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# Soviet Space Programs

**National Intelligence Estimate**
**Volume II–The Estimate**



~~Top Secret~~

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# NIE 11-1-85

# SOVIET SPACE PROGRAMS
# VOLUME II–THE ESTIMATE

Information available as of 5 December 1985 was used in the preparation of this Estimate, which was approved by the National Foreign Intelligence Board on that date.

THIS ESTIMATE IS ISSUED BY THE DIRECTOR OF CENTRAL INTELLIGENCE.

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

# CHAPTER I

# TRENDS AND DEVELOPMENTS

## Highlights

1. There have been a number of significant developments in the Soviet space program since the 1983 NIE 11-1, *The Soviet Space Program*. These occurred in diverse areas and indicate a continuing strong Soviet commitment to space. Major highlights since the last Estimate include:

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— *Construction of a large facility, begun in 1981, 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 antisatellite (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 weapon. An alternative view holds that the evidence is insufficient to judge the purpose of the Dushanbe or Storozhevaya facilities.[1] CIA Statute

— *Further progress in the development of a reusable space transportation system.* 25X1
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25X1
25X1 A runway suitable for shuttle landings at Tyuratam is now complete.
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25X1 We anticipate the first test flight of the SL-W heavy-lift launch vehicle in 1986. The Soviet shuttle will probably first go into orbit in 1987 on an SL-W, when construction of a suitable launchpad is completed. CIA
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— 25X1
25X1 We estimate a moderate likelihood that the full-scale version of the spaceplane will be launched on an SL-X-16 booster in 1987, but it could be launched as early as late 1986. The Soviets deny the subscale vehicle will be developed into a full-scale spaceplane. CIA Statute

— *A new type of ELINT satellite (Cosmos-1603-type), launched in 1984.* 25X1
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— *A record of 237 continuous days in space, set by Soviet cosmonauts in 1984 as part of Soviet efforts to establish a permanent manned presence in space.* Long-duration manned missions also have applications for a possible manned mission to Mars. CIA Statute

— *The Salyut 7 space station failed in February 1985 but was reoccupied and restored to full*

[1] *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)

*operational status by a new crew in June 1985.*
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25X This accomplishment reflects the increasing maturity of their manned space program. The mission was terminated in November 25X1
25X1 but Salyut 7 is expected to be remanned in early 1986. CIA Statute

*Development of additional prototypes of electro-optical imaging satellites (IMSVT) with limited operational capabilities.* 25X1
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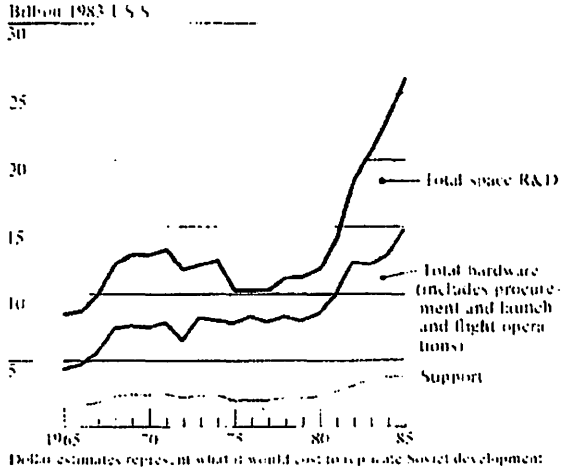
— *The launch in December 1984 of two international scientific missions which have flown by Venus and also will rendezvous with Halley's Comet in 1986.* These missions will enhance Soviet prestige and contribute to the scientific community's knowledge of several astronomical phenomena. CIA Statute

- *Development of a new ocean research satellite that we judge will be used for naval support, such as locating ice-free sea routes, and may be of particular utility for Arctic submarine operations.* CIA Statute

- *Further developments in the Soviet comsat programs.* The Soviets are increasing the use of satellites that carry transponders for more than one network. The Soviets have also filed for three new networks: Statsionar-D, which may relay digital military data; More, which may support civil maritime users; and Foton, which may support military users. They are also expanding three existing networks (Statsionar, Volna, and Gals). CIA Statute

