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What Moscow Might Do In Replying to 'Star Wars'

Weapons in Space

The Controversy
Over 'Star Wars'

Fourth of six articles.

By CHARLES MOHR

Special to The New York Times

WASHINGTON, March 5 — The Soviet Union is approximately equal to the United States in basic research on directed energy, like lasers and subatomic-particle beams, that would be required for a broad land- and space-based missile defense system, according to Pentagon reports.

But the Russians are said to trail badly in the technology that would be needed to make such energy beams into workable weapons.

High Reagan Administration officials publicly express a belief that a United States drive to design a space-based missile system, as a defense against nuclear attack, will eventually force the Soviet Union to give up its present reliance on offensive land-based intercontinental ballistic missiles and build a similar defense system of its own.

These officials say the result of the American effort, made through its Strategic Defense Initiative, more commonly called "Star Wars," would be a more stable nuclear stalemate.

In the view of several other experts on Soviet policy and weapons technology, however, the Soviet Union may instead multiply its present offensive missile force in the hope that it can saturate and overwhelm the proposed United States defensive shield. The Russians will also probably explore technologically simple and inexpensive methods of overcoming a "Star Wars" defense, the analysts say.

In private, some Government authorities agree that both the Soviet development and the American Strategic Defense Initiative are more likely to reach a result opposite from that intended: encourage an offensive arms race, bring about the death of the 1972 treaty limiting antimissile defenses and prompt a shift toward a more hostile, hairtrigger relationship between the two powers.

Soviet Steps Expected

Interviews with experts on the Soviet Union both in and outside the United States Government and a review of their writings and public statements shows a general belief that, eventually at least, the Soviet Union may also seek to build a defensive umbrella against intercontinental missiles.

In the next few years, however, some experts say they believe the Soviet Union will probably take few dramatic or visible military steps to counter the professed intention of the Reagan Administration to build a new and complex strategic nuclear defense.

The Russians already have by far the most extensive strategic, or long-

range, defense system in the world. But it is known to be porous. It includes an air defense of 10,000 surface-to-air missiles and thousands of interceptor aircraft and a relatively primitive and rudimentary antiballistic missile defense in the Moscow area.

Defense Department officials say they do not believe these defenses could prevent penetration of the Soviet Union by low-flying bombers and cruise missiles or prevent a crushing blow by nuclear missiles. Nonetheless, they say they are worried that the use of mobile radars and "upgraded" surface-to-air missiles could be used in an effort to provide a nationwide antimissile network now prohibited by treaty.

Andropov's Statement

Speaking four days after President Reagan outlined his own hopes in March 1983 for a defense that would render nuclear weapons "impotent and obsolete," Yuri V. Andropov, then the Soviet leader, said, "Should this conception be translated into reality, it would in fact open the floodgates to a runaway race of all types, both offensive and defensive."

Savre Stevens, a former Central Intelligence Agency deputy director and a consultant on national security matters, said of the Administration's goal of shifting from a strategy of deterrence based on retaliatory offensive power to one of defense, "I don't quite see how you get from here to there." And he predicted a period of strategic uncertainty.

Stephen M. Meyer of the Massachusetts Institute of Technology and a Defense Department consultant on Soviet military policy, said, "It's not going to be a race between our 'Star Wars' and their 'Star Wars,' but a race against our system and their efforts to overwhelm or neutralize it."

Continued

Soviet 'Star Wars' Potential

An increasingly frequent Administration contention is that the Soviet Union is "doing more than we are" in the exotic technologies needed for a nearly leak-proof and advanced defense.

Richard D. DeLauer, a former Under Secretary of Defense for Research and Engineering, told Congress that although the Soviet Union "equals" the United States in directed energy research, it "lags in other technologies that are crucial" for missile defense.

He added, "We are ahead in computers, optics, automated control, electro-optical sensors, propulsion, radar, software, telecommunications and guidance systems."

The area in which the Soviet Union leads the United States is in large rockets with great throw-weight — the capacity to lift and propel great weight. But for lifting such things as fuel and components for space battle stations, the United States space shuttle is regarded as more useful than large rockets.

Advantage in Computers

High-speed computers will also be needed to manage a "Star Wars" defense.

"The United States is working to transcend fourth generation computers, while the Soviet Union is still struggling to master the third generation," said John E. Pike, a space policy analyst of the Federation of American Scientists, a private group that studies policy problems arising out of science.

But, despite an inferior technology base, the Soviet Union has always managed to match any major United States weapon innovation from early fission bombs to multiple warheads on missiles and high missile accuracy. The catch-up period has usually been shorter than American policy makers expected.

