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# Soviet Space Programs

National Intelligence Estimate  
Volume I--Key Judgments  
and Executive Summary

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NIE 11-1-85J

SOVIET SPACE PROGRAMS  
VOLUME I—KEY JUDGMENTS  
AND EXECUTIVE SUMMARY

Information available as of 5 December 1985  
was used in the preparation of this Estimate,  
which was approved by the National Foreign  
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THE NATIONAL FOREIGN INTELLIGENCE BOARD CONCURS, EXCEPT AS NOTED IN THE TEXT.

*The following intelligence organizations participated in the preparation of the Estimate:*

The Central Intelligence Agency, the Defense Intelligence Agency, the National Security Agency, and the intelligence organization of the Department of State.

*Also Participating:*

The Assistant Chief of Staff for Intelligence, Department of the Army

The Director of Naval Intelligence, Department of the Navy

The Assistant Chief of Staff, Intelligence, Department of the Air Force

The Director of Intelligence, Headquarters, Marine Corps

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PREFACE

This Estimate is published in two volumes. Volume I includes the Key Judgments and Executive Summary. Volume II is a comprehensive discussion of Soviet space programs. CIA Statute

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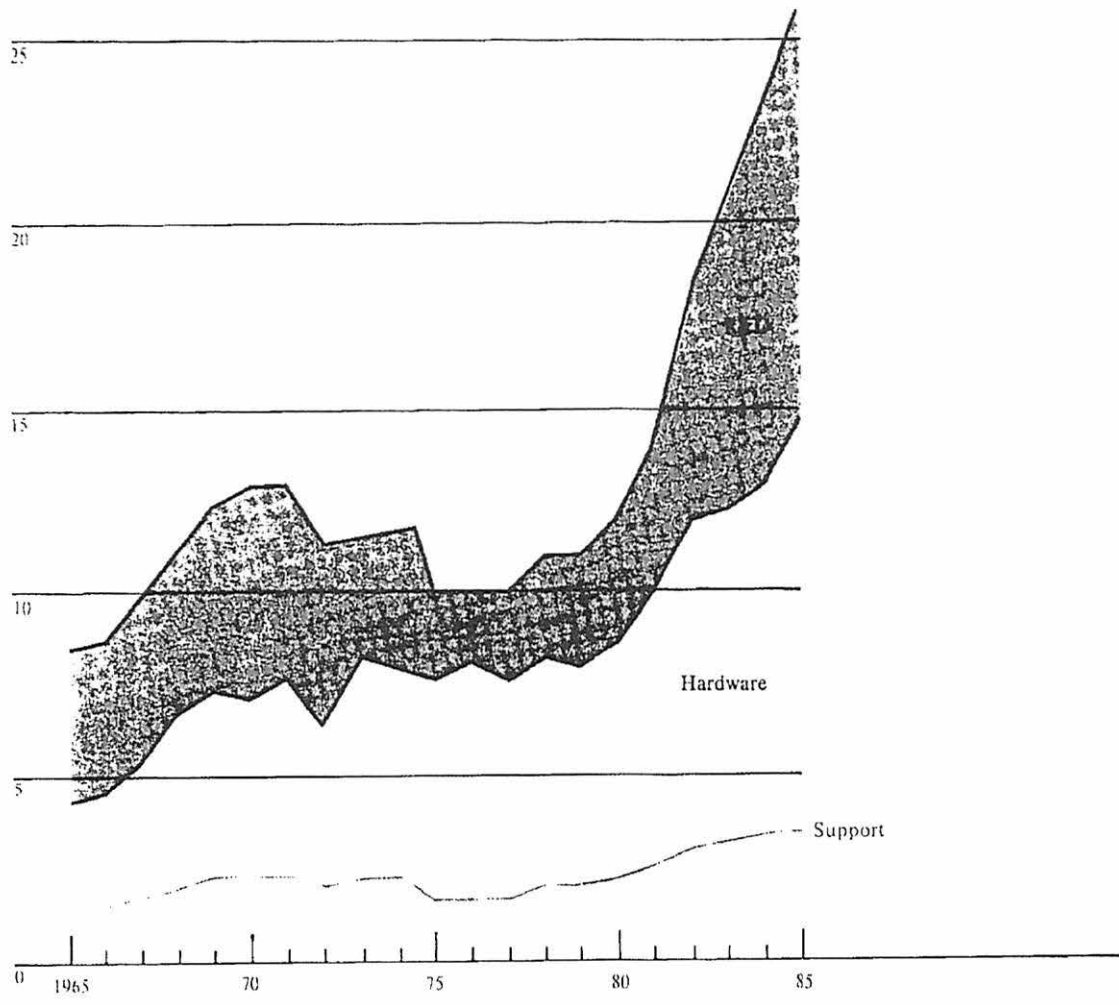
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**Figure 1**  
Soviet Space Expenditures, 1965-85

