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SCIENTIFIC INTELLIGENCE REPORT

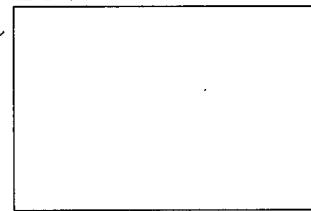
THE SOVIET SPACE RESEARCH PROGRAM

MONOGRAPH III
ORGANIZATION, PLANNING, AND CONTROL

CIA/SI 37-59

27 August 1959

CENTRAL INTELLIGENCE AGENCY
OFFICE OF SCIENTIFIC INTELLIGENCE



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Scientific Intelligence Report

THE SOVIET SPACE RESEARCH PROGRAM

MONOGRAPH III ORGANIZATION, PLANNING, AND CONTROL

NOTICE

The conclusions, judgments, and opinions contained in this finished intelligence report are based on extensive scientific intelligence research and represent the final and considered views of the Office of Scientific Intelligence.

CIA/SI 37-59

27 August 1959

CENTRAL INTELLIGENCE AGENCY
OFFICE OF SCIENTIFIC INTELLIGENCE

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PREFACE

The intelligence information presented in this monograph covers the period from October 1957 to 15 May 1959 and is based on open literature and classified reports. This study, which is made to determine the organization, planning, and control of the Soviet space research program and to assess the impact of these factors on future Soviet space research, is one of 12 studies on the Soviet space research program. Monographs II through XII are designed to support the conclusions found in Monograph I, an overall evaluation of the program, which will be published last.

Monographs on the Soviet Space Research Program:

- | | |
|---|---|
| I Estimate 1959-74 | VII Telemetry, Communications, and Reconnaissance Instrumentation |
| II Objectives | VIII Ground Support Facilities |
| III Organization, Planning, and Control | IX Space Medicine |
| IV Space Vehicles | X Space Biology and Astrobiology |
| V Propulsion Systems | XI Astronomical Aspects |
| VI Guidance and Control | XII Current Status of Progress |

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THE SOVIET SPACE RESEARCH PROGRAM

MONOGRAPH III

ORGANIZATION, PLANNING, AND CONTROL

SUMMARY AND CONCLUSIONS

There appears to be a division of responsibility in the administration of the Soviet space research program between the civilian and military authorities.

Administration of the space scientific research program is apparently centralized in the Interagency Commission for Interplanetary Communications (ICIC) of the Astronomical Council of the Academy of Sciences, USSR. Space research is probably conducted in a variety of Soviet research institutions. The Academy of Sciences, USSR, and higher educational institutions probably conduct the major proportion of the theoretical research, whereas the ministerial institutes and institutes of the Councils of National Economy and of the State Committees probably conduct a considerable amount of the applied research that concerns space.

The launching and space vehicle development phase is probably administered and controlled by a special scientific-technical committee on guided missiles and space vehicles that is believed to exist under the Council of Ministers, USSR, and that probably works closely with the Ministry of Defense. Some scientific research in support of the launching and space vehicle development phase of the program is probably conducted in institutions under the Academy of Sciences, Councils of

National Economy (Sovnarkhozes), higher educational institutions (VUZ's),* and ministries, but the major portion of this phase of the research is probably conducted in institutions under the Ministry of Defense and the State Committees of the Council of Ministers.

The formulation of policy and plans concerning space research is probably highly centralized and coordinated to assure rapid decision making and efficient allocation of resources. Responsibility for the formulation of policy and planning of space research will probably continue to be allocated as follows:

The ICIC will continue to develop long-range policy and plans on space scientific research in accordance with broad directives issued by the Central Committee of the Communist Party and the Council of Ministers. The ICIC will probably review and coordinate the plans with the State Planning Committee (GOSPLAN), USSR, and assign research projects to various scientific institutions considered most capable of fulfilling the plans.

(2)

* VUZ is a Russian term made up of the initial letters of the words meaning higher educational institution — vyssheye uchebnoye zavedeniye.

