probably would attempt to expand the satellite networks to as many as four EORSATs and four to seven RORSATs. [redacted]

24. Both the RORSAT and EORSAT have short average lifetimes—two to four months for the RORSAT, and five to 10 months for the EORSAT. However this may not be a significant limitation to their wartime targeting mission. The Soviets probably recognize that these satellites are vulnerable and would be short lived once hostilities began. The satellites would be useful just before hostilities and as hostilities begin. We expect the Soviets to attempt to complete a full EORSAT/RORSAT [redacted] launches by SL-11s in a matter of days. [redacted]

25. The EORSAT is a specialized ELINT satellite [redacted]

26. [redacted] Major limitations of the EORSAT system include:

[redacted]

— Excessive time required for a single satellite to revisit a given target—six to 14 hours at northern latitudes and about 28 hours at the equator. A network of at least four EORSATs is required to provide nearly continuous targeting data—that is, no more than two hours old—at high latitudes.

[redacted]

27. The EORSAT will probably continue to be used for the next several years. Improvements under way in the EORSAT program include fitting out new Soviet naval combatants to receive the collected data directly and increasing satellite lifetime. We project evolutionary improvements [redacted]

28. The RORSAT system complements the EORSAT. The RORSAT uses a radar capable of detecting and locating ships of destroyer class [redacted] and larger; [redacted]

29. Major advantages and capabilities of the RORSAT system include:

[redacted]

The RORSAT system also has some major limitations, including:

[redacted]

[redacted] 25X1 25X1 CIA Statute

30. The RORSAT has experienced numerous onboard systems failures resulting in shortened satellite lifetimes. Typical RORSATS are in orbit for only about 90 days even though the quantity of onboard propellants for orbit maintenance is sufficient for mission durations of about 210 days, and the nuclear reactor power supply should last at least a year. Thus the system probably has a longer design life than is currently achieved, and we expect Soviet efforts to extend RORSAT operating lifetimes. Although we have no evidence of such a system, we estimate that there is a moderate likelihood that an advanced RORSAT will be deployed in the late 1980s that will be able to operate in adverse weather conditions and may be less susceptible to jamming and electronic countermeasures. We are less confident of our estimate than in the past because, although the Soviets may perceive a need and have the technical capability, [redacted] 25X1 25X1 CIA Statute

Oceanographic Research

31. The Soviets launched the first two in a new series of ocean research satellites in 1983 and 1984. These satellites are equipped with a side-looking real-aperture radar, a visible and near-infrared multispectral scanner, and a microwave radiometer for monitoring the world's oceans (see figure IV-7). Ocean research satellites can transmit data to land-based receiving stations or to ships at sea. The first satellite gained widespread publicity in 1983 when it assisted in the rescue of icebound Soviet ships navigating the Soviet Northern Sea route. [redacted] CIA Statute

32. We expect the Soviets to continue to launch ocean research satellites at a rate of about one a year. We also anticipate that such satellites will be used primarily for military missions, such as providing ice information for Soviet SSNs and SSBNs, providing ocean anomalies that could make submarines less vulnerable to acoustic detection or could enhance ASW operations, and locating ice-free sea routes. [redacted] CIA Statute

Antisubmarine Warfare

33. We are concerned about the energetic Soviet effort to develop a capability to remotely sense submarine-generated effects from aircraft or spacecraft [redacted] 25X1 25X1 CIA Statute

