

Technology

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Soviet Gaining In Computers

DRAMATIC evidence has come to light suggesting that the Soviet Union has made major gains in semiconductor and computer technology.

For years it had been believed that the United States held a 10-year edge over the Soviet Union in microelectronics, but a recent disclosure indicates that the gap has been narrowed considerably.

In a rare glimpse at the state of Soviet microelectronics technology, the Control Data Corporation has obtained through Hungarian sources a Soviet microprocessor — that seminal device from which computers and computer peripheral equipment are made.

Specifically, on the basis of tests conducted by Control Data on the device, which carries the serial number K580IK80,77, it is now believed that the Soviet Union is at most three years behind the United States in the design and production of microprocessors.

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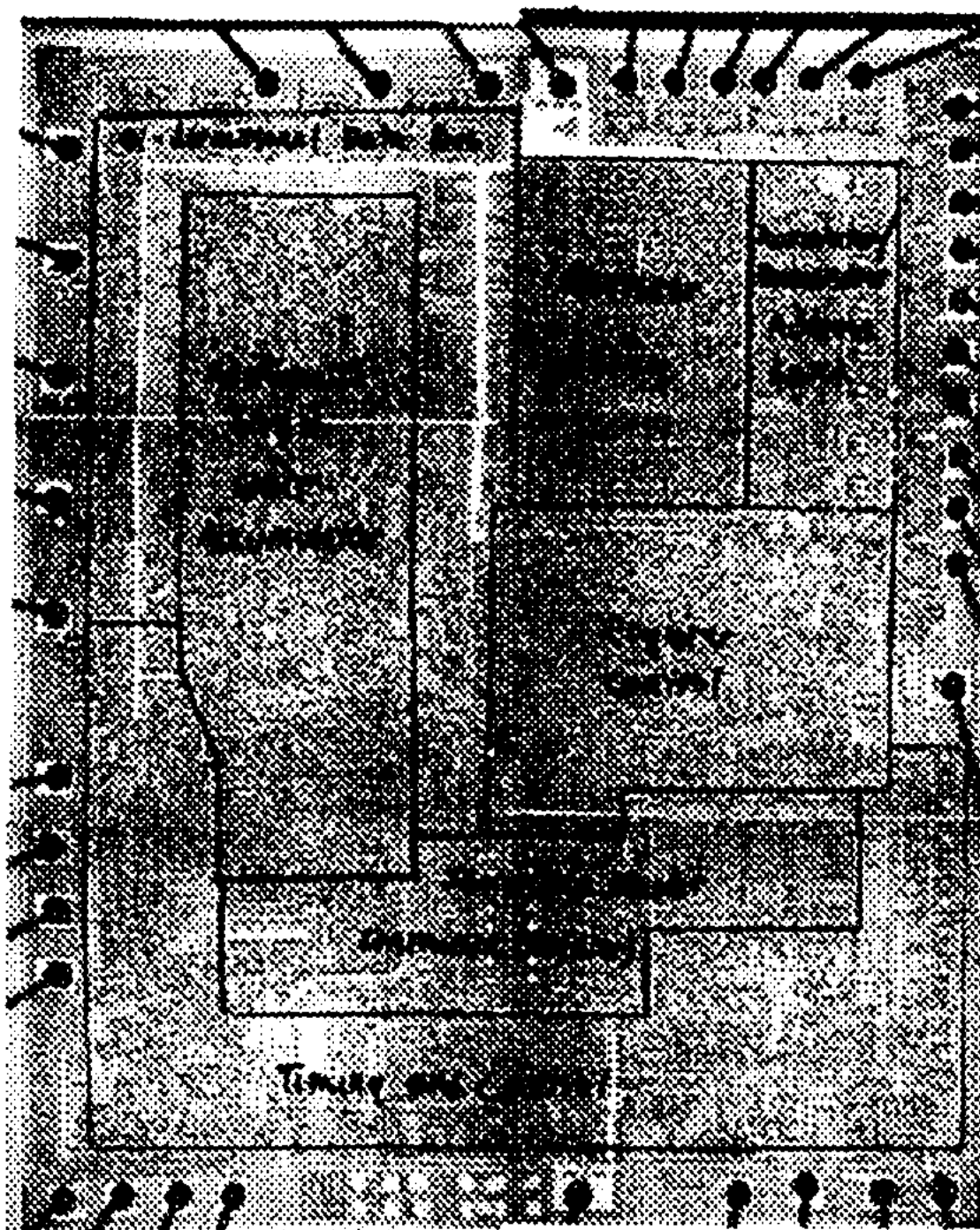
This finding revives the larger question concerning the wisdom of maintaining the tight restrictions currently placed on the export of large mainframe computers to Eastern bloc nations. Computer systems, after all, are little more than clusters of microprocessor and semiconductor memory chips, which are widely available to almost anyone by mail order through specialty electronics stores or in such consumer goods as microwave ovens and sewing machines.

