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# USSR: Military and Space Systems in Development—Improving Capabilities for the 1990s

A Research Paper

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# USSR: Military and Space Systems in Development— Improving Capabilities for the 1990s

A Research Paper

This paper was prepared by

Office of Scientific and Weapons  
Research, and Office of Soviet  
Analysis

Comments and queries are welcome and may be  
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**USSR: Military and Space  
Systems in Development—  
Improving Capabilities  
for the 1990s**

**Preface**

This report provides an overview of the extensive Soviet effort to develop new and modernized military systems. It lists the systems that we have identified in development, briefly discusses their principal design organizations, projects their initial operational capability, and summarizes technology and performance trends in each major mission area. The weapons developments described in this paper, for the most part, have been addressed in relevant National Intelligence Estimates and other more weapons-specific analyses. This is an effort to bring together a comprehensive view of what the Soviets have under development in each mission area.

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August 1986

**USSR: Military and Space  
Systems in Development—  
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for the 1990s**

**Key Judgments**  
Information available  
as of 1 January 1986  
was used in this report.

The USSR is expanding and improving its war-fighting capabilities by the continuous development of new and highly modernized weapon, support, and command and control systems. The Soviets have at least 123 military systems in development, most of which will achieve initial operational capability by the mid-1990s.

Future Soviet systems, including some of those currently in development, will use greater amounts of advanced technologies. In some mission areas, this increase in technology level will lead to the development of fewer but more complex systems. Soviet systems will thus be more comparable in performance characteristics to US and NATO systems. Most of the improvements in Soviet weapons will be based on advances in computers, electronics, and materials technologies. At the same time, service life will be significantly lengthened and the technical capabilities of some older systems increased by adapting new technologies to them.

Our assessments of the status of Soviet developments in strategic, theater, and tactical forces weapons and in military space applications are summarized below.

*Strategic Warfare.* We believe the Soviets will continue their efforts to increase the lethality of their ballistic missile systems through improved accuracy obtained by upgraded navigation subsystems and through the possible use of terminal guidance on maneuverable reentry vehicles. In addition, significant increases in throw weight could result from advances in engine design and propulsion. The survivability of the force will be enhanced by the development of road- and rail-mobile systems although at some cost to accuracy and reliability. Soviet strategic offensive systems in development also include a new long-range supersonic bomber and new long-range cruise missiles, some with terminal guidance. The Soviets will extend their strategic defensive capabilities to lower altitudes and more deeply in space. A variety of ground-based and airborne systems are being developed; these include a two-layered antiballistic missile (ABM) system, new early warning and target tracking systems, surface-to-air missiles, and interceptor aircraft.

*Theater Nuclear Forces.* We believe the Soviets' major technological improvement in their theater nuclear forces will be in short-range ballistic missile guidance. Expected improvements in accuracy probably will reduce miss distances [ ] using both inertial- and terminal-guidance systems. These improvements will greatly increase the lethality of Soviet systems and allow them to use smaller nuclear and improved conventional warheads against certain targets.

*Tactical Land Warfare.* Soviet development of new tactical weapon systems will continue to emphasize mass firepower and mobility, and the capability to discover, pinpoint, and destroy the enemy. Technical improvements in assault vehicles, helicopters, firepower systems, and air defense weapons will stress improved armor protection, missile guidance and propulsion, guided artillery munitions, radars, and lasers.

*Tactical Air Warfare.* We believe the Soviets will continue evolutionary improvements of their combat and support aviation elements. They probably will emphasize aircraft survivability first and weapon system efficiency second. Future fighters will be deployed with radars and missile systems that will significantly enhance the Soviets' air-to-air capability. We believe they will achieve all-aspect, lookdown/shootdown capability against small radar cross section targets in ground clutter. Soviet tactical airlift capabilities will be enhanced by the deployment of two new transports, including the Condor, a C-5-like aircraft capable of carrying a maximum payload of 150 metric tons to a distance of over 3,000 kilometers.

*Tactical Naval Warfare.* We believe that, although the Soviets' primary emphasis will continue to be on the improvement of the war-fighting capabilities of the Navy, by the mid-1990s there will also be substantial improvements in their capability to use naval forces to project power in distant areas. They have in development three new, fast, deep-diving attack submarines with markedly improved quieting characteristics. The first unit of a new class of large aircraft carrier was launched in 1985 and should be operational by 1990. [ ], we are uncertain of its weaponry, aircraft, and power plant. In addition, the Soviets are developing modernized versions of their antiship and air defense weapons that have improved sensors and guidance systems.