Billion 1983 US \$  
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## KEY JUDGMENTS

A continuing trend toward the increasing use of space assets by Soviet military forces is clearly foreshadowed by the large investments in space systems R&D of the past few years. We can expect to see the payoff by the early 1990s in terms of expanded access to space for performance of a variety of missions. In the long term, space systems would probably be an integral part of any advanced-technology strategic defense system the Soviets might develop and deploy, and we expect antisatellite (ASAT) capabilities—improved by then—to be a critical aspect of Soviet efforts to counter any space-based elements of a potential future US strategic defense.

Ultimately, it is the sheer size and breadth of the Soviets' space effort that gives them their greatest potential in the competition for leadership in space. The magnitude of the effort compensates for much of the inefficiency and technological deficiency that characterizes many individual Soviet programs. Furthermore, we cannot clearly account for all of the Soviet space support facilities in existence and under construction—design bureaus, production facilities, launchpads, and control facilities—with known programs. Although some or even all of this additional capacity may be designated for relatively "benign" programs that we have not been able to detect, the possibility remains that developments of a more ominous nature await us, such as the eventual deployment of weapons in space. Another possibility is that more of the older facilities and launch vehicles will be phased out than we have projected. Finally, it appears that the Soviets are providing themselves with the necessary support structure to ensure that they will be well positioned to make timely deployments of space systems based on any major breakthrough in one or more areas in which we know they are working—antisubmarine warfare (ASW), ASAT, or ballistic missile defense (BMD) technologies, for example.

We estimate that in 1985 the costs of Soviet space programs are about \$26 billion. Between 1980 and 1983, space costs nearly doubled, largely because of the costs associated with the development of the heavy-lift launch vehicle. Since then, space programs have continued to expand at a rate of nearly 10 percent annually (see figure 1). This level of investment is equivalent to about 1.5 percent of the Soviet gross national product. The costs of military space activities alone are about the same as those for strategic offensive forces. Since 1980, manned space programs have accounted for the bulk of increased expenditures and now amount to about one-fourth of the total costs of Soviet space

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efforts. The Soviets are making extensive use of man in space for performing research on critical military problems such as submarine detection and BMD. We expect the largest increases to be noted in manned activities and communications programs over the next five years.

The Soviets currently have a dedicated antisatellite interceptor and several other potential means to conduct ASAT operations. The orbital interceptor system presents a significant threat to all low-altitude US intelligence and military support satellites but its effectiveness is limited by operational considerations and reliability. The Soviets' overall ASAT capabilities are somewhat limited, especially against satellites at higher altitudes. We expect the Soviets to make significant improvements in their ASAT capabilities, particularly in the area of directed-energy technologies.

The Soviets use their space assets today principally to perform traditional military support missions of communications, targeting, reconnaissance and surveillance, navigation, meteorology, and geodesy; militarily, these functions will remain the most important space activities in the near term, and most of the future developments we project are extensions of these basic military support missions. In addition, the Soviet space effort supports civilian-oriented functions, such as telecommunications, remote sensing for agricultural and resource development, and scientific research.

The military importance of Soviet space assets has increased greatly in the past 10 years, and the Soviets increasingly value these assets for support of military operations in a crisis or conflict, especially for reconnaissance and targeting, communications, and navigation. We judge that, although the USSR is not at present overly dependent on space systems for the effective conduct of military operations, satellites become more important to the Soviets as the level of conflict increases. In addition, as more near-real-time monitoring capabilities are introduced (including manned platforms), we expect that Soviet space systems will become increasingly important in providing information on rapidly developing situations to both national-level decisionmakers and military commanders.

Soviet efforts to acquire space technology will increase in the face of intensified military-technological competition with the United States. The proliferation of commercial space capabilities among the Western allies and the establishment of cooperative space programs will widen the available targets for Soviet access. Through such efforts, a vast amount of valuable space-related technology already has been and continues to be obtained directly from US sources and US allies in Western Europe and Japan. Critically sought-after missile and space



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technologies include those related to development of space-based laser and other directed-energy weapons and antimissile defense systems. Open source publications, particularly NASA documents and NASA-funded contractor studies, constitute the largest and most important source of US space technology.

