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171856 MEMO	R. BURT TO R. KIMMITT, D. AMSTUTZ, ET AL. RE US-USSR AGREEMENT ON ECONOMIC, INDUSTRIAL AND TECHNICAL COOPERATION	2	12/9/1983	B1 B3	
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National Intelligence Estimate

Prospects for Soviet Military Technology and Research and Development

Summary

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for the Assistant to the President for

National Security Affairs

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PROSPECTS FOR SOVIET MILITARY TECHNOLOGY AND RESEARCH AND DEVELOPMENT

SUMMARY

The full text of this Estimate is being published separately with regular distribution.





THIS ESTIMATE IS ISSUED BY THE DIRECTOR OF CENTRAL INTELLIGENCE.

THE NATIONAL FOREIGN INTELLIGENCE BOARD CONCURS.

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





SUMMARY

Soviet political leaders recognize the role that technology plays in determining the extent of the USSR's military capabilities—their principal foreign policy asset. They are seeking to attain militarytechnical superiority over the West, and have given this goal a very high priority for at least the past two decades.

Progress to Date

The Soviets' resource commitment to military research and development is enormous by any measure. We estimate that, despite serious problems in the civilian economy, Soviet military R&D outlays have been about double those of the United States in recent years, and today amount to a significantly larger share of gross national product than in the United States. Leadership support for military R&D remains strong, facilities are still expanding, and the R&D program effort seems not to have been affected by economic difficulties in the civilian sector. If conditions worsen in the civilian economic sector, pressures against military outlays will surely grow, but the Soviets will almost certainly maintain their high level of commitment to weapons research and development. Also, requirements for R&D are increasing as the complexity of military threats facing the Soviets becomes greater.

The Soviets have narrowed the US lead in nearly all key technologies. In general, their technology available for application to future military systems¹ is now about five years behind the West roughly comparable to that of the West in the mid-to-late 1970s. The relative Soviet position in the key military technologies ranges from world leadership in a few fields—but significant fields, such as chemical warfare and some areas of directed-energy research—to as much as 15 years behind the United States in some vitally important areas of computing.

Western technology has helped the Soviets considerably. They subsidize their military R&D programs through significant open and clandestine acquisitions of Western technology, most of which is of US origin. Their well-organized national program for acquiring and assimi-

¹ In this Estimate, projections about the *availability* of technologies mean that a particular technology would be ready to be incorporated in a weapons *development* program. Weapon system development times vary widely, but typically an additional five to 12 years is usually required before deployment is possible.



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lating Western technology has been a major factor in the advances they have made since the early 1970s in significant areas, including microelectronics and computers, that are essential to the development of modern military systems. Their strategy of large-scale Western technology acquisition and use derives from their historic realization that it is to their benefit to take advantage of the advanced technology efforts of the West. Incorporating Western technology into their military programs, rather than relying on Soviet indigenous capabilities, yields a significant savings in program costs, thereby freeing indigenous R&D resources for efforts in other areas, and takes less development time, thereby producing more capable military systems at an earlier date.

The Soviets' weapons acquisition process helps them to overcome technological weaknesses and economic constraints. Relative to their US counterparts. Soviet military planners are better able to marshal, focus, and sustain the commitment and resources for developing weapon systems. Politburo-level weapons decisions carry force of law in the economy, and are the rough equivalent in US practice of combining a Defense Department program approval, a Presidential decision authorizing top priority, and multiyear Congressional funding. Strict schedules are enforced, resulting in essentially a technology freeze once a decision to develop a weapon is made. This reduces technological risk and affords a high probability of development success. The weapons decisionmaking process offsets inadequate performance and the potential for technological stagnation in deployed weapons by an almost routine approval of follow-on improvement programs. The Soviets field new or significantly modernized weapons on the average of every five to 10 years in each system area.

The USSR currently leads the United States in several key technologies, including chemical warfare agents and some aspects of millimeter-wave radar and sensor technology. These strengths, in conjunction with our limited understanding of some Soviet efforts, give the USSR a potential for deploying military systems we do not fully understand, and hence the potential for future military advantages. Such systems could prove extremely difficult to detect and to counter in combat. Soviet advanced research is also strong in directed-energy technologies, including that for development of high-energy laser weapons for possible application to space-, air-, ground-, and sea-based systems.