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*Military Applications of Space.* We expect the Soviets to operate large, permanent space stations that will support global military operations. To do this they are developing a heavy-lift launch vehicle, a reusable space transport system, and a space tug. Military missions in space will include intelligence collection using a near-real-time imagery satellite, as well as command and control using improved precision navigational and continuous-broadcast satellites. Research and development are under way on new intelligence collection and communications systems.

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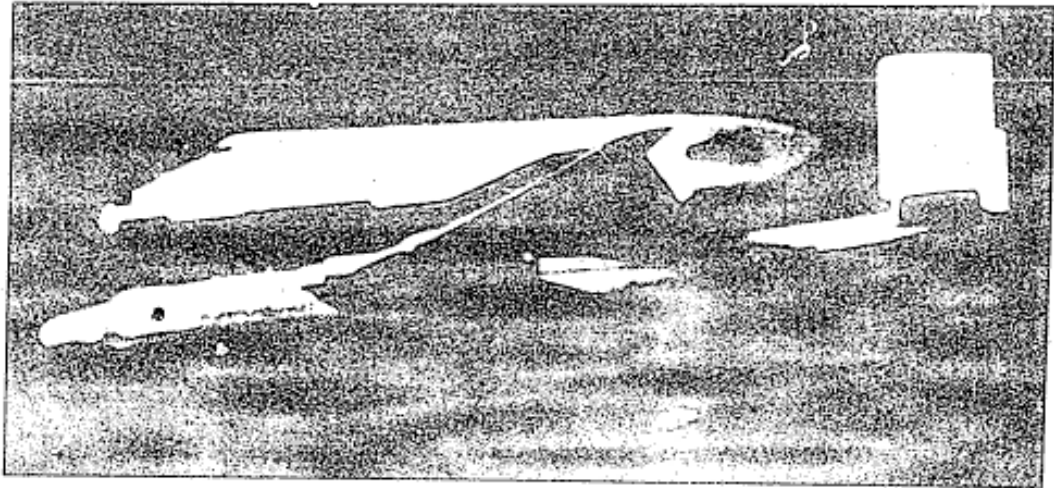
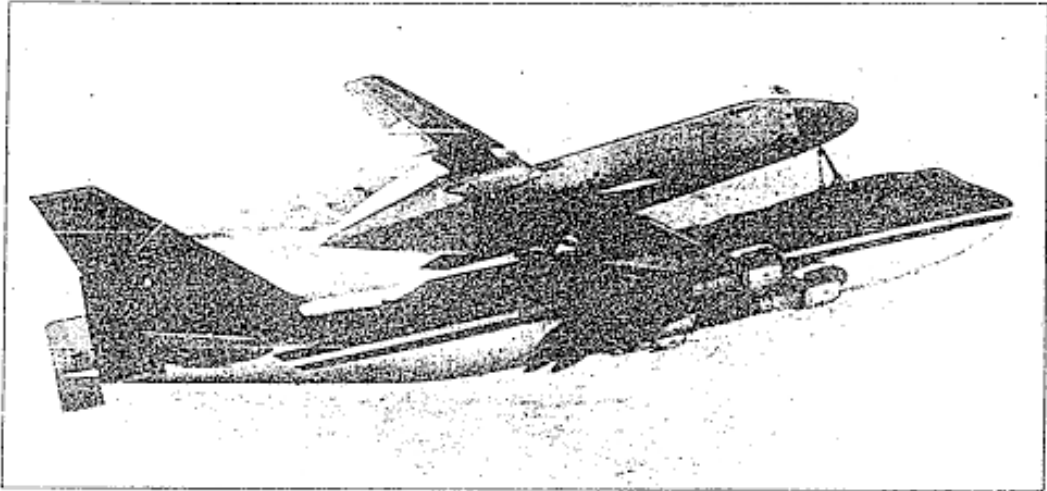
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**Military Application of Space**

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Figure 11  
US and Soviet Shuttle Orbiters



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**Military Application of Space**

We expect the Soviets to operate large, permanent space stations that will support global military operations. To do this, they are developing a heavy-lift launch vehicle [ ] a reusable space transport system, and a space tug. The principal military missions for the space stations are not clearly understood, but will include intelligence collection, command and control, and research and development. Other space assets in support of Soviet military need will include advanced communications satellites and new, continuous-broadcast, precision-navigational satellite system