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




Dollar estimates represent what it would cost to procure Soviet development and procurement in the United States and then launch and operate systems as the Soviets would. They costs represent only those programs existing or planned 25X1 They may, therefore, underestimate total program costs in general and R&D in particular.
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These and other developments over the past two years contribute to a wide range of capabilities summarized in table 1-1. CIA Statute

## Trends

2. We estimate that in 1955 the costs of Soviet space programs are about $26 billion in FY 1983 dollars. Between 1950 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 1-1). 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 efforts. (See figure 1-2.) 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

Table I-1
Main Capabilities of Soviet Space Systems

Existing Capabilities and Expected Improvements

**Navigation.** Location data (about 100 meters for fixed users) are provided to Soviet naval and commercial shipping. A new system, GLONASS, will aid ships and other mobile users in determining their positions, possibly within 30 meters.

**Mapping, Charting, and Geodesy.** Data are generated for accurately locating points on the Earth's surface and for producing accurate models of the Earth's gravitational field for ICBM targeting and other uses. New generations of geodetic and geophysical satellites will provide more accurate data for targeting of ballistic and cruise missiles.

**Calibration.** Testing and development of ABM radars, space-tracking systems 25X1 25X1 are facilitated by calibration satellites.

**Weather.** Data are provided for global weather forecasting and may be used to improve effectiveness of space-based imagery collection. A new geosynchronous system (GOMS) will provide better coverage and more timely data.

**Command and Control.** Secure and redundant communications and data relay are made available to major Soviet military units as well as military advisory groups. New systems will provide higher capacity, more secure, global communications.

**Civil Communications.** Newer geosynchronous satellites will make domestic telephone and television services available to about 90 percent of the Soviet population.

New Capabilities

**Space Transportation System.** This system, similar to the US space shuttle will be able to transport bulk cargo to and from space stations. It also will be used for delivery, recovery, refueling, and repair of satellites. A space tug, if perfected, would assist the space station and shuttle.

**Military Intelligence.** The deployment and exercises of most major NATO and Chinese ground, naval, and air units are monitored by space systems providing current order-of-battle information, warning of possible attack, and monitoring of treaty compliance and crisis situations. Improved SIGINT and new electro-optical satellites will provide improved coverage and more timely indications and warning information as well as tactical data. A new satellite data relay system will pass reconnaissance data from low-altitude satellites directly to Moscow in near-real time.

**Naval Targeting.** Satellites locate US naval battle groups and other naval formations and transmit the derived target information on a real-time basis to selected Soviet naval combatants. These satellites have gaps in coverage 25X1 25X1 Coverage improves with additional satellites launched in crisis or wartime.

**Warning.** A multisatellite, semisynchronous network augmented by satellites in geosynchronous orbit provides on a continuous basis 30 minutes' early warning of US ICBM launches. It supplements ground-based ballistic missile early warning radar systems. We project a new system capable of detecting both ICBMs and SLBMs.

**Resupply Vehicle.** Existing "Progress" vehicles deliver about 2,300 kilograms of cargo. Newer resupply vehicles have greater capacity and will be able to recover materials produced in space, return cosmonauts in emergencies, and return equipment.

**Spaceplane.** A reusable spacecraft may be developed. Likely missions include: ferry and rescue of cosmonauts from space stations, reconnaissance, and satellite inspection/negation roles.

**Earth Resources.** Data on domestic and foreign natural resources and crop surveys are collected using a recoverable film system. A developmental electro-optical system with capabilities similar to US Landsat will provide more timely information and attain longer mission duration.

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**ASAT.** Orbital interceptors can attack satellites in low Earth orbit one at a time, and six to eight and possibly 10 within an initial 24-hour period. The operational system has damaged a target in nine of the 15 tests to date. Other systems with ASAT potential include Galosh ABM interceptors, ground-based lasers at a test range, and the technological capability to conduct electronic warfare.

**Lunar and Planetary Exploration.** Venus flyby to Halley's Comet and Mars/Phobos orbiter/remote sample missions will be highlights. Lunar polar orbiter and Venus lander/asteroid lander missions are planned.

