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NATIONAL SECURITY COUNCIL

U. S. POLICY ON OUTER SPACE

Approved by the President
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NOTE BY THE EXECUTIVE SECRETARY
to the
NATIONAL SECURITY COUNCIL
on
U. S. POLICY ON OUTER SPACE

References: A. NSC 5814/1
B. NSC 5906/1, paragraph 63
C. NSC Action No. 2114

The enclosed draft statement of policy on the subject, prepared under the auspices of the National Aeronautics and Space Council, is transmitted herewith for consideration by the National Security Council at a joint meeting with the National Aeronautics and Space Council on Tuesday, December 29, 1959, at 2:30 p.m..

The National Aeronautics and Space Council was assisted in the preparation of the enclosure by an ad hoc committee consisting of the Deputy Administrator, National Aeronautics and Space Administration (Chairman), representatives of the Departments of State and Defense, the National Aeronautics and Space Administration, the Atomic Energy Commission, the National Science Foundation, and the Office of the Special Assistant to the President for Science and Technology, and Advisory members from the Bureau of the Budget, the Central Intelligence Agency, the Joint Chiefs of Staff, and the U. S. Information Agency.

The enclosure is also being circulated as a National Aeronautics and Space Council document. In view of this fact, this report is being given a limited NSC distribution.

The enclosed statement of policy is intended, if adopted, to supersede NSC 5814/1.

JAMES S. LAY, JR.
Executive Secretary

cc: The Secretary of the Treasury
The Attorney General
The Director, Bureau of the Budget
The Chairman, Atomic Energy Commission
The Chairman, Joint Chiefs of Staff
The Director of Central Intelligence
The Special Assistant to the President
for Science and Technology
The Director, U. S. Information Agency
The Director, National Science Foundation
The Director, National Aeronautics and Space Administration

U. S. POLICY ON OUTER SPACE

Table of Contents

SECRET

GENERAL CONSIDERATIONS

SCOPE OF POLICY

1. This policy is concerned with U. S. interests in scientific, civil, military, and political activities related to outer space. It deals with sounding rockets, earth satellites, and other space vehicles, their relationship to the exploration and use of outer space, and their political and psychological significance. Although the relation between outer space technology and ballistic missile technology is recognized, U. S. policy on ballistic missiles is not covered in this policy. Anti-missile defense systems also are not covered except to the extent that space vehicles may be used in connection with such systems.

SIGNIFICANCE OF OUTER SPACE TO U. S. SECURITY

2. Outer space presents a new and imposing challenge. Although the full potentialities and significance of outer space remain largely to be explored, it is already clear that there are important scientific, civil, military, and political implications for the national security, including the psychological impact of outer space activities which is of broad significance to national prestige.

3. Outer space generally has been viewed as an area of intense competition which has been characterized to date by comparison of Soviet and U. S. activities. The successes of the Soviet Union in placing the first earth satellite in orbit, in launching the first space probe to reach escape velocity, in achieving the first "hard" landing on the moon and in obtaining the first pictures of the back side of the moon have resulted in substantial and enduring gains in Soviet prestige. The U. S. has launched a greater number of earth satellites and has also launched a space probe which has achieved escape velocity. These U. S. activities have resulted in a number of scientifically significant "firsts." However, the space vehicles launched by the Soviet Union have been substantially heavier than those of the U. S., and weight has been a major point of comparison internationally. In addition, the Soviets have benefited from their ability to conceal any failures from public scrutiny.

4. From the political and psychological standpoint the most significant factor of Soviet space accomplishments is that they have produced new credibility for Soviet statements and claims. Where once the Soviet Union was not generally believed, even its baldest propaganda claims are now apt to be accepted at face value, not only abroad but in the United States. The Soviets have used this credibility for the following purposes:

a. To claim general superiority for the Soviet system on the grounds that the Sputniks and Luniks demonstrate the ability

SECRET

of the system to produce great results in an extremely short period of time.

b. To claim that the world balance has shifted in favor of Communism.

c. To claim that Communism is the wave of the future.

d. To create a new image of the Soviet Union as a technologically powerful, scientifically sophisticated nation that is equal to the U. S. in most respects, superior in others and with a far more brilliant future.

e. To create a new military image, of the vast manpower of the Communist nations now backed by weaponry that is as scientifically advanced as that of the West, superior in the missile field, and superior in quantity in all fields.

5. Soviet efforts already have achieved a considerable degree of success, and may be expected to show further gains with each notable space accomplishment, and particularly each major "first."

