

IAC-15,E4,1,2,x28201

## THE MISHIN DIARIES, A NEW SIGNIFICANT PRIMARY SOURCE OF SPACE HISTORY INFORMATION

**Dmitry Payson**

Russian Federation, [dpayson@mail.ru](mailto:dpayson@mail.ru)

**Oleg Alifanov**

Russian Federation, [o.alifanov@yandex.ru](mailto:o.alifanov@yandex.ru)

**Ivan Moiseev**

Russian Federation, [i\\_mois@mail.ru](mailto:i_mois@mail.ru)

**Charles Vick**

United States, [cpvick@globalsecurity.org](mailto:cpvick@globalsecurity.org)

**David Woods**

United States, [drwoods@stny.rr.com](mailto:drwoods@stny.rr.com)

Vasily Mishin (1917-2001) was a prominent Russian engineer and scientist: one of the founders of the reality of spaceflight. In 2014 the Mishin Diaries have now been published and can serve an extensive source for the first-hand historical information. The original Diaries manuscripts are now owned by the Perot Foundation and was generously provided by them to the Moscow Aviation institute for this transcription project. The actual publication was made possible by Mishin's students, co-workers, family members as well as spaceflight historians and enthusiasts.

### I. INTRODUCTION

Vasily Mishin (18.01.1917 – 10.10. 2001) was one of the ‘founding fathers’ of the spaceflight program. After Sergey Korolyov’s death in 1966, Mishin led the Soviet human space program until 1974. He held a position of Chief Designer and head of the firm we now know as Rocket and Space Corporation Energia [3].

Mishin was a key technical person after most ‘Korolyov’s Firm’ early rocket projects, including R7 ‘Mother of all Soyuzes’ , N1 ‘Tzar Rocket’ and the whole N1-L3 manned lunar program. After Korolyov, he was in charge for Soviet manned Moon program and witnessed the first efforts on the Salyut orbital stations and Apollo Soyuz Test Program.



Fig.1. Vasily Mishin (1917-2001)

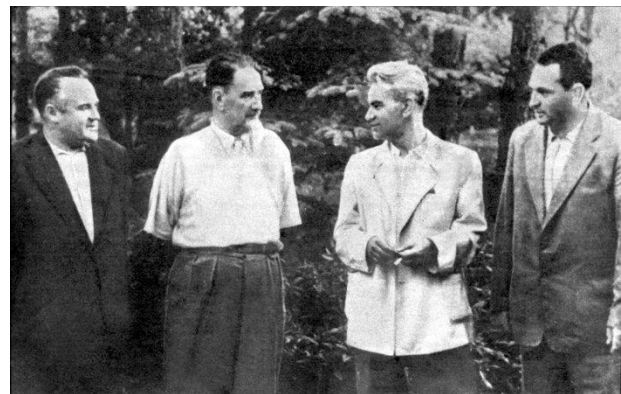


Fig.2. The iconic photo of Soviet rocket and nuclear scientists (from left to right: S. Korolyov, I. Kurchatov, M. Keldysh, V. Mishin)

In 1974 Mishin 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 became the Rector's Advisor where he remained 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. Since late 1980's Mishin was free to write 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 [4]. For researchers in the West, this began a flood of totally new information.

