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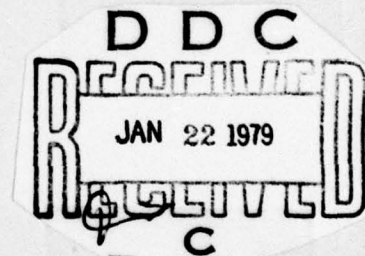
FOREIGN TECHNOLOGY DIVISION



CZECHOSLOVAKIA JOINS THE USSR IN SPACE EXPERIMENTS

by

Miroslav Wagner



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CZECHOSLOVAKIA JOINS THE USSR IN SPACE EXPERIMENTS

Dr. Miroslav Wagner, Czechoslovak Academy of Sciences

Scientific and technological co-operation with the first socialistic country in the world is a solid backbone of development of our country. One of the areas of our cooperation in the future is ~~the~~ space research.

Up to now, space research confirmed and further developed many discoveries of experimental and applied physics and simulated a further development of these sciences. In particular, space research contributed to our understanding of the structure and properties of materials, time and space, relation between microcosm and macrocosm, dual character of radiation particles, etc. Thus, certain physical phenomena can be studied only in space; space conditions can not be in some cases duplicated on Earth-bound laboratories. This research contributes to our understanding of behavior of matter and energy release. We must realize that similar energy-releasing processes take place in the solar atmosphere; such processes are being studied in numerous physical laboratories. Consequently, the study of the Solar physics is closely related to the study of thermonuclear reactions, to utilization of high-energy plasma in non-thermal reactions.

Other examples of importance of space research are the impacts on meteorology, cartography, transportation, and telecommunication systems. In recent years, the importance of space research in detection of natural resources and protection of our environment has been of a growing importance. Use of satellites for photography, filming, and TV-monitoring will soon enable us to monitor the Earth and detect changes due to natural forces and human activity.

Thousands of discoveries and inventions originally earmarked for the space research are finding place in manufacturing technology and experimental techniques. They can be utilized for organization and direction of our national economy,

agriculture, and even in households. ~~The~~ Space technology considerably accelerated the development of new materials, manufacturing technology, introduction of new products. In particular, the resistance of materials was improved to extreme stress and temperatures; moreover, ~~the~~ weight reduction and miniaturization was also accomplished for many devices.

However, ~~the~~ space research is very complex, extensive, and expensive. Beside the USSR, no other socialistic country had enough resources to contribute to this field. The Soviet government, following the principle of "international solidarity of proletariat", indicated in 1965 a no-cost participation of other socialistic countries on utilization of ~~the~~ modern space technology -- satellites and rockets -- for long-distance data-transfer. This policy resulted later in ~~the~~ formation of an international scientific program -- INTERCOSM. This program is the third largest space effort, following the national space research in ~~the~~ USSR and USA. All nine socialistic countries participate on ~~this~~ program. The USSR shares 95% of planned space experiments; Czechoslovakia is the second most important contributor to this program. Since 1966, the Czechoslovak Commission for Space Research and Space Utilization ^{has been} ~~is~~ in existence, as a part of the Czechoslovak Academy of Sciences. The purpose is to coordinate and direct the participation of Czechoslovakia in the INTERCOSM program. Since 1971, Academician Jaroslav Kozesnik, Head of the Czechoslovak Academy of Sciences, has been heading the Commission. A technological and scientific base for our participation in this program has been established at the institutes of the Academy of Sciences, universities, research institutes of the Department of Health in Czech Republics and Slovakia, Federal Department of Communications, and numerous production facilities, particularly in plants of the Department of Engineering. A number of achievements has been accomplished by now. Czechoslovak experts are the most valuable

colleagues of the Soviet scientists and engineers. Thus, only Czechoslovakia contributed with instrumentation to all sixteen INTERCOSM satellites, to Soviet PROGNOZ 5 satellites, and to four high-altitude VERTICAL rockets. It is a considerable achievement of our instrumentation and telemetry technology; our instrumentation was proven in rigorous conditions of space flight (zero-gravity, high acceleration, vibrations, space vacuum, etc.). The high-quality instrumentation of this type finds other uses in our national economy.