6. Significant advances have been made in restoring U. S. prestige overseas, and in increasing awareness of the scope and magnitude of the U. S. outer space effort. Although most opinion still considers the U. S. as probably leading in general scientific and technical accomplishments, the USSR is viewed in most quarters as leading in space science and technology. There is evidence that a considerable portion of world leadership and the world public expects the United States to "catch up" with the Soviet Union, and further expects this to be demonstrated by U. S. ability to equal Soviet space payloads and to match or surpass Soviet accomplishments. Failure to satisfy such expectations may give rise to the belief that the United States is "second best," thus transferring to the Soviets additional increments of prestige and credibility now enjoyed by the United States.

7. To the layman, manned space flight and exploration will represent the true conquest of outer space and hence the ultimate goal of space activities. No unmanned experiment can substitute for manned space exploration in its psychological effect on the peoples of the world. There is reason to believe that the Soviets, after getting an earlier start, are placing as much emphasis on their manned space flight program as is the U. S.

SECRET

8. The scientific value of space exploration and the prestige accruing therefrom have been demonstrated. The scientific uses of space are a potent factor in the derivation of fundamental information of use in most fields of knowledge. Further, the greater the breadth and precision the knowledge of the space environment, the greater the ability to exploit its potentials.

9. Among several foreseeable civil applications of earth satellites, two at present offer unique capabilities which are promising in fields of significance to the national economy: communications and meteorology. Other civil potentials are also likely to be identified.

10. The great importance of certain military utilization of outer space already has been recognized; however, the full military potential of outer space remains to be determined by further experience, studies, technical developments and strategic considerations. Space technology constitutes a foreseeable means of obtaining increasingly essential information regarding [redacted] Space technology is being further utilized with the intention of more effectively accomplishing other military functions by complementing or extending non-space capabilities. In addition, as space technology and resulting uses of outer space expand, new military requirements and opportunities for development of new military capabilities are likely to materialize.

11. Space vehicles may also have important application and may play a key role in the implementation of international agreements which may be concluded respecting the reduction and control of armaments, cessation of atomic tests, and safeguards against surprise attack.

12. Outer space activities present new opportunities and problems in the conduct of the relations of the U. S. with its allies, neutral states, and the Soviet bloc; and the establishment of sound international relationships in this new field is of fundamental significance to the national security. Of importance in seeking such relationships is the fact that all nations have an interest in the purposes for which outer space is explored and used and in the achievement of an orderly basis for the conduct of space activities. Moreover, many nations are capable of participating directly in various aspects of outer space activities, and international participation in such applications of space vehicles as those involved in scientific research, weather forecasting, and communications may

be essential to full realization of the potentialities of such activities. In addition, an improvement of the international position of the U. S. may be effected through U. S. leadership in extending internationally the benefits of the peaceful uses of outer space. The fact that the results of arrangements in certain fields, even though entered into for peaceful purposes, could have military implications, may condition the extent of such arrangements in those fields.

USE OF OUTER SPACE

General

13. As further knowledge of outer space is obtained, the advantages to be accrued will become more apparent. At the present time, space activities are directed toward technological development and scientific exploration; however, it is anticipated that systems will be put into operation, beginning in the near future, that will more directly contribute to national security and well-being and be of international benefit.

14. Present and planned outer space activities will require the use of the following classes of vehicles:

a. Sounding Rockets* - Vehicles that are launched vertically or in a ballistic trajectory to heights well outside the earth's atmosphere and return to earth.

b. Earth Satellites - Manned and unmanned vehicles that orbit the earth.

c. Space Probes and Interplanetary Space Vehicles - Manned and unmanned vehicles that escape the earth environment to traverse interplanetary space.

15. It is not possible to foresee all the uses of outer space, but the ability to identify and develop such uses will be significantly influenced by the breadth of the exploratory scientific research which is undertaken.

Scientific Research and Exploration

16. Space technology affords new and unique opportunities for immediate and long-range scientific observation, experimentation, and

* Sounding rockets have also been defined as those vertically launched rockets that do not penetrate outer space beyond one earth radius, approximately 4000 statute miles.