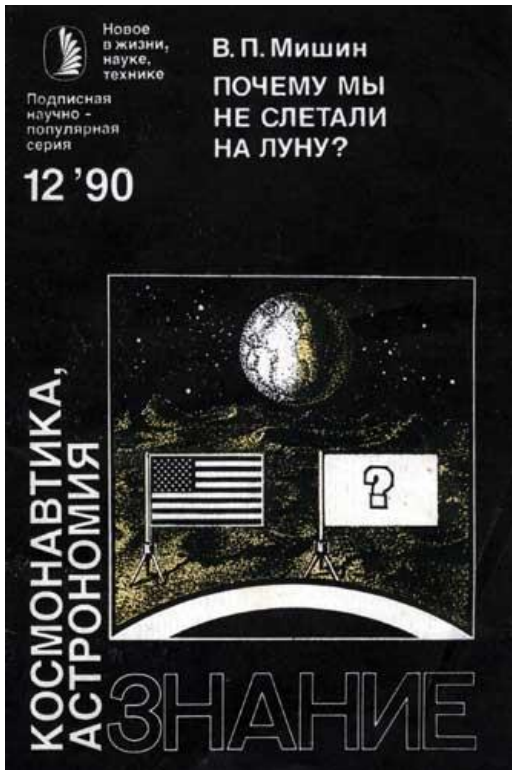


Fig.3. The cover of 'Why Didn't We Fly to the Moon' by Vasily Mishin, a first public first-hand evidence of the Soviet manned lunar program [4]

Now Mishin was also permitted to travel abroad. During the 42nd IAC in Montreal in 1991 he was the center of attention following the presentation of his paper. And so Academician Mishin and Mishin's Mission became known and popular in the international space history community.



Fig.4. Vasily Mishin is inducted into the IAA

## II. THE NOTEBOOKS

During whole his long life Vasily Mishin stored his numerous work notes. He recorded the brief estimations of space hardware they built, drafted the important letters and meeting minutes, registered the phone calls and to-do's, his thoughts and opinions during the failures' investigations. Mishin used both book size daily planners and pocket notebooks, some of them he was taking to Baikonur with him.

He never planned to publish these notes. After Mishin leave the Chief Designer position at Central Design Bureau of Experimental Machine Building (now RSC Energia) in 1974, he would destroy some 'too sensitive' pages, but kept the notebooks with him. During his MAI tenure, Mishin sometimes would return to his old pages to add remarks and to use the blank pages for new notes and drafts.

In the late 1980's and earlier 1990's after the Soviet Union collapsed, Vasily Mishin, his colleagues and their families found themselves in what they perceived a different country, not much interested in space, space history and space education. It was a hard time of surviving. And when in 1993 it became known that Sotheby's is planning a large Russian Space History auction, Mishin suggested his old notebooks for sale as a historical memorabilia. With no copies left for himself. 'There is nothing of interest in them', he told those interested. Not without slyness it probably was: who would be interested in the old space program notebooks if the society is not interested in the space program itself?..



Fig 5. Vasily Mishin and Charles Vick at the IAC

Mishin's old notebooks would become one of the Sotheby's pearls. Charles Vick remembers these weeks in New York quite well\*.

\*By rights, Charles was among the first persons to get the access to the Diaries given his lifelong interest and research achievements in the Soviet space program history – *Dmitry Payson*.

### III. SOTHEBY'S

October 22, 1993 was a cold, overcast day in New York City. Charles Vick and David Woods 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. There were such fascinating items as the Cosmos-1443 VA 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.

In one conference room was a cardboard box, filled with a collection of 31 small, well worn books. 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. 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.



Fig.6. N1 launch vehicle from Soviet manned lunar program is closely associated with Vasily Mishin's name

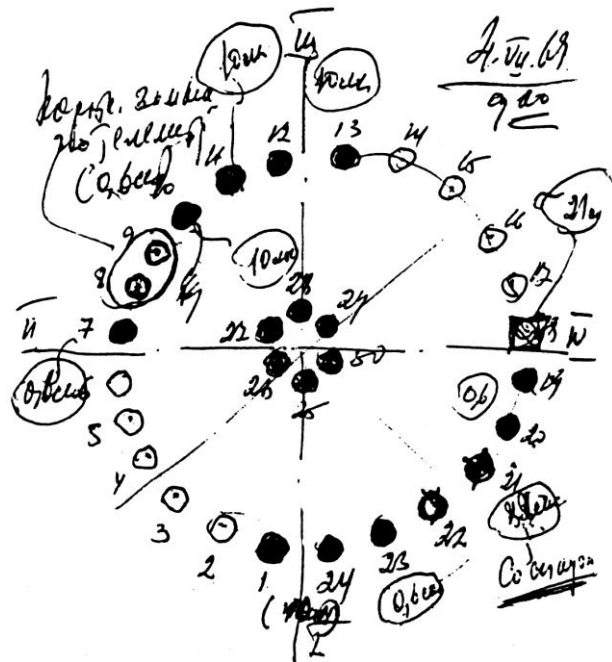


Fig.7. Mishin's draft of the N1 first stage engines during 1969 failure investigation [1]