Since space research is a priority project, the Soviet scientific and technical information system will continue to support the space research program by the exploitation of domestic and foreign literature on space research [redacted]

(3) Other agencies, such as the Communist Party and the Committee for State Security, exercise varying degrees of control over the program.

The Soviet space research program appears to be well coordinated at the national level by the ICIC. Much informal coordination is probably facilitated by the presence on the ICIC of eminent scientists, who represent a broad cross section of the scientific community. Coordination is apparently also achieved through problem conferences, Head Institutes, and interdisciplinary research groups.

Although there is no evidence of Sino-Soviet Bloc coordination in space research — except in the field of satellite observation — the USSR space effort probably will benefit to some extent from the overall coordination of Bloc scientific research effected through agreements concluded between the Academy of Sciences, USSR, and national academies of Bloc countries and through scientific-technical commissions organized between the USSR and Bloc countries.

DISCUSSION

ORGANIZATIONS ENGAGED IN SPACE RESEARCH

Early Activities

Soviet scientific research connected with rocketry and space flight was organized early in 1929 by a group of Soviet scientists who called themselves the "Group for the Study of Reactive Motion" (GIRD). I. P. Fortikov, Ya. Perel'man, and N. A. Rynin formally organized the group with government encouragement to investigate and systematically develop new rocket devices. GIRD was a part of a larger organization called the Society for the Promotion of Defense and the Aviation and Chemical Industries (OSOAVIAKHIM).

Scientific publications issued by GIRD included contributions by I. A. Markhulov, M. K. Tikhonravov, and Yu. A. Pobedonostsev, who are still active in Soviet rocket propulsion and space flight activities.

In 1934, the Soviet government recognized the military potential of the rocket and launched a government-sponsored rocket research program, which apparently included a special commission to direct and coordinate scientific research in aviation technology, with special emphasis upon piloted rocket planes.^{1,2}

Academician A. N. Nesmeyanov, President of the Academy of Sciences, USSR, indicated the official existence of a Soviet space flight program in his speech to the World Peace Council in Vienna on 27 November 1953. He stated that "science has reached a state when it is feasible to send a stratoplane to the moon, to create an artificial earth satellite."³ This statement was followed later by an announcement of the creation of an Interagency Commission for Interplanetary Communications.

Administrative Organizations

Administrative responsibility for the direction of the Soviet space flight research program appears to be divided between civilian and military authorities. Civilians direct the broad scientific research program; and the launching and space vehicle development program is probably controlled by the military.⁴

Interagency Commission for Interplanetary Communications — To bring the direction of the space flight scientific research program under the centralized authority of one organization on the national level, the Soviet government established the Interagency Commission for Interplanetary Communications