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exploration which will add to our knowledge and understanding of the earth, the solar system, and the universe. Immediate opportunities exist in many areas, including among others:

a. Atmosphere - Study of the structure and composition of the earth's outer atmosphere.

b. Ionosphere - Measurement of the electron density of the earth's outer ionosphere and its temporal and spacial variations.

c. Energetic Particles - Measurement of cosmic ray intensity, radiation belts, and auroral particles and their variations with time and space in the vicinity of the earth and moon.

d. Electric and Magnetic Fields - Measurement of the magnitude and variations of the earth's magnetic field and the associated ionospheric electric currents.

e. Gravitational Fields - Study of the detailed motion of existing and special satellites with the object of determining a more detailed picture of the earth's and moon's gravitational field.

f. Astronomy - Preliminary investigation of the moon; and measurement of spectra, especially in the ultraviolet and X-ray regions, including the brightness and positions of interesting regions of the sky.

g. Bio Sciences - Investigation of the effects of outer space on living organisms, especially those which have most application to the manned exploration of outer space.

h. Geodesy - Measurement of the size and shape of the earth, and location of land masses and water.

17. Future possibilities for scientific research and exploration include: continuation on a more sophisticated basis of the measurements of atmospheres, ionospheres, electric and magnetic fields, and expansion of such measurements to Mars and Venus and ultimately throughout the solar system; astronomical observations from points beyond the earth's atmosphere; manned and unmanned exploration of the moon and the planets; advanced experiments designed to test certain predictions of the theory of relativity and other theories relating to the fundamental nature of the universe; investigation of the occurrence of biological phenomena in outer space.

SECRET

Operational Applications of Space Technology

18. All applications of the technology of outer space that now show promise of early operational utility for military or civilian purposes are based on the earth satellite. These applications ultimately will have to meet one of several criteria if they are to survive in either the defense program or the civilian economy. They will either have to make possible the more efficient operation of an existing activity, the effective extension of an existing activity, or the creation of a new and desirable activity. It is expected that benefits will be gained from these applications, but the full extent of their military, economic, political and social implications has yet to be determined. Military applications are designed to enhance military capabilities by fulfilling stated requirements of the Military Services and are currently being developed for use as operational systems. The applications that are expected to be available earliest are as follows:*

a. Meteorology - Satellite systems to provide weather data on a global scale, making use of such techniques as television, optics, infrared detectors and radar. Information on cloud cover, storm locations, precipitation, wind direction, heat balance and water vapor would permit improved weather forecasting, including storm warnings, useful in a variety of civil activities such as agricultural, industrial and transportation activities, and would provide weather information to meet military operational needs.

b. Communications - Satellite systems to improve and extend existing world-wide communications. For the Military Services, such systems would provide more effective global military communications for purposes of command, control, and support of military forces. Civil applications will benefit through more prompt service, increased message capacity, and greater reliability. Direct world-wide transmission of voice and video signals is envisaged.

c. Navigation - Satellite system to provide global all-weather capability, for land, sea and air vehicles, which will permit accurate determination of position; in the case of the military, secure operations would be possible.

d. Mapping and Geodetic Control - Satellite systems to produce accurate, world-wide mapping data of economic, military and political importance and to provide geodetic control data such as those required for missile operations.

* Order of listing does not indicate anticipated order of availability.

e. [redacted]

f. Early Warning - Satellite systems to provide, through the use of infrared techniques, early warning that a missile attack has been launched.

g. Inspection and Control - Satellite systems to enforce possible international agreements respecting the control of armaments, cessation of atomic tests and safeguards against surprise attack.

19. In addition to continued improvement of the foregoing systems, future military possibilities under study include: passive and active defense systems to detect and to destroy enemy missiles or space vehicles: [redacted]

Manned Space Flight and Exploration

20. It is expected that manned space flight will add significantly to the effectiveness of many of the scientific, military and civil applications indicated in the foregoing paragraphs. There are a number of important reasons why manned space activities, including the initial step of placing a man in orbit, are being carried out. Primary among these are:

a. To the layman, manned space flight and exploration will represent the true conquest of outer space. No unmanned experiment can substitute for manned exploration in its psychological effect on the peoples of the world.

b. Man's judgment, decision-making capability, and resourcefulness will ultimately be needed in many instances to ensure the full exploitation of space technology.

Moreover, manned space flight is required for scientific studies in which man himself is the principal subject of the experiment, because there is no substitute for the conduct in outer space of essential psychological and biological studies of man.

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INTERNATIONAL PRINCIPLES, PROCEDURES, AND ARRANGEMENTS

21. National policies and international agreements have dealt extensively with "air space" and expressly assert national sovereignty over this region; however, the upper limit of air space has not been defined. The term "outer space" also has no accepted definition, and the consequences of adopting a definition cannot now be fully anticipated. Although an avowedly arbitrary definition might prove useful for specific purposes, most of the currently foreseeable legal problems of outer space may be resolved without a precise line of demarcation between air space and outer space.