**Space Station.** Since 1983 Soviet space stations have been manned about half of the time. Cosmonauts have conducted military experiments, reconnaissance, materials processing, and other research. In 1986, we expect construction to begin on a modular space station with crews of three to 12 persons that will provide permanently manned platforms for similar activities and weapons component testing.

**Heavy-Lift Launch Vehicle (SL-W).** Current Soviet space launch vehicles are limited to placing about 20,000 kg in low orbit. The new SL-W booster will be capable of lifting at least 100,000 kg into low orbit, or about 30,000 kg in the shuttle orbiter configuration.

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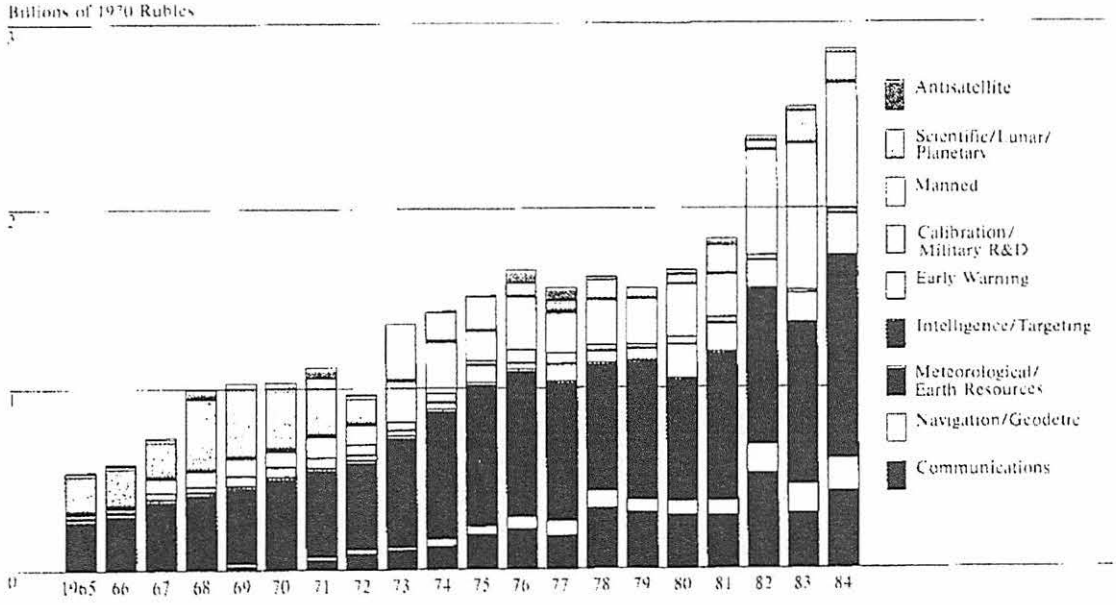
Figure 1-2
Soviet Space Hardware Costs, by Mission Category

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largest increases to be noted in manned activities and communications programs over the next five years.

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3. Trends in allocations of resources are also reflected in Soviet space launches (see figure I-3). We expect the costs of Soviet space activities to continue to grow at an annual rate of about 10 percent for at least the next five years, with the largest increases in manned activities and communications programs.

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4. Since our last Estimate in 1983, two satellite systems have become fully operational: the second-generation photogeophysical (PHOTOGEO-2) and the second-generation geodetic (GEOSAT-2). In addition, three Soviet space systems are progressing from the developmental stage to operating with limited capabilities: the developmental near-real-time INMSAT, the experimental geosynchronous relay satellite (RELSAT), and GLONASS. These new systems, when fully operational, will substantially improve the timeliness and accuracy of the support provided by Soviet space systems. The developmental INMSAT system provides a near-real-time satellite reconnaissance capability to Moscow.

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GLONASS, when fully operational, will provide location information to Soviet users accurate to within about 30 meters, and will be used for sending navigation data to Soviet weapons in flight. The new geodetic and photogeophysical systems provide more accurate data for targeting ballistic and cruise missiles.