**Space Support**

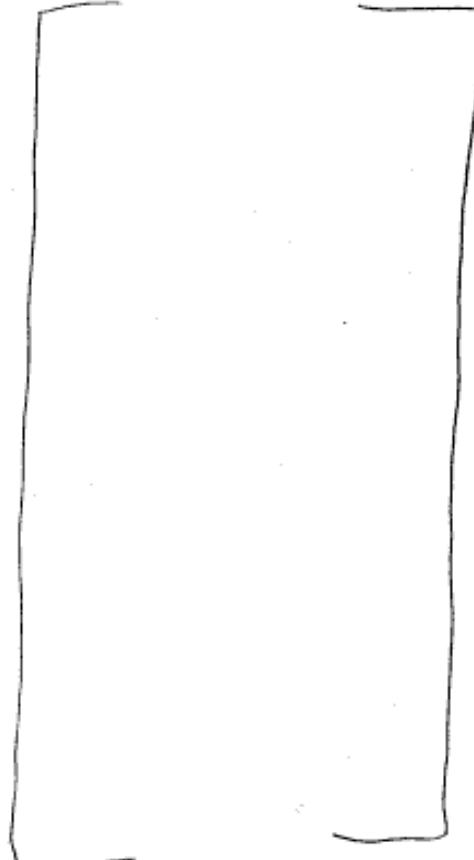
The Soviets are developing two new launch vehicles: the SL-X-16 and the SL-W. [ ]

[ ] Both of these systems are expected to be operational in the next few years. A version of the SL-W is expected to be used to launch a reusable space shuttle orbiter. These launch vehicles will be the workhorses of the Soviet manned space program in the 1990s.

The Soviets are developing a reusable shuttle orbiter system that is a near copy of the US shuttle orbiter (see figure 11). Initial flights could take place in 1986 or 1987. Soviet motives for space transport development include a desire to economize on space launchers, the construction of large space stations, and a desire to compete with the United States for prestige and political influence by providing competitive space launch services for international clients

A smaller, reusable, spaceplane probably will be used for conducting reconnaissance, satellite inspection, and other military missions [ ]. Suborbital tests of a subscale model have been conducted, and more tests are expected before a full-scale test is conducted

The Soviets probably will have a continuously manned modular space station by the late 1980s (see figure 14). They have demonstrated the capability to assemble a two-module space station and have indicated that a multimodular system would involve a station composed of several modules that could be changed or



added to as mission objectives changed. This program will require the successful development of the heavy-lift launch vehicle and adequate power sources. Large multimodular space stations could be deployed beginning in the early-to-middle 1990s, taking several years to accomplish:

- These stations could be used as:
  - Logistic bases for the repair, maintenance, modification, and assembly of spacecraft.
  - Launch platforms for deep-space missions.
  - Military-support platform permitting in-orbit reconnaissance operations.
  - An R & D facility for space-based military systems.

The ability to work on satellites in orbit would require a space tug. Such a system could be [ ] in the late 1980s or early 1990s. The tug would provide

access to high-orbit satellites and would complement the Soviets' space shuttle. The space shuttle and tug combination would extend satellite service life, enhance the building and servicing of orbital launch complexes, and allow the economical shipment of goods between Earth and space bases.

#### **Military Support**

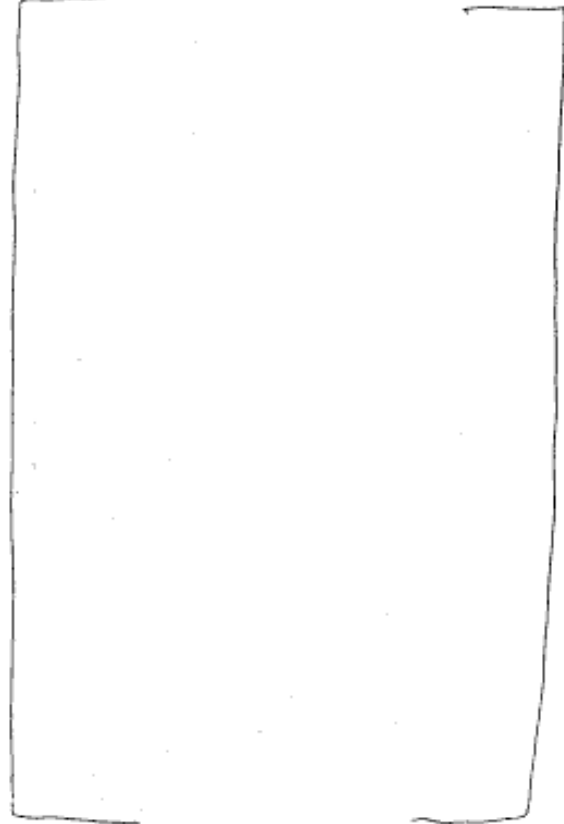
**Reconnaissance Satellites.** An E-O imaging system is being developed to provide more timely reconnaissance. [

