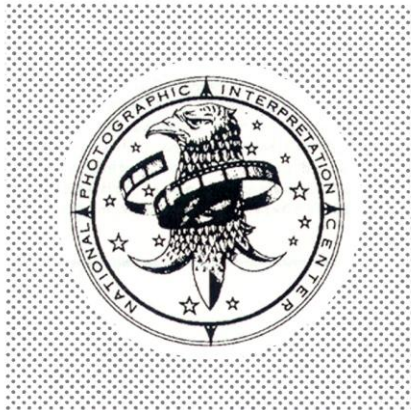
- VEHICLE ASSEMBLY BUILDING

1 TRANSPORTER ERECTOR

12 RAIL CARS

1 STRONGBACK

*Approved For Release 2000/04/17 : CIA RDP78T04562A001700010009-1*



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# OAK SUPPLEMENT

## PHOTOGRAPHIC INTERPRETATION REPORT

*KH-4 Mission 1115*

*IPIR Number 8*

*OAK Supplement Part VI*

*11-29 September 1971*

*TOP SECRET - Handle via Talent Keyhole Channels Only*

*TCS-20452/71*

*November 1971*

*OAK-203/71*

*Approved For Release 2000/04/17 : CIA RDP78T04562A003300010005-7*

TYURATAM LAUNCH COMPLEX J      45-57-      N      063-18-      E  
[REDACTED]      [REDACTED]

STATUS: UNKNOWN

REMARKS:

RECONSTRUCTION OF LAUNCH PAD J1 HAS CONTINUED. A NEW DITCH EXTENDS FROM THE STRUCTURE UNDER CONSTRUCTION JUST NE OF THE PAD AT J1, AROUND THE EASTERN SIDE OF THE PAD TO THE SE EXHAUST FLUME. A SECOND OPEN DITCH EXTENDS FROM THE INTERPAD AREA TOWARD THE STRUCTURE JUST FORWARD OF THE PAD. THE SERVICE TOWER WAS POSITIONED TOWARD THE PAD AT J2, AND APPROXIMATELY FOUR RAILCARS WERE ON THE J2 SPUR. BOTH TRANSPORTER ERECTORS WERE PARKED AT THE NORTHERN END OF THE VEHICLE ASSEMBLY BUILDING.

MISSILE ORDER OF BATTLE:

2 TRANSPORTER ERECTORS      4 RAILCARS (APPROXIMATELY)  
[REDACTED]

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None of the preceding Corona imagery or reports was available to the general public until they were declassified and released by President Clinton in Executive Order-12951 on February 24 1995. Prior to that, western analysts had to rely upon information found only in open literature. Nevertheless, there were a number of people who made significant strides in their efforts to determine details about the Soviet manned lunar program systems and facilities.

Dr. Charles Sheldon of the Science Policy Research Division of the Congressional Research Service of the U.S. Library of Congress produced a series of unclassified reports on the Soviet space program over the years. In his 1966-1970 report, he included an illustration of the family of Soviet space boosters. He had developed a nomenclature for them: alphabetical for each booster class as they had appeared chronologically, plus a number for each new set of upper stages for each booster class, and an "E" designation for those boosters that had an additional Escape Stage for deep space missions. For example, the Sputnik booster was A, Vostok was A-1, Soyuz was A-2, and Molnyia used for deep space missions was A-2-E. He gave the N-1 booster a designation of G-1-E

Dr. Sheldon could not show the actual classified configuration of the N-1 booster seen in the Corona imagery. However, he felt that if he depicted his G-1-E concept as simply an enlarged version of a Soyuz booster, that he could get that past any censors. Therefore he showed the N-1 with a conical base and cylindrical upper section, all with dashed lines to indicate that this was only a concept. Nevertheless, he was able to show its correct shape, height, and base diameter. That illustration is shown below, along with an insert with the actual N-1 showing how closely he had depicted it.

He also developed a collection of quotes from a wide range of sources for his 1971-1975 report that clearly showed that there was a Soviet manned lunar program in place. They show that the cosmonauts were confident that they would be walking on the Moon in the early 1970's, that the mission profile would use lunar orbit rendezvous, and what some of the spacecraft masses were to be at various points in a mission.