Difficult to Double-Check

Statements regarding Soviet research and possible Soviet advantages are often difficult to double-check. Much of what is known about Soviet programs involves extrapolation from photo reconnaissance and electronic surveillance by United States satellites.

The Soviet Union has what is believed to be two large ground lasers at Sary-Shagan in Kazakhstan, as well as a vigorous research program in particle-beam acceleration. Almost all experts, however, describe the lasers and programs as "basic" research and not active weapons development programs. Pentagon documents speak only of "possible" military applications.

"What we can measure, in fact, is mostly such things as floor space, probable electrical power consumption and so forth," Mr. Pike said. "For example, we know nothing about laser tube life or reliability."

A United States Government expert agreed, saying, "We know nothing about beam resolution and other technical factors that would make a laser an effective weapon."

A half-dozen officials in the Pentagon and the Central Intelligence Agency said intelligence about Soviet efforts was scanty and ambiguous.

Mr. Pike and Mr. Meyer used identical language in saying that American analysts tended to measure "input rather than output," because they are forced to do so. "The real question," Mr. Meyer said, "is what the Soviets are getting out of it."

'Damage Limitation'

The Soviet Union has been committed to a military doctrine called "damage limitation," which has not until now been embraced by United States officials.

A belief in the usefulness of limiting nuclear damage has meant that the Soviet Union has historically been willing to put into place — and to expend large amounts of money and manpower for — marginally effective military systems that clearly could not protect the nation from nuclear devastation.

The Soviet antiballistic missile defense around Moscow is an example. Although Moscow was permitted by treaty to build 100 ABM launchers, it constructed only 68. A wide range of United States Government and non-Government analysts say they believe the actual protection provided against a huge United States strike is close to zero, but the Soviet Union did not dismantle its system as the United States did in the 1970's.

According to intelligence reports, the Soviet Union is now upgrading the Moscow ABM network with SH-04 and SH-08 rocket interceptors that are much faster than the original Galosh rockets, although still slower than American Sprint rockets developed more than a decade ago.

'Atmospheric Sorting'

The increased speed of the interceptors would apparently permit them to engage United States warheads after the warheads had re-entered the atmosphere, which would strip away the cloud of American decoys.

The Soviet Union has also made observable advances in phased array radars, which are steered electronically. Mechanically steered radars of the past are regarded as almost useless against a large swarm of warheads. But the Russians still trail in radar technology.

One Pentagon fear is that comparable improvements that permit tracking and engagement radars to pick up targets with low radar cross-sections — which is to say, American warheads — and to make radars mobile or transportable will bring closer the possibility of a nationwide ballistic missile defense. American monitoring of the new generation SA-12 surface-to-air missile tests indicate that they have some potential antimissile use, experts said, and could possibly be incorporated into a defense system.

Deploy Now, Perfect Later

Several other experts tend to agree with Mr. Meyer that Soviet policies regarding weapons development and deployment are different from those of the United States, and that if a true "race" develops the Russians are likely to be first into the field with rudimentary weapons.

"They have always been willing to field systems that did not work and then tinker with them through model changes and design innovation," Mr. Meyer said.

He said he believed the present "operational" ABM system was only now beginning to approach the effectiveness of American technology abandoned 10 years previously.

Mr. Meyer even predicts that if the Strategic Defense Initiative provokes unlimited competition, the Russians "will be the first in space with a laser."

He added that "it won't be an effective weapon" because the Russians would still face the daunting problems of finding targets and pointing and tracking, which are far from solution by superior American technology. "But it will be a laser," he said, "and it will drive Congress and officials here crazy."

The Countermeasures

Possible Soviet countermeasures against the American Strategic Defense Initiative seem to raise more troubling questions for the short and middle term than a race for the ultimate defense system.

Indeed, it is the possibility of these measures that lies behind much of the

uncertainty about the feasibility and ultimate reliability of the "Star Wars" proposals.

Paul H. Nitze, the Administration's senior arms-control adviser, said last month that at least two "demanding" conditions must be met before even a technically workable nuclear defense system would be deployed.

He said that the components of the defense must be survivable against attack and that Soviet countermeasures must not be cheaper to put in place than the defensive shield. If Soviet countermeasures were cheaper, devices to penetrate a defense could be built faster and on a scale larger than the planned defense.

Experts outside the Government, however, have for two years expressed belief that plausible countermeasures by the Soviet Union not only are likely to be cheaper but also will involve technologies that, on the whole, are considerably more simple than the daunting problems of building an integrated, working defense.