Soviet weaknesses are significant. The rate of return to the Soviets on decades of high-priority R&D investments—measured in economic terms—has been low relative to that in the West. While the payoff in



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military output in absolute terms-numbers of new weapon systems, improved effectiveness, and the growth in overall military capabilities-has been quite good, on balance, productivity in the Soviet R&D sector, both civilian and military, has been notably poor. We expect this inefficiency to continue. The Soviet system does not-and probably will not--effectively stimulate advances in multidisciplinary efforts such as microelectronics and computers. While the Soviets have made important gains in recent years, serious shortcomings persist in some key areas of military technology, including the design, manufacture, and quality control of microelectronics. Moreover, in computer technologies, the Soviets will continue to lag the United States by five to 15 years; this lag will continue to hamper many programs, including those for ballistic missile defense, antisubmarine warfare, aircraft, and command and control systems. They also face major limitations in signal-processing technology and in automated production technologies and precision test equipment. In addition, their practice of heavily adopting Western ideas and designs will continue to reinforce their position of technological inferiority to and dependence on the West.

However, the Soviets' persistent modernization efforts help them to compensate for these weaknesses. For example, they have been able to move computer technology into deployed systems on the average of six years faster than the United States, enabling them to offset partially the US technological lead in computers. Similarly, frequent modernization of fielded weapon systems also helps the Soviets to offset the attendant technological lags that result from their reliance on Western technology for their military systems.

Prospects for Soviet Technologies

We think the prospects are, in general, low for an unanticipated major technological advance in the Soviet Union during the next 10 years that could lead to a revolutionary new capability posing a significant new threat to the West. For those technologies where we have an adequate understanding of Soviet achievements to date, the Soviets lag the United States in several areas critical to the achievement of military advantage. Moreover, about nine to 12 years are required to transform a major technological advance into a new operational weapon. The Soviets almost certainly will not be able to incorporate into systems deployed through 1995 advances much beyond their present technology levels.

We do not completely discount the prospects for technological surprise through 1995, particularly in several areas where the Soviet



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efforts are already strong

nonacoustic antisubmarine warfare, chemical weapons, directed energy, and optical processing are our greatest concern because of the strength and persistence of Soviet R&D in these areas. The growth and maturity of the Soviets' R&D sector, in conjunction with the scale of their military programs, could result in some unexpected advances either in the speed with which they are able to develop and field new weapon systems with higher levels of performance, or in the novel design of some of their systems.

For the 1990s the Soviets will be working from a strong and sizable base of military technologies, but the pace of their advances will be uneven:

- Developments in *information acquisition* technology will probably accelerate and be stronger before the end of the 1980s. The Soviets will increasingly emphasize advanced radar and electrooptical sensors in an effort to counter US Stealth technology.
- Soviet information-processing technologies, particularly microelectronics and computers, are not likely to keep up with Western developments; however, we expect the Soviets to adapt large-scale integrated circuitry for military applications by the end of the 1980s.
- We expect Soviet *weapons delivery* technologies, particularly in missile guidance and propulsion, to advance steadily and continue to provide a strong base for both tactical and strategic weapons development.
- The Soviets' most significant advances may occur in the area of *lethality/damage*. Their extensive efforts in chemical warfare and directed-energy technologies could result in some major advances. They are likely to keep up their large investment in conventional explosives technologies in order to maintain the excellent technological capabilities they now have.

Soviet prospects for gaining on the West in some military technologies, and keeping pace in others, will in large measure depend upon continued success in acquiring Western technology. Soviet dependence is especially important in computers, microelectronics, and automated production technologies.

Military Implications of Soviet Technologies

The decade of the 1990s will pose some new, major technological challenges to Soviet military planners. Western defense programs,



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particularly US strategic force modernization, will lead to costly and technologically demanding Soviet efforts. The USSR's weapons development programs will continue to be vigorous.

The weapon systems that the Soviets will deploy through the mid-1990s will be based largely on the technology levels achieved—or obtained from the West—in the 1975-85 time frame. We estimate that the Soviets currently have under development between 150 and 200 new and major modernized weapon systems and support systems. We believe that the number of systems in development in the 1990s is unlikely to decline.

In strategic offensive systems, Soviet emphasis will be on greater survivability through deployment of mobile systems, as well as improved accuracy. The development of mobile land-based missile systems will serve to offset the increasing vulnerability of fixed intercontinental ballistic missiles to programed US strategic weapons.

In strategic defense technologies, the Soviets must make significant advances in several critical technology areas well beyond those now available for military applications. They will probably continue to lag behind the changing threat posed by programed US bombers and cruise missiles, particularly those employing Stealth, and by US ballistic missile submarines. They will nevertheless make major improvements in their defensive systems.

In *directed-energy* technologies, we expect development and prototype testing of several types of Soviet laser weapons. Laser technologies are already available for development of ground-based weapons capable of damaging satellite sensors and antisensor weapons for use in air defense. Technology for the development of destructive laser air defense weapons is expected to be available within the next several years. The Soviets are likely to be able to test a prototype spacebased laser weapon for antisatellite application by the early 1990s. But the technology for space-based laser weapons for ballistic missile defense is not yet sufficient to support development of a prototype weapon. Operational laser systems for destruction of ballistic missiles or their reentry vehicles, if they prove feasible, probably could not be fielded until after the turn of the century.