Figure 1

ORGANIZATION AND COORDINATION OF SOVIET SPACE RESEARCH

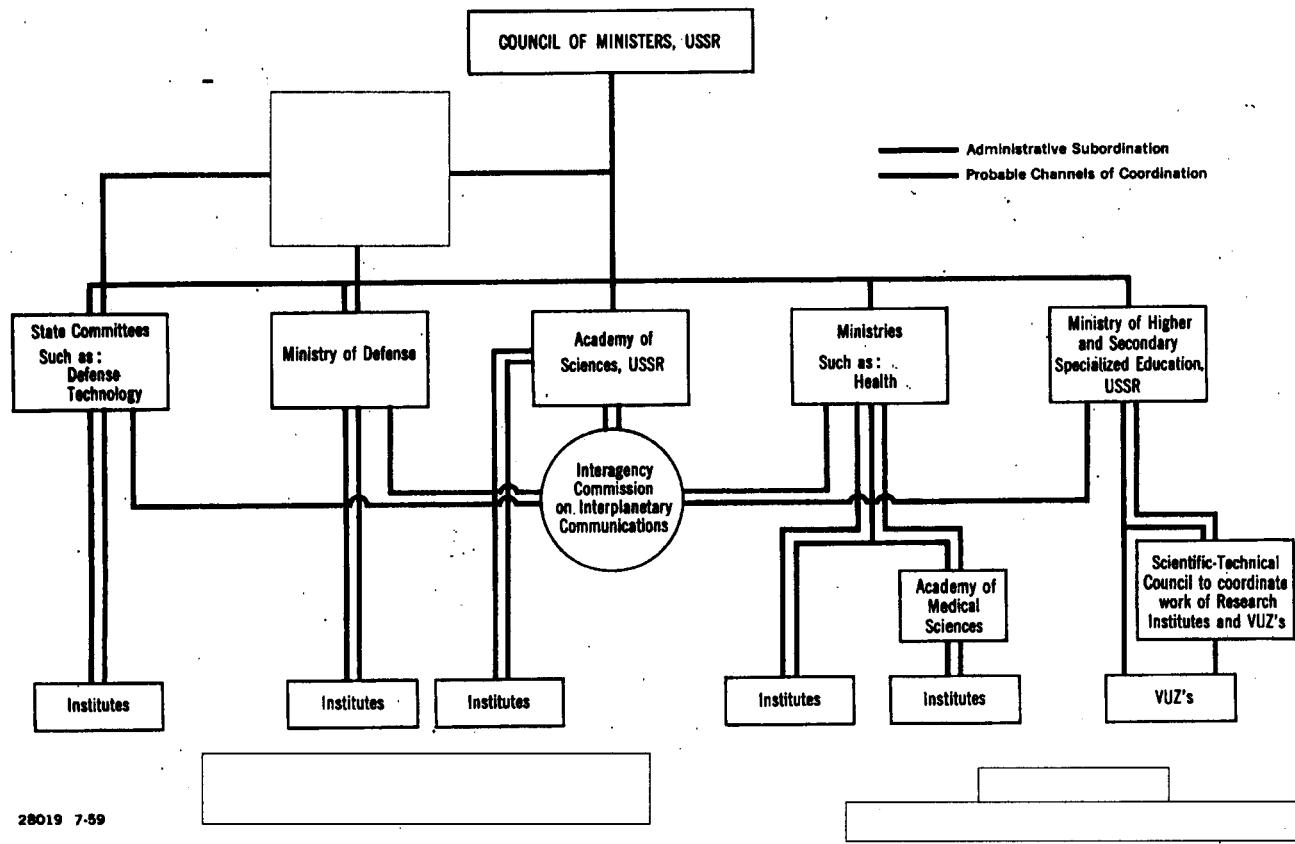
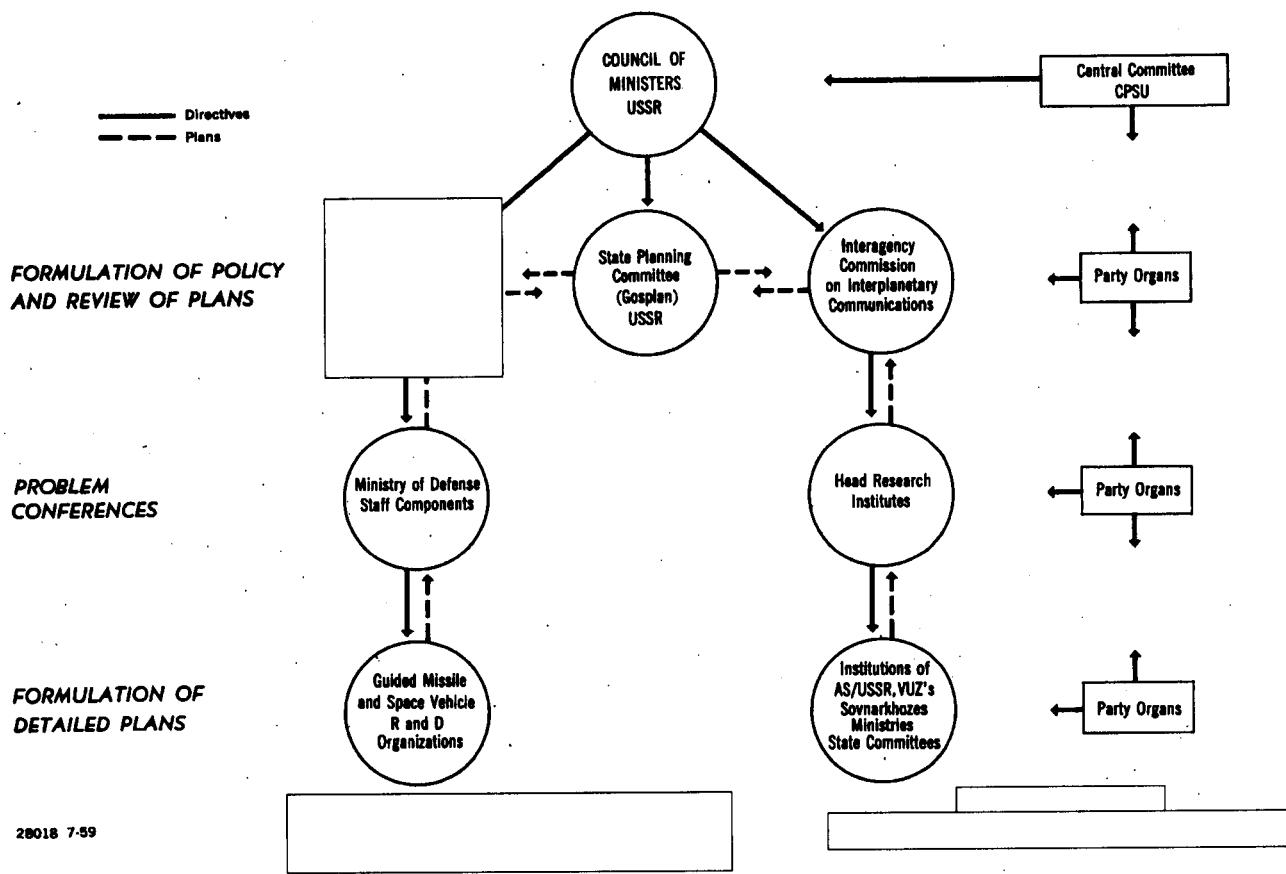