22. The U. S. has advanced and a number of states have accepted the view that outer space is not wholly without law inasmuch as the United Nations Charter and the Statute of the International Court of Justice are not spatially limited. Furthermore, the principles and procedures developed in the past to govern the use of air space and also the sea may provide useful analogies. However, many problems of outer space will be unique in character.

23. An initial problem, in which all states have an interest, involves the permissibility of various activities in outer space. With respect to this problem, the report of the United Nations Ad Hoc Committee on the Peaceful Uses of Outer Space expresses the following view which the U. S. has supported:

> "During the International Geophysical Year 1957-1958 and subsequently, countries throughout the world proceeded on the premise of the permissibility of the launching and flight of the space vehicles which were launched, regardless of what territory they passed over during the course of their flight through outer space. The Committee, bearing in mind that its terms of reference refer exclusively to the peaceful uses of outer space, believes that, with this practice, there may have been initiated the recognition or establishment of a generally accepted rule to the effect that, in principle, outer space is, on conditions of equality, freely available for exploration and use by all in accordance with existing or future international law or agreements."

In this connection, it should be noted that definitions of "peaceful" or "non-interfering" uses of outer space have not been advanced by the United States or other states.

24. Although the U. S. has not to date recognized any upper limit to its sovereignty, a principle of freedom of outer space, such as that expressed by the United Nations Ad Hoc Committee, suggests

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that at least in so far as peaceful exploration and use of outer space are concerned, the right of states to exclude persons and objects may not obtain. However, the full implications of a principle of freedom of outer space, in contrast with a principle of national sovereignty over outer space, remain to be fully assessed.

25. It is possible that certain military applications of space vehicles may be accepted as peaceful or acquiesced in an non-interfering. On the other hand, it may be anticipated that states will not willingly acquiesce in unrestricted use of outer space for activities which may jeopardize or interfere with their national interests.

26. There is frequent and sharpening concern on the part of world opinion over the military implications of unchecked competition in outer space between the U. S. and the Soviet Union, and there is an accompanying interest in international agreements, controls or restrictions to limit the dangers felt to stem from such competition. With regard to the armaments control aspects of outer space, the United States first proposed in 1957, in connection with international consideration of an armaments control system, that a multilateral technical committee be set up to attempt to design an inspection system to ensure that the sending of objects through outer space will be exclusively for peaceful purposes. Furthermore, the United States has offered, if there is general agreement to proceed with this study on a multilateral basis, to join in this study without awaiting the conclusion of negotiations on other substantive disarmament proposals. There has not, to date, been multilateral agreement to proceed with such a study, and U. S. policy has not been determined concerning either the scope of control and inspection required to ensure that outer space could be used only for peaceful purposes or the relationship of any such control arrangement to other aspects of an arms agreement.*

27. Exploration and use of celestial bodies require separate consideration. Neither the U. S. nor any other state has yet taken a position regarding the questions of whether a celestial body is capable of appropriation to national sovereignty and if so what acts would suffice to found a claim thereto. It is clear that serious problems would arise if a state claimed, on one ground or another, exclusive rights over all or part of a celestial body. At an appropriate time some form of international arrangement may prove useful.

28. Other problems in which all states have an interest arise from the operation of space vehicles. The following problems appear

* Basic national security policy with respect to disarmament is stated in paragraph 52 of NSC 5906/1.

amenable to early treatment with a view to seeking internationally a basis for orderly accomplishment of space vehicle operations: (a) identification and registration of space vehicles; (b) liability for injury or damage caused by space vehicles; (c) reservation of radio frequencies for space vehicles and the related problem of termination of transmission; (d) avoidance of interference between space vehicles and aircraft; and (e) the re-entry and landing of space vehicles, through accident or design, on the territory of other states.

29. Although only a few states may be capable of mounting comprehensive outer space efforts, many states are capable of participating in the conduct of outer space activities, and active international cooperation in selected activities offers scientific, economic, and political opportunities. Continuation and extension of such cooperation in the peaceful uses of outer space through a variety of governmental and non-governmental arrangements should further enhance the position of the United States as the leading advocate of the exploration and use of outer space for the benefit of all. Where space vehicles are employed for military applications, some degree of international cooperation may also prove useful. Any international arrangements for cooperation in outer space activities may require determination of the net advantage to U. S. security.