The auction was held on December 11, 1993. 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. After the auction, a small collection of these items went on tour around the United States. It was later revealed that the famous American industrialist: H. Ross 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. His wish was 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.

So are the Mishin Diaries.

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. 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.'

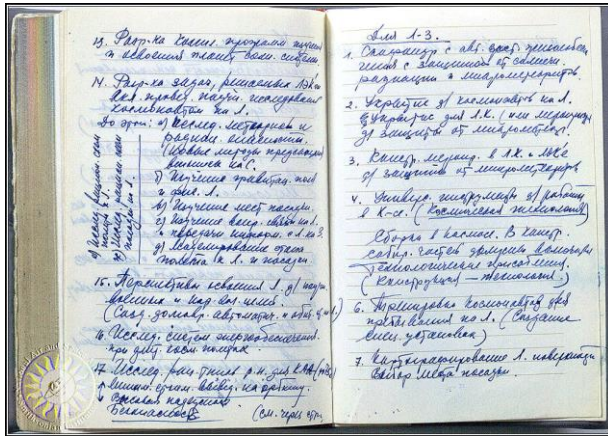


Fig.8. Pages from the manuscript Diaries at the Smithsonian Air and Space Museum (1)

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... Any attempt at telling the history of the space race without the material in these notebooks will be second-rate.’

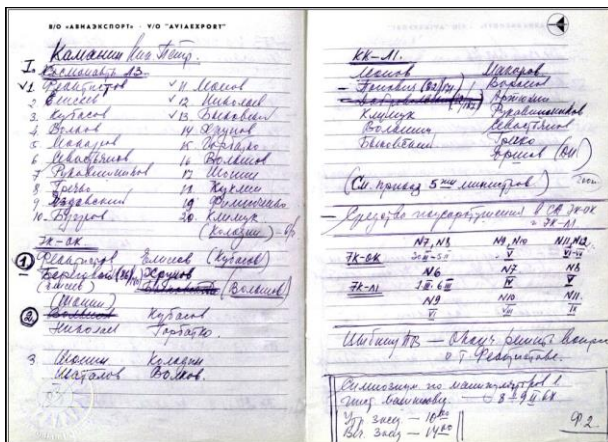


Fig.9. Pages from the manuscript Diaries at the Smithsonian Air and Space Museum (2)

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.

#### IV. DIARIES GO EAST

After Mr. Perot had purchased the diaries and given them to his Perot Foundation which now legally owns them, it was clear that the Foundation 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.

It was obvious that someone was needed 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 of Moscow Institute of Physics and Technology 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. We included in this paper his translation of the Diaries items for 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. The example of this translation effort is provided on pp.5 to 7.

The results were delighting. It seemed that if Maxim could find the time and funding for all of the diaries, the end product would be an incredible resource for researchers. Charles Vick and David Woods began looking into securing a grant to fund Maxim at half time over approximately a year to complete the project. Before any progress was made on the grant it became known that Maxim had died in an automobile accident on 14 May, 1999.

After Mishin died in 2001, Moscow Aviation Institute would recognize that a memorial project should be organized to pull together all of his works. 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.

In 2002 the project team had been convoked by Moscow Aviation Institute Aerospace School's Dean Prof. Oleg Alifanov, Mishin’s student and long time associate, and Dmitry Payson who got lucky to work with Mishin in 1998-2001 helping him to arrange the chapters for the memoirs book that would be later included in the Diaries publication. Ivan Moiseev of Moscow-based Institute of Space Policy was in charge for the most of the deciphering effort and methodology. The project was strongly supported by Mishin’s family members, including his wife Nina, daughters Vera, Kira and Elena, and grandchildren Vasily and Maria Danilov. Vasily Danilov was able to secure the deciphering effort material support. At the final phase Maria Matveeva joined the team to make the book layout.