A number of modern methods of space research ^{are} ~~is~~ applied in astronomy, geophysics, geology, geography, meteorology, and to some extent in biology and medicine. The contribution to ~~the~~ space research is an example of Czechoslovak-Soviet scientific cooperation and of integration of scientific work in Socialist Countries. Due to the increasing extent and volume of the INTERCOSMOS program, an agreement was reached last year between the USSR and other socialistic countries **about** space research and utilization of space for **peaceful** purposes. This agreement defined organization principles of such cooperation, which were proven successful ^{the} in last ten years. An example is the "Principle of Interest", accepted in the Council of Mutual Economic Cooperation; the participating countries **choose the** projects from the accepted list and then are responsible for realization by their own scientific and production facilities.

A new era in this cooperation is an invitation of citizens of the participating countries to participate as astronauts in ^{Manned} ~~piloted~~ satellites and orbiting stations. Since last year, citizens of Czechoslovakia, East Germany, and Poland have been participating in astronaut training.

Czechoslovakia will accompany the USSR during the Sixth Five-Year Plan in the development of a new generation of satellites -- AUOA (Automatically Guided Orbiting Stations) and on preparation for take-off of Soviet national satellites PROGNOZ.

Important contributions were achieved both, in basic sciences and space

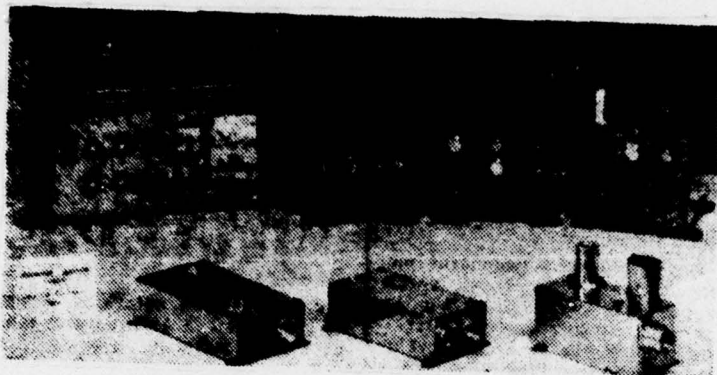


Figure 1. Instruments of the school of Mathematical and Physical Sciences of the Charles University for the INTERCOSMOS 13 launched in 1975. The instruments measure charged particles in the Earth magnetosphere.

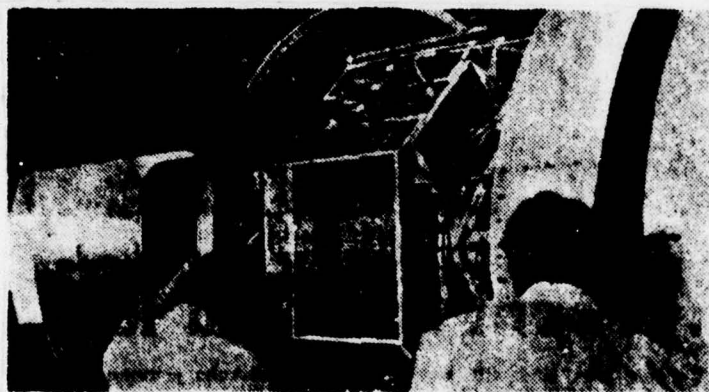


Figure 2. Placing an aerodynamical cover on the INTERCOSMOS 5 satellite.