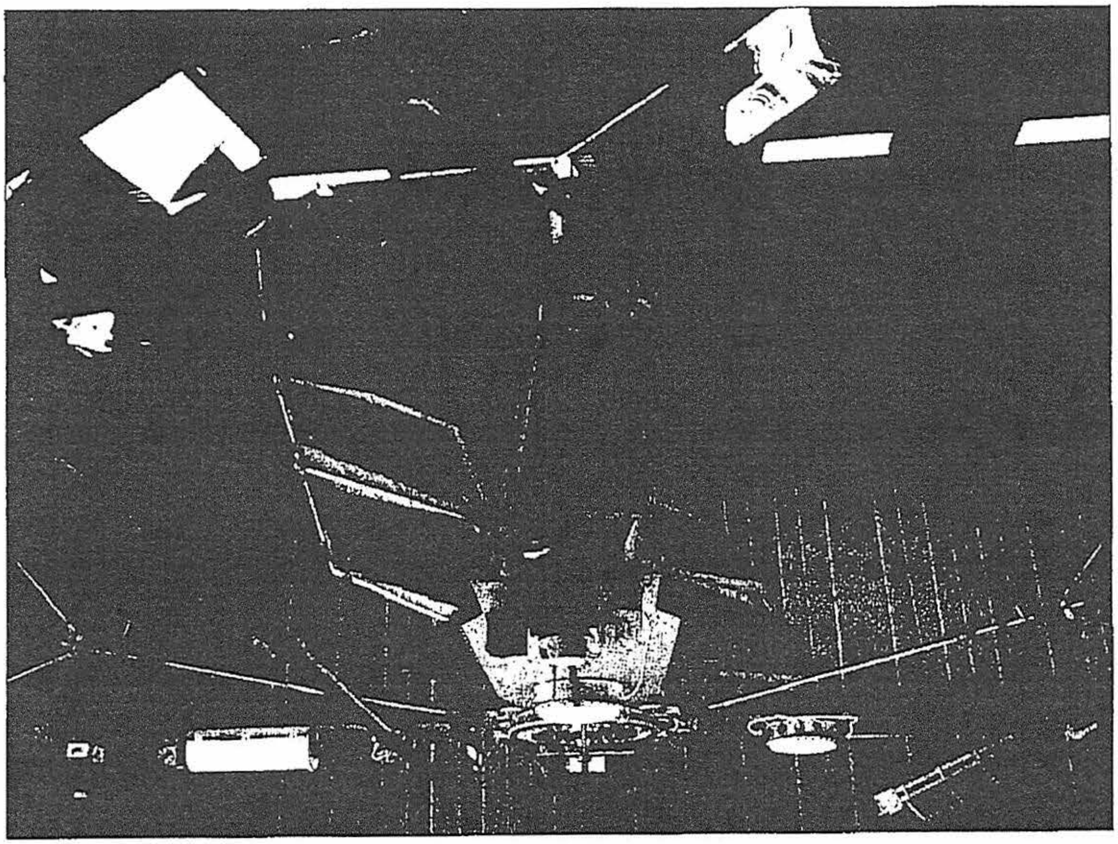
34. [redacted] 25X1 25X1 25X1 CIA Statute

35. Soviet nonacoustic ASW detection systems that could be deployed within the next 10 years are unlikely to pose any significant threat to US SSBNs on patrol but could possibly be applicable to protection of Soviet SSBNs in bastion areas:

— An operational space-based remote-sensing system could not be available in less than 10 years

[4] See NIE 11-3/8-84/85, Vol. II, chapter 3, for an expanded discussion of Soviet ASW capabilities. (U)

Figure IV-7
Cosmos 1500 Ocean Research Satellite



Unclassified
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from the start of engineering development. (This constraint is imposed by Soviet design practices, as demonstrated by numerous development programs.) The wide range of continuing experimentation, however, suggests that the Soviets have not yet selected a sensor for engineering development.

— In view of operational considerations, the difficulties in exploiting the basic phenomena, and the major advances required in high-speed computing and in sensor and signal-processing technologies, we do not believe there is a realistic possibility that the Soviets will be able to deploy in the 1990s a system that could reliably monitor US SSBNs operating in the open ocean.

— There is a low-to-moderate (10 to 60 percent) probability that the Soviets could deploy in the mid-1990s an ASW remote detection system that would operate with some effectiveness if enemy SSNs approached ASW barriers near Soviet SSBN bastions. [redacted]

[redacted]

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Ballistic Missile Launch Detection

36. The Soviet launch detection satellite (LDS) network currently provides continuous 24-hour coverage, [redacted] of all US ICBM fields. The network consists of nine semisynchronous orbital posi- [redacted] Launch-detection satellites can detect both isolated and massive launches of US ICBMs and can provide about 30 minutes' warning before impact. They can also provide limited information about the nature of an attack. As currently configured, operational constraints prohibit the system from being able to cover US SLBM launch areas or Chinese missile launch areas [redacted]

37. [redacted]

[redacted]

38. [redacted]

[redacted]

39. It is likely that the Soviets are developing a new geosynchronous system of satellites to expand launch-detection coverage to SLBM launch areas and China. In 1982 the Soviets requested from the International Frequency Registration Board that four satellite positions in geosynchronous orbit be reserved for them, giving radiofrequency ranges currently used by their LDS network. The Soviets claimed the mission for this network of satellites, called Prognoz, would be to study oceanic and atmospheric phenomena. In addition, construction at a complex outside of Moscow that supports the current LDS network [redacted] indicate preparations to handle a geosynchronous capability as well [redacted] Such a geosynchronous LDS would assist launch confirmation. It could also improve warning time for SLBM launches by as much as 15 to 20 minutes, depending on the location of the SSBN. It probably could provide additional coverage of launches of land-based ballistic missiles from Europe and Asia as well. Initial flight tests are expected to begin in 1986-87, and an operational network is expected to be deployed by the early 1990s. [redacted]

40. The reason for the considerable overlap in coverage of the four satellite positions [redacted] may be related to providing more reliable launch confirmation. The coverage of a new downward-looking LDS system could be extended to include the Pacific patrol areas of US SSBNs. [redacted]

41. The Soviets have recently placed two LDS satellites into geosynchronous orbit, [redacted]

[redacted]