Figure 2

PROBABLE CHANNELS FOR PLANNING SOVIET SPACE RESEARCH



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under the Astronomical Council of the Presidium of the Academy of Sciences, USSR, in 1954.¹ A. G. Karpenko, Scientific Secretary of the Commission, has stated that the space flight program requires the active participation of many scientific and technological collectives and that the ICIC was established to unify and guide the work of the collectives.² The Commission is responsible for the direction and coordination of all work concerned with the problem of mastering cosmic space, except for launching and space vehicle development, and has the responsibility and authority to secure the active participation of appropriate scientific research institutions and individuals in the space research program.³

The ICIC,* headed by Dr. L. I. Sedov, is composed of 30 members representing a cross section of the Soviet scientific community. Included on the Commission are some of the USSR's most eminent scientists, e.g., P. L. Kapitsa, V. A. Ambartsumian, and N. N. Bogolyubov.** Moreover, a number of the members, such as A. A. Blagonravov, G. I. Pokrovski, V. F. Bolkhovitinov and Yu. A. Pobedonostsev, hold high ranks in the military reserve and are familiar with the military facets of rocketry and space technology.⁴ The inclusion of eminent scientists who represent various scientific disciplines and who are affiliated with the Academy of Sciences, USSR, and higher educational institutions probably will facilitate efficient direction by the ICIC of the Soviet space research program.

Launching and Space Vehicle Development Organizations — The administrative control of the launching and space vehicle development phase of the Soviet space program

space vehicle development phase of the program is probably administered by staff components such as the Chief Artillery Directorate of the Ministry of Defense.⁵⁶

Although a considerable amount of scientific research in support of the launching and vehicle development is probably conducted in scientific research organizations of the Academy of Sciences, Councils of National Economy, higher educational institutions, and ministries, the major proportion of such research and development is probably conducted in institutions under the Ministry of Defense and the State Committees of the Council of Ministers for Defense Technology, Radio Electronics, Aviation Technology, Shipbuilding, Chemistry, and Automation and Shipbuilding. These Committees are responsible for the coordination and administration of scientific research in their respective fields.¹⁹ Two major installations that probably contribute to the launching and vehicle development aspects are the Scientific Research Institute of Factory 88 under the State Committee for Defense Technology and Scientific Research Institute 4 of the Ministry of Defense.