The scope and direction of the Soviet space effort, the extensive efforts to acquire Western space technology, and the military nature of Soviet manned space experiments are ultimately disquieting. Although we judge that overall the Soviets remain at a significant technological disadvantage relative to the United States in space, we are concerned about the possibility that they may be heading toward a major military advance. Our concern stems primarily from the considerable uncertainties we face in several key areas: the Soviet efforts in advanced weapon technologies, the purpose of the Soviet use of man in space, and the great increase in the infrastructure the Soviets are providing for space system operations. Their efforts in these areas could lead to important military advantages.

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## EXECUTIVE SUMMARY

1. Over 70 percent of Soviet space launches are for military purposes at present and have been for some years; most of the remainder serve both military and civil purposes. The Soviets are increasing their space efforts in overall expenditures, R&D, booster size and payload capabilities, and number and types of satellites in orbit. Much of the increase is due to the growing use of satellite systems to support military operations. We have identified 15 Soviet space systems that are probably in development and are likely to undergo testing in the next 10 years (see figure 2).  
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2. The Soviet approach to space differs from the US approach. In general, the Soviets conduct their activities in space in much the same way they conduct all their military activities. Space assets are integrated into the various elements of Soviet military forces and are not subordinated to a separate entity such as a space command. In the Soviet view, any major conflict on Earth cannot be conducted without involving space. Soviet military precepts, such as the importance of surprise, the necessity of confusing the enemy, and the use of overwhelming force to secure military objectives, are also likely to apply to Soviet military operations in space during a war.  
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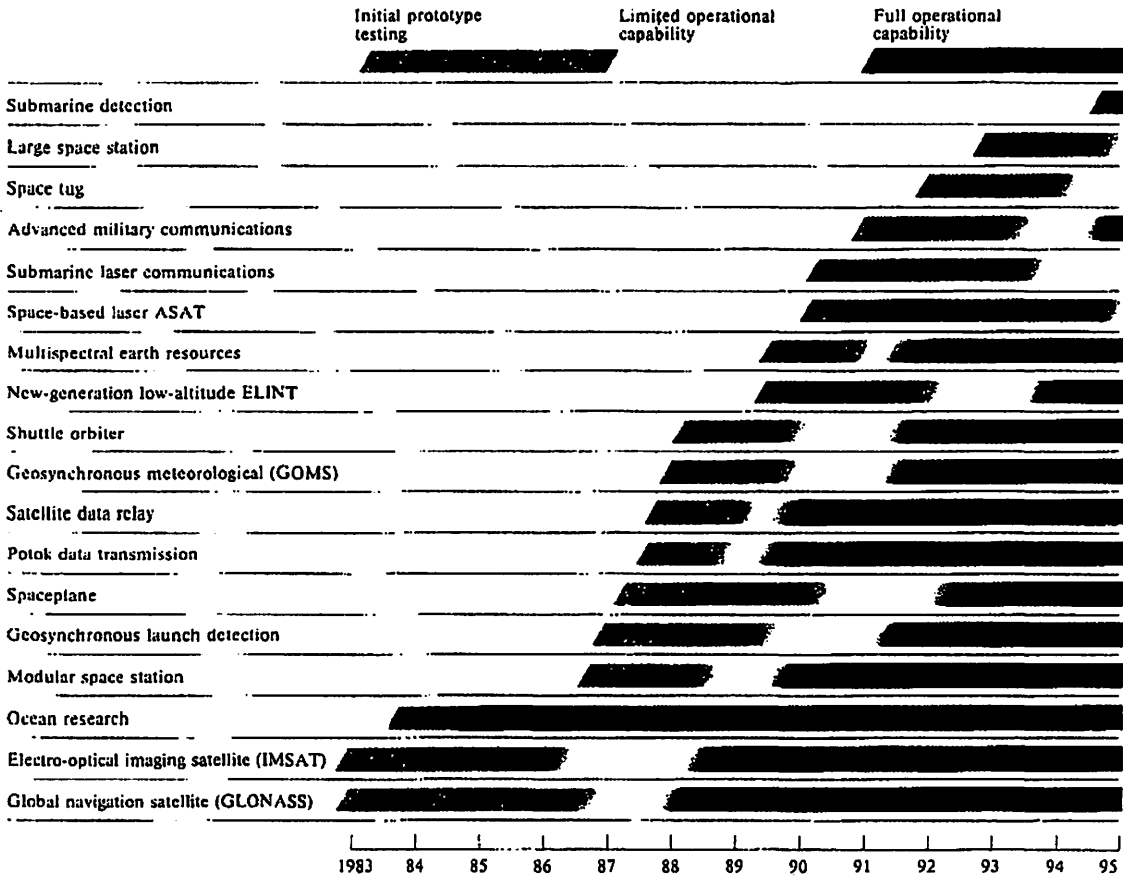
### A. Key Developments