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5. These new space systems are part of a network of over 140 active satellites representing about 30 different types of spacecraft. Although no entirely new capabilities have been added since the last Estimate, progress is evident in providing more timely support to a wide variety of users. The next major addition is expected to be the space shuttle system in 1987.

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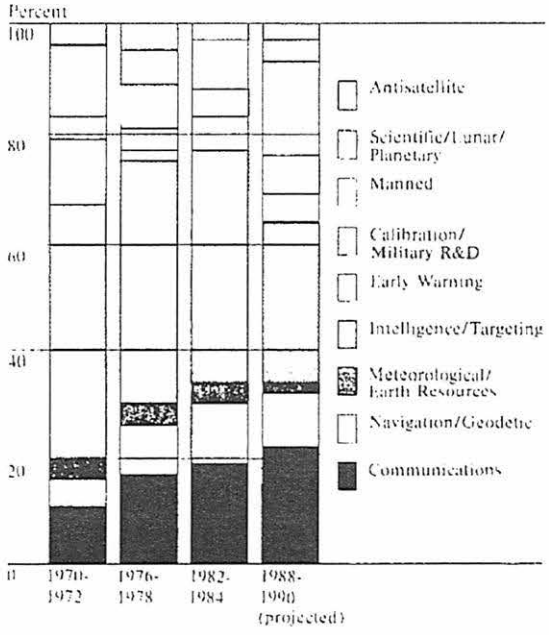
6. Steady growth also is reflected in construction at the design bureaus, production facilities, launch complexes, control sites, cosmonaut training facilities, and other elements of the space support infrastructure. We

**Figure 1-3**
**Trends in Soviet Space Launches**

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also note an increase in the number of space support ships (see table I-2). This growth will provide a foundation for even more diverse and ambitions Soviet space programs in the 1990s CIA Statute

7. Major new construction projects at design bureaus, test centers, and space support facilities are important indicators of increased Soviet investment in space activities. Much of this effort will go into building a versatile inventory of space capabilities that will not be fully realized until the 1990s or later. Two new launch vehicles, the medium-lift SL-X-16 and the heavy-lift SL-W, are expected to become operational in the next several years and will provide key support for the establishment of a modular space station, a major step in achieving the Soviet goal of a continuous manned presence in space CIA Statute

8. We have identified 15 Soviet space systems that are probably in development and are likely to undergo testing in the next 10 years. In addition, there are four lunar and planetary missions that have at least a moderate chance of being undertaken within the next 10 years or so. Compared with the last Estimate, the new systems include a new-type satellite similar to ELINT collectors, an ocean research satellite for naval support and a new multispectral earth resources imaging system. There are also two new planetary missions: a Mars-Phobos mission and a mission to Venus. In addition to changes in the composition of the list of systems in development, we have changed our estimate of when some of these systems might be tested (See figure I-4 and table I-3, page I-8). CIA Statute

9. Beyond the space systems we have identified as likely to be tested within the next 10 years or so, there are several other developments that could occur in the Soviet space program in the next 10 to 20 years, but for which we lack specific evidence and have greater uncertainty. These additional possibilities are noted in part B of table I-3, page I-9. In some cases, we are inferring possible significant future developments on the basis of limited information on the general nature of Soviet research. In other cases we are assuming Soviet choices based on the expected availability of key technologies. The high cost of future space projects; formidable technological challenges; and limitations on research, design, and production facilities suggest that not all of them will be undertaken or pursued to the system development phase. CIA Statute

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**Table I-2**
**Growth of Infrastructure of Soviet Space Programs**

| | 1975 | 1980 | 1985 | 1990 (Projected) |
|---|---|---|---|---|
| Floorspace of design bureaus and plants (*thousand square meters*) | 1,670 | 1,885 | 2,100 | 2,180 |
| Space control sites (not including tracking sites) | 16 | 18 | 20 | 21 |
| Seagoing space support and control ships | 10 | 11 | 18 | 20 |
| Launchpads | 16 | 17 | 21 | 24 |
| Tyuratam | 6 | 8 | 10 | 13 |
| Plesetsk | 6 | 7 | 9 | 9 |
| Kapustin Yar | 4 | 2 | 2 | 2 |