[redacted] Although the Prognoz slots are being filled with second-generation, ATH-looking LDS spacecraft providing limited SLBM coverage in the Atlantic, we believe that this is only an interim step before a new "Earth-looking" LDS network is deployed. [redacted] these satellites would have a potential to cover current Atlantic patrol areas of US SSBNs, but not Pacific patrol areas, or Chinese or West European launch areas. [redacted]

Nuclear Detection

42. We have not identified a Soviet satellite that provides data on nuclear events. Several Soviet satellites in synchronous and semisynchronous orbits provide extensive coverage of the Earth's surface, [redacted] on them. One possibility is that nuclear detection packages could be carried on the new GLONASS navigation satellites. Another possibility is that scientific satellites that are placed into highly elliptic orbits (five times synchronous) could carry nuclear detectors. According to Soviet open sources, scientific satellites collect data on solar radiation to improve the forecasting of the effects of solar proton flares. Also, scientific papers associated with this satellite program have addressed nuclear detection from space, implying that solar forecasting satellites may have a secondary mission of nuclear detection. [redacted]

Aircraft Surveillance

43. The Soviets probably perceive a need to detect and locate US aircraft in flight over certain critical routes around the world. Thus the Soviets may wish to develop advanced space systems using radars or IR sensors to detect aircraft in flight. Although the detection of very small vehicles, such as cruise missiles, will most likely not be possible for some time, overhead detection of large aircraft, such as bombers and cruise missile carriers, will soon be a technological possibility for the Soviets. We estimate there is a low-to-moderate chance that orbital flight tests of a space-based radar system for aircraft detection and localization will be conducted in the early-to-middle 1990s and moderate chance by the year 2000. We judge it less likely that a space-based infrared system will be pursued. If they do elect to develop an infrared system, we estimate

that a prototype could be tested in the mid-1990s. [redacted]

44. The development of sufficiently large antennas that can be properly deployed in space appears to be a critical technology for a space-based radar for detecting aircraft. A 10-meter-diameter, 2-GHz antenna was tested in 1979 on Salyut 6. However, further development and testing would be required before an antenna of sufficient size or accurate shape could be developed for this mission. A 10-meter-diameter, 6- to 9-GHz antenna, or an equivalently larger antenna operating at a lower frequency (30 meters at 2 GHz), would be a major step toward acquiring the required technology. [redacted]

45. An operating network of space-based radars for aircraft detection would require several satellites depending on detection and tracking requirements. It could take one of several forms because factors such as radiated power, search rate, detection range, and area to be covered must be considered. An example of a system concept is three satellites in elliptical 7,000-km polar orbits that could provide continuous coverage of the northern area. Another system concept would be three to six satellites in 1,700-km polar orbits. [redacted]

46. A space-based infrared system capable of performing this task would probably operate in the far infrared region (8 to 14 microns) and would be based on detecting the temperature difference between the aircraft and the Earth background. This type of detection requires that the sensors be small enough that the aircraft would occupy a significant amount of the area covered by each element. To provide continuous coverage of a significant area on the Earth requires a large number of small sensor elements (on the order of 100 million elements). An ideal system may consist of a large phased-array radar with a backup IR sensor. [redacted]

47. For both systems a real-time communications link is essential to the operational capability of the surveillance system. The link between ground station and sensor satellites should permit the operator at the ground site to have direct access to satellites at all times. Therefore, satellite-to-satellite data relay is mandatory for any low-orbit satellite outside of line of sight of its ground station. [redacted]

48. Two methods of processing the sensor return signals are possible: on board the satellite or terrestrial ground based [redacted] A signal processor on the spacecraft has several advantages:

— It would permit the real-time transmission of target data directly to the user.

— It also allows for a much narrower bandwidth for the data link (on the order of 1 MHz versus 100 MHz) as compared with the method for central ground-site processing.

— It has the potential of achieving a higher level of electronic counter-countermeasure (ECCM) capability for the downlink.

— Conceivably, onboard processing of the raw sensor data could enable the target location data to be transmitted from the spacecraft to an airborne warning and control system (AWACS) or interceptor aircraft without going through the ground station. [redacted]

49. Both onboard and ground-based processing have difficulties associated with them:

— Onboard processing requires the development or acquisition of minicomputers more capable than those currently available to the Soviets and a processing capability for handling extremely large amounts of data.

— For ground-based processing, the raw sensor data would most likely be digitized on board and then transmitted to the ground site in real time via direct data link when the surveillance satellite is within view of the site or via a satellite-to-satellite relay data link when the surveillance satellite is out of view. Although the ground-site processing approach requires the least hardware in the spacecraft, it does demand a very wide bandwidth for the downlink. A downlink bandwidth capable of handling up to 200 megabits per second is required. [redacted]

50. The high data requirements in real-time signal processing anticipated for space-based sensors incorporating moving target indicator, target discrimination, signature analysis, and computer-driven control functions will require an onboard central processor, and cannot be performed by downlink and ground-based processing. Such ground-based support would require extremely high data rates probably not achievable with current digital circuitry. Current Soviet integrated circuit technology probably lacks the maturity to provide the high data rates for sophisticated processing either on board or for multiplexed downlinks. [redacted]