30. The role most appropriately undertaken by the United Nations with respect to the foregoing matters appears to lie in performing two principal functions: (a) facilitating international cooperation in the exploration and use of outer space, and (b) providing a forum for consultation and agreement respecting international problems arising from outer space activities. Future developments may make it desirable for additional functions to be performed by or under the auspices of the United Nations.

OBJECTIVES

31. Carry out energetically a program for the exploration and use of outer space by the U. S., based upon sound scientific and technological progress, designed: (a) to achieve that enhancement of scientific knowledge, military strength, economic capabilities, and political position which may be derived through the advantageous application of space technology and through appropriate international cooperation in related matters, and /(b) to achieve and demonstrate an over-all U. S. superiority in outer space without necessarily requiring United States supremacy in every phase of space activities./[1]

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1 Budget wants to delete.

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POLICY GUIDANCE

PRIORITY, SCOPE AND LEVEL OF EFFORT

32. Commit and effectively apply adequate resources with a priority sufficient to enable the U. S. /at the earliest practicable time/[1] to achieve the objectives as stated in paragraph 31.

33. Relate the resources and effort to be expended on outer space activities to other programs to ensure that the anticipated gains from such activities are properly related to possible gains from other programs which may be competitive for manpower, facilities, funds or other resources.

34. In addition to undertaking necessary immediate and short-range activities related to outer space, develop goals and supporting plans for outer space activities for the longer range, through at least a ten-year period.

35. Study on a continuing basis the implications and possible consequences which United States and foreign exploitation of outer space may hold for international and national political and social institutions. Critically examine such exploitation for possible consequences on activities and on life on earth (e.g., the use of nuclear energy for auxiliary or main power sources or for other applications in outer space which may affect health, or other outer space activities which may affect weather or other factors relating to activities and life on earth).

36. Periodically evaluate and compare the space activities of the U. S. and USSR with a view to determining, in so far as possible, the goals and relative rate of progress of each country's program.

PSYCHOLOGICAL EXPLOITATION

37. To minimize the psychological advantages which the USSR has acquired as a result of space accomplishments, select from among those current or projected U. S. space activities of intrinsic military, scientific or technological value, one or more projects which offer promise of obtaining a demonstrably effective advantage over the Soviets

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[1] Budget wants to delete.

and, so far as is consistent with solid achievements in the over-all space program, stress these projects in present and future programming.

38. Identify, to the greatest extent possible, the interests and aspirations of other Free World nations in outer space with U. S.-sponsored activities and accomplishments.

39. Develop information programs that will exploit fully U. S. outer space activities on a continuing basis; especially develop programs to counter overseas the psychological impact of Soviet outer space activities and to present U. S. outer space progress in the most favorable light.

MANNED SPACE FLIGHT

42. [At the earliest practicable time, proceed with manned space flight and exploration, starting with the recovery from orbit of a manned satellite.][1]

INTERNATIONAL PRINCIPLES, PROCEDURES AND ARRANGEMENTS

43. Continue to support the principle that, in so far as peaceful exploration and use of outer space are concerned, outer space is freely available for exploration and use by all, and in this connection: (a) consider as a possible U. S. position the right of transit through outer space of orbital space vehicles or objects not equipped to inflict injury or damage; (b) where the U. S. contemplates military applications of space vehicles and significant adverse international reaction is anticipated, seek to develop measures designed to minimize or counteract such reaction; and (c) consider the usefulness of international arrangements respecting celestial bodies.

44. Conduct a study of the implications for the national security of the expression "peaceful uses of outer space" with a view to defining this expression in a manner that would best serve the interests of the U.S.

[1] Budget wants to delete.

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45.[1] Taking into account, among other factors, the relationship of outer space capabilities of the present and future security position of the United States, study:

a. The scope of control and character of safeguards required in an international system designed to assure that outer space be used for peaceful purposes only; include in this study an assessment of the technical feasibility of a positive enforcement system and an examination of the possibility of multi-lateral or international control of all outer space activities.

b. The relationship between any international arrangement to assure that outer space be used for peaceful purposes only and other aspects of the regulation and reduction of armed forces and armaments.

45.[2] Considering fully the relationship of space capabilities to the present and future over-all U. S. military posture, ensure that no international agreements might be reached which would result in a net disadvantage to the United States by sustaining or enhancing over-all Soviet military capabilities while restricting those of the United States. In this connection, study the relationship between any international arrangement to assure that outer space be used for peaceful* purposes only and other aspects of the regulation and reduction of armed forces and armaments.