A number of research institutions that are subordinate to the 104 Councils of National Economy, which emphasize applied research, are probably engaged in the vehicle development phase of the space flight program. In 1958, a number of workers of the Leningrad Council of National Economy, including a specialist in optics, received awards for participation in the development and launching of the USSR's artificial earth satellite.¹⁷

Research Organizations

Since space research involves a large number of scientific disciplines, various facets of the program are probably conducted in a variety of the research institutions in the USSR.

Academy of Sciences, USSR — Although there is little available information to indicate the extent to which the institutions of the Academy of Sciences, USSR, are directly engaged in space research, it is highly probable that a large proportion of the space research is conducted in its institutions. Since

* See appendix for charter.

** For membership of the ICIC see appendix C of CIA/SI 18-59, *The Soviet Space Research Program. Monograph XI, Astronomical Aspects*, 15 May 1959.

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the scientific institutions of the Academy of Sciences, USSR, are estimated to perform about 50 percent of all Soviet fundamental research and much of the applied research, it is likely that they conduct a major proportion of the theoretical research and perform some applied research directly connected with the space program.

does not indicate the extent to which the 39 universities and estimated 352 specialized scientific and technical institutes are engaged directly in space research activities, but a number of VUZ's are engaged in research that may be directly related to the Soviet space program.²⁵ In 1956, the Chair of Botany of the Alma-Ata Pedagogical Institute imeni Abaia was conducting research on the problem of plant life on Mars.²⁶ The VUZ's also play a significant role in the optical observations of artificial earth satellites. The Astronomical Council of the Academy of Sciences, USSR, in collaboration with the Ministry of Higher Education, USSR, and the Ministries of Education of the Russian Soviet Federated Socialist Republic (RSFSR), and the Georgian, Uzbek, Turkmen and SSR's, organized 66 stations for visual and 24 stations for photographic observation of the artificial earth satellites at a number of universities, astronomical observatories and pedagogical institutions.

Republic Academies of Sciences — The extent to which the Union Republic Academies of Sciences are engaged in space research activities [redacted] but they participate in the broad scientific research programs of the Academy of Sciences, USSR, and a number of their institutions and scientific personnel are probably engaged in research on space flight problems. There are fragmentary bits of evidence to support this thesis. In 1947, for example, a Department of Astrobotany was established in the Academy of Sciences of the Kazakh SSR in which research on astrobotanical and astrobiological problems relevant to space flight may be conducted.⁹ In 1958, this sector of the Department reoriented its research toward the study of the biological support of man in space.

In addition, about 130 teachers of astronomy and physics from VUZ's were trained to become heads and deputy heads of observation stations.¹⁸ Aside from their participation in the earth satellite observation program, the 13 astronomical observatories associated with the universities are probably also engaged in other aspects of space research.

Ministerial Institutes — Scientific research institutions under ministries perform both theoretical and applied research in support of the industrial, military or other responsibilities of the ministries.⁷ The Ministry of Defense probably controls a number of research organizations involved in research related to space vehicle development.

Institutions under the Academy of Medical Sciences, USSR, which is under the Ministry of Health, probably conduct research on the medical aspects of interplanetary travel.

The Ministry of Communications [redacted]
[redacted] the main organization responsible for
supplying Soviet visual observation stations

Higher Educational Institutions — According to the Ministry of Higher Education, the VUZ's played a large part in the launchings of the earth satellites and the successful experiments with the intercontinental ballistic missiles (ICBM).¹⁸ Available information

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with accurate time signals submitted to it by the All-Union Institute of Physicotechnical Measurements under the Committee on Standards, Measures, and Measuring Instruments of the Council of Ministers, USSR.