Further, informed opinion puts Russian computer output last year at around the \$6 billion level, or about the size of the United States computer industry, excluding the International Business Machines Corporation.

"All their flag waving notwithstanding, the technology possessed by the Russians, as well as their Czech, Hungarian, East German and Polish counterparts, is certainly very close to, if not on a par with, our own," noted Charles P. Lecht, the chairman of the Advanced Computer Techniques Corporation and a member of the Hudson Institute.

Indeed, the Control Data evidence tells just how close.

An internal memorandum prepared by Control Data's Failure Analysis Laboratory, which performed the evaluation on the Russian chip, declares that, on the basis of its tests, "The processes used for



The Soviet microprocessor obtained by the Control Data Corporation. The markings, identifying the logic blocks, were added by Control Data.

the K580IK80,77 are comparable to those used by our domestic vendors in 1977."

To be sure, the Russian device is a copy of a microprocessor produced by the Intel Corporation, the world's leading producer of single-chip computers. And like Intel's 8080A chip, it is a complete eight-bit processor unit designed for use in general-purpose computer systems.

The report goes on to state that, not only were the Russians able to copy the Intel chip, but also, based on an examination of the way the logic is laid out, they possess a thorough understanding of the internal architecture, or the specific logic functions and their interaction, of Intel's technology. "The layout of the blocks of circuitry is very similar," the report states.

In conclusion, the report says, "There can be no doubt that Soviet semiconductor processes can provide them with just about any of the off-the-shelf devices used in this country."

Experts say that the Soviet Union's chip was probably produced in the city of Zelenograd, 20 miles

northwest of Moscow, sometimes referred to as Russia's "Silicon Valley."

Almost as revelatory as the device itself is the manner in which Control Data was able to obtain it.

It had been known for some time that the Hungarian national computer company, Videoton, which specializes in producing data terminals for the Russian Ryad line of computers, had been using Intel microprocessors in its development work for new computer systems.

What had not been known, however, was that the company, which has had a long-standing trading relationship with Control Data, had been purchasing these parts, quite legally as it turns out, in Munich, West Germany.

Further, Videoton indicated to Control Data that, when and if it decided to put these products into production, it would not use the Intel part, but rather a Russian copy of the part, whereupon it turned over to Control Data a sample of the Russian chip for evaluation.

Control Data officials are convinced that the Russian chip is a genuine production device and not a laboratory artifact. "It was made on a production line of some kind," Robert D. Schmidt, Control Data's vice chairman, asserted in a recent interview. "You wouldn't find those kinds of interconnections or leads on a laboratory chip," he added.

It is not just the similarities between the Russian and Intel microprocessors that so intrigue researchers, but also the differences.

For one thing, the Russian chip and its circuit paths, or line widths, as they are called, are larger than on the Intel chip, strongly suggesting that the Russians did not simply copy the Intel part, but rather used it as a model for developing their own photolithographic masks, which are used to "lay" circuit on the silicon chip.

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Packaging, too, was another crucial difference noted by the Control Data scientists. In this case, the Russians used a stronger, more reliable ceramic "flat-pack" to encapsulate their device, which is an indication of the harsher industrial environment in which their microprocessor chips are used.

Because it was unable to obtain a set of the electrical specifications for the device, Control Data was not able to ascertain the circuit's electrical performance characteristics, such things as rise times, pulse height and electrical current requirements.

Still, Mr. Schmidt, who is also chairman of Control Data's export strategy committee, remains convinced that the device performs up to specifications. "If everything else is correct," he said, "you can assume that the device performs well also."