

## About of the First Readings of GM Zarakovskiis

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### Annotation

The article is devoted to the preparation and conduct of scientific readings of the memory of Zarakovskii GM. The composition of the working bodies of the readings is presented. A summary of the preparation and content of the principal reports of the reading participants is provided. The history of the formation of aviation ergonomics at the State Scientific Research and Testing Institute of Aviation and Space Medicine is presented. It is noted that the psychophysiological characteristics and capabilities of a person are taken into account in the design and testing of aviation and space technology. The bibliography of articles published in a special collection and issue of the journal "Aerospace Medicine, Psychology and Ergonomics" is given.

**Keywords:** Readings; Ergonomics; Psychology; Engineering psychology; Science school

### Introduction

Scientific readings of the memory of Zarakovskii GM were conducted under the auspices of the Scientific and Technical Society of Aerospace Medicine, Psychology and Ergonomics. Participants of Zarakovsky readings there were representatives of organizations, educational institutions and aircraft-building enterprises, including the Research Testing Center (aerospace medicine and military ergonomics), the Moscow Aviation Institute (national research university), the Moscow Helicopter Plant named after M.L. Mill, Institute of Psychology of the Russian Academy of Sciences, Scientific and Practical Center of the Military Academy of the General Staff of the Armed Forces of the Russian Federation, Russian National Medical Research University named after NI. Pirogov, the Scientific and Manufacturing Association named after Lavochkin SA, Flight Research Institute named after Gromov MM, Scientific and Testing Institute of Ergatic Systems and other organizations.

The conference was led by a member of the Skolkovo Foundation's expert panel, a member of the International Academy of Astronautics, M.D., Ph.D., Professor Medenkov AA. The deputy leaders were M.D., Professor Dvornikov MV and M.D., Professor Rybnikov ON. The responsible secretaries of the conference were Ph.D. Melikova MM and Nesterovich TB.

The plenary meeting of the First Zarakovian readings was held on March 26, 2019 at the Research and Testing Center (aerospace and military ergonomics), in the conference hall, which was marked by the fact that at one time it was here that the meetings of the Scientific Council of the State Research Testing Institute of Aviation and space medicine and festive meetings on the occasion of the 50<sup>th</sup> anniversary and 60<sup>th</sup> anniversary of the birth of Georgy Mikhailovich Zarakovsky.

The plenary session of the First Zarakovskii Readings was held on March 26, 2019 at the Scientific Research And Testing Center (Aerospace and Military Ergonomics), in a conference room, significant by the fact that it was held here at the time meetings of the Scientific Council of the State Research And Test Institute of Aviation and Space Medicine and celebratory meetings on the occasion of the 50<sup>th</sup> anniversary and 60<sup>th</sup> anniversary of the birth of Zarakovskii GM.

The reading was preceded by preparatory work on the formation of the Organizing Committee, sections and directions of work of the Scientific Readings of the Memory of Zarakovskii GM. The Organizing Committee of the Readings of the City included Medenkov AA (chairman), Afonskaya TA, Dvornikov MV (deputy chairman), Derevyashkina OV,

Doroshenko IE, Ershov VA, Zakharova NL, Kibabshina MA, Kozlov NI, Moskovskaya NL, Nesterovich TB, Nekhoroshev VP, Khomenko MN, Filippchenkova SI and Fetisova NL.

Reading sections were formed on the main areas of discussion of current problems of development in the country of research in the field of labor psychology, engineering psychology and ergonomics in aviation and space.

Information and reports presented at the plenary session were included in the collection published at the beginning of the Scientific Readings of the Memory of Zarakovsky GM. Medenkov AA (chairman), Gozulov AS, Dvornikov MV (deputy chairman), Levchuk IP, Tretyakov NV, Homenko MN, Chuntul AV and Shalimov represented the editorial board for the publication of the materials of the reading. The editorial board of scientific readings of the memory of Zarakovsky GM included Medenkov AA (chairman), Borisenko AI, Dvornikov MV (deputy chairman), Gorobets TN, Evdokimov AV, Zakharova NL, Zvonikov VM, Kozlov VV, Kozlova NM, Kopchenov SV, Levchuk IP, Logunova OA, Mastryukov AA, Melikova MB, Moiseyenko VV, Oboznov AA, Rybnikov ON, Syemshchikov EA, Tretyakov NV and Frantsuzov VN.