3. Key developments since the 1983 NIE on *The Soviet Space Program* point to a continuing determined Soviet effort to acquire a mature and robust set of capabilities in space:

- *Expanded Satellite Network.* The Soviets have increased the number of operational satellites typically on orbit to over 140. This larger and more sophisticated network is more capable of supporting Soviet military forces and operations than the 110-satellite network of just two years ago.  
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- *New Capabilities.* The Soviets have further broadened satellite support to military missions, including reconnaissance, communications, targeting, and other purposes. Noteworthy developments include the introduction of a prototype near-real-time imaging system and development of a new ocean research satellite for naval support such as locating ice-free routes and facilitating Arctic submarine operations. The Soviets have also increased the use and sophistication of their military comsat networks.  
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- *Improved Readiness Posture.* These developments have improved the Soviet posture with regard to augmentation needs in a crisis. Whereas two years ago, about 40 additional satellites would have been needed to fill out existing peacetime networks in order to support crisis or wartime needs, today's requirement probably has been reduced to 20 to 30 because of the larger number of satellites and upgraded systems now on orbit. In addition, demonstration of a capability to store on orbit some communications, navigation, and reconnaissance satellites indicates Soviet intentions to reduce even further their need to launch additional spacecraft in a crisis.  
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- *Timeliness.* The Soviets have taken preliminary steps to improve the timeliness of their space-based reconnaissance.  
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By the 1990s, the Soviets will be capable of relaying some satellite-derived information to field commanders within about two hours of collection by reconnaissance satellites, a capability essential for combat conditions in which mobility characterizes the forces of both sides.  
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- *Survivability.* We have noted some Soviet efforts to improve the survivability of Soviet space control facilities. Launch facilities and the main control facilities are fixed, however, and remain vulnerable to attack.  
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- *Long-Duration Manned Spaceflight.* Soviet cosmonauts set a world record of 237 continuous days in space in a single flight, part of the long-term Soviet effort to establish a permanent manned presence in space. The Soviets also demonstrated the capability to bring the damaged Salyut 7 spacecraft back into service, with

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**Figure 2**  
**Soviet Space Systems Likely To Be in Development**



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the cosmonauts performing repairs on orbit. These experiences will provide a basis for long-duration, continuously manned, earth-orbiting space stations, and possibly manned lunar or interplanetary missions.  
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**B. Space Support Activities**

4. Other important developments represent significant Soviet investment in R&D and infrastructure to

support more diverse and ambitious space programs in the 1990s:

- Progress continues on major new construction projects at space support facilities. Significant expansion has occurred at a number of major design and production facilities in the past few years; in some cases, we observed expansion in excess of identified projects. The capacity of the space control network to deal with increasing

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volumes of data, and its efficiency and timeliness, are being improved with the introduction of more computer capabilities. Extensive construction continues at Soviet space launch centers, especially at Tyuratam, which supports all manned launches and launches of heavy payloads. The preparation of three launchsites for the new heavy-lift launch vehicle indicates plans for its extensive use (see figure 3).

- Development work continues on the new medium- and heavy-lift launch vehicles, and further progress has been made in the development of a reusable space transportation system (a manned space shuttle). The Soviet shuttle program probably began in 1974, and the shuttle orbiter is similar to the US space shuttle, the result of extensive ongoing efforts on the part of the Soviets to acquire Western space technology (see figure 4). Initial flight testing of the medium-lift launch vehicle began in April 1985; we anticipate the first test flights of the heavy-lift launch vehicle in 1986. The Soviet shuttle will probably first go into orbit in 1987, when construction of a suitable launchpad is completed. These launch vehicles will support a wide variety of military and civil missions, and will provide key support for the establishment of larger space stations and a continuous manned presence in space. The heavy-lift launch capability will also give the Soviets the option of orbiting large power sources and other potential components for future space weapons.
- The Soviets continue to increase their use of communications satellites for their military, government, and civil communications. Projected developments will have the advantages of significantly improving the speed, flexibility, and reliability of command and control and other communications. The Soviets are actively pursuing a comprehensive program for geostationary communications systems that could include satellites that serve more than one communications network, intersatellite crosslinking, and laser communications links.