AN EXAMPLE OF EARLY DIARIES TRANSLATION BY MAXIM TARASENKO

**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)**

-----  
*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**

-----  
**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) Voltisfer: 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**

-----  
**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)**

-----  
**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 Secretary 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 under 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[emperature] at KP [lift off] in the area of engine NN 10,11**

**Finogeyev VI. 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**

Most of the Diaries content was deciphered to form the book by 2004. However, it took unexpectedly long time to have the legal issues settled, including all kinds of clearances, really needed or excessive.

In 2013 a brief overview of the Diaries content accompanied with the essays by Mishin's contemporaries and associates had been published in Korolyov city with circulation of 500 copies as 'Записки ракетчика', 'Memoirs of the Rocketman' [5] (Fig.10).

It was Vladimir Rachuk, General Designer of KBKhA JSC, one of Russia's leading rocket engine enterprises, who joined the process in 2013 to support the final effort. As a result, in early 2015 the 3-volume Mishin Diaries were presented to the public. The 'paper' circulation was minimal, as it was decided to have the book openly published online (Fig.11).

The 3-volume edition contains completely deciphered Vasily Mishin's daily technical notes (based

on Sotheby's notebooks and those still owned by Mishin family) with the reference section prepared by Ivan Moiseev. The book includes chapters of the Mishin's unfinished memoirs with Dmitry Payson's literary adaptation as well as some Mishin's earlier works. We included Vasily Mishin's paper on rocket technologies' usage for aircraft design, a research Mishin called his 'swansong' – we assume he would be glad to see it published here. In his letter of November 20<sup>th</sup>, 2014 H.Ross Perot highly appreciated the project results.

In January 2015 the Mishin Diaries were presented in Moscow in the HQ of United Rocket and Space Corp (URSC). The paper version was published in very small circulation. However, the complete digital version of the Diaries is available from <http://www.mishindiaries.com> (with a mirror at <http://дневникимишина.рф>) (Fig.15) [6], [7].



Fig.10. Memoirs of Rocketman, 2013.



Fig.11. Mishin Diaries 3-volume paper edition



Fig.12. Mishin Diaries book presentation at URSC



Fig.13. Diaries presentation. From right to left: V.Khubaeva (Mishina), V.Vachnadze (former RSC Energia Director of Manufacturing), O.Alifanov, A.Kuzin (URSC), T.Dragnysh (Literaturnaya newsp.), G.Nechitailo (RAS).



Fig.14. Dmitry Payson demonstrates the copies of the Diaries manuscript



**Дневники ВАСИЛИЙ МИШИН**      **The Diaries of VASILY MISHIN**

**В.П. Мишин**

Василий Павлович Мишин (1917-2001) – выдающийся российский ученый, один из основоположников практической космонавтики. В 2014 г. изданы «Дневники» В.П.Мишина – обширный массив исторической информации «из первых рук».

Vasily Mishin (1917-2001) was a prominent Russian engineer and scientist: one of the founders of the reality of spaceflight. In 2014 the Mishin Diaries have now been published and can serve an extensive source for the first-hand historical information.

Издание «Дневников», подлинник которых находится в собственности Фонда Росса Перо и был предоставлен МАИ для расшифровки, стало возможным благодаря ученикам, соратникам, родным Мишина, историкам и энтузиастам космонавтики. Среди них – О.М.Алифанов, Ч.Вик, Д.Вудс, В.Ю.Данилов, Е.В.Данилова, М.Ю.Данилова, М.В.Матвеева, В.В.Хубаева, К.В.Мишина, Н.И.Мишина, И.М.Моисеев, Д.Б.Пайсон, В.С.Рачук.