Command, control, and communications systems, although effective, will continue to be limited by deficiencies in computer technology and computer networking. We expect a number of advanced electronic warfare systems in the 1990s, including highly capable jamming systems. In addition, we expect improvements in Soviet technical intelligence collection capabilities, including the deployment in the late 1980s of a network of space-based near-real-time reconnaissance systems.



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Advanced technologies will allow the Soviets to improve many aspects of their *naval forces*. The deployment of a new class of aircraft carrier with accompanying combat and surveillance aircraft will support their efforts to expand their areas of sea control and sea denial. In antisubmarine warfare, they will remain unable to systematically detect and track Western ballistic missile submarines in broad ocean areas, but they may achieve improved capabilities against enemy attack submarines attempting to penetrate bastions for Soviet ballistic missile submarines.

Soviet ground forces and particularly supporting air and air defense forces will incorporate some weapons with advanced technologies. Western advances in armor protection and antiarmor weapons will reduce some of the present Soviet numerical advantages in the land-warfare area, and we expect the Soviets to have difficulties countering these advances. We anticipate advanced electro-optical and infrared sensors and imaging radars to be based on aircraft, remotely piloted vehicles, and drones. Introduction of small, guided, fire-and-forget weapons on helicopters is expected by the mid-1990s.

The Soviets have committed substantial R&D resources to support their *space programs*, with large increases in the early 1980s for the military manned space program and communications systems. The development of new systems, including the shuttle, space plane, heavy-lift launch vehicles, and near-real-time imagery relay systems, will offer the Soviets new military opportunities in space.

Soviet military research and development organizations have probably become more capable in developing high-technology weapon systems than Soviet industry has become in producing them. A combination of factors—more multipurpose weapons, higher costs, problems in production engineering and quality control, and more difficult and costly maintenance requirements—is likely to cause the Soviets to produce, in some areas, new and more technically advanced systems in smaller quantities than they have in the past. Thus, they are tending to rely somewhat more on technology, and somewhat less on quantity, to achieve their future military goals.

We believe that the Soviets will experience difficulties in manufacturing many of the sophisticated weapons projected for the 1990s. The Soviets are currently experiencing production rate limitations and technical problems that are disrupting the manufacture of several advanced systems—including the T-72 tank, the MIG-31 aircraft, the Backfire bomber, and the Typhoon ballistic missile submarine. The Soviets may partially overcome such difficulties through their present



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efforts to expand their electronics-related industry, to press for advances in precision machining and other fabrication technologies, and to maintain their aggressive exploitation of Western technology.

Can the Soviets Catch Up in Military Technologies?

If the United States sustains a strong program of military research and development, we believe that the Soviet Union will not be able to match or overtake the United States in overall military technologies by the 1990s. In addition to the institutional impediments inherent in their system, the Soviets must also contend with uncertainties about their future successes in technology acquisitions. Nonetheless, we expect continued advancements in all Soviet military technologies. and that the present overall gap between the United States and the USSR of about five years will be further narrowed. The size of this gap, however, will depend also on US progress in military technologies. A larger number of the Soviet military technologies will be lagging by no more than two to three years-small enough to make the levels of technology nearly comparable for those military systems incorporating such technologies that will be introduced in the late 1990s and beyond. Moreover, the Soviet systems development process incorporates technology advances more frequently into deployed systems than does the US process.

The current and prospective upswing in US military R&D commitments, if sustained, will pose a major challenge to Soviet military R&D and make it more difficult for the USSR to close existing technology gaps. In certain areas of prospective US concentration, such as directed-energy technologies applicable to ballistic missile defense, existing Soviet strengths could be overshadowed. In these and other areas, however, Soviet military R&D will continue for some years to benefit from the increases in investment—and the larger total investment relative to that of the United States—that have characterized the past decade.

We caution, however, that there are numerous uncertainties associated with our assessments of the overall relative standing of US and Soviet military technologies by the 1990s. Our uncertainties stem from an incomplete understanding of the relative standings now and of the rates of change in Soviet and Western technologies, and from the difficulty in forecasting the contribution of technology transfer. In addition, while we assume a strong US commitment to military R&D, systematic comparisons of the future states of US and Soviet technological capabilities must also account for actual advances in US technol-



ogies—which we have not studied here, and which have yet to be realized, but which could significantly influence any projections.

We project that the Soviets will remain generally behind the West. However, their major commitment to technological advances will persevere into the next decade, their S&T and economic reform efforts may yield incremental but useful payoffs, and their military R&D will continue in any case to benefit for years to come from past investments.



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