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### C. Manned Space Efforts

5. Observed efforts in the area of manned space operations illustrate several aspects of the Soviet approach:

- Military applications have characterized an unusually high proportion of Soviet manned space activity. Since 1978, the number of military-related experiments on Soviet manned space flights has increased substantially.

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Conducting such tests on manned platforms overcomes some of the limitations for the Soviets of remote instrumentation and highly complex, unmanned, space-based prototypes.

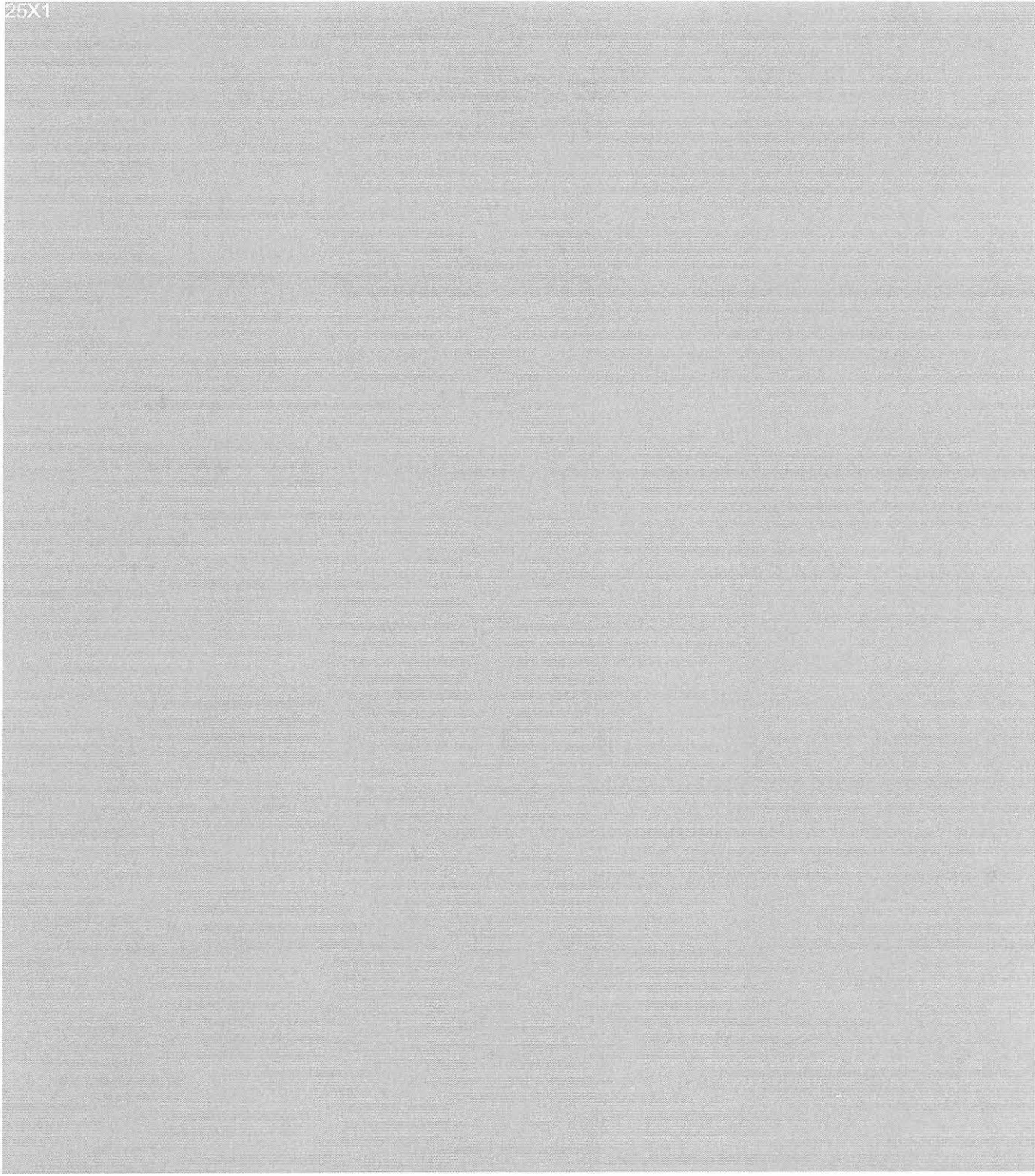
- Prestige is another key aspect. Scientific achievements in space are important to the Soviet leadership for both domestic and international political purposes. Moscow is apparently willing to invest substantial resources to maintain high visibility in this area. The announced Soviet goal of a continuously manned space station in near-earth orbit is undoubtedly motivated in part by prestige considerations.