46.[2] Ensure that any international agreements which would place major restrictions or limitations upon military use of outer space are accompained by enforceable and positive guarantees of compliance with such agreements. In this connection, study the scope of control and character of safeguards required in an international system designed to assure that outer space be used for peaceful* purposes only; include in this study an assessment of the technical feasibility of a positive enforcement system and an examination of the possibility of multi-lateral or international control of all outer space activities.

* This does not necessarily exclude military applications

1 State, Budget, NASA, NSF and Spec. Assistant to the President for Science and Technology proposal

2 Defense/JCS proposal

SECRET

47. In the interest of establishing an international basis for orderly accomplishment of space flight operations, explore the desirability of and, where so indicated, seek international agreement on such problems as: (a) Some form of identification and registration of space vehicles which is to the net advantage to national security; (b) liability for injury or damage caused by space vehicles; (c) reservation of radio frequencies for space vehicles and the related problem of termination of transmission; (d) avoidance of interference between space vehicles and aircraft; and (e) the re-entry and landing of space vehicles, through accident or design, on the territory of other nations.

48. Seek to increase international cooperation in selected activities relating to the peaceful exploration and use of outer space by such means as: (a) Arrangements within the framework of the international scientific community including the Committee on Space Research (COSPAR) of the International Council of Scientific Unions, and (b) bi-lateral and multi-lateral arrangements between the U. S. and other countries including the Soviet Union. International arrangements for cooperation in outer space activities should consider the net advantage to U. S. security.

49. Support the United Nations in facilitating international cooperation in the exploration and use of outer space and in serving as a forum for consultation and agreement respecting international problems arising from outer space activities.

50. Develop means and take appropriate measures to insure that the U. S. leads the USSR in making the scientific and technological information from its outer space program available to the world at large.

SECURITY CLASSIFICATION

51. In implementing security classification regulations, take special account of the lead achieved by the USSR in outer space activities and the advantages to the U. S. which result from the maximum availability and use of scientific and technological information and material.

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THE SOVIET SPACE PROGRAM

1. Soviet Objectives: The USSR has announced that the objective of its space program is the attainment of manned interplanetary travel. At present, the program appears to be directed toward the acquisition of scientific and technological data which would be applicable to Soviet space activities, their ICBM program, and basic scientific research. While the space program was undoubtedly initiated to serve scientific purposes, one of the primary underlying motivations which continues to give it impetus is the promise of substantial world-wide political and psychological gains for the USSR. Military considerations may have little bearing on the decision to develop certain types of space vehicles, although the successful development of these vehicles may result in military applications. Thus, it can be concluded that the Soviet space program has four major objectives. These objectives will have varying priorities as the program itself progresses and as new political and military requirements develop:

a. Manned space travel

b. Scientific research

c. Propaganda

d. Military applications.

Of the above, it appears now that flight test priority has been on the scientific and propaganda objectives rather than on man-in-space or military applications.

2. Background: Russian interest in space flight dates back to 1903 when a scientific paper was published entitled: "Investigation of Universal Space by Means of Rocket Flight," by the eminent Russian scientist Tsiolkovsky. Several other Russian actions took place during the succeeding years to the present which have been identified as at least partially associated with a space program. These have included the founding of the Soviet Institute of Theoretical Astronomy in 1923, establishment in 1934 of a government-sponsored rocket research program, flights of animals in vertical rockets since the early 1950's and systematic investigations of moon flight problems starting in 1953. The establishment in early 1955 of the Interagency Commission for Interplanetary Communications was indicative of the Soviet realization that theory and capability for space flight were both feasible and that accomplishment of a long cherished ambition was within sight.

3. Priority: The Soviets have demonstrated that they are conducting a well-planned space flight program. The importance attached to this program is illustrated by the high quality of the scientists assigned to its direction, by the broad range of facilities and specialists engaged in its implementation, and by the wealth of theoretical and applied research being conducted in its support. However, the numbers of space vehicles actually launched over the past few years have not been as numerous as had been expected and it is apparent that their actual flight program is proceeding at a fairly deliberate pace. While there is no direct evidence on the priority of the over-all Soviet space program vis-a-vis the military missile program, it is believed that any interference between the two would be resolved in favor of the missile program. To date however, there is no indication that the space program has interfered with the missile program.