Communications and Data Relay

51. The USSR continues to increase its use of communications satellites for its military, government, and civil communications. At the same time, Soviet ground-based high-frequency (HF) communications have been enhanced, providing added flexibility and improved redundancy with various microwave, troposcatter, and landline communications systems. The projected developments will have the advantages of significantly improving the speed, flexibility, and reliability of command and control and other communications. [redacted]

52. Current and future Soviet comsat systems are summarized in table IV-2 [redacted] [5] The USSR currently operates six comsat networks. Four of these—Molniya 1, Molniya 3, Statsionar, and Statsionar T [6]—use satellites in high-altitude (semisynchronous and geostationary) orbits. These satellites use wideband transponder systems for real-time reception, amplification, and retransmittal of communications signals. The other two comsat systems—designated as multiple-payload and single-payload communications satellites (MPCS and SPCS)—are in low-altitude orbits. These systems use specially designed satellites that record Soviet communications for transmittal at a later time (store-dump). With the exception of the Ekran television relay and amateur radio satellites, all existing Soviet comsats are used, in some cases exclusively, to support the Soviet military and political leadership and the intelligence services. [redacted]

53. *Molniya 1.* The Molniya 1 comsat system consists of [redacted] four satellites. [redacted]

[6] The Statsionar system (currently utilizing both Raduga and Gorizont satellites) is to occupy 18 orbital positions. The Statsionar T system, consisting of Ekran television satellites, occupies one orbital position. [redacted]

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Table IV-2
Current and Prospective Soviet Satellite Communications Systems

Communications System	Number of Satellites in System [a]	Orbit	Principal Users
Current			[redacted]
MPCS	16-24	1,500 km circular	
SPCS	3-6	800 km circular	
Molniya 1	8	Semisynchronous	
Molniya 3	4	Semisynchronous	
Statsionar	18 [b]	Geosynchronous	
Statsionar T	1 [c]	Geosynchronous	
Amateur radio	Variable	1,800 km circular	Amateur radio operators
Future			
Gals	(6) [b]	Geosynchronous	Military
Volna	(4) [b]	Geosynchronous	[redacted]
	(6) [b]	Geosynchronous	
Volna-M	(5) [b]	Geosynchronous	
Luch	(4) [b]	Geosynchronous	
Luch-P	(4) [b]	Geosynchronous	Military
[redacted]			[redacted]
Statsionar T2	1 [c]	Geosynchronous	
[redacted]			
Potok data transmission	3	Geosynchronous	
[redacted]			
Satellite data relay system (SDRS)	3	Geosynchronous	
[redacted]			

[redacted]

This table is [redacted]

25X1
[redacted]

58. ***Ekran.*** The Soviets use the designation Statsionar T to refer to a direct broadcast TV system of geostationary satellites. Satellites in this series, named Ekran, broadcast a high-power television signal that can be received by small ground terminals all over the USSR. Fourteen Ekran satellites have been launched to date, usually at six- to seven-month intervals. The sole function of Ekran satellites is to transmit television from Moscow nationwide. According to IFRB filings a second series of TV direct broadcast satellites will operate at different frequencies. [redacted]

59. ***Multiple- and Single-Payload Comsats.*** [redacted] the multiple-payload communications satellite (MPCS) system. [redacted] The Soviets maintain 16 to 24 of these satellites in a 1,500-km circular orbit. [redacted]

[redacted] the single-payload communications satellite system (SPCS), [redacted] The Soviets maintain at least three and as many as six of these satellites in 800-km circular orbits. [redacted]

[redacted]

60. *The Direction of Comsat Development.* [redacted]

61. The USSR is 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. Six communications networks are being developed: Volna, Volna-M, Gals, Luch, Luch-P, and More. Figure IV-12 compares the orbital positions of satellites in the current and planned geosynchronous communications networks. Hybrid satellites that carry transponders for more than one communication network are being developed. The first hybrid satellite, Gorizont 5 launched in March 1982, carries Statsionar, Volna, and Luch transponders, which operate at different frequencies. All Gorizonts orbited since this one except Gorizont 6, are hybrid. [redacted]

62. We project that a system of four hybrid communications satellites carrying transponders for the Statsionar, Volna, and Luch networks primarily will support civilian users. Transponders of the even-numbered positions of the Volna system are designed to be used with air- and sea-mobile terminals, while all transponders of the Luch system are to be used for telephone, telegraph, TV, and radio transmissions. The Soviets have recently filed for another four-satellite network called More, which will likely serve civil maritime users. We infer from this filing that they may intend to supplant the even-numbered Volna positions with the More system. [redacted]