- **Speaking of the Moon competition, Cosmonaut Belyayev said "Preparations are in full swing. The Americans speak broadly about their preparations to land a man on the Moon, but naturally we in our country are not idle either. We shall see who will be there first".** (Bratislava Radio, April 12, 1965 1800 GMT.)
- Cosmonaut Bykovskiy discussed three approaches to lunar landing by men: direct flight, Earth orbit rendezvous, and lunar orbit rendezvous. He seemed to indicate that a rendezvous technique offered an earlier opportunity than direct flight and particularly praised the U.S. lunar orbit rendezvous approach. **He said work is in full swing to develop maneuvering ships, and to develop the suits needed for work on the lunar surface.** (TASS, February 16, 1966, 0644 GMT.)
- Cosmonaut Leonov said that **Soviet cosmonauts are in training to land on the Moon.** He did not name a date, but **he believed it would come within five years.** (Moscow Radio, April 16, 1966, 0001 GMT.)
- Cosmonaut Belyayev stated that **the USSR is planning to put a man on the Moon within the next five years.** (East Berlin Radio, June 11, 1966, 2100 GMT.)
- General Kaminin denied rumors of a six to eight man ship which he said exaggerated the current Soviet capability. **He repeated that in five years manned flights to the Moon will be frequent. The rocket to be used will carry 60 to 70 metric tons towards the Moon.** (Warsaw Radio, March 9, 1967, 1900 GMT.)
- Cosmonaut Feokistov saw Jupiter a more logical target for automatic devices, but later men would fly to its vicinity, too. Mercury and Saturn are also logical targets for unmanned devices. **Although a direct lunar**



**landing and return could be made, it would seem more advantageous to park a fueled ship in lunar orbit to return to, rather than make the direct flight to Earth.** (*Moscow Radio, October 4, 1967, 0700 GMT.*)

- Cosmonaut Feokistov stated that aerodynamic principles influence primarily the design of reentry bodies, and a shape to permit controlled reentry can cut the G load to less than 3-4. **A Moon ship which in Earth orbit weighs between 100 and 200 metric tons will be reduced to only 5 to 7 tons on return to Earth.** (*Sovietskaya Litva, Vil'nyus, January 7, 1968, pg 3.*)
- Cosmonaut Belyayev said cosmonauts were preparing to orbit the Earth again and **"The goal is well known: The conquest of the Moon.** However, this requires far longer space flight than has been made up to now. The complexity of preparations increases in proportion to the duration of the stay in space". **Cosmonaut Bykovsky added that before men are sent to the Moon, unmanned spaceships will land on the Moon and return, probably with animals on board.** "The Soviet Union will send men to the Moon only when there is every guarantee that a safe return can be made. **One of the next steps is not a Moon landing, but the orbiting of the Moon by a manned space vehicle.** (*Magyar Nemzet, Budapest, February 22, 1968, pg. 5*)
- Cosmonaut Leonov said that the Soviet Union was planning a manned flight to the Moon similar to the Apollo landing. If all went well, it would be possible for the Russians to send a man or men to the Moon before the end of 1969 or early 1970. He was confident that pieces of rock picked up on the surface of the Moon by Soviet cosmonauts would be on display in the Soviet pavilion during the Japan World Exposition in Osaka (Expo '70). (*Tokyo KYODO, June 2, 1969 0313 GMT.*)