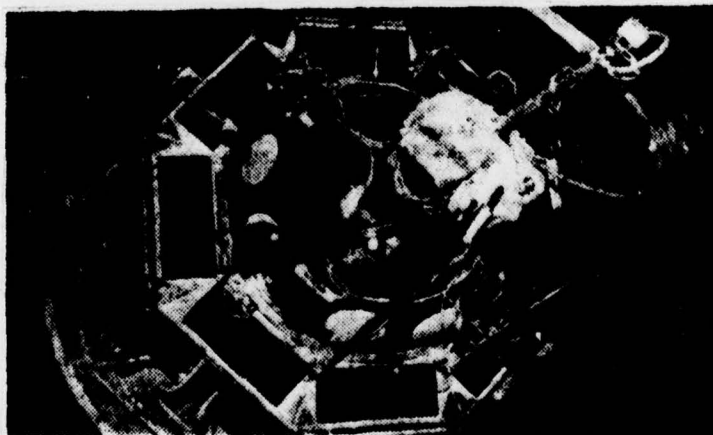


Figure 3. INTERCOSM 5 satellite launched in December 1971, containing Czechoslovak and Soviet instruments.

technology, ~~were reached~~ in space meteorology. Czechoslovak scientists studied cloud-cover photographs obtained by Soviet and US satellites and explained certain problems related to formation, motion, development, and structure of frontal cyclones. This contributes to improvement of long-term weather forecasting.

In the area of space biology, our scientists from the P.J. Safarik University in Kosice, from the Institute of Experimental Endocrinology of the Slovak Academy of Sciences, of the Institute of Biophysics of the Czechoslovak Academy of Sciences cooperate with Soviet researchers. The results obtained by them contribute to elucidation of effects of space radiation on formation of blood and metabolism; in space physiology, they contributed to elucidation of interactions between organisms and gas environment and to elucidation of thermal regime, biological function of gravitation, and vestibular reactions.

The research of space communications facilitated ~~to formulate~~ the agreement on international communication system and organization of space communications between member countries of the Council of Mutual Economic Cooperation. Our ground station of the INTERSPUTNIK communication system was built; Soviet Molnija 2 satellites are used in this system. TV programs and telephone communications are mediated by these satellites.

Last year, a unified communications system was tested in the INTERCOSMOS 15 satellite. This system enables the participating countries to obtain information directly from satellites. A secondary standard of exact time and frequency was developed for the ground stations.

It is obvious that the area of applications of space research expands and that the importance of space research is increasing. Thus, the secondary frequency and time standard, ACES-1 was used for development and production of an improved instrument ACES-2 and ACES-3, which will be used as very accurate reference sources of frequency and time. Moreover, the satellite telemetry system using a transmitter

operating on the frequency of 136 MHz , using four channels, can be used for a number of applications since it enables one to transmit information at a minimum power requirement to a relatively long distances. Another example of "non-space" application is the use of the impulse laser device ("laser radar") for measuring of long distances (several thousands of kilometers) with the accuracy of 1 m.

A number of other instrumentations find a widespread application in laboratory equipment and other practical applications: dielectric optical filters, X-ray optics for very soft radiation (in vacuum devices and in vacuum X-ray microscopy), channel detectors of short-wave radiation and electrons (in electron spectroscopy), and proportional counters (for the softest X-ray radiation). The oriented platform SKAN should be mentioned here as an example of instrumentation developed for the new generation of satellites -- AUDOS. This instrument is capable of orienting its axis with an accuracy better than 10 seconds.

Let us mention an example of instrumentation developed for the space physiology -- "tissue oxymeter". It is used for monitoring of dissolved oxygen in tissues during various pathological states or after use of medications. This instrument will obviously find a widespread use in surgery and oncology. The Czechoslovak space dynamical calorimeter is another example; this instrument determines the output of heat by the astronaut's body; it will be also useful for evaluation of effects of cooling or heating load in a micro-climate.