63. The proposed geostationary locations and allocated frequencies further suggest that transponders of the Statsionar, Statsionar-D, Gals, Luch-P, Volna (odd-numbered positions only), and Volna-M networks may be combined on single hybrid satellites to form a six-satellite multiple-band communications system with near-worldwide coverage for military command and control communications. The frequencies to be used in the Gals network (8 GHz uplink/7 GHz downlink) are internationally recognized for military communications satellites. Satellites with Gals transponders will have both global and regional beams. In addition, Soviet filings indicate that two satellites will have spot beam capabilities directed at regions in the North Atlantic and North Pacific, suggesting naval roles. The Soviets have recently filed for a new six-satellite system, Statsionar-D, which we expect will relay digital military data. [redacted]

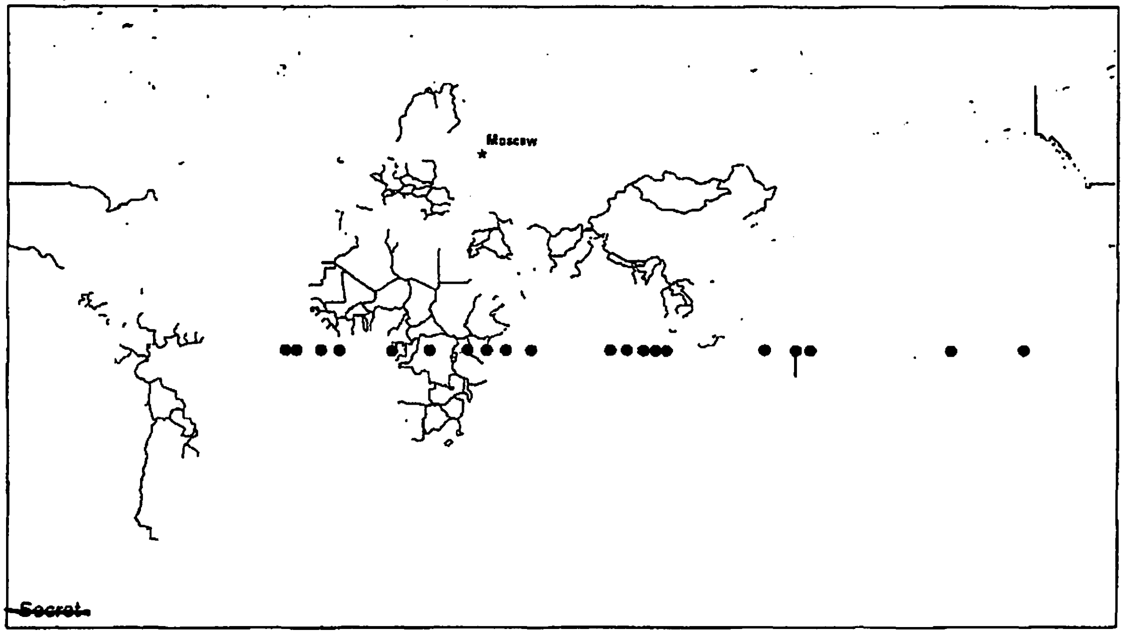
64. We expect the entire Statsionar, Statsionar-D, Gals, Volna, Volna-M, Luch, Luch-P, and More geosynchronous communications satellite networks to be completed by the early 1990s. Although the Soviets have filed for more than 40 satellites (see figure IV-12), we believe they could meet their geosynchronous requirements with as few as 20 satellites carrying hybrid payloads. In addition to these new networks we expect improvements in communications satellites used in the Molniya orbits. [redacted]

65. In addition to the comsat networks, we expect a three-satellite Potok data transmission satellite system, [redacted] The Potok [redacted] systems are designed to transmit digital information between central Earth stations and peripheral Earth stations. The purpose of these systems remains unclear but may include military missions. The SDRS is designed to relay data from low-orbiting satellites, including Salyut space stations, to Earth terminals, [redacted] Such a system will greatly improve the real-time control of low-orbiting satellites and their timely transmission of data. Potential applications include the real-time transmission of data from low-orbiting intelligence collectors, timely redirection of collection activities, and on-demand orbit adjustments of low orbiters. [redacted]

66. New Soviet comsat systems will use advanced communications, including computer and data transmission technologies, that will result in more reliable communications with higher data capacities to an increasing number of users. Also, spread spectrum signals will provide better security. By 1990, [redacted] we expect that lasers will be used experimentally for intersatellite relay and possibly with other comsat systems to achieve even greater bandwidth and communications security. We project an advanced Soviet communications satellite system will be put into orbit in the early-to-middle 1990s and operate at higher frequencies, up to 30 GHz, and will have increased capacities over current systems. These systems could support the expanding manned space programs and real-time sensor satellites. [redacted]

67. [redacted]

Figure IV-12
Soviet Geostationary Communications Satellite Network Filings With International Frequency Registration Board