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**Figure I-4**
**Soviet Space Systems Likely To Be in Development**

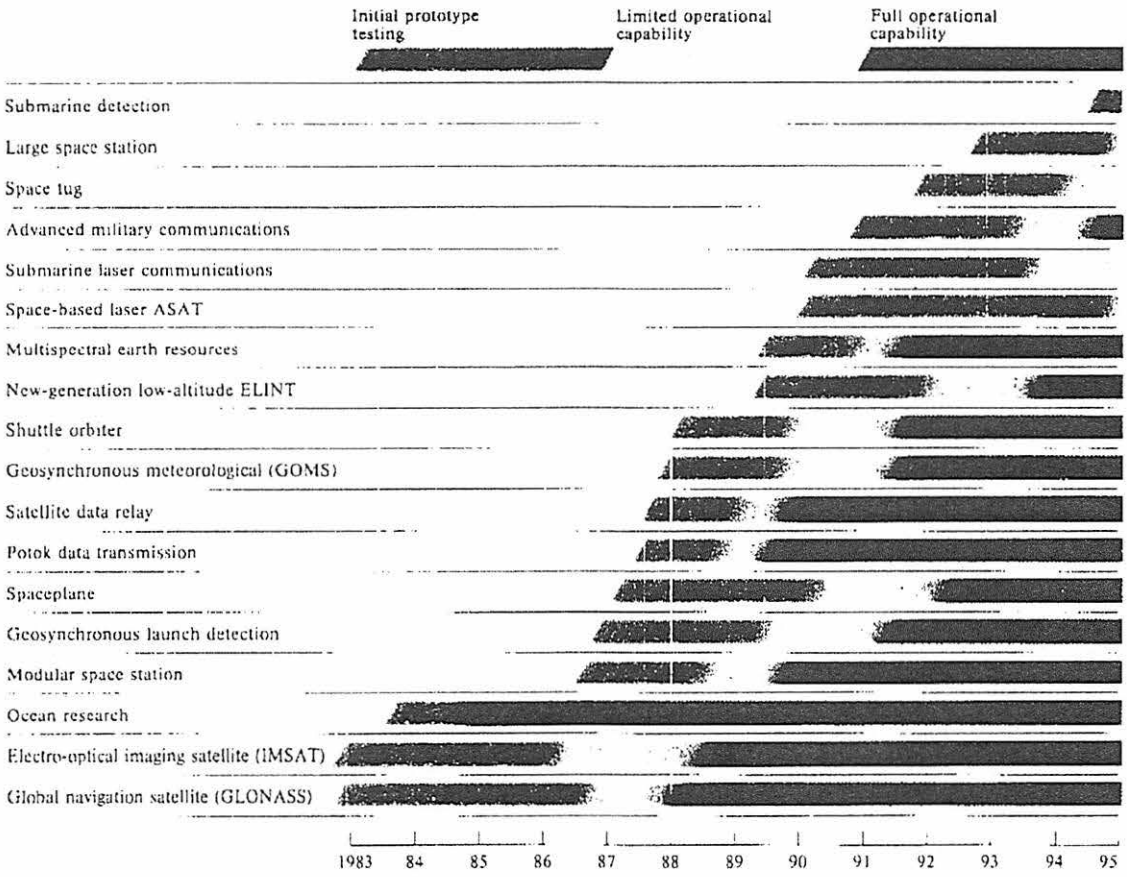




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**Table I-3**
**Projected Major New Soviet Space Developments** [a] [b]