'The Physics Is All Right'

Even scientists critical of the workability and desirability of "Star Wars" say most of the basic scientific principles are possible. After a visit to the Lawrence Livermore National Laboratory in California, Hans Bethe, the Nobel laureate in physics, said "the physics is all right" for proposed X-ray lasers that would be powered by nuclear explosions in space.

But Dr. Bethe and other scientists contend that fashioning these physics principles into a large-scale, reliable defense may not be possible.

The main difficulties faced by the United States provide numerous opportunities for Soviet strategic thinkers and scientists to counter the Strategic Defense Initiative. The "boost phase" aspect of the United States system, for example, might use chemical lasers that would destroy Soviet ICBM's in the first three to five minutes of their flight while the boost, or lifting, rockets were still burning. This would occur before the missiles had dispersed multiple warheads and before a cloud of decoys, chaff and aerosols could be raised that might thwart American defenses.

There is also speculation that the United States could employ ground-based lasers that would bounce their beams off a system of space-based mirrors.

Reaction by Soviet

"One of the first things the Soviets could do," Mr. Meyer of M.I.T. said, "is to drag out all of the 1,000 or more ICBM boosters they have lying around. They would not even need warheads or decoys."

He said launching such boosters along with armed missiles would automatically increase the number of targets, complicating the task of the United States sensors and defensive weapons.

And he said intelligence information indicated that the Soviet Union was continuing to produce about 150 modern boosters a year. By the time an American system could be deployed, Mr. Meyer said, the Soviet "threat cloud" would be much larger than it is now.

Alternatively, according to Richard L. Garwin and Kurt Gottfried, who are physicists and leaders of the Union of Concerned Scientists, an independent organization of scientists concerned about nuclear war, the Soviet Union could seek to develop "fast-burn boosters" that would finish burning before leaving the atmosphere, where they are immune to present day laser technology.

Such fast-burning rockets might be relatively simple, and, Administration technicians agree, could be achieved with a sacrifice of only 15 to 20 percent in missile payloads.

In the somewhat longer run, the Soviet Union could clearly increase its arsenal of actual ICBM's, fitted with both warheads and such "penetration aids" as decoys and chaff.

Expanded Strategic Arsenal

The Defensive Technologies Studies Team that examined the "Star Wars" prospects for the Administration in 1983 anticipated a possible expansion of the Soviet strategic arsenal, postulating that an actual United States defense should be able to deal with about 30,000 hostile warheads, more than three times the number now in the Soviet strategic arsenal.

This should not have been surprising. When the Soviet Union began building the relatively impotent antiballistic missile defense permitted under the 1972 ABM treaty, the United States increased its inventory of nuclear warheads from about 2,000 to about 7,000 in nine years. Most of these were multiple independently targetable re-entry vehicles, or MIRV's, which were developed in large part as a means of overcoming the limited Soviet defense.

While the availability and production of fissionable materials place some limits on the growth of warheads, they are much cheaper than space battle stations and much faster to build, according to weapon technologists.

"Fractionation," or increasing the number of MIRV's carried by each missile, is possible, and it is easier for the Soviet Union because its large missiles have greater payloads. The Joint Chiefs of Staff told Congress that Soviet SS-18 ICBM's could be fitted with 30 warheads each instead of the 10 now permitted by an unratified arms treaty.

The Russians are also expected by most experts to step up the development — already under way — of cruise missiles and of airplanes and submarines with which to launch them.

Cruise missiles are pilotless jet aircraft that fly at low altitudes toward their targets. As now organized, the Defense Department's Strategic Defense Initiative Office directing "Star Wars" research has no programs to deal with cruise missiles. A defense against them might not be an insurmountable problem — and may be easier than defending against ballistic missiles — but will be necessary if the ballistic missile shield is to have real meaning and would require substantial additional United States spending.

Low-Angle Trajectories

Another Soviet countermeasure much discussed by weapons experts and strategic analysts involves firing ballistic missiles from offshore submarines on "depressed" or low-angle trajectories.

The use of such low-angle trajectories would mean that boosters and warheads would spend much less time in space outside the atmosphere and that the elapsed time from launching to target would be significantly less. These factors would considerably complicate nuclear defense.

"Precursor attacks" are another possible Soviet ploy, and in the view of some weapons experts, one of the most likely. Such attacks, timed to take place shortly before salvos of missiles were launched at key targets in the United States, could conceivably take a variety of forms. But in simple terms, they would involve detonating nuclear weapons in space to blind, cripple or destroy the defensive armada or else attacking the relatively delicate ground stations in the United States that will relay battle data to and from the defensive weapons. A combination of both would probably be the most effective in neutralizing a defense.