6. Since 1971, Soviet space stations have been in orbit nearly continuously, periodically occupied by Soviet cosmonauts. Within three years, and possibly as soon as next year, the Soviets will have established a permanent manned presence in space. The comprehensive Soviet manned program will probably consist of several functionally interrelated components including:

- Initially, a modular space station for a crew of three to 12 persons.
- Later on, a large space base for a crew of 12 to 20 persons.
- A reusable space shuttle orbiter, which will be launched by the SL-W heavy-lift launch vehicle.

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— A spaceplane which, if developed, will probably be launched by the SL-X-16 medium-lift launch vehicle. CIA Statute

7. Much of the Soviet manned space effort is not fully explainable; nor can we be certain how much progress the Soviets have made. It is unclear whether they envision man's role in space as limited to R&D functions, or whether they intend to give him some major function in eventual operational systems. We are skeptical that the Soviets will find an effective and efficient way to put man in the loop in space for space warfare systems, but, on the other hand, we have only a very limited understanding of what their system concepts look like. CIA Statute

#### D. Space Warfare Capabilities

8. The Soviets use their space assets today principally to perform traditional military support missions of communications, targeting, reconnaissance and surveillance, navigation, meteorology, and geodesy; militarily, these functions will remain the most important space activities in the near term, and most of the future developments we project are extensions of these basic military support missions. In a crisis or conflict, Soviet space assets would enhance existing terrestrial capabilities, especially by collecting and transmitting critical data in a more timely manner. Examples include warning of US ballistic missile launches and availability of reconnaissance data on strategic targets in near real time. In some cases, Soviet space systems comprise unique capabilities, including providing real-time targeting information on Western surface naval forces to Soviet naval combatants, and providing continuity for long-distance communications. CIA

9. The Soviets have long had the objective of acquiring the capability to deny the military benefits of space to their adversaries. Soviet military doctrine calls for efforts to blind enemy reconnaissance and disrupt enemy communications in the event of conflict. Current Soviet systems with potential antisatellite capabilities include:

- A nonnuclear orbital interceptor that has been operational since the early 1970s.
- Galosh ABM interceptors that may have an ASAT mission. There is an alternative view that holds that there is insufficient evidence to alter the previous assessment that an ASAT role for the Galosh is unlikely.<sup>1</sup>

<sup>1</sup> The holders of this view are the Director, Bureau of Intelligence and Research, Department of State, and the Director, National Security Agency. (u)

— Two ground-based high-energy lasers at the Saryshagan test range with potential ASAT capabilities.

— The technological capability, using active electronic warfare (EW), to attempt to interfere with enemy space systems. We have no direct evidence that enables us to judge the extent of these capabilities. We believe, however, that the Soviets intend to use active EW to attempt to interfere with some space systems. Potential Soviet active EW platforms include many fixed, transportable, and mobile transmitters; however, we have no evidence of Soviet equipment or organizations with an ASAT EW mission. There is an alternative view that evidence is insufficient to support the judgment of Soviet intent to use active EW against satellites.<sup>2</sup> CIA Statute

10. Current Soviet ASAT capabilities are limited and fall short of meeting the apparent requirement to be able to deny enemy use of space in time of war:

- The orbital interceptor, the Galosh, and the lasers have the potential to destroy or interfere with satellites in near-Earth orbit. Electronic warfare currently represents the only potential threat to unprotected satellites in higher orbits. Some ICBMs, with modifications, and some space boosters have the capability to be used against satellites at all altitudes, but we doubt the Soviets would use them in such a role.
- The orbital interceptor, because it is nonnuclear, would be used at lower levels of conflict than a nuclear ASAT weapon. The orbital interceptor system presents a significant threat to all low-altitude US intelligence and military support satellites. However, it has a demonstrated success rate of about 60 percent, it is susceptible to evasive maneuvers or other countermeasures from some of its intended targets, and it could not rapidly attack key low-altitude satellites.
- The nuclear-armed Galosh ABM interceptor used as an ASAT weapon would offset several deficiencies of the orbital interceptor. The Galosh would be less susceptible to countermeasures because its direct-ascent flight profile allows it to attack targets within several minutes from launch. It would need to use a nuclear warhead, however.