The USSR provides free of charge the rockets and space installations. This enables Czechoslovakia and other socialist countries to concentrate their efforts on scientific exploration and development of instrumentation. The scientific co-operation on the INTERCOSMOS program is an example of effective co-operation of scientific efforts. All participating countries have an opportunity to use their capabilities and to utilize the results of research. It was not by an

accident that the co-operative research effort to elucidate corpuscular radiation and low-frequency waves in ^{the} Earth's atmosphere and magnetosphere, carried out by satellites INTERCOSM 3 and INTERCOSM 5 and supervised by a group of Soviet and Czechoslovak scientists, was awarded the first joint prize given by the USSR and Czechoslovak Academies of Sciences.

The established working and "proletarian" co-operation creates a comradeship in which the exchange of information leads to formation of new scientific programs. The unselfish leadership of the USSR contributes here to progress of science, technological and social progress, and prevention of peace.

BLUE-UNIFORM HOLIDAY

Pira Filipicova

Some five years ago, we accompanied "the train with sacred traditions" directed to the 85th rail of the Vrutky railway station." Then our wish was that the problems which then persisted were solved.

Recently, the "train" of the Vocational Center of Railway Workshops in Vrutky reached its "90th rail". We can conclude that the wishes have been fulfilled almost completely. Modern laboratories, cafeterias, audiovisual aids, gyms, industrial TV, and dorms were built. The Vocational Center has now all what is needed for a demanding instruction of almost 700 students and night-class students. The Center is equipped with 22 classrooms, has a well-qualified faculty, instructors, and pedagogues. The classrooms, laboratories, gym are well equipped; the medical care is excellent; cafeteria is also well-staffed. There are numerous benefits during the study concluded with the cumulative exam. Numerous comparisons could be made indicating how much has changed during the five last years; the instruction has improved considerably.

The Railway Workshop in Vrutky was awarded by the Order of Klement Gottwald

and by the Order of Red Star. The instructors of the Center who trained thousands of workers for the Workshop have their share.

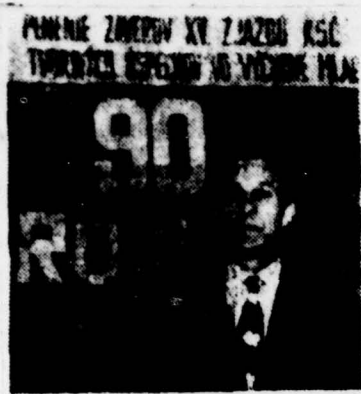
Let us mention one of the instructors who at the occa^Ssion of 90th anniversary of founding of the Center recieved an award of Merititious Worker of the Vocational Center of the Railway Workshop in Martin-Vrutky.

In 1945, he was a twenty-year old trainee -- JAN SVRCOK, and then he took a job in the Main Workshop of the Czechoslovak Railway System (CSD). He was a railroad man, like his father; "nothing could be done about is, just switch to the reliable rail". During the war, he participated in the Slovak National Resistance, as a rail-road man. After the liberation, he participated on rebuilding program. He worked on reconstruction of destroyed Strecniansky tunnel, removed locomotives from wreckages and from Vah River, built reailways and workshops. During that period he also obtained his education: in 1951 he graduated from the high school and took a job of the chief foreman.

Commrade JAN SVRCOK knows well his trade, is a good instructor, a disciplined worker, and he loves youth. Most of his life has been devoted to youth. He trains young workers , yearly he instructs up to 200 workers. He is also the chairman of the examining committee at cummulative examinations; almost all students passed these exams. This indicates that the job is well done by him and other instructors of the Vocational Center. The instructors of the Center followed well the Guidlines of the XVth Convention of the Czechoslovak Communist Party for instruction of workers devoted to their profession.

Commrade SVRCOK has bravely overcome a number of difficulties also as a chairman of the Plant Committee of the Communist Trade Unions and then as the vice-chairman of the Plant Unit of the Slovak Communist Party. He now serves as the political lecturer of the Evening School of the Communist party in OU ZOS.

He is very busy with his many functions but remains an optimistic pedagogue. We wish him best of luck in his job in the Vocational Center.



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