The original Diaries manuscripts are now owned by the Perot Foundation and was generously provided by them to the Moscow Aviation institute for this transcription project. The actual publication was made possible by Mishin's students, coworkers, family members as well as spaceflight historians and enthusiasts, including Oleg Alifanov, Elena Danilova, Maria Danilova, Vasily Danilov, Maria Matveeva, Kira Mishina, Nina Mishina, Vera Knubaeva, Ivan Moiseyev, Dmitry Payson, Vladimir Rachuk, Charles P.Vick and David Woods

Сегодня открыт свободный доступ к электронной версии «Дневников».

The digital version of the Diaries is available from this page.

**NEW** Дополнительные материалы, включая "Взгляд с Запада" Ч.Вика

**NEW** The Mishin Diaries – A western perspective by Charles P.Vick

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Fig.15. Mishin Diaries Online (<http://www.mishindiaries.com>)

## V. DIARIES IN CONTEXT

The Diaries are not an easy reading at all. We consider them an authentic source providing a structural framework for the space history research of 1960s and 1970s, a frame of reference for more detailed and multi-facet studies. In a sense, the Diaries join the fundamental writings comprising the fundamental source base, like 'Rockets and People' by Boris Chertok [8], 'Hidden Cosmos' by Nikolai Kamanin [9], 'The Way it Was' by Yuri Mozzhorin [10] et al. However, the key feature of the Vasily Mishin's Diaries publication is our deliberate denial of any actualization or editing except for pointing to obvious misspellings and anachronisms. The plan was to deliver the Diaries to the researchers working at their own studies and looking for additional first-hand evidences.

However, one never can say in advance. Recently the education materials were located in the Internet mentioning the Diaries (still in their Smithsonian-based manuscript form) [11] as an important artefact of the historical space program (Fig.16). One Man Who Kept a Diary seems an archetype character for youngsters adding some intrigue in otherwise less entertaining 'rocket science'.



Fig.16. One Man Who Kept a Diary

Technically, what we call Diaries are actually the daily work notes, brief minutes of meetings, plans and nota bene's that by no means were originally intended for the publication or even for sharing with somebody else. This explains the unique openness and relevancy of the notes (no a-posteriori editing) as well as obvious problems with the deciphering. The most characteristic issues include handwriting recognition as well as abbreviations and arbitrary notations. Fortunately, most of the vocabulary and word usage issues associated with the Diaries are rather country, epoch and industry specific than reflect Mishin's personality and background – if otherwise, even Russian publication effort, not to mention any bilingual research, would be extremely complicated. The large quotation hereinbefore provided in Maxim Tarasenko's translation demonstrates the text specifics very clearly. However, the English Diaries would be probably a natural continuation. It is known that in 2004 NASA issued a request for deciphering effort, but it is still unclear if any publically available results would be achieved [12].

The Diaries list 2200+ persons, most of them worked in rocket and space industry or were otherwise dealing with the rockets, spacecraft and their systems. Mishin provides the personal estimates very rarely, but records the person's positions as applied to the technical or organizational problems. Thus, the Diaries provide a vast amount of first-hand materials for the spaceflight personal history.

Mishin often mentions enterprises, institutions, design bureaus and ministries. Information of this kind is helpful for better understanding of what was going on in the national space industry in the 1960's and early 1970's. However, there is a problem of the exact recognition of the particular firms involved, as the different names are used for the same entrants based on the official nomenclature, geographical location or company's leader name (that is, 'Chelomei', 'OKB-52' and 'Reutov' mean the same enterprise we now know as OJSC Military Industrial Corporation Scientific and Production Machine Building Association).

## V. CONCLUSION

The Mishin Diaries project took much more time that it was originally planned. Now when it is finished and everybody can download the three volumes containing the first hand historical evidences on the early days of spaceflight we would like thank everybody on two continents who made this publication possible, with especial thanks to H.Ross Perot and Vasily Mishin's family. We believe this is a good example of international cooperation in our common history and for our common future.



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