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~~NOFORN~~**Soviet Quest for
Supercomputing Capabilities** [REDACTED]**Key Judgments***Information available
as of 1 April 1986
was used in this report.*

Soviet development of supercomputers—required for large-scale scientific computing (LSSC)—lags that of the United States by about 10 years. Through the year 2000, Soviet LSSC is virtually certain to remain at least five and probably 10 to 15 years behind the West. At present, we believe that the Soviets have no machines in the true supercomputer class. The best Soviet scientific computers are slower by at least a factor of 20 than their Western counterparts, and Soviet claimed computer capabilities are greatly exaggerated. Rapid future Soviet progress in LSSC is likely to depend on the technology transfer of both software and hardware from the West. Accordingly, we expect substantially increased Soviet efforts at industrial espionage—particularly efforts directed at software acquisition.

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Lack of LSSC handicaps many important aspects of Soviet weapons programs, especially in the nuclear and aerodynamic fields. To compensate for their inability to do effective computer modeling of weapon systems, Soviet developers must make trade-offs involving:

- More extensive experimental testing programs.
- Larger engineering design teams.
- Longer system development time.
- Greater development expense.
- Reduced system performance and reliability.

In some fields, such as reentry vehicle design, the Soviets have been successful in making such trade-offs; in other fields, their progress has been severely hindered. [REDACTED]

Soviet LSSC lags in both software and hardware. Although the Soviets have great strength in some well-established areas of traditional pure mathematics, the USSR has made few contributions to theoretical computer science. Those contributions that they have made—in the area of algorithms—have not been exploited in the USSR. The lack of a “computer culture” in the Soviet Union has reduced the Soviets’ ability to encourage and support research in advanced software. In hardware, the best Soviet machines fall far short of Western supercomputers. Their reliability is poor, their processing rate is slow, and their memory sizes are limited. By the early 1990s, the Soviets could have a true supercomputer, the El’brus-3, in production; at present, however, system development is only in the very early stages. [REDACTED]

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In our judgment, Soviet propaganda boasting of computer capabilities may be designed to undercut attempts to restrict Communist Bloc access to Western supercomputers by making such safeguards appear unnecessary. In specific computer software areas, the Soviets have acquired and exploited significant Western programs and will probably increase their efforts to steal or purchase software. Hardware acquired by the USSR includes machines up to—but probably not above—the VAX “supermini” class. Soviet efforts to access or acquire a true supercomputer such as a Cray-1 are likely to be strenuous. Unrestricted access to Western supercomputer technology would help the Soviets close the gap in this field, perhaps cutting their development time in half. [REDACTED]

Two long-term trends may help the Soviets in LSSC development during the next 10 to 15 years. First, as computer science research progresses, the labor-intensive nature of software development probably will be reduced; research into automatic programing and ultra-high-level computer languages may make it possible to set up and solve complex LSSC problems much more easily than at present. It will be difficult to keep this technology out of Soviet hands, and acquisition of it may eventually help reduce the Soviet lag in LSSC capability. Second, as Western computer hardware technology advances, more computer power will become available in smaller, cheaper packages. In 10 to 15 years, it is possible that desktop computers with power equal to that of today’s supercomputers will be available for under \$10,000. We believe that such hardware will also be virtually impossible to keep away from the Soviet Union. [REDACTED]

In both hardware and software, even if the gap between the West and the USSR remains constant or widens, the Soviets will still be making rapid progress in absolute terms. In 10 to 15 years, we believe the top Soviet scientific institutions will probably have equipment comparable to that of the best US national laboratories at present. Average research institutes may reach that level a few years later. [REDACTED]

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