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Geosynchronous position	26.5° W	25°	14°	11° W	8° E	23°	35°	40°	45°	53°	80°	85°	90°	95°	99°	128°	140°	145° E	170° W	145° W
Network position numbers																				
Statsionar	17	8	4	11	18	19	2	12	9	5	13	3	6	14	[illegible]	15	7	16	10	
Statsionar-D	1						3		4			5				6			2	
Gals		1					6		2			3				5			4	
Volna		1	2				11		3	4		5	8			9	6		7	
Volna-M		1							3			5				9				21
Luch			1							2			3				4			
Luch-P		1							2			3							4	
More			1							2			3				4			
Total filings 59	2	5	4	1	1	1	4	1	6	4	1	6	4	1	2	5	4	1	5	1

- Hybrid military comsat
- Hybrid civil comsat
- Direct-broadcast TV satellite
- International comsat
- To be determined

CIA Statute [redacted]

[redacted] A laser communications link would be able to handle extremely broadband, short-duration signals. Such a system could enhance the security and survivability of SSBNs on patrol. There is a moderate likelihood that testing of laser communications components will take place in space in the late 1980s or early 1990s, perhaps on board a manned space station. This is somewhat later than our previous estimate [redacted] If tests are successful and sufficient resources are committed, a small network of laser satellite-to-submarine communications satellites could be operational as early as the mid-1990s. [redacted]

Navigation

68. Naval support satellite (NAVSAT) systems provide Soviet naval forces [redacted] navigation signals. The second-generation system, NAVSAT 2, consists of six satellites in near-Earth orbits [redacted] According to a 1978 announcement, the NAVSAT 3 system (four satellites in near-Earth orbit) has the purpose of providing navigation support to their maritime and fishing fleets. [redacted]

69. In July 1982 a NAVSAT 3 equipped with two special radio transponders for relaying distress signals from ships and aircraft was placed into orbit as part of the joint US, Soviet, Canadian, and French COSPAS-SARSAT program. The Soviet project is administered by the Ministry of the Merchant Fleet and utilizes three ground stations in the Soviet Union to process the signals transponded by the satellites. The location accuracy for emergency transmitters is reportedly within 2 kilometers. [redacted]

70. In early 1982 the Soviets filed with the IFRB for a Global Navigation Satellite System. These filings state that the GLONASS network is designed for worldwide aircraft and maritime radio navigation, and it will have nine to 12 satellites. However, we judge that the full GLONASS network will eventually consist of 24 satellites in order to provide three-dimensional position (latitude, longitude, and altitude) accuracies to within at least 30 meters—considerably better than that provided by NAVSAT 2 and 3. In addition, a GLONASS user will be able to obtain velocity information, a capability that is not provided by current navigation satellites. [redacted]

71. Three GLONASS developmental satellites were launched in 1982 by a single SL-12 Proton launch vehicle. Since the initial launch, five more sets of three have been orbited into two of the three planes that the full GLONASS network is expected to occupy. [redacted] An operational network of nine to 12 satellites is likely to be established by 1987. A network of this size could be adequate for certain users, such as ships or aircraft that can supplement the satellite data with information from an onboard atomic clock or a precision altimeter. However, a 24-satellite network is needed to ensure that a worldwide three-dimensional position fix capability is available to all potential users. A 24-satellite network could be established by 1988 [redacted]

[redacted]

* See NIE 11-3/8-84/85, Vol. II, for additional discussion. (U)

[redacted]

— The system is inherently difficult to attack because of the large number of satellites in the constellation and because they are deployed at high altitude.

[redacted]

— The Soviets probably assess that the United States has the technological prowess to develop ASATs capable of attacking large numbers of high-altitude satellites. But they probably also realize that such operational systems are unlikely to be available until the mid-to-late 1990s.

[redacted]

75. The Soviets have shown a trend toward using multiple payloads on some spacecraft. It is possible that the operational GLONASS satellites will also carry secondary payloads, such as a communications package or a nuclear detection system. Soviet scientists from the Institute of Physics at Moscow State University published results of studies involving particle detectors on GLONASS precursors. The report confirmed another similarity between the development programs for the GLONASS system and the US Global Positioning System (GPS), which is capable of detecting nuclear detonations. Based upon the scientific report and a perceived Soviet need for such a system, we judge there is a moderate probability that future operational GLONASS satellites will be configured to provide the Soviets with their first global nuclear burst detection capability [redacted]

76. Even after GLONASS is operational, the NAVSAT 2 system probably will be retained to support navigation requirements of the Soviet Navy. NAVSAT 3, however, is used by the merchant fleet and could easily be replaced by GLONASS. [redacted]

77. Currently, the US Transit navigation satellite system is used by Soviet ships to supplement their own Doppler navigation satellites. We expect continued Soviet procurement of Western receivers, so that Soviet ships and possibly aircraft in the future could use the US GPS for navigation [redacted]

Mapping, Charting, and Geodesy

78. Geodetic and photographic-geophysical (PHOTOGEO) satellites were developed to improve maps, charts, and Earth gravitational models, which are

required for a variety of military missions, including precise targeting information for ballistic missiles:

- *Geodetic satellites (GEOSATs).* These are used to develop and refine geodetic and gravitational models of the Earth. GEOSATs were first launched in 1968. The second-generation GEOSAT program, begun in 1981, provides more accurate measurements of the Earth's shape and gravitational field.