Reviewers of the collection of materials of scientific readings of the memory of Zarakovskii GM were the winner of the State Prize in Science and Technology, Professor Shalimov PM and Ph.D., Professor Levchuk IP.

The conference focused on the history of the formation of methodology and practice of research in Russia in order to take into account psychophysiological characteristics and human capabilities in aviation and space. An integral part of this story was considered the participation of Zarakovskii GM in scientific forums devoted to the theory and practice of domestic psychology of labor, engineering psychology, psychophysiology and ergonomics. The long-term concept of studying, using and developing the ergonomic assessment of the means and conditions of operation developed by Zarakovskii GM was outlined and the justification of proposals to improve psychophysiological reliability of flights and air traffic management specialists.

Particular emphasis was placed on the methodological basis of medical-psychological and psychophysiological support of flight activities, infrastructure to ensure the professional reliability of the pilot and the restoration of the functional state of the flight after-flight. The problems of taking into account the human factor in aviation and space under the current system of management and the use of the experience of ergonomic support to create systems of automation of aviation control and conduct were considered as engineering and psychological research in the interests of optimizing them.

The directions of the development of Zarakovskii GM's ideas in the field of ergonomics, design and quality of life were determined taking into account his psychological, philosophical views and ideas about the ways, directions and features of the implementation

of the domestic strategy space activities remain relevant and require consideration in solving problems of socio-psychological adaptation to space activities.

Psychological and educational issues of the formation and evaluation of knowledge, skills and skills of specialists and their readiness to perform professional activities, including in extreme conditions and circumstances, were considered. The basis of this review was the materials of the research of Zarakovsky GM and his school of professional competence structure, the content of the transformation of information in solving the tasks of the activity and the specifics of the regulation of the functional state and people in dangerous occupations. The contribution of Zarakovsky GM in the formation of the methodology of psychophysiological analysis and ergonomic optimization of means, algorithms and conditions of activity was evaluated. The peculiarities of Zarakovskii GM's scientific approach to the problems of professional orientation and motivation of professional activity, formation and maintenance of the functional state and psychophysiological reliability of persons dangerous were determined.

The reports, proposed for communication in the sections of the readings, were published in the journal "Aerospace Medicine, Psychology and Ergonomics". This has enabled reading participants to familiarize themselves in a timely manner with the issues proposed for consideration and to prepare to participate in their discussion at the round table after the plenary. The plenary session was attended by reports approved at the sections on the current problems of the theory and practice of ergonomic studies of aerospace orientation.

It was noted at the readings that the shortcomings of the distribution of functions in the "flyer-aircraft" system, information support for training and decision-making by the pilot, the organization of the work and recreation regime contribute to the commission of erroneous and untimely action. Analysis of the causes of aviation incidents showed that in 5-15% of cases they are not established, in 15-20% of cases are associated with failure of equipment, including as a result of external factors, and in 70-75% of cases - with errors and late actions of the crew. It is believed that it is the erroneous and untimely actions of the crew that are at the heart of most aviation accidents and incidents.

But in half of these cases, the shortcomings of the pilot's information support, including the design of information display systems and the pilot's intellectual support, especially in extreme cases, contribute to these actions and flight conditions. The real cause of aviation accidents and incidents is the lack of consideration of the psychophysiological capabilities of the pilot in the design of the means and algorithms of his work and organization of flight work.

The cradle of the formation of the systemic methodology of ergonomics in the interests of flight safety and the efficiency of military aviation was the State Research and Test Institute of Aviation and Space Medicine. In the institute, ergonomic views and innovations were formed in the department of Zarakovskii GM.

At the State Scientific Research and Testing Institute of Aviation and Space Medicine, his department was the head of systemic engineering, psychological and ergonomic research. In the track record of Zarakovskii GM from 1965 to 1987 only one record "head of the department of the State Scientific Research and Testing Institute of Aviation and Space Medicine." The department he originally headed, on 3 March 1967, was transformed into a special department for the development of psychophysiological recommendations for control, indication and alarm systems. The task of the department was to design the activities of aviation specialists on the basis of psychophysiological analysis of its content and synthesis of the structure on a number of qualitative and quantitative criteria using the developed by Zarakovskii GM operational-psychophysiological method of evaluation and ergonomic optimization of means, algorithms and conditions of activity. The Division has been developing methods and means of comprehensive accounting of psychophysiological characteristics and capabilities of humans in the creation and operation of aviation equipment and weapons. At the end of 1980, the department established a laboratory for psychophysiological research and optimization of the operational composition of command posts of aviation control and flight control systems. The urgency of establishing the laboratory was related to the transition to the management of the Armed Forces using complexes and means of automating the transmission and processing of data, increasing the speed of assessment of the situation and decision-making on a real scale Time. The issues of data transmission automation and decision-making by the operational staff of command posts became particularly important.