| Systems | Likelihood of Development [c] | Estimated Date of Initial Testing/Launch | Degree of Confidence [d] | Page Reference |
|---|---|---|---|---|
| **A. Space systems likely to be in development** | | | | |
| Antisatellite [e] | | | | |
| Space-based laser (ASAT) [f] | Low [g]<br>Moderate [h] | Late 1980s<br>Early 1990s | Poor-fair<br>Poor-fair | |
| Submarine detection | | | | |
| Limited area detection | Low-moderate | Mid-1990s | Fair | |
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| Communications | | | | |
| Potok data transmission | High | 1986-87 | Fair | |
| Advanced military comsat | High | 1990 | Fair-good | |
| Satellite data relay systems | High | 1986-87 | Good | |
| Submarine laser communications | Moderate [h] | 1989-91 | Fair | |
| Manned systems | | | | |
| Full scale spaceplane | Moderate | 1986-87 | Fair-good | |
| Shuttle orbiter | High | 1987 | Good | |
| Space tug | Moderate | Early 1990s | Poor-fair | |
| Modular space station | High | 1986 | Good | |
| Large space station | High | Early to mid 1990s | Fair | |
| Weather | | | | |
| Geosynchronous meteorological satellite (GOMS | High | Late 1980s | Poor-fair | |
| Earth resources | | | | |
| Multispectral Landsat-type (MSPR) | High | 1986-88 | Fair | |
| Launch detection | | | | |
| Earth-looking geosynchronous | High | 1986-87 | Fair | |
| Lunar and planetary [i] | | | | |
| Lunar polar orbiter | High | Early 1990s | Good | |
| Mars Phobos mission | High | 1988 | Good | |
| Mars orbiter/lander/soil sample return | High | Early 1990s | Fair | |
| Venus lander/asteroid lander | Moderate-high | Early 1990s | Fair | |

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Table I-3 (continued)

| Systems | Likelihood of Development [a] | Estimated Date of Initial Testing/Launch | Degree of Confidence [d] | Page Reference |
|---|---|---|---|---|
| **B. Additional Possible Developments** [i] | | | | |
| Antisatellite and ballistic missile defense | | | | |
| Improved orbital interceptor ASAT | Very low | Late 1980s | Poor | |
| High-altitude conventional orbital interceptor | Very low | Late 1980s | Poor-fair | |
| Nonnuclear direct-ascent ASAT | Low-moderate | Late 1980s-early 1990s | Poor | |
| Airborne laser ASAT | Low | Early 1990s | Poor-fair | |
| Geosynchronous laser ASAT [e] | Moderate [b] | Mid-to-late 1990s | Poor | |
| Space-based laser for BMD | Very low [b] | Mid-to-late 1990s | Poor | |
| Space-based neutral particle beam ASAT weapon | Low [b] | Mid-to-late 1990s | Poor | |
| Ground-based radiofrequency ASAT weapon | Moderate | Early 1990s | Poor-fair | |
| Space-based radiofrequency ASAT weapon | Very low [b] | About 2000 | Poor | |
| Space-to-space missiles (defensive) [f] | Low-moderate | 1990s | Poor | |
| Intelligence and targeting | | | | |
| Advanced RORSAT | Moderate | 1987-89 | Poor | |
| Radar reconnaissance (SAR) | Moderate-high [b] | Mid-1990s | Fair-good | |
| Aircraft surveillance | Low-moderate [b] | Early to mid-1990s | Poor | |
| Lunar and planetary [i] | | | | |
| Lunar farside soil sample return | Very low-low | Early to mid-1990s | Poor | VIII-1 |
| Lunar nearside lander | Low | Mid-1990s | Poor | VIII-1 |
| Manned lunar base | Low [b] | Late 1990s | Poor | VIII-1 |
| Manned Mars mission | Low-moderate [b] | Late 1990s | Poor | VIII-2 |
| Jupiter probe | Very low-low | Mid-1990s | Poor | VIII-3 |

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[b] The terms "research" and "development" are used in this Estimate in a broad sense and do not necessarily have the same meaning as these terms when used in arms control agreements.

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[e] Testing of ASAT or BMD weapons may be constrained by arms control agreements.

[f] There are ground-based facilities under construction that are candidate laser ASAT weapons. See chapter VI, paragraphs 42-44.

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[h] Likelihood will increase if initial testing is estimated for later date.

[i] For these developments, date is that of mission, not a prototype.

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[k] Based only on a perceived requirement and our expectations for prior low-orbit testing. 25X1

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[l] For alternative views, see chapter VI, para. 68.

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