The All-Union Institute of Scientific and Technical Information — The All-Union Institute of Scientific and Technical Information (VINITI) is the USSR's main center for the processing and dissemination of all scientific and technical information, including that on space research. This Institute is the world's largest scientific and technical information processing organization and is subordinate both to the State Scientific-Technical Committee of the Council of Ministers, USSR, and the Academy of Sciences, USSR.¹¹⁻²⁰

Amateur Scientific Organizations

Clubs and amateur scientific groups play an important role in the popularization of the Soviet space flight program by participating in the observation and tracking program for earth satellites, but probably do not contribute significantly to the space research effort.

Central Air Club imeni Chkalov — One of the most important organizations that is active in the popularization of space flight is the Central Air Club imeni Chkalov, which includes a number of leading scientists.

Amateur Radio Clubs — Amateur radio clubs contribute to the Soviet earth satellite tracking program. In addition to a large number of professional radio observation stations, the USSR has a large amateur radio observation program.

The Institute of Radio Engineering and Electronics of the Academy of Sciences, USSR, published a request for radio amateurs to report their data. The request included reporting instructions. This participation stimulates interest and enthusiasm on the part of the club members and serves as an instrument for the further popularization of space flight.²²

THE PLANNING FUNCTION FOR THE SOVIET SPACE RESEARCH PROGRAM

Centralized planning of the Soviet space research program by the ICIC

facilitates an efficient allocation and utilization of scientific and technical resources and manpower in both the research and development phases of the space research program.²³

Overall planning of the broad scientific space research effort is carried out through the ICIC, which probably uses the following procedures in the formulation of space research plans:

- (1) The ICIC issues directives defining the problems to be solved.
- (2) Then problem conferences are convened under the auspices of the ICIC to facilitate the coordination of plans on particular problems.²⁴
- (3) Plans made at the conferences are probably reviewed and coordinated with the State Planning Committee, USSR, after which they become a part of the national science plan.

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(4) After approval by the Council of Ministers, USSR, the scientific projects on space research are probably assigned by the ICIC to those institutions that possess the best facilities and scientific personnel to perform the research.

National-Level Coordination

The presence on the ICIC of a large number of eminent scientists in various scientific disciplines and from a number of scientific research institutions probably facilitates a high degree of informal coordination of the space effort on a national scale. Moreover, a number of the members of the Commission are reported to be politically influential and are apparently in positions to have their views heard on the highest echelons of the Party and Government.⁵ Coordination is also achieved by problem conferences, Head Institutes, and interdisciplinary research groups.

Problem Conferences — The Soviets have held various conference problems under the auspices of the ICIC to coordinate their space research program. In 1956, the first conference of biologists and astronomers on the prognostication of conditions of life on other planets was held at the State Astronomical Institute imeni P. K. Shternberg. The conference elected a scientific council to coordinate research on the problem of prognostication of conditions of life on other planets. The council was also given the responsibility for developing a 5-year plan for scientific research on the problem.⁶ At the same conference, a 5-year plan for astrobiological research of the Institute of Biophysics of the Academy of Sciences, USSR, was also approved.

Head Institutes — In some cases, the ICIC has apparently designated specific institutes as Head Institutes to coordinate particular facets of scientific research related to the space program.¹⁰

Head Institutes, often referred to in the Soviet press as "Head," "Lead," or "Central" Institutes, are those that have proved themselves to be the most competent and best equipped scientific institutions in a given discipline. Head institutes may be subordinate

to the Academy of Sciences, USSR; the State Planning Committee, USSR; the Councils of National Economy; State Committees of the Council of Ministers, USSR; or the Ministry of Higher Education. The United Learned Council of a Head Institute has the authority to coordinate on a national scale all research activities related to the Institute's specialty and to publicize pertinent information on research planning and progress in their particular fields.¹¹ The Institute of Physics of the Atmosphere of the Academy of Sciences, USSR, for example, is responsible not only for the study of the upper atmosphere, but also for the coordination of work of Institutes working in the same field in order to prepare data for special meetings on space rockets and satellites attended by important officials and scientists from other Institutes.¹⁰ The Institute of Biological Physics of the Academy of Sciences, USSR, is also a Head Institute that coordinates the biophysical research of other Institutes and laboratories on biophysical problems, many of which are probably directly related to the space program.¹² It is quite possible that the Soviets have designated other Head Institutes to coordinate research on particular problems in the space program.