- *PHOTOGEO satellites.* These satellites, designed to collect mapping and geophysical data on worldwide ocean and land surfaces, were first launched in 1971. Other photoreconnaissance satellites also provide useful information to Soviet cartographers. The second-generation PHOTOGEO was introduced in 1981. [redacted]

79. The new-generation geodetic and photogeophysical satellites provide more accurate data for ballistic and cruise missiles. [redacted] Used in conjunction with each other, new-generation geodetic and photogeophysical satellites can provide the data needed to develop an improved gravitational Earth model, Earth-surface grid system, and more accurate missile launch and target points. Improvements in SLBM accuracy require refined data on local gravity in the vicinity of the launch platform. GEOSAT-2s are making radar altimetry measurements over ocean regions that include Soviet SSBN patrol areas; accurate measurement of the geoid in these areas could be used to improve the gravity model for submarine inertial navigation systems. [redacted]

Meteorological

80. Meteor 2 satellites, with two to four operational satellites typically in orbit, provide meteorological data both for civil weather forecasting and military support. Probable military functions include scheduling and routing aircraft and ships, executing force movements, scheduling tests of optical devices that propagate through the atmosphere, such as lasers, and scheduling other operations and exercises. Another possible use includes support for Soviet photoreconnaissance satellite targeting. In October 1985 the Soviets launched the first of a third-generation, low-altitude meteorological satellite system, Meteor 3. The satellite, orbiting at a higher altitude than previous systems, will provide worldwide coverage on a daily basis. [redacted]

81. Eventually, a three-tier meteorological satellite system will be developed consisting of a low-altitude manned space station, medium-altitude satellites (the current Meteor 2 series and/or future Meteor 3 series), and a system of geostationary satellites. The Geostationary Operational Meteorological System (GOMS) originally was scheduled for launch in 1978 in support of the Global Atmospheric Research Program, but has been delayed because of technical problems. There was strong evidence in 1982 that a GOMS launch was planned for 1983, but to date, none has been attempted. [redacted] The Soviets have recently filed for a three-satellite GOMS network, positioned at 76 degrees East, 14 degrees West, and 166 degrees East. Soviet planners will thus have access to more timely cloud-cover data over the Indian Ocean and most of Europe, Africa, and Asia than are provided by the Meteor 2s, which typically pass within range of a given location every six hours. GOMS also will reportedly relay Meteor 2 cloud-cover imagery, allowing reception in the Soviet Union of real-time or near-real-time cloud-cover data over a larger portion of the Earth than could be achieved by either the Meteor 2 or GOMS systems independently. This capability would be useful for optimizing the use of Soviet photoreconnaissance satellites. The filings for GOMS suggest that the first satellite would be operational in 1987. [redacted] we are not confident it will be launched that early. [redacted]

Earth Resources

82. The USSR has filed for a two-satellite Earth Resource Survey System called SSIPR. The first operational satellite in this system could be launched at any time and probably will use sensors being developed and tested on the Meteor-Priroda (Met-P) spacecraft. These sensors are electro-optical, multispectral scanning devices with resolutions comparable to those provided by US Landsat D satellites. The SSIPR, like the Met-P satellites, will be launched into sun-synchronous orbits to maximize good lighting conditions for imaging. The first SSIPR is expected to be launched in 1986-88. We expect an operational land remote-sensing system will be available in about 1988-89. [redacted]

Calibration

83. Radar support satellites (RADSATs) have been used since the early 1960s to calibrate ABM engagement radars located around Moscow and Saryshagan. RADSAT 3s were introduced in 1976, and conduct multipurpose missions, including ABM radar calibration, training activities, command system checkout for various satellite systems, as well as research and development activities. [redacted]

[redacted]

[redacted]

87. ***"Six Pack."*** Two groups of six satellites (Cosmos 1617-1622 and Cosmos 1690-1695) were launched into orbit [redacted] 1985. [redacted]

88. [redacted]

89. ***Cosmos-1543 Type.*** Cosmos 1543 was launched on 10 March 1984 from Plesetsk. [redacted]

90. ***Cosmos-1645 Type.*** Cosmos 1645 was launched on 16 April 1985 [redacted] The satellite was announced by the Soviets (in TASS) as a space materials-science satellite. [redacted]

25X1 [redacted]

CHAPTER V

MANNED SPACE ACTIVITIES

Current Projects

1. Since 1980, manned space programs have increased substantially and now account for about one-fourth of the total costs of Soviet space efforts. The size, scope, and integrated nature of Soviet manned space activities is impressive. We estimate that 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 station 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.

— A space plane, which, if developed, will probably be launched by an SL-X-16 launch vehicle.

— And, probably, a reusable space tug for satellite orbital transfer.

