

Soviet semiconductor technology is better than you may have heard

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Is the American public being told the truth about Soviet capabilities in microprocessor chips and related advanced electronics technologies? The article in the April 20 issue of *Science* magazine, "New Chips Shed Light on Soviet Electronics," illustrates the problems faced by Americans who depend on secondary sources for the data required to assess the validity of Carter administration policies in the areas of Soviet trade and, more importantly, strategic policy.

The "New Chips" the article refers to were sample Large-Scale Integrated Circuits (the basic electronic semiconductor components of present-day computers), including a 4 bit Microprocessor and a 16,000 bit Random Access Memory (RAM) chip that Mr. Lynn W. Gallup, an executive of the Control Data Corporation (CDC), obtained from Soviet officials and displayed at a Washington press conference on Feb. 28, 1979.

In Gallup's assessment, "the Soviets obviously have developed the semiconductor processes and know-how sufficient to make devices close to the edge of technology" and may soon "branch off into a leading position ... in some areas of semiconductors."

The Gallup statements sent the editors of *Science* magazine scurrying off to solicit a series of denials and denigrating comments from government officials and other sources. According to a Defense Department expert quoted by *Science*, "CDC is getting all the publicity because ... it is trying to make the point that the Russians really have the technology to make big computers that CDC wants to sell. ..." According to another official, the Soviet chip was fabricated by means of "help they may have had from other countries. ..." A similar inference could be drawn from a Department of Commerce official's opinion that the Soviet RAM chip "is very similar to Mostek's" (the leading American semiconductor memory manufacturer). And an

unidentified electronics expert grants that "at their laboratory at Novosibirsk, they could produce a few of anything ... but semiconductor production is a black art ... the Soviets have a tremendous ability to do individual pieces of science, but they have never been good at translating that into production."

To the contrary, U.S. Department of Defense reports in the public domain strongly indicate that since 1971 at the latest, the Soviet Union *has had* the capability to implement the most advanced semiconductor technologies. Moreover, this and other evidence indicates that in that same year the Soviet Union made the political decision to commit its resources to mass produce all advanced semiconductors essential for the forced-march expansion of their computer industries, as well as those semi-conductor devices essential for their instrumentation and defense electronics industries.

In 1972, for instance, the Defense Department's Advanced Research Projects Agency (ARPA) addressed important aspects of the question of Soviet semiconductor capabilities by commissioning the Rand Corporation of California to undertake a study of Soviet work with photo-lithographically-prepared, semi-conductor integrated circuits (Thin Films) as reported in open Soviet literature especially during the 1970-1972 period. Some of the relevant summary conclusions of the ARPA February 1973 report (ARPA-R-1181), *Soviet Research on Semiconductor Thin Films*, are:

1. "Soviet film preparation techniques do not differ from those in the West."

2. "The published Soviet work leads one to conclude that in semiconductor technology, the U.S.S.R. is generally a few years behind the United States, with the exception of some narrow aspects of materials in which it is ahead."

Hence, from the open Soviet literature alone, the ARPA document's authors judged the Soviet's capability in semiconductor technology as almost on a par with the West at the beginning of this decade. Could the Soviets translate this capability into effective mass production of advanced semiconductor devices? The 1973 ARPA document quotes Soviet Chairman Brezhnev's 1971 report of the Central Committee to the 24th

Congress of the Communist Party of the U.S.S.R. as setting "the task of dramatic improvement in quality control of its electronic semi-conductor industry" and the "mass production of high performance computers" and all auxiliary instrumentation.

The ARPA reports adds that on the basis of this commitment by the 24th Congress, "it is quite reasonable to expect the Soviets to make a major effort in the development of semiconductor thin films during 1972-1975." Finally, the report suggests that even larger successes were to be expected for the remainder of the decade.

Certainly, the editors of *Science* are familiar with the contents of these documents. Why, then their dissimulation? A further case study helps to clarify the issue:

The sudden increase in demand for semiconductors after Brezhnev's 1971 report quickly outpaced the productive capacity of old and new manufacturing facilities coming on line in the Soviet sector. In late 1972 or early 1973 the Soviet Union awarded a contract to Fairchild, one of the leading U.S. semiconductor manufacturers, for the construction of an additional plant within the Soviet Union. While the Fairchild application was pending in various U.S. government agencies, the U.S.S.R. gave a Fairchild executive, Harry Sello, samples of the semiconductors the plant would manufacture.

But 1973 was the year of Kissinger's Mideast war and the fourfold increase in the price of oil. Talk of confrontation was in the air, and detente on the back burner. Of course, the Fairchild plant construction application was turned down. In its April 20, 1979 article, *Science* claims that "the 1973 Fairchild case backfired. Analyses of the devices showed that the Soviets were seriously behind the United States in the then-exploding field, and the government denied Fairchild's request to construct the plant."

The very opposite is more likely true. The Fairchild request was turned down because of the *advanced state* of the 1973 Soviet sample semiconductors. A decision was made to freeze all semiconductor technology transfers in either direction.

The case of the "Foxbat" plane which a Soviet defector used for a flight from the Soviet Union to Japan a few years ago is fairly well known. Much was made of the "backwardness" of Soviet electronics because the plane's navigation and radar gear included

many vacuum tubes—until it was discovered that these tubes had better frequency characteristics than available semiconductor replacements. The case of the Soviet-built plane shot down by the Israelis during the 1973 Mideast war is less well known. A careful analysis of the plane's semiconductors were on a par with the very best U.S. efforts.

Since the 1973 ARPA document there have been no further *public* reports by ARPA on the Soviet semiconductor industry. A shroud of mystery has been placed around Soviet semiconductor technology by the Department of Defense since that date. Why the secrecy? Why *Science* magazine's dissimulation? Certainly the Soviets know their own capabilities.

Rather, it appears that semiconductors may become a casualty of the Carter administration-Council on Foreign Relations war on technology that has already crippled the U.S. nuclear industry and has seen the U.S. reject a series of Soviet offers to collaborate on important aspects of fusion energy technology. In the CFR "1980s Project" scenario, widespread application of such advanced technologies was viewed as "dangerous," and the CFR planners instead argued the need to restrict advanced technologies to carefully delimited, primarily military sector applications.

In this latter respect, such reports as the one in *Science* magazine, and the thinking behind them, are fueling dangerous misconceptions about U.S. strategic posture and the U.S. ability to fight a nuclear war with the Soviet Union. As "deindustrialization" policies stemming from the days of the Kennedy administration have steadily eroded the basic industrial base upon which U.S. defense capabilities rest, wishful defense planners have increasingly turned to "wunderwaffen" conceptions to conceal—from themselves as well as others—this basic U.S. defense softness. The "infrared sensors" and "body counts" of Robert McNamara were the Vietnam era reflections of this tendency; today, defense mythologizers

priority will enable the U.S. to offset Soviet advances in basic weaponry with such wunderwaffen as the "cruise missile"—a cheap, souped-up V-1 "buzz bomb" which owes its alleged superiority to a dubious advanced electronics guidance system which, proponents claim, enables it to dodge "technologically inferior" Russian radar.

If the Soviets are not behind, as *Science* et al. claim, where does this leave U.S. strategic planning?