4. Capabilities: The Soviet Union dramatically demonstrated its interest and capability in space flight with the orbiting of two earth satellites in the fall of 1957, and a third in May 1958. These were followed by the launching of three lunar associated vehicles in 1959. Evidence indicates that the Soviet space program has been built on the foundation of military rocketry and guidance systems, with military and other facilities probably engaged dually in supporting tests of military ballistic missiles and space experiments. Thus, although these first space flights were doubtlessly undertaken for the furtherance of scientific knowledge and for whatever psychological and political advantage would accrue, the Soviet military, by intimate participation of its hardware, personnel, and facilities, has been in a position to utilize immediately such knowledge for the enhancement of the Soviet military position and objectives. The realization of more advanced space projects, particularly those involving manned flight, must be preceded by a vast amount of scientific and technological work directed towards the development of useable space vehicles, the determination of basic operational requirements and limitations, and the creation of an environmnet and equipment capable of sustaining human life in outer space. Since such a program embraces virtually all fields of science and engineering, the following areas were particularly examined for evidence of Soviet technical capability: guided missiles, (including vertical rocket launchings), re-entry vehicles and techniques, propulsion, guidance, communications, space medicine, internal power supplies, and celestial mechanics. While firm association of these fields with a space program varied considerably, it is noted that the state of Soviet art in all the sciences required in a space program is such that no scientific or technical barriers of magnitude have been noted. Four areas deemed critical to a space program have apparently received considerable attention by the USSR; e.g., development of large rocket-engine propulsion systems, vertical rocket flights with animals (including recovery devices), space medicine, and celestial mechanics. There are indications that Soviet advanced thinking and study

in astro-biology apparently have been de-emphasized in favor of providing an artificial environment within a vehicle suitable for manned space flight.

5. Future Capabilities:

a. There is no firm evidence of Soviet future plans for the exploration of outer space with either unmanned or manned vehicles. It is believed they will continue and expand their scientific research with further unmanned earth satellites, lunar probes (including satellites and soft landings), solar and planetary probes. Manned experiments will probably be conducted in earth satellites, circum-lunar flights and soft landings on the moon. It is expected that all manned flights into outer space will be preceded by similar tests with animals, unless for political purposes the Soviets attempt a high risk program. Man-in-space programs are confronted by many problems or hazards, the most immediate of which are recovery and life support over extended periods. While data which might lead to solutions or better understandings of both can be obtained from instrumented packages which are orbited and recovered, accomplishment of the same test with animals would provide data of more direct application to subsequent attempts with man.

b. The dates estimated for specific Soviet accomplishments in space represent the earliest possible time periods in which each specific event could be accomplished. It is recognized that the various facets of the space flight program are in competition not only among themselves, but with other priority programs, and that the USSR probably cannot undertake all the space flight activities described below at the priority required to meet the time periods specified. At this time it cannot be determined which specific space flight activities enjoy the higher priorities and will be pursued first.

c. No attempt has been made to estimate manned space missions beyond the earth-moon realm. The time periods in which the successful development of sub-systems essential to planetary flight activities can be brought to fruition and integrated into a complete space flight system cannot be foreseen.

d. Similarly, considerations of military applications have been limited to earth orbiting types of space vehicles. Missions beyond this realm are considered only in the scientific or exploratory sense because we believe they cannot be successfully accomplished in the time period considered.

6. An estimate of a possible Soviet space development program is as follows:

POSSIBLE SOVIET SPACE DEVELOPMENT PROGRAM

SPACE PROGRAM OBJECTIVES	FIRST POSSIBLE CAPABILITY DATE

These dates represent the earliest possible time period in which each specific event could be successfully accomplished. However, competition between the space program and the military missile program as well as within the space program itself makes it unlikely that all of these objectives will be achieved within the specified time periods.

Unmanned Earth Satellites	
5000-10,000 pounds, low orbit satellites	1959
Recoverable (including biological) satellites	1959
Military Satellites:-The dates shown are the earliest in which feasibility demonstrations could begin. Generally, militarily useful vehicles would be available 2-3 years after the feasibility demonstration.	
Unmanned Lunar Rockets	
Biological Probe	1959
Satellite of the Moon	1959
Soft Landings	1960
Lunar Landing, Return and Earth Recovery	1963-1964
Planetary Probes	
Mars	about Oct. 1960
Venus	about Jan. 1961
Manned Vertical or Short Down-Range Flight	1959
Manned Earth Satellites - The specified time periods for manned accomplishments are predicated on the Soviets having previously successfully accomplished a number of similar unmanned ventures.	
Capsule-type Vehicles 1/	Mid-1960-mid-1961
Glide-type Vehicles	1 to 2 years after above
Maneuverable (minimum: conventional propulsion)	1963
Maneuverable (nuclear propulsion)	about 1970
Space Platform (minimum, non-ecological, feasibility demonstration)	1965
Space Platform (long-lived)	about 1970
Manned Lunar Flights	
Circumlunar	1964-1965
Satellites (temporary)	1965-1966
Landings	about 1970

1/ Recovery would probably be attempted after the first few orbits but life could probably be sustained for about a week.