Interdisciplinary Research Groups — The solution of a number of scientific problems in the space research requires an interdisciplinary or "complex" research approach. Although there is little information on Soviet institutions engaged in interdisciplinary research specifically on space flight problems, statements of leading scientists connected with the Soviet space program emphasize the importance of utilizing the interdisciplinary approach to solve many problems. Karpenko, Scientific Secretary of the ICIC, for example, has stated that "it is necessary to get ready for interplanetary travel by solving a wide range of questions by joint efforts of astronomers, biologists, geologists, geophysicists, and many other specialists."⁹ P. A. Moiseyev, of the Institute of Evolutionary Physiology imeni Sechenova, has also stated that complex research on the problem of protecting man during his sojourn on other planets must be centered in one scientific well-equipped estab-

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lishment that will encourage other research establishments to work on the problem.⁹ Available information does not indicate that such an institute has been created in the USSR for the study of space flight problems.

The Kirghiz Academy of Sciences has announced plans to establish a scientific post in the Tien Shan Mountains which will probably engage in interdisciplinary research on problems directly connected with space flight. The scientists at the post will probably conduct astronomical observations, and study cosmic rays, atmospheric physics, radio technology, astrobotany, and other subjects.¹⁸

Special Scientific-Technical Committee

It is believed that [redacted]

[redacted] the Council of Ministers and plans the space vehicle development and satellite launching activities.³⁰ The Ministry of Defense probably exerts a direct influence in the planning of these phases of the space program through its staff components.³¹

Sino-Soviet Bloc Coordination

There is no evidence of Bloc coordination in the space research effort, but it is known that the USSR coordinates the activities of observation stations of the Sino-Soviet Bloc and helps the countries organize and equip a number of stations in order to increase the volume of observations of Soviet artificial earth satellites.¹⁶ In 1957, the Astronomical Council of the Academy of Sciences, USSR, working through the Soviet IGY Committee and the IGY Committees and Academies of Sciences of the Chinese People's Republic, the German Democratic Republic, Poland, Czechoslovakia, Hungary, Rumania, and Bulgaria, suggested that visual observation stations be established in their respective countries. As a result of the USSR's suggestion, a total of 41 observation stations were set up in Bloc countries.* Moreover, in 1957, the Academy of Sciences, USSR, presented 500 AT-1 telescopes to these stations [redacted]

* The following number of stations was established in each of the Bloc countries: Chinese People's Republic, 7; East Germany, 10; Czechoslovakia, 9; Poland, 9; Hungary, 3; Romania, 2; Bulgaria, 1.

The Soviet space flight research effort may benefit to some extent from the overall coordination of the Sino-Soviet Bloc scientific and technical effort achieved through agreements concluded between the Soviet Academy of Sciences and the national academies of the Bloc countries and through the organization of special scientific-technical cooperation commissions. The Academy of Sciences, USSR, concludes bilateral agreements with Bloc countries on scientific and technical cooperation that call for cooperation and coordination with an emphasis on theoretical research. Such agreements provide for coordination of plans on research topics of mutual interest, exchange of scientific and technical publications, and the reciprocal exchange of invitations to important scientific conferences.²⁷ The agreements concluded by the scientific-technical commissions provide primarily for exchange of documentation, delegations, and coordination of research largely in applied scientific fields.²⁸

THE CONTROL MECHANISMS FOR SOVIET SPACE RESEARCH PROGRAM

Space research, like all research in the USSR, is subject to control exercised by the Communist Party, the Committee of State Security, and the State Planning Committee, USSR.¹¹

The Communist Party

The Communist Party exercises control over the Soviet space research program through an elaborate network of Party organizations on a territorial and institutional basis. A section for "Science, Higher Educational Institutions, and Schools" is reported to exist within the apparatus of the Central Committee of the Party. Similar sections exist in the Union Republic Party Central Committees.²⁰⁻²² These sections apparently maintain Party vigilance over all scientific research, including space research, through regional Party administrative organs and primary Party units which exist in all Soviet scientific institutions. The Party units are responsible for carrying out Party and Government policies, for maintaining a business-like atmosphere and for assuring that re-

search work is completed within the established time period.²³ The units are also responsible for (i) selection, assignment, and education of cadres, scientific workers, and engineers; (ii) the ideological indoctrination of personnel; and (iii) the development of self-criticism.²⁴