<sup>2</sup> The holder of this view is the Director, National Security Agency. (u)

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— Operational limitations could affect the military utility of the test lasers at Saryshagan; such lasers could be used only on relatively cloud-free days, and only on orbits when target satellites pass near Saryshagan. CIA Statute

11. The military importance of the Soviets' own space assets has increased greatly in the past 10 years, and the Soviets increasingly value these assets for support of military operations in a crisis or conflict, especially for reconnaissance and targeting, communications, and navigation. In general, in the prospective main area of confrontation in a NATO-Warsaw Pact conflict, space assets are becoming increasingly important to the conduct of Soviet military operations, but Soviet dependency on them is mitigated because they are backed up by alternate and redundant means of terrestrial support. The importance of space systems also tends to be high with respect to Soviet ambitions to project power to distant areas of the world, especially when this entails the use of naval forces. CIA

12. We estimate that during an intense conventional conflict involving direct US-Soviet military engagement, the Soviets probably would attempt to destroy or interfere with US satellites. However, the Soviet military establishment has its own growing need for access to space in such a conflict, and would be concerned about possible US retaliation. The dilemma posed by these potentially incompatible objectives is likely to emerge in Soviet planning and policy due to this growing reliance on space assets and to the prospective emergence of better US capabilities to interfere with the Soviets' own space systems and access to space. However, we cannot judge whether the likelihood of Soviet use of ASAT capabilities will decrease in the future as a result of these developments. CIA Statute

13. In the future, it is highly unlikely that Soviet leaders would forgo the military capability to actually interfere with or destroy US space systems in the event of conflict. We believe they will seek to keep open the option to employ ASAT means and also to maintain a deterrent capability. This would be consistent with Soviet military planning, which seeks to provide the political leadership with maximum flexibility in the uncertain conditions preceding and during a conflict. It would also be consistent with the Soviet tendency in past arms control negotiations to protect their own programs rather than to sacrifice important Soviet capabilities in the interest of limiting the other side. CIA  
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14. From a Soviet point of view, it is essential to guarantee access to space for their assets providing important support to Soviet military operations. The Soviets probably recognize that technologies of the type likely to be developed in the US Strategic Defense Initiative (SDI) could lead to capabilities to threaten space assets long before they would be robust enough to permit a comprehensive ballistic missile defense. Soviet leaders are concerned that the US SDI program will force them to change the scope and pace of their own program in ways that tax their capabilities and stress areas of Soviet weakness such as sensors and data processing. CIA Statute

#### E. Advanced Space Warfare Technologies

15. The Soviets have concluded that they cannot afford to concede a major advantage to the United States in space and space technologies. They must continue to compete with the United States and, if possible, achieve superiority over it—especially in those technologies applicable to ASAT and to defense of space assets. But, in the Soviet mind, this competition in space is not inconsistent with seeking to slow or halt the US SDI and antisatellite programs through negotiations. Rather, their minimum goal is probably to be able to buy enough time to develop their own advanced technology systems so as to be able to enforce their guaranteed access to, and survivability in, the medium of space. CIA Statute

16. The Soviet potential for applying advanced technology to space warfare missions is substantial. We have strong evidence of Soviet efforts to develop high energy laser weapons:

- On the basis of the high-energy laser efforts we have been able to observe, we estimate a laser weapon program of this magnitude would cost roughly \$1 billion per year if carried out in the United States. The evidence indicates a heavy emphasis on ground-based lasers.
- Two facilities at the Saryshagan test range are assessed to have high-energy lasers with the potential to function as ASAT weapons.
- Soviet research includes a project to develop high-energy laser weapons for use in space. We judge there is a high probability that a prototype high-energy, space-based laser ASAT weapon will be developed. We estimate there is an even chance that such a prototype will be tested in low



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orbit in the early 1990s. Even if testing were successful, such a system probably could not be operational before the mid-1990s. The Soviets could, however, choose to demonstrate lower power laser technology in space well before the deployment of a high-power prototype; there is a possibility of such a demonstration in the near term.