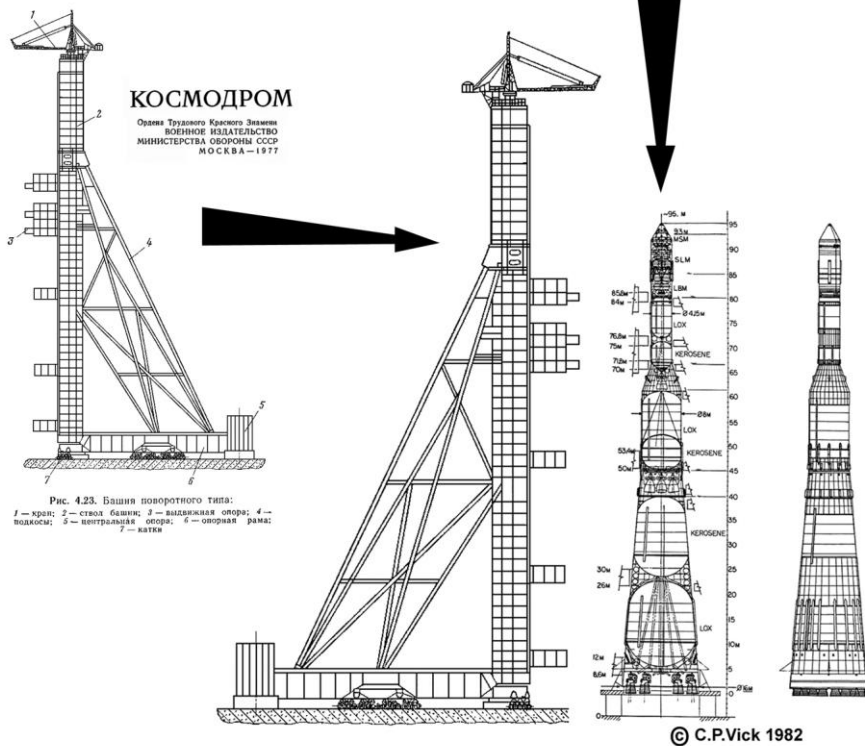
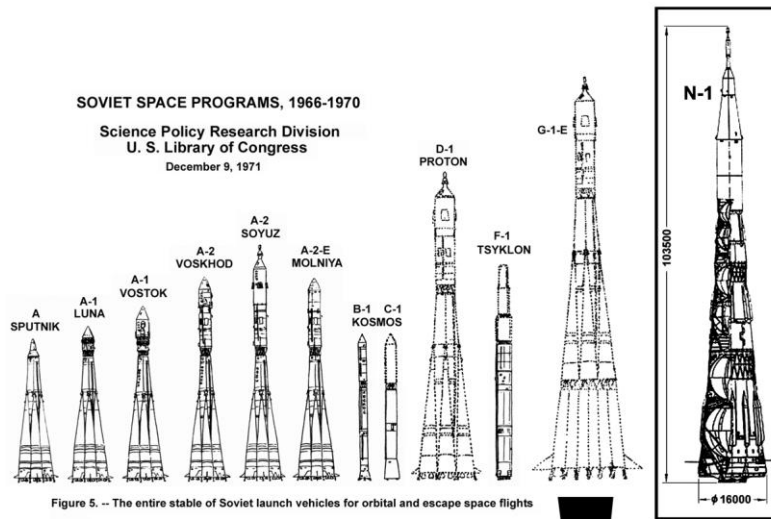
Source: Soviet Space Programs 1971-1975  
Science Policy Research Division  
Congressional Research Service  
U.S. Library of Congress

So it was clear that there was a Soviet manned lunar program. Knowing this, a number of western researchers tried to determine what some of the lunar program hardware and facilities looked like. One of the most successful of them was Charles Vick. He was able to locate an obscure book called *Kosmodrom* that was published in the Soviet Union in 1977. It featured a number of gantries associated with various known launch vehicles. One of the gantries, called a "Turning Tower", did not correspond to any of the boosters that were known up to that point in time. He rightly assumed that it was associated with Sheldon's G-1-E Soviet lunar program booster. Vick used the general shape of the Sheldon booster concept for its overall size plus the individual gantry levels as indicators for needed access into engine compartments and intrastage areas to develop a vehicle configuration design. He correctly assumed the use of liquid oxygen and kerosene propellants and used mission profile velocity requirements and a possible payload to develop his launch vehicle configuration concept. He delivered a paper on that booster concept and its launch facilities at a British Interplanetary Society conference in London in 1982. That concept was featured in the Kenneth Gatland book: "The Illustrated Encyclopedia of Space Exploration" that sold over 200,000 copies world wide, including a 40,000 copy Russian edition sold in the Soviet Union. Vick's booster configuration concept was reproduced in various publications all around the world, including in Russia, until the actual design became known.



# SOVIET SPACE PROGRAMS, 1966-1970

Science Policy Research Division  
U. S. Library of Congress  
December 9, 1971



There were other efforts by researchers to try to gain additional insight into the Soviet space program. Examples include the famous Kettering Group founded by Geoffrey Perry in England. His initial efforts to demonstrate the Doppler shift to his grammar school students using signals from Soviet satellites grew into a world wide organization that monitored and deciphered all manner of telemetry coming from those spacecraft. By tracking Cosmos, Luna and Zond spacecraft and noting their trajectories, telemetry formats, and timing relationships, Kettering Group members were able to determine mission objectives when none were announced and predict mission events before they happened. Perry helped to complete the 1976-1980 Library of Congress report project, following the untimely death of Dr. Sheldon.

All of these efforts, based upon open literature, helped to provide some insight into the Soviet manned lunar program. That plus some classified satellite imagery that has been made public has helped to give a better understanding of the Soviet space program. However, it was not until Vasily Mishin and other Russian specialists began to write their own stories and publish detailed papers on the subject that the world really began to understand the full scope and depth of that program. The information content found in the Mishin diaries is unlike anything else that has been published so far. It is a daily account of actual events along with associated engineering data that gives perhaps the most complete insight into what was happening during that fascinating period of time. We can all be thankful that the diaries were preserved and that the team, along with the publisher, has taken the time and effort to make them available for researchers for many years to come. We are sure Vasily Mishin would be pleased and proud of the end result of this project.