Inherent in these projects is a design philosophy that emphasizes flexibility. [redacted]

2. To a large extent, recent developments in the Soviet manned space program reflect US concepts and designs and confirm the substantial transfer of US technology. For example, prototypes of the Soviet space plane closely resemble US lifting-body research vehicles flown in the late 1960s and early 1970s [redacted] Even more apparent is the Soviet reusable space shuttle orbiter that appears identical in many respects to the US space shuttle. By capitalizing on US designs and technology, the USSR was able to achieve in a relatively short time a system it could not have otherwise developed until the 1990s. The transfer of Western space technology to the Soviet Union is discussed in detail in chapter X. [redacted]

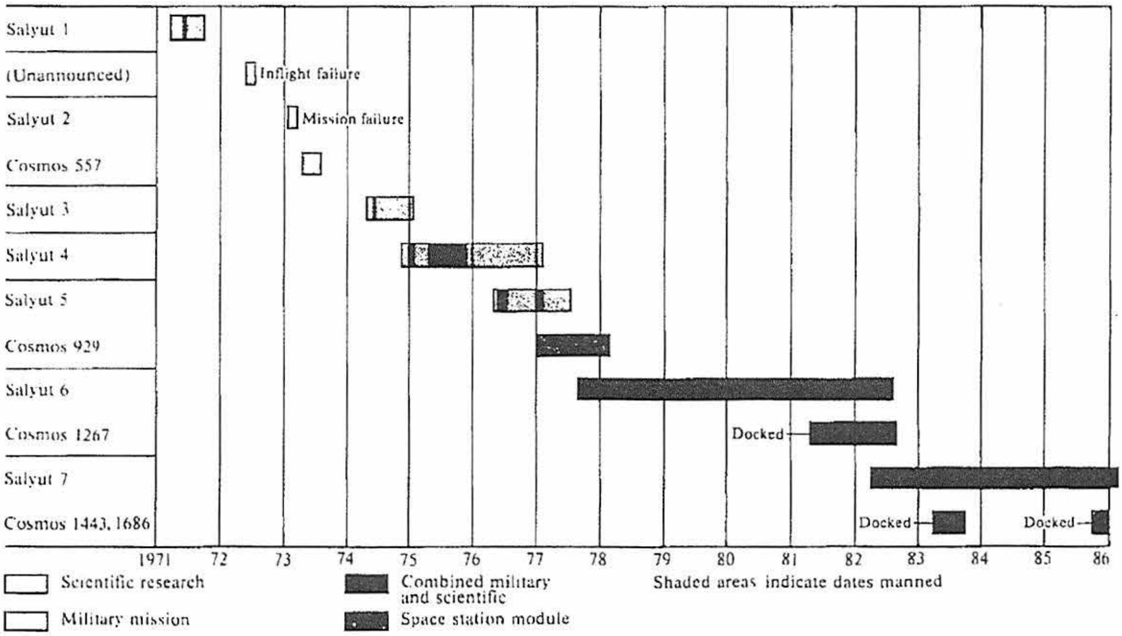
Salyut Space Stations

3. Senior Soviet officials and scientists have repeatedly stated a national goal of having continuously manned space stations. Since 1971, Soviet space stations have been in orbit nearly continuously, periodically occupied by Soviet cosmonauts (see figure V-1). Salyuts 3 and 5 were primarily military in nature and [redacted] Salyuts 1 and 4 served primarily scientific purposes, although some military research was performed. Salyuts 6 and 7 conducted both military and scientific experiments, [redacted] Salyut space stations are small (15m by 4m) and typically have crews of two to three persons. [redacted]

4. The Salyut systems have brought the USSR worldwide recognition as the leader in long-duration manned space flight. Crews aboard Salyut 7 logged more man-days in three years—over 1,500—than have been logged in the entire US space program. In 1982 the first crew to visit Salyut 7 stayed for 211 days, and, in 1984, the third crew stayed 237 days, breaking all previous records. (U)

5. Salyut 6 remained in orbit for almost five years and was manned 38 percent of the time. Thus far, Salyut 7 has been in use for three years and has been occupied 55 percent of the time. [redacted] the increasing maturity of the Soviet manned space program and has provided valuable experience in space station maintenance and repair. Furthermore, in

Figure V-1
Soviet Space Station Program



[redacted]

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September the Soviets conducted the first space station crew rotation, another important step in establishing a permanent manned presence in orbit. Unlike previous space stations, Salyuts 6 and 7 were equipped with a second docking port to accommodate Soyuz spacecraft or Progress nonrecoverable resupply spacecraft, used to replenish all consumables (oxygen, food, and fuel) and to deliver replacement parts and equipment. The capability to resupply consumables was necessary for the long-term missions, and the cosmonauts' ability to do extensive repair and maintenance work has been essential to achieving such long-duration missions. [redacted]

6. ***Salyut Military-Related Activities.*** Since 1978 the number of [redacted] military-related experiments on Soviet manned space flights has increased substantially. [redacted]

[redacted]