- Since 1981, the Soviets have been constructing a large facility on top of a mountain near Dushanbe in the southernmost area of the USSR. It is too early to judge with much confidence what the function of the Dushanbe facility will be, when it might be operational, or what capabilities it will have. However, a directed-energy weapon function—either a laser or a radiofrequency (RF) ASAT weapon—seems most consistent with the available evidence. A somewhat less likely, but still plausible, function is deep space surveillance and/or space object identification. There is another facility under construction at Storozhevaya, which, among other possibilities, could be a ground-based laser ASAT. An alternative view holds that the evidence is insufficient to judge the purpose of either the Dushanbe or Storozhevaya facilities. CIA Statute

17. The Soviets are also conducting research under military sponsorship for the purpose of acquiring the ability to develop particle beam weapons (PBWs), but the size and scope of this effort are unknown. We believe the Soviets will eventually attempt to build a space-based PBW, but the technical requirements are severe, including those for power generation, power conditioning, and beam pointing, and we estimate there is a low probability they will test a prototype before the year 2000, although allowing for our uncertainties, it is possible they could test a prototype in the mid-to-late 1990s. CIA Statute

18. The Soviets are strong in the technologies appropriate to develop radiofrequency weapons to destroy the electronics of a target. We judge they are capable of developing a prototype RF weapon system, and by the 1990s there is a moderate likelihood that the USSR will test a ground-based RF ASAT weapon potentially capable of damaging unprotected satellites. CIA Statute

19. We do not know whether the Soviets have any plans to develop hypervelocity kinetic-energy weapons

*The holders of this view are the Director, Bureau of Intelligence and Research, Department of State, and the Assistant Chief of Staff for Intelligence, Department of the Army. (c)*

for strategic applications, but we have recently compiled evidence that they have expended significant resources since the early 1960s in research and development on technologies with potential applications for such weapons. CIA Statute

20. An analysis of Soviet collection requirements for missile and space technology indicates that the four most critically sought-after technological areas were related to land- and sea-based strategic offensive missiles, ballistic missile warheads, development of space-based laser and other directed energy weapons, and antimissile defense systems. Half of these were for the technologies themselves and half were for production technologies for manufacturing future weapon systems. In the early 1980s, the Soviets had high-priority collection requirements for Western technology to support their space-based laser efforts, and they succeeded in obtaining certain key technical reports and technologies. CIA Statute

21. Moscow recognizes that the US pursuit of SDI could have potentially far-reaching consequences for Soviet strategic force planning, including their planning for the development and application of advanced space warfare technologies. The efforts described previously are part of vigorous and innovative ongoing research and development programs in advanced technologies with potential ASAT applications. In dealing with SDI, we anticipate that the Soviets will avoid major disruptions in the defense sector and direct their greatest efforts to the design of longer term solutions that have intrinsic value to Soviet strategic forces, regardless of the outcome of the SDI effort itself. We therefore judge that the Soviets will include, in their probable future responses to SDI, an emphasis on developing operational capabilities to suppress elements of SDI systems, including improvements in their existing antisatellite capabilities and expanded R&D for future systems. Improved ASAT systems are likely to be an early result of continuing directed-energy weapon developments, and the Soviets probably perceive that space-based components would be the most vulnerable element of the SDI, particularly in the early phases of development. CIA Statute

#### F. International Competition

22. The USSR has taken a few steps toward becoming a competitor in international telecommunications and commercial space launch services. In addition, Moscow might enter the market providing Earth resources data, navigation and meteorological support, and materials processing and manufacturing in space.

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Success in such competition would bring increased prestige and respect, and over the longer term would provide the Soviet Union an important supplement to its hard currency earnings. In addition, opportunities for technology transfer could be improved by increasing Soviet involvement in cooperative and commercial space ventures. CIA Statute

23. The Soviets recently announced the establishment of GLAVCOSMOS, an agency which will be responsible for Soviet space scientific and commercialization efforts. This is a major departure from past Soviet efforts in two ways: the Soviets are intent on actively pursuing the economic and political potential of their space program, probably with an eye toward the prospects for acquisition of Western computer and telecommunications technologies; and it represents a more open approach to a portion of their civilian space

efforts. The publicity for the 1984 Vega mission to Venus and Halley's Comet (including televised coverage of the launch), and the submission of booster information to a number of satellite manufacturers also indicate Soviet intentions for active competition with NASA and the European Space Agency for providing low-cost space services. CIA Statute

24. There is considerable worldwide interest in the manufacture of high-value, low-volume products in space. Activities on board Salyut space stations indicate the Soviets have moved beyond the initial research phase and may be able to manufacture materials for commercial markets in the late 1980s. The Soviets probably view production and sale of even small amounts of new and unique products manufactured in space as an important means of increasing national prestige. CIA Statute

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