If a scientific hypothesis promises to be fruitful, it is relatively easy to reinterpret doctrine to meet the ideological requirements of the Party. Party organizations have been warned to respect the opinions of the scientific community and not to interfere with the planning and administration of scientific institutions. Nevertheless, party organs are encouraged to maintain a high degree of vigilance over compliance with state policies and the fulfillment of research plans by scientific institutions.¹¹

The social and financial status of scientists is high in relation to that of other elements in Soviet society. The scientists receive high salaries, are well paid for published work and receive special awards for outstanding work. Scientists working in priority programs receive special incentives. In 1954, for example, the Presidium of the Academy of Sci-

ences, USSR, established the K. E. Tsiolkovsky Gold Medal "for outstanding work in the field of interplanetary communications."¹²

Compulsions that stem from the totalitarian nature of Soviet society will continue to cause unhappiness in individual cases but are not likely to be sufficiently widespread to result in serious loss of quality or momentum in space research.

The State Planning Committee, USSR

The State Planning Committee (GOSPLAN), USSR, probably exercises some degree of control over the space research program, as it does over all other research, through its authority to allocate resources.¹¹ Apparently after the ICIC, in cooperation with the State Planning Committee, determines the resources needed for the space research program, the Ministry of Finance is responsible for allocating the funds for the projects.

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APPENDIX

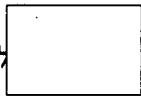
**CHARTER OF THE INTERAGENCY COMMISSION FOR INTERPLANETARY
COMMUNICATIONS ***

1. The fundamental task of the Interagency Commission for Interplanetary Communications is to assist in every way the development of scientific-theoretical and practical work in the Soviet Union concerning questions of studying cosmic space and the achievement of interplanetary communications.
2. The Commission is charged with:
 - a. Taking actions which secure the active participation of academic and branch scientific research establishments in work for the investigation of cosmic space.
 - b. Organization of work on drawing up problems, plans, and programs of scientific investigations on the fundamental trends of astronautics.
 - c. Broad attraction of scientific-research establishments, universities, and individual investigators to the solution of problems to secure the realization of flight into cosmic space.
 - d. The coordination of scientific activities of individual research institutions on problems of astronautics.
- e. The popularization of the tasks and achievements in the field of astronautics.
3. The Interagency Commission for Interplanetary Communications inquires into plans and reports concerning the activities of scientific research institutes that work on the program controlled by the Commission.
4. At its discretion, the Commission summons coordinating meetings and scientific-theoretical conferences concerning the problems of astronautics.
5. The Commission organizes competitions and carries out the examination of scientific research works submitted in the competition for the K. E. Tsiolkovskiy Gold Medal.
6. The Commission, through the foreign action of the Academy of Sciences, USSR, maintains connections with scientific organizations in foreign countries that are working in the field of investigation of cosmic space and the achievement of interplanetary communications.
7. The Interagency Commission for Interplanetary Communications comes under the Astronomical Council of the Academy of Sciences, USSR.

* As submitted by Academician L. I. Sedov to the International Astronautics Federation in October 1957.

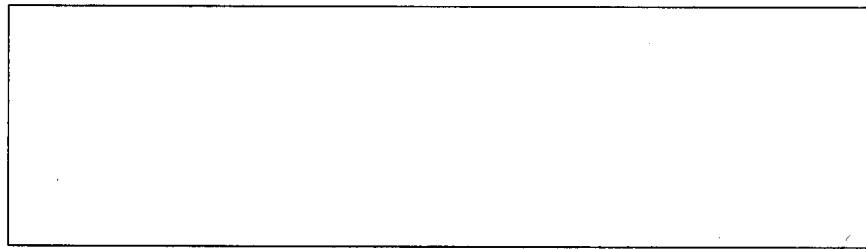
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