The results of engineering, psychological and ergonomic studies of the laboratory staff were of important practical importance. Their reasonable requirements and recommendations were included in technical tasks for the development of complexes and automated systems of aviation management. Laboratory staff actively participated in the review and examination of sketch and technical projects of the automation systems being created. Their valid proposals and recommendations were taken into account when making final decisions on the formation of automation tools at aviation command posts. In terms of its practical contribution to improving the combat capability and combat readiness of aviation and professional reliability of aviation managers, the activities of laboratory staff were unparalleled, both domestically and abroad aeronautical engineering psychology and ergonomics. The experience of such research can and should be used in today's innovative environments

Saravovskii GM led the research work carried out in order to develop the theoretical, methodical and organizational foundations of ergonomic provision for the creation of aviation and space technology. These studies were focused on developing methods and means of ergonomic optimization of military aviation equipment in order to improve its efficiency, reduce the cost and reduce the time of development. Mathematical models were developed describing the relationship between performance indicators, the functional state of specialists with the characteristics of the process, means

and conditions of activity. The structure and structure of the automated information and search system for the provision of ergonomic works were determined.

Analytical and experimental methods of ergonomic examination and medical and technical requirements for the technical equipment used were unified. The experience of unification and standardization of scientific and technical documentation in the field of accounting for psychophysiological characteristics and human capabilities, ergonomic support for the development of aviation and space technology and organization was discussed military-scientific support for its creation, testing and operation.

Under the leadership of Zarakovskii GM formed a scientific school, recognized not only in our country, but also abroad. His scientific school has made a significant contribution to the development of domestic aviation ergonomics and the development of current problems of psychology, physiology and aviation medicine, as well as to the solution of important national and economic problems of ensuring safety aviation efficiency by implementing a comprehensive accounting of psychophysiological characteristics and capabilities of flight lifting and engineering and technical staff, personnel of operational calculations of aviation control command posts and aviation specialists in the creation and operation of aviation equipment.

Thanks to the developments of G.M. and his employees in the 1980s in the country it was developed an ergonomic support system for the creation, testing and operation of military aircraft, with enormous potential to ensure aviation development and improve flight safety. The State Research and Test Institute of Aviation and Space Medicine was the Air Force's main organization in the field of aviation and space ergonomics. He coordinated inter-agency research aimed at improving flight safety by ensuring the professional reliability of the pilot and cosmonaut. Human factor accounting for improving flight safety was organized on a systemic basis and was carried out during the development and testing and operational phases of aviation and space technology.

The organization was in line with the objectives of ensuring the competitiveness of domestic aerospace technology and improving flight safety through inter-agency coordination of plans and programmes for the efficient use of capacity and human resources in aviation and space.

The readings ended with summing up and making a decision that noted the merits of Zarakovskii GM in the development of the national psychology of labor, engineering psychology, psychophysiology and ergonomics and its fundamental role in the development of methodology of psychophysiological analysis of activity and optimization of its tools, algorithms of work and conditions. The decision reflected the confidence of the participants of the readings in the need to prepare and conduct scientific readings of the memory of Zarakovskii GM on a regular basis. The importance of active participation in the preparation and conduct of the Zarakovskii GM readings of students, graduate students and young staff of educational institutions, research organizations and aerospace enterprises were noted.

Familiarity with the problems of taking into account the psychophysiological characteristics of a person in his educational and work activities will help them to determine the choice as their profession of noble work to improve the efficiency and reliability of work, to ensure the safety of persons of dangerous professions, comprehensive personal development, and, ultimately, to improve the quality of life of the population of the country. The careful attitude to the scientific heritage of Zarakovskii GM and the desire

to continue and develop his ideas should contribute not only to their implementation, but also to attracting the attention of the general scientific community to the problems of the psychology of labor, engineering psychology and Ergonomics. At the conclusion of the readings, a member of the International Academy of Astronautics, M.D., Ph.D., Professor Medenkov AA thanked the participants of the readings and expressed hope that they will take an active part in the next scientific readings of the memory of Zarakovskii GM.

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