Direct attack of the defense by antisatellite weapons is another possibility. Mr. DeLauer told Congress in 1983 that it would be virtually impossible to install a space defense if the Soviet Union took military action to oppose

that step.

"Space mines" are another widely discussed ploy. These would be satellites parked in orbit near United States warning sensors or space-based defensive devices. The explosive charges in such mines could be detonated by radio before, or during, an attack.

Or, experts said, missile boosters could be spun at several revolutions per minute. This would require a large increase in the power of defensive lasers, since the beam could dwell on an area of the rocket for only a short time.

Easier still would be an increase in Soviet measures for "passive defense," such as further reinforcement or hardening of missile silos, dispersal of vital facilities — everything from industry to command-and-control bunkers to transportation — and civil defense. The Russians already far surpass the United States in most such measures, experts said.

No one professes to know which, if any, of the more plausible countermeasures the Soviet Union might seek to employ. But, in part, this uncertainty grows out of uncertainty about the eventual United States designs and intentions.

Defense Or Offense?

In the Reagan Administration, officials have made ambiguous and contradictory signals as to the actual goal of the Strategic Defense Initiative. They have alternated between describing it as a "thoroughly reliable" system to protect the United States' civil population and the easier-to-achieve protection of missile silos and command posts.

The more limited goal would "enhance" present policies of nuclear deterrence based on retaliation by making a Soviet first strike attack uncertain of success, officials argue.

In a recent detailed assessment of the Reagan defense initiative published last July, Sidney D. Drell, a prominent physicist and deputy director of the Stanford Linear Accelerator, and several associates asked whether the program was meant to "transcend" conventional deterrence as President Reagan indicated in 1983 or was intended to improve offensive deterrence.

In any case, some analysts say they doubt the program will have the desired strategic and political effect on Soviet leaders, and cite Soviet statements to underline this doubt.

'Plainly Irrational'

Roald Z. Sagdeyev, director of the Institute for Space Research of the Soviet Academy of Science, said recently that "it is plainly irrational to build up defensive systems and expect the other side to limit offensive weapons."

Other Soviet officials are saying privately that they are going to have to speed up their research programs and keep open the option of making more offensive nuclear weapons to overcome the prospective American defenses.

Ray M. Garthoff of the Brookings Institution, a former American diplomat and an expert on Soviet policy, predicted that "Star Wars" would "certainly inhibit" any hope of reducing nuclear arsenals.

Other analysts say they fear the worst effect of the American defense initiative may be on Soviet nuclear strategy and planning, rather than on technological innovations.

A report on "Star Wars" written by a commission of which Mr. Sagdeyev was co-chairman, said that "although it cannot be regarded as an effective means of defense against a massive first strike, it may create illusions about possible defense against the retaliatory strike."