We believe a full network of two to four imaging satellites, supported by multiple data-relay satellites, will be operational by the late 1980s. This network may increase to eight imaging satellites in the early 1990s and provide greater area coverage on a real-time basis.

**Communications and Data Relay.** Communications satellites will be used increasingly over the next 10 to 20 years to support intelligence, military, and political activities worldwide. This will result in significant improvements in the speed, flexibility, and reliability of the Soviet command and control network, while also improving the security of this network. The high-data-rate multiple-access systems, onboard multiplexing, spread spectrum, and compact mobile ground terminals now being used are among the more important developments in the Soviet communications satellite program

The Soviets are developing a geostationary communications system that could include satellites that serve more than one network, intersatellite cross-linking, and laser communications links. These systems include the Volna, Gals, Luch, and Luch-P. We project that this communications satellite system will be completed by the early 1990s

In addition to the communications satellite network, the Soviets also are developing a three-satellite data transmission satellite system, designated Potok, and a three-satellite data-relay system. These systems will be established in geostationary orbits by the late 1980s. The Potok system is designed to transmit digital information between central and peripheral Earth stations, and may include military missions. The data-relay system is designed to relay data from low-Earth-orbiting satellites to Earth terminals. This relay capability will greatly improve the Soviets' real-time control of low-orbiting satellites and the timely

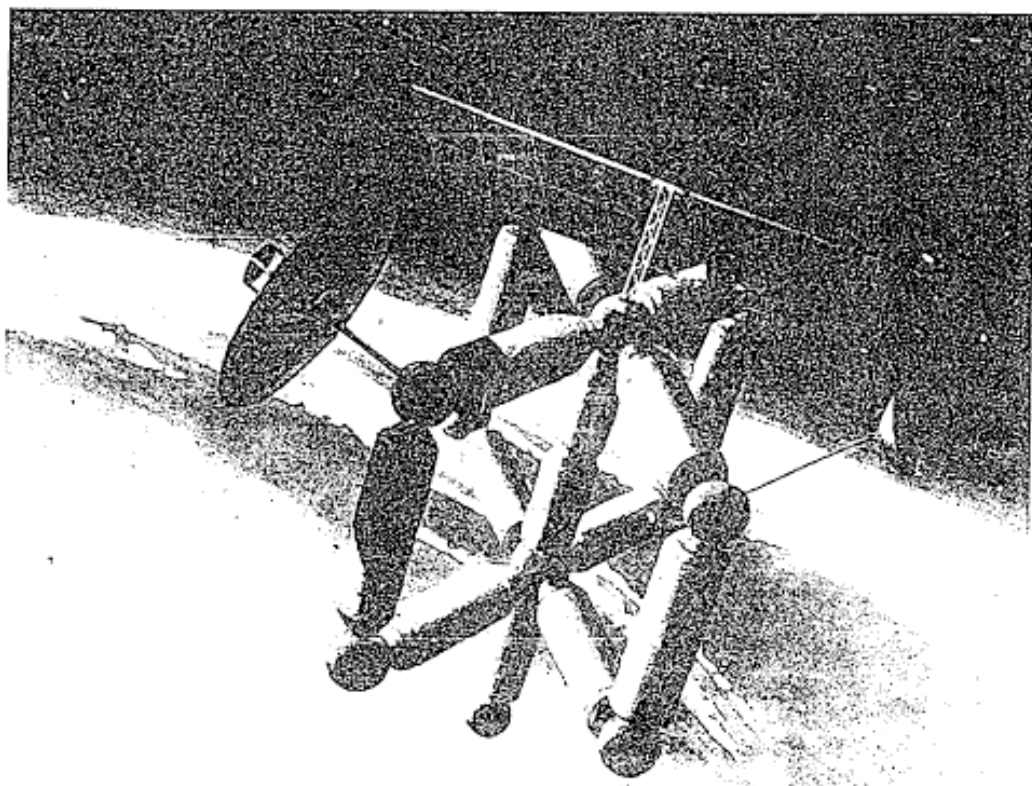


relay of data. This will allow for real-time intelligence collection, the timely redirection of that collection, and on-demand orbit adjustments of low orbiters.