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ANNEX B

ESTIMATED FUNDING* REQUIREMENTS

SUMMARY

	Fiscal Year 1960	1961	1962	1963	1964
NASA	524.0	802.0	1031.0	1171.0	1350.0
AEC	46.7	41.5	66.0	60.6	55.2
Defense	483.8	480.7	747.5	750.0	728.0
Total	1054.5	1324.2	1844.5	1981.6	2133.2

* Figures are in millions of dollars.
More detailed agency estimates given on following pages.

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ESTIMATED FUNDING* REQUIREMENTS

OF

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

	Fiscal Year 1960	1961	1962	1963	1964
RESEARCH & DEVELOPMENT					
Launching Vehicle Dev.	57	140	163	230	375
Space Propulsion Technol.	39	51	118	120	90
Vehicle Systems Technol.	13	30	47	49	50
Manned Space Flight	87	108	120	135	180
Scientific Investig. in Space	82	95	140	145	150
Satellite Applications	11	27	36	60	75
Aeronautical and Space Res.	28	61	70	70	70
Space Flight Operations	16	33	42	50	55
SUB TOTAL - Research & Dev.	333	545	736	859	1045
CONSTRUCTION & EQUIPMENT	100	89	120	137	130
SALARIES & EXPENSES	91	168	175	175	175
TOTAL FUNDS REQUIRED	524	802	1031	1171	1350

* Figures are in millions of dollars.

These figures represent a level of effort which corresponds to an efficient and steadily growing capability. The rate of progress could be improved by an increased funding level, primarily by improving the certainty of the timely completion of the many essential engineering developments.

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ESTIMATED FUNDING* REQUIREMENTS

OF

ATOMIC ENERGY COMMISSION

	Fiscal Year				
	1960	1961	1962	1963	1964
PROJECT					
Rover - Nuclear rocket	31.5	24.9	33	32.6	26.2
SNAP - Nuclear auxiliary power system	15.2	16.6	33	28	29
Total	46.7	41.5	66.0	60.6	55.2

* Figures are in millions of dollars.

ESTIMATED FUNDING* REQUIREMENTS

OF

MILITARY PROGRAMS USING SPACE SUB-SYSTEMS

PROJECT	PURPOSE	Fiscal Year 1960	1961	1962	1963	1964
DISCOVERER	Res. & Dev.	64.6	3.6	0.0	0.0	0.0
[redacted]						
EARLY WARNING	Res. & Dev.	46.9	81.0	130.0	60.0	40.0
	Construction	12.8	11.0	0.0	0.0	0.0
	Operations	0.0	10.0	100.0	100.0	100.0
	Sub Total	59.7	102.0	230.0	160.0	140.0
NAVIGATION	Res. & Dev.	10.5	7.0	5.0	5.0	5.0
	Construction	0.0	1.1	3.0	3.0	3.0
	Operations	0.0	0.0	11.0	4.0	4.0
	Sub Total	10.5	8.1	19.0	12.0	12.0
COMMUNICATIONS	Res. & Dev.	36.0	42.0	90.0	80.0	60.0
	Construction	2.3	2.3	-	-	-
	Operations	0.0	3.7	42.0	73.0	108.0
	Sub Total	38.3	48.0	132.0	153.0	168.0
MAPPING AND GEODESY	Res. & Dev.	0.0	0.0	0.5	18.0	11.0
STUDIES AND ANALYSES	Res. & Dev.	12.0	12.0	12.0	12.0	12.0
COMPONENT DEV.	Res. & Dev.	0.0	0.0	20.0	20.0	20.0
VEHICLE DEV.	Res. & Dev.	81.4	0.0	0.0	0.0	0.0
SPACE SURVEILL.	Res. & Dev.	12.0	18.0	30.0	35.0	30.0
Sub Total		448.8	422.7	643.5	590.0	533.0
AEROSPACE TEST VEHICLE (DYNASOAR)		35.0	58.0	104.0	160.0	195.0
GRAND TOTAL		483.8	480.7	747.5	750.0	728.0

* Figures are in millions of dollars and represent the best estimates of the Research & Development Divisions of the Military Services. All figures beyond FY 1960 are good for broad planning purposes only.

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