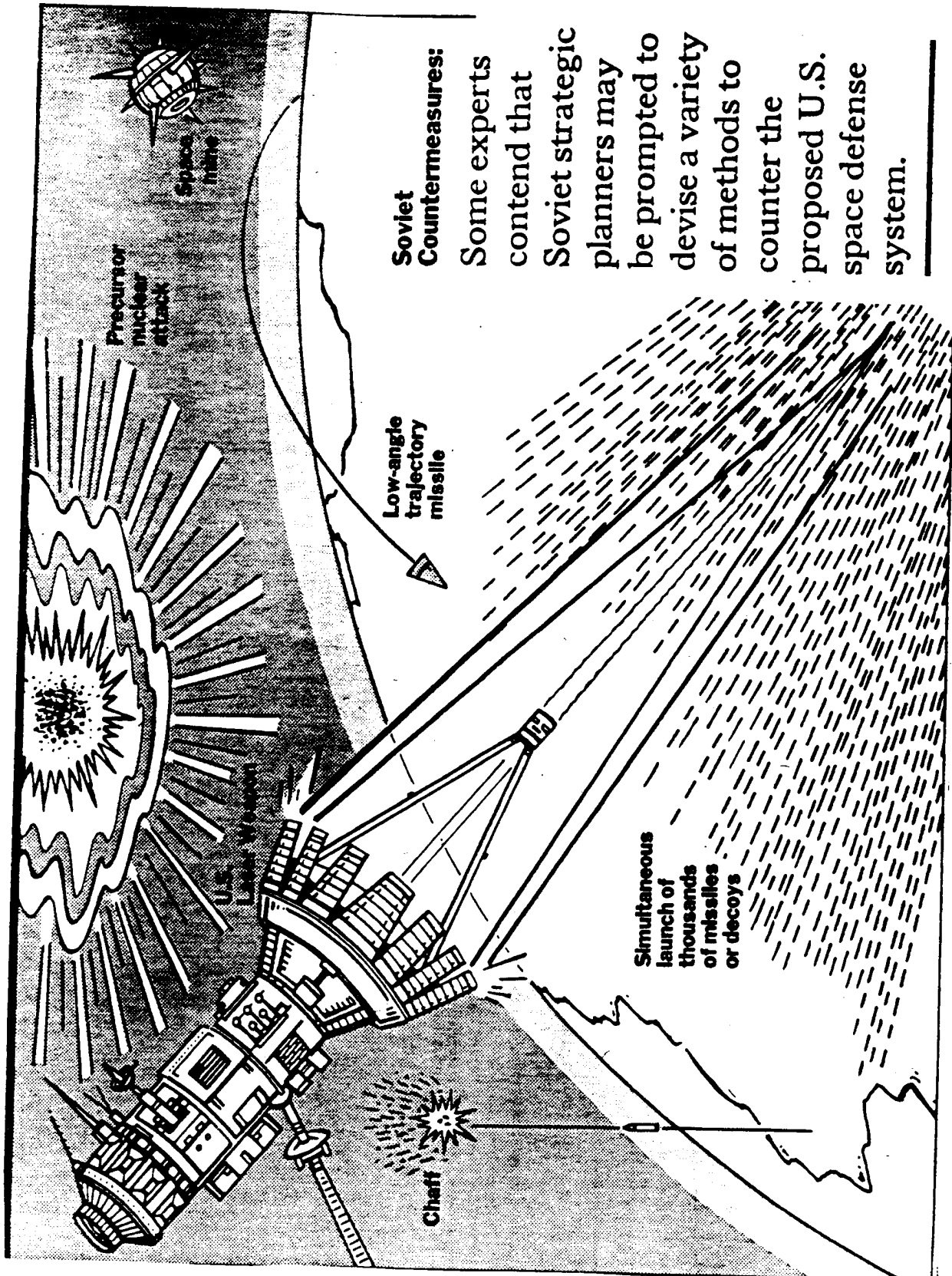
This conclusion is in close agreement with the opinion of several United States scientists and Soviet affairs analysts, who say they believe that while a defensive shield is under construction or even when completed, it will be seen by both sides as more useful in handling what is called a "ragged response" by a nation whose nuclear forces have been badly damaged in a first strike.

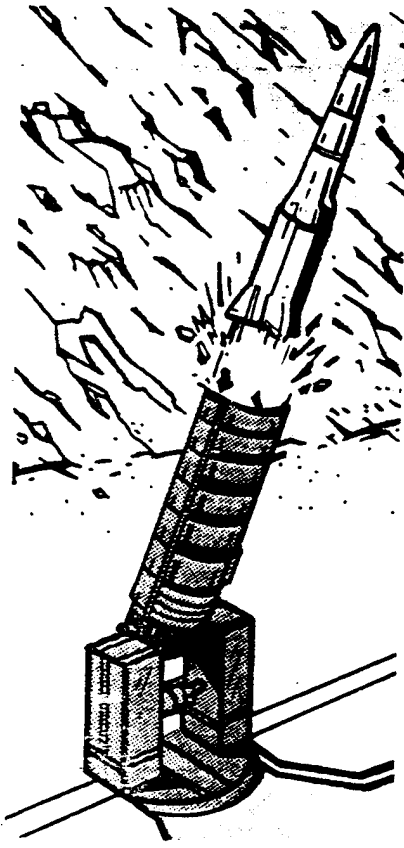
Such thinkers therefore believe that missile defense would be seen in both Moscow and Washington as encouraging first strike strategic policies and would hurt rather than help deterrence.

People like Mr. Meyer, Mr. Pike and Mr. Sayre, who is the author of a chapter on Soviet defensive theory in a 1984 Brookings Institution book on ballistic missile defense, tend to doubt that the Soviet Union will take dramatic, visible military steps in the near future. They say they believe there are too many questions and uncertainties about the United States plan now to justify crash Soviet programs. More and more people agree on the desirability of rendering nuclear weapons "impotent and obsolete," as President Reagan envisions.

But one possibility that is also of general concern is that neither nation will be able to overcome the problems inherent in building a nuclear shield. Even a tiny leak might, in the end, render it useless.

NEXT: Offensive capabilities of "Star Wars."





Present ABM System Around Moscow