**Space Exploration.** New planetary missions and a lunar mission are expected by the early 1990s. Some of the proposed missions could be used to test new military technology. The purely scientific missions may be delayed or canceled if Moscow decides to place more emphasis on the military space program.

Most of the identified lunar and planetary missions are already technologically feasible or soon will be. The SL-12 is the SLV for space exploration missions. However, the Soviets may utilize the heavy launch vehicle for a number of their planetary mission

Figure 14  
Artist's Conception of Soviet Space Base



*By the mid-1950s the Soviets should have the capability to construct a large space base, using space stations as components. Assembly of such bases will take place over several years.*

**Table 6**  
**Soviet Military and Civil Space Programs**

Program	Mission Area	Program Start/Type	Estimated IGC*	Significant Improvements
<b>Military</b>				
Space base	Space launch and orbital support	Early 1980s/new	Mid-to-late 1990s	
Large modular space station; Salyut type	Space launch and orbital support	Mid-1970s/new or modernization	Mid-to-late 1980s	
Space shuttle orbiter	Space launch and orbital support	Early 1970s/new	1986-88	
Spaceplane <sup>a</sup>	Space launch and orbital support	Early 1970s/new	1986	Lower cost and shorter turn-around time than shuttle
Cargo/resupply vehicle	Space launch and orbital support	Early 1970s/new	1986-87	
Space tug	Space launch and orbital support	Early-to-mid-1970s/unknown	Mid-to-late 1980s	Move satellites in orbit and/or place satellites in higher Earth orbits
				Construction of large modular space station
SL-W heavy-lift booster	Space launch and orbital support	Mid-1970s/new	1986-88	Capability to launch shuttle support construction of large modular space station
SL-X-16 medium-lift booster	Space launch and orbital support	Mid-1970s/new	Mid-1980s	Launch space shuttle and heavier photo and radar reconnaissance satellites
Electro-optical imaging satellite	Strategic surveillance and warning	Mid-1970s/new	1986-87	Electro-optical system for near-real-time reconnaissance
Global positioning satellite	Navigation and position fixing	Early-to-mid-1970s/new	1986-87	
30-meter dish space antenna	Possibly strategic communication, surveillance VLBI	Mid-to-late 1970s/modification	Late 1980s/early 1990s	
Satellite data-relay system	Strategic communication	Mid-1970s/new	1986-87	Data relay to improve real-time control of low-Earth orbiting satellites
Posok satellite data-relay system	Strategic communication	Early-to-mid-1970s/new	1986-87	

Table 6 (continued)

Program	Mission Area	Program Start/Type	Estimated IOC *	Significant Improvements
Luch-P COMSAT	Strategic communication	Mid-1970s/ unknown	1986	Combined with Gals and Volna for worldwide C3 coverage
Gals COMSAT	Strategic communication	Mid-1970s/ unknown	1986	Combined with Luch-P and Volna for worldwide C3 coverage
Volna COMSAT	Strategic communication	Mid-1970s/ unknown	1986	Combined with Gals and Volna for worldwide C3 coverage
Geosynchronous meteorological satellite	Global military environment support	Mid-1970s/ new	1986	
<b>Civil</b>				
Interball/Earth's magnetotail payload		Mid-1970s/ modification	Late 1980s	
X-ray phenomena observatory		Mid-1970s/ modification	Late 1980s	
Gamma-1 gamma ray telescope		Mid-1970s/ modification	1986-87	
Sigma gamma ray telescope		Late 1970s- early 1980s/ modification	Late 1980s	
Submillimeter-wave-length telescope		Early 1980s/ unknown	1990s	
Venus asteroid mission (Vesta)		Early 1980s/ unknown	Early 1990s	
Mars manned-mission spacecraft		Mid-1980s/ new	Mid-to-late 1990s	
Mars Phobos mission		Late 1970s/ new	1988	
Lunar polar-orbiting mission		Mid-to-late 1980s/ modification	1988-91	
Active wave experiment or satellite		Early 1980s/ modification	Late 1980s	
Magnetospheric mission		Early 1980s/ modification	Late 1980s	

\* See appendix for acronyms.

\* Existence of a